Copyright The Authors, 2013. All Rights Reserved.

No reproduction, copy or transmission may be made without written permission from the individual authors.

Papers have been double-blind peer reviewed before final submission to the conference. Initially, paper abstracts were read and selected by the conference panel for submission as possible papers for the conference.

Many thanks to the reviewers who helped ensure the quality of the full papers.

These Conference Proceedings have been submitted to Thomson ISI for indexing. Please note that the process of indexing can take up to a year to complete.

Further copies of this book and previous year’s proceedings can be purchased from http://academic-bookshop.com

E-Book ISSN: 2049-1034
Book Version ISSN: 2049-1026

The Electronic version of the Proceedings is available to download at ISSUU.com. You will need to sign up to become an ISSUU user (no cost involved) and follow the link to http://issuu.acpil

Published by Academic Conferences and Publishing International Limited
Reading
UK
44-118-972-4148
www.academic-publishing.org
## Contents

<table>
<thead>
<tr>
<th>Paper Title</th>
<th>Author(s)</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td></td>
<td>vi</td>
</tr>
<tr>
<td>Committee</td>
<td></td>
<td>vii</td>
</tr>
<tr>
<td>Biographies</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td><strong>Volume One</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Roadmap to e-Democracy in Arab Spring Countries via Social Networks</td>
<td>Hany Abdelghaffar and Lobna Sameer</td>
<td>1</td>
</tr>
<tr>
<td>Case Study of the Implementation of Business Process Management in Public Administration in Germany, Switzerland and Austria</td>
<td>Norbert Ahrend, Konrad Walser and Henrik Leopold</td>
<td>11</td>
</tr>
<tr>
<td>Developing a Conceptual Framework to Evaluate e-Government Portals’ Success</td>
<td>Obaid Almalki, Yanqing Duan and Ingo Frommholz</td>
<td>19</td>
</tr>
<tr>
<td>Evolution Roadmaps for Smart Cities: Determining Viable Paths</td>
<td>Leonidas Anthopoulos and Panos Fitsilis</td>
<td>27</td>
</tr>
<tr>
<td>Assessing the Effectiveness of Cross-Border Cooperation in Joint Provision of Public Services</td>
<td>Alina Badulescu, Daniel Badulescu and Catalin-Adrian Bucur</td>
<td>36</td>
</tr>
<tr>
<td>Ideas for a new Civic Reputation System for the Rising of Digital Civics: Digital Badges and Their Role in Democratic Process</td>
<td>Marco Bani and Stefano De Paoli</td>
<td>45</td>
</tr>
<tr>
<td>Measuring the Provision of Public Services by Digital Means</td>
<td>Juan Carlos Barahona and Andrey Elizondo</td>
<td>54</td>
</tr>
<tr>
<td>Lessons Learned From the Implementation of Contact Centers in Swedish Municipalities</td>
<td>Irene Bernhard and Kerstin Grundén</td>
<td>63</td>
</tr>
<tr>
<td>Benefit Maximization of Legacy web Page Application Using Client Side web Page Modification</td>
<td>Choompol Boonmee and Tawa Khampachua</td>
<td>71</td>
</tr>
<tr>
<td>Rapid Interconnection Development Between Legacy Software Using Client Side web Page Modification</td>
<td>Choompol Boonmee, Tawa Khampachua and Romayong Surakittunharn</td>
<td>77</td>
</tr>
<tr>
<td>Improving Data Cleansing Techniques on Administrative Databases</td>
<td>Roberto Boselli, Mirko Cesarini, Fabio Mercorio and Mario Mezzzanica</td>
<td>85</td>
</tr>
<tr>
<td>A Stakeholder Based Approach to Public Value</td>
<td>Walter Castelnovo</td>
<td>94</td>
</tr>
<tr>
<td>An Evaluation Framework for Traditional and Advanced Open Public Data e-Infrastructures</td>
<td>Alexopoulos Charalampous, Euripides Loukis, Yannis Charalabidis and Anneke Zuiderwijk</td>
<td>102</td>
</tr>
<tr>
<td>A Comparative Study of Campaign and Non-Campaign Facebook Strategies: The Case of Taiwan’s Legislators</td>
<td>Yu-ju Chien and Pin-yu Chu</td>
<td>112</td>
</tr>
<tr>
<td>Towards a Socio-Political Foundation of e-Government</td>
<td>Dimitris Christodoulakis Natassa Xarcha, George Sourmelis and George Stylios</td>
<td>120</td>
</tr>
<tr>
<td>A Prospective Survey on Future e-Governance Research Directions</td>
<td>Pin-yu Chu and Yueh-yun Sun</td>
<td>127</td>
</tr>
<tr>
<td>Open Data and Personal Information: A Smart Disclosure Approach Based on OAuth 2.0</td>
<td>Giuseppe Ciaccio, Antonio Pastorino and Marina Ribaudo</td>
<td>135</td>
</tr>
<tr>
<td>Does e-Government Curb Corruption? G2E Service Delivery of Ethics Training in the U.S</td>
<td>Michaelene Cox</td>
<td>144</td>
</tr>
<tr>
<td>TeleWeaver: An Innovative Telecommunication Platform for Marginalized Communities in Africa</td>
<td>Lorenzo Dalvi, Sibuwele Gumbo, Lindikaya Ntshinga and Alfredo Terzoli</td>
<td>152</td>
</tr>
<tr>
<td>Paper Title</td>
<td>Author(s)</td>
<td>Page No.</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Open Data and Open Government in the UK: How Closely are They Related?</td>
<td>Martin De Saulles</td>
<td>160</td>
</tr>
<tr>
<td>Practicing Semantic web Technologies in e-Government</td>
<td>Jean Vincent Fonou Dombeu and Magda Huisman</td>
<td>166</td>
</tr>
<tr>
<td>E-Government Typologies, Stakeholder Relationships and Information Systems Support: The Case of Services to Employment</td>
<td>Mariagrazia Fugini, Piercarlo Maggiolini and Ramon Salvador Valles</td>
<td>187</td>
</tr>
<tr>
<td>Design Thinking and Storytelling in e-Government: The Case of ThinkData.ch</td>
<td>Olivier Glassey and Jean-Henry Morin</td>
<td>196</td>
</tr>
<tr>
<td>E-Democracy in Russia: Political Awareness and Participation Among Young Citizens</td>
<td>Anastasia Golubeva and Diana Ishmatova</td>
<td>205</td>
</tr>
<tr>
<td>E-Identity Cards: Lessons From Hong Kong?</td>
<td>Leo Goodstadt, Regina Connolly and Frank Bannister</td>
<td>213</td>
</tr>
<tr>
<td>A Social Networking Adoption Model for Communication and Collaboration in e-Government</td>
<td>Kenneth Griggs and Rosemary Wild</td>
<td>221</td>
</tr>
<tr>
<td>An User-Centric Check of the Available e-Government Services in Europe</td>
<td>Alessio Gugliotta, Francesco Niglia and Laura Schina</td>
<td>230</td>
</tr>
<tr>
<td>Shaping Information Infrastructure Evolution: Governmental Claims of Architectural Control Points</td>
<td>Stefan Heningsson, Jonas Hedman and Bo Andersson</td>
<td>240</td>
</tr>
<tr>
<td>Understanding Service Transaction Costs: Developing a Framework for e-Government Change</td>
<td>Paul Jackson</td>
<td>248</td>
</tr>
<tr>
<td>E-Government Evolution: A Supply Perspective of e-Government</td>
<td>Kamalia Azma Kamaruddin, Ariza Nordin and Nor Laila Md Noor</td>
<td>256</td>
</tr>
<tr>
<td>Driving Connected Government Implementation with Marketing Strategies and Context-Aware Service Design</td>
<td>Asanee Kawtrakul, Anan Pusittigul, Suchada Ujjin, Udomsak Lertsuchatavanich and Frederic Andres</td>
<td>265</td>
</tr>
<tr>
<td>A Case Study Analysis of Factors Determining Success or Failure for Participants in Collaborative Innovation Projects in e-Government</td>
<td>Terry Keefe, Andrea Bikfalvi, Martin Beer and Josep Lluis De La Rosa</td>
<td>276</td>
</tr>
<tr>
<td>Providing Government e-Services: An Extension of Applicability Check for Practitioners</td>
<td>Luc Lagrandeur and Denise Fortier</td>
<td>283</td>
</tr>
<tr>
<td>Maturity and Usability of e-Government in Informational World Cities</td>
<td>Agnes Mainka, Kaja Fietkiewicz, Adriana Kosior, Sandra Pyka and Wolfgang Stock</td>
<td>292</td>
</tr>
<tr>
<td>Open Data: Barriers, Risks and Opportunities</td>
<td>Sébastien Martin, Muriel Foulonneau, Slim Turki and Madjid Ihadjadene</td>
<td>301</td>
</tr>
<tr>
<td>Remote Signatures for e-Government: The Case of Municipal Certification in Italy</td>
<td>Michele Martoni and Monica Palmirani</td>
<td>310</td>
</tr>
<tr>
<td>ICT Investment Effectiveness in the South African Post Office</td>
<td>Seabelo Mathswenyego, Rembrandt Klopper and Sam Lubbe</td>
<td>319</td>
</tr>
<tr>
<td>Bridging the Contradictions of Open Data</td>
<td>Ronald Meijer, Sunil Choenni, Roexsana Sheikh Alibaks and Peter Conradie</td>
<td>329</td>
</tr>
<tr>
<td>Barriers to Electronic Government and Digital Inclusion</td>
<td>Adela Mesa and Pedro Martínez-Monje</td>
<td>337</td>
</tr>
<tr>
<td>Paper Title</td>
<td>Author(s)</td>
<td>Page No.</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Towards Adoption of Government Enterprise Architecture: The Cases of Egypt and Syria</td>
<td>Mohamed Ali Mohamed, Galal Hassan Galal-Edeen and Hesham Ahmed Hassan</td>
<td>345</td>
</tr>
<tr>
<td>The Effectiveness of e-Governance Experiences in the Knowledge Society</td>
<td>José María Moreno-Jiménez Cristina Pérez-Espés and Maria Wimmer</td>
<td>354</td>
</tr>
<tr>
<td>Role of e-Government in the Realization of Knowledge Management at Universities</td>
<td>Fattah Nazem and Anahita Madankar</td>
<td>363</td>
</tr>
<tr>
<td>E-Democracy at the American Grassroots</td>
<td>Donald Norris and Christopher Reddick</td>
<td>371</td>
</tr>
<tr>
<td>Dimensions of the User Experience of e-Government Services: The Nigeria Immigration Service Website</td>
<td>Olaseni Muritala Okunola and Jennifer Rowley</td>
<td>380</td>
</tr>
<tr>
<td>Small is Beautiful or Bigger is Better? Size of Municipalities and Quality of Websites</td>
<td>Svein Øines</td>
<td>389</td>
</tr>
<tr>
<td>Governmental Incentives for the Application of the Developed e-Services</td>
<td>Igor Pihir, Katarina Tomić-Pupek and Darko Andročec</td>
<td>398</td>
</tr>
<tr>
<td>Verifying Viral Veracity?</td>
<td>Rajash Rawal and Paul Nixon</td>
<td>414</td>
</tr>
<tr>
<td>Management Structures and Strategies for Successful e-Government Deployments</td>
<td>Arthur Riel, Denisa Popescu and Luisita Guanlao</td>
<td>419</td>
</tr>
<tr>
<td>Exploring How the Appreciative Inquiry Model can Vitalize the Online Citizen Debate</td>
<td>Elena Sánchez-Nielsen and Carolina Martín-Vázquez</td>
<td>424</td>
</tr>
<tr>
<td>Measuring the Digital Divide in the Field of e-Government</td>
<td>Ninoslava Savić and Zoran Radojičić</td>
<td>432</td>
</tr>
<tr>
<td>Measuring the Public Value of e-Government: Trust in Measurement Processes or Processes of Building Trust?</td>
<td>Alberto Savoldelli, Gianluca Misuraca and Cristiano Codagnone</td>
<td>442</td>
</tr>
<tr>
<td>The Adoption of Cloud Computing for e-Government Initiative in Regional Governments in Developing Countries</td>
<td>Shareef Shareef</td>
<td>453</td>
</tr>
<tr>
<td>Challenges to e-Government Applications: A Delphi Study</td>
<td>Shawren Singh</td>
<td>462</td>
</tr>
<tr>
<td>Interoperability and Standardization of e-Government Ubiquitous Systems in the EU Member States</td>
<td>Anna Softysik-Piorunkiewicz and Janina Banasikowska</td>
<td>481</td>
</tr>
<tr>
<td>Evaluating the Development of e-Health Project: The Case of Slovenia</td>
<td>Dalibor Stanimirovic and Mirko Vintar</td>
<td>491</td>
</tr>
<tr>
<td>An Assessment of Rural e-Government in Romania</td>
<td>Virgil Stoica and Andrei Ilas</td>
<td>500</td>
</tr>
<tr>
<td>Assessment of Redactable Signature Schemes for Trusted and Reliable Public Sector Data</td>
<td>Klaus Stranacher, Vesna Knjic and Bernd Zwattendorfer and Thomas Zefferer</td>
<td>508</td>
</tr>
<tr>
<td>Suggesting e-Service Quality Model for e-Governance Service Delivery in Saudi Arabia</td>
<td>Gopikrishna Vasista Tatapudi and Mohammed Ahmed Turki AlSudairi</td>
<td>517</td>
</tr>
<tr>
<td>Paper Title</td>
<td>Author(s)</td>
<td>Page No.</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Virtual Democracy and Models of Political Democracy: Reflections on the</td>
<td>Luiza Teixeir</td>
<td>526</td>
</tr>
<tr>
<td>Case of the First Conference on Virtual Transparency and Social Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT Project Governance - why IT Projects in Public Administration Fail and</td>
<td>Konrad Walser</td>
<td>535</td>
</tr>
<tr>
<td>What can be Done About it</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisational Possibilities for a Public Administration Community Cloud</td>
<td>Konrad Walser and Olivier Brian</td>
<td>543</td>
</tr>
<tr>
<td>A Grounded Theory of Government Website Promotion</td>
<td>Fang Wang and Ying Wang</td>
<td>551</td>
</tr>
<tr>
<td>A Pragmatic Approach to the e-Government Maturity in Poland – Implementation and Usage of SEKAP</td>
<td>Ewa Ziemba and Tomasz Papaj</td>
<td>560</td>
</tr>
<tr>
<td>PHD Papers</td>
<td></td>
<td>571</td>
</tr>
<tr>
<td>Citizen Centered e-Government Services Assessment Framework</td>
<td>Ibrahim Alfadli and Malcolm Munro</td>
<td>573</td>
</tr>
<tr>
<td>Factors Affecting Citizens’ Adoption of e-Government Moderated by Socio-Cultural Values in Saudi Arabia</td>
<td>Mohammed Alsaf</td>
<td>578</td>
</tr>
<tr>
<td>Balancing Rights and Utility in Determining Power Relationship Ratios in e-Health Systems</td>
<td>Stephen Darlington</td>
<td>587</td>
</tr>
<tr>
<td>Conceptualizing Public Service Networks as Complex Adaptive Systems</td>
<td>Ameneh Deljoo and Marijn Janssen</td>
<td>594</td>
</tr>
<tr>
<td>Citizen-Centric Requirements for Transformational Government</td>
<td>Kamalia Azma Kamaruddin, Ariza Nordin and Nor Laila Md Noor</td>
<td>601</td>
</tr>
<tr>
<td>Classification Schemes for Open Government Data Provision</td>
<td>Wolfgang Palka, Marlen Jurisch, Maximilian Leicht, Petra Wolf and Helmut Krcmar</td>
<td>608</td>
</tr>
<tr>
<td>Mediated Emotions and Politics of Dissent</td>
<td>Kassandra Rothenstadt</td>
<td>616</td>
</tr>
<tr>
<td>Non academic Papers</td>
<td></td>
<td>625</td>
</tr>
<tr>
<td>Accelerating e-Government Implementation With a new Framework for Decentralised Change Support</td>
<td>Jeroen Meij and Jeroen Pastoor</td>
<td>637</td>
</tr>
<tr>
<td>Work In Progress Papers</td>
<td></td>
<td>647</td>
</tr>
<tr>
<td>Design of the Electronic Course on e-Government Interoperability Essentials</td>
<td>Alla Anohina-Naumeca, Vjaceslav Sitikovs, Piotr Goetzen and Michal Chmielecki</td>
<td>649</td>
</tr>
<tr>
<td>Public Services Provision in a Cross-Border Framework: The Bihor – Hajdu-Bihar Euro-Region Case</td>
<td>Daniel Badulescu, Alina Badulescu and Catalin-Adrian Bucur</td>
<td>654</td>
</tr>
<tr>
<td>BIG Work in Progress: Big Data Public Private Forum and Public Sector</td>
<td>Ricard Munné -</td>
<td>662</td>
</tr>
<tr>
<td>What Kind of Cultural Citizenship? Dissent and Antagonism When Discussing Politics in an Online gay Community</td>
<td>Jakob Svensson</td>
<td>666</td>
</tr>
</tbody>
</table>
Preface

These proceedings represent the work of authors at the 13th European Conference on e-Government (ECEG 2013). The Conference this year is hosted by the University of Insubria in Como, Italy. The Conference Chair is Professor Walter Castelnovo and the Programme Chair is Professor Elena Ferrari, both are from the Department of Theoretical and Applied Sciences and the Research Center “Knowledge and Service Management for Business Applications” at the University of Insubria.

The opening keynote address is given by Dr Gianluca Misuraca from the European Commission, Joint Research Centre, Institute for Prospective Technological Studies, Seville, Spain and Gianluca is addressing the topic “eGovernment: Past, Present & Future: A policy-research perspective for renewing governance in the digital age”. The second day of the conference is opened by Dr Antonino Cordella from the London School of Economics, London, UK, who will talk about “Public value creation: the new challenge for e-government policies”.

ECEG brings together, researchers, Government officials and practitioners in the area of e-Government from around the world. Participants are able to share their research findings and explore the latest developments and trends in the field which can then be disseminated to the wider community.

With an initial submission of 153 abstracts, after the double blind, peer review process there are 81 papers published in these Conference Proceedings. These papers represent research from 40 countries including Australia, Austria, Belgium, Brazil, Canada, China, Costa Rica, Croatia, Denmark, Egypt, Germany, Greece, India, Iran, Iraq, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malaysia, Netherlands, New Zealand, Norway, Pakistan, Poland, Romania, Russia, Saudi Arabia, Serbia, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, UK and USA. This will ensure a very interesting two days.

Selected papers will be published in special issues of the Electronic Journal of e-Government (www.ejeg.com) and the Journal of E-Government Studies and Best Practices.
We hope that you have an stimulating conference, and enjoy your time in Como.

Walter Castelnovo  Conference Chair
Elena Ferrari  Programme Chair
June 2013
Conference Committee

Conference Executive
Walter Castelnuovo, University of Insubria, Como, Italy
Elena Ferrari, University of Insubria, Como, Italy
Oscar Sovani
Danilo Piaggi, Fondazione Rosselli Americas, USA
Massimo Simonetta

Mini track chairs
Dr Jakob Svensson, Karlstad University, Sweden
Prof Dr Mirko Vintar, University of Ljubljana, Slovenia
Dr Gianluca Misuraca, Institute for Prospective Technological Studies (IPTS), Seville, Spain
Dr Gianluigi Viscusi, University of Milan Bicocca, Italy
Milan Todorovic, Union Nikola Tesla University in Belgrade, Serbia
Terry Keefe, Sheffield Hallam University, UK
Mehdi Asgarkhani, CPIT, New Zealand
Dr Zaigham Mahmood, University of Derby, UK

The conference programme committee consists of key individuals from countries around the world working and researching in the e-Government community. The following have confirmed their participation:

Dr Bulent Acma (Anadolu University, Eskisehir, Turkey); Dr Carl Adams (University of Portsmouth, UK); Prof Carlos Afonso (ESGHT/University of Algarve, Portugal); Georg Aichholzer (Institute of Technology Assessment, Austrian Academy of Sciences, Austria); Dr Soud Almahamid (Al Hussein Bin Talal University, Jordan); Estee Almirall (Information Systems Department, ESADE, Spain); Jose Manuel Alonso (World Wide Web Foundation, Spain); Professor Paul Alpar (Phillips-Universitaet Marburg, Germany); Prof. Hussein Al-Yaseen (Al-Ahliyya Amman University, Jordan); Dr Nadia Amin (University of Westminster, UK); Miquel Amuto (Spanish Ministry of Territorial Policy and Public Administration, Spain); Darko Androvec (University of Zagreb, Faculty of Organisation and Informatics, Croatia); Dr. Gil Ariely (School of Government, Interdisciplinary Center Herzliya, Israel); Dr Aykut Arslan (Halic University, Turkey); Medj Asgarkhani (CPIT, Christchurch, New Zealand); Charles Ayo (Covenant University, Ota, Nigeria); Dr Paul Baker (Georgia Institute of Technology, Atlanta, USA); Dr Joan Ballantine (University of Ulster, UK); Dr Frank Bannister (Trinity College Dublin, Ireland); Dr Jordi Barrat Esteves (Rovira i Virgili University, Tarragona, Spain); Professor Dr Victor Bekkers (Erasmus University, Rotterdam, The Netherlands); Dr Jaro Berce (University of Ljubljana, Slovenia); Dr Egon Berghout (University of Groningen, The Netherlands); Lasse Berntzen (Vestfold University College, Norway); Rodica Bldisel (West University from Timisoara, Romania); Neil Botten (Westminster Business School, London, UK); Elke Boudry (IBBT-MICT-U Gent, Belgium); Dr Ramon Bouzas-Lorenzo (University of Santiago de Compostela, Spain); Christian Breitenstrom (Fraunhofer FOKUS, Germany); Robert Brookes (Conwy County Borough Council, Wales, UK); Xavier Busquets (Information Systems Department, ESADE, Spain); Michael Butler (Revenue Commissioners, Ennis, Ireland); Gulcin Buyukozkan (Galatasaray University, Istanbul, Turkey); Carlos Caldeira (University of Evora, Portugal); Toni Carbo (Drexel University, USA); Dr. Maria Luisa Carrio Pastor (Universidad Politecnica de Valencia, Spain); Dr Lemuria Carter (North Carolina A & T State University, Greensboro, USA); Dr Walter Castelnuovo (Università dell’Insubria, Como, Italy); Dr Akemi Chatfield (University of Wollongong, Australia); Dr Lichun Chiang (National Chung Kung University, Tainan City, Taiwan); Jyoti Choudrie (University of Hertfordshire, UK); Dr Marie-Therese Christiansson (Faculty of Economic Sciences, Karlstad University, Sweden); Dr Duncan Cleary (Revenue Commissioners, Dublin, Ireland); Tom Collins (University of Limerick, UK); Marta Continentino (Smart Cities, Citilab, Spain); Dr Maura Conway (Dublin City University, Ireland); Leela Damodaran (Department of Information Science, Loughborough University, UK); Geoffrey Darnton (Requirements Analytics, UK); Mohan Datar (Mumbai University, India); Dr Susana De Juana-Espinosa (University of Alicante, Spain); Dr Martin De Saulles (University of Brighton, UK); Bruno de Vuyst (Vrije Universiteit Brussel, Belgium, Belgium); Mitja Decman (University of Ljubljana, Slovenia); Dr Ales Dobnikar (Faculty of Public Administration, Slovenia); Prokopios Drogaaris (Info-Sec Lab) University of the Aegean, Greece); Dr Vladimir Drozhzhinov (e-Government Competence Centre, Moscow, Russia); Dr Yamaya Ekanayaka (University of Colombo School of Computing, Sri Lanka); Frances Ekwulugo (University of Westminster, UK); Prof Mohamed Dafir El Kettani (ENSIAS – University Mohammed V-Souissi, Morocco); Andrey M Elizondo Solano (INCAE Business School, Costa Rica); Marwan Elnaghi (Brunel University, Uxbridge, UK); Dr Yousef Elsheikh (Applied Science University, Jordan); Prof. Dr. Ayman Elzeyne (Elmenfy University, Egypt); Prof Sara Eriksen (School of Engineering, Blekinge Institute of Technology, Sweden); Prof. Dr. Alptekin Erkollar (Hacettepe University, Turkey); Jose Esteves (Instituto de Empresa Business School, Madrid, Spain); Elsa Estevez (Universidad Nacional del Sur, Argentina); Dr Alea Fairchild (The Constantia Institute bvba, The Netherlands); Manuel Ferez (Institute on Public Governance and Management, ESADE, Spain); Elena Ferrari (University of Insubri, Italy); Marianne Frefel (Bern University of Applied Sciences, Switzerland); Prof. Roberto Fragale Filho (Universidade Federal Fluminense and Fundacao Getulio Vargas, Brazil); Dr Juliet Freeman (University of Canberra, Australia); Kieran Gallery (National Centre For Taxation Studies, Kemmy Business School, University of Limerick, Ireland); Prof Eduardo Gamero (Universidad Pablo de Olavide, Spain); Professor Jean-Gabriel Ganascia (Laboratoire d’Informatique de Paris VI, University
Pierre and Marie Curie, France); Professor Somayajulu Garimella (International Management Institute, New Delhi, India); Dr. Mila Gasco (Institute of Public Governance and Management (ESADE), Barcelona, Spain); Dr Rimantas Gatautis (Kaunas University of Technology, Kaunas, Lithuania); Dr Stephane Gauvin (université Laval, Canada); Dr Jenny Gilbert (University of Bedfordshire, UK); Prof Oliver Glasssey (Swiss Graduate School of Public Administration, Switzerland); Marius Albert Gomez (Open University Catalonia, Barcelona); Branko Gorjan (Tax Administration, Dept for Planning, Analyzing and statistics, Slovenia); Dave Griffin (Leeds Metropolitan University, UK); Mary Griffiths (University of Adelaide, Australia); Dr Kerstin Grunden (Trollhattan University, Sweden); Panos Hahamis (Westminster Business School, London, UK); Dr Ute Hansen (Ute Hansen, Research & Concept., Germany); Simra Hanspal (BMS, India); Martijn Hartog (The Hague University of Applied Sciences / Centre for Research and Development, The Netherlands); Associate Professor Rugayah Hashim (University Technology Mara, Selangor, Malaysia); Dr Paul Henman (University of Queensland, Brisbane, Australia); Patrik Hitzelberger (Centre de Recherche Public - Gabriel Lippmann, Belvaux, Luxembourg); Dr Keith Horton (University of Derby, UK); Dr Omar Hujran (Princess Sumaya University for Technology, Jordan); Arild Jansen (University of Oslo, Norway); Dr Marijn Janssen (Delft University of Technology, The Netherlands); Carlos Jimenez (Estratic, Barcelona, Spain); Tina Jukic (Faculty of Administration, University of Ljubljana, Slovenia); Prof Konstantinos Kalemis (National Centre For Local Government And Public Administration, Greece); Georgios Kapogiannis (University of Salford, Manchester, UK); M.ed Ioannis Karavasilis (University of Macedonia, Greece); Dr. Hasmia Kasimis (Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia); Dr Christos Katsis (Technological Educational Institution of Ionian islands, Greece); Dr Anjali Khaskish (Management Development Institute, India); Prof. Dr TürkSEL Kaya Bensghir (Public Administration Institute For Turkey And Middle East, Turkey); Terence Keefe (Sheffield Hallam University, UK); Dr Samihah Khalil (Universiti Utara Malaysia, Malaysia); Dr Maja Klun (University of Ljubljana, Slovenia); Ibrahim Kuschu (Mobile Government Consortium, UK); Dr Konstadinos Kutsikos (Business School, University of the Aegean, Greece); Dr Mohammad Lajzian (Ferdowsi University of Mashhad, Iran); Djamal Eddine Laouisset (Alhosn University, Abu Dhabi, United Arab Emirates); Dr Vanessa Liston (Trinity College Dublin, Ireland); Dr Ying Liu (Cambridge University, UK); Prof. Juliet Lodge (University of Leeds, UK); Kristina Lundevall (mCity, Sweden); Jyoti Devi Mahadeo (University of Technology, Mauritius); Devender Maheshwari (Delft university of Technology, The Netherlands); Zaigham Mahmood (University of Derby, UK); Dr. Gregoriy Maniopoulos (Newcastle University, UK); Panagiotis Manolitzas (Technological educational institute of Piraeus, Greece); Paul McCusker (Letterkenney Institute of Technology, Ireland); Anthony Meehan (The Open University, UK); Ienny Meringoh (kenya Institute of education, Kenya); Adela Mesa (University of the Basque Country, Spain); Jeremy Millard (Danish Technological Institute, Aarhus, Denmark); Peter Millard (University of Portsmouth, UK); Prof. Harekrishna Misra (Institute of Rural Management Anand, India); Gianluca Misuraca (Institute for Prospective Technological Studies, European Commission, Spain); Dr. Yonathan Mizrachi (University of Haifa, Israel); Pat Molan (Revenue Commissioners, Limerick, Ireland); John Morison (Queens University Belfast, UK); Bert Mulder (Haagse Hogeschool, Den Haag, The Netherlands); Hilary Mullen (Buckinghamshire Chilterns University, UK); Prof Maurice Mulvenna (University of Ulster, UK); Dr Darren Mundy (University of Hull, UK); Prof Miheala Muresan (Dimitrie Cantemir Christian University, Bucharest, Romania); Olli Mustajarvi (The Finnish Parliament, Finland); Emanuela-Alisa Nica (Center for Ethics and Health Policy and, Petre Andrei University from Iasi, Romania); Paul Nixon (Haagse Hogeschool, Den Haag, The Netherlands, The Netherlands); Dr Donald Norris (Department of Public Policy, University of Maryland, Baltimore County, USA); Dr Abdelkader Nouibat (University of M'Sila, Algeria); Mohammad Nuruzzaman (Daffodil International University, Bangladesh); Ass.Prof. Birgit Oberer (Kadir Has University, Turkey); David O'Donnell (Intellectual Capital Research Institute of Ireland, Ireland); Adegbuyega Ojo (United Nations University, Macao, China); Dr Mustafa Kemal Oktém (Hacettepe University, Ankara, Turkey); Eleonora Paganeli (University of Camerino, Italy); Thanos Papadopoulos (Hull University Business School, UK); Dr Ioannis Papaoannou (Computer Technology Institute and Press, Greece); Dr Shaua Pather (Cape Peninsula University of Technology, South Africa); Ass. Prof. Michail-Bogdan Petrisor (Faculty of Economics and Business Administration, Alexandria Ioan Cuza University) Romania; Mick Phythian (De Montfort University, Leicester, UK); Dr. Danilo Piaggesi (Fondazione Rosselli Americas, USA); Jon Pike (Westminster Business School, London, UK); Joan Miquel Pique (Maurilia Knowledge, Spain); Ph.D Nataša Pomazalová (University of Defence, Brno, Czech Republic); Adina Popa ("Efittime Murgu" University of Resita, Romania); Key Pouschti (University of Augsburg, Germany); Andrew Power (IADT, Ireland); Prof Thurasamy Ramayah (Univisiti Sains Malaysia, Malaysia); Rajash Rawal (Haagse Hogeschool, Den Haag, The Netherlands); Prof. Gregory Reinhardt (Australian Institute of Judicial Administration, Melbourne, Australia); Dr Kristina Reinsalu (eGovernance Academy/University of Tartu, Estonia); Dr Oliviero Riganelli (University of Milano Bicocca, Italy); Waltraud Ritter (Asia Pacific Intellectual Capital Centre, Hong Kong); Dr Jose Rodrigues (Federal University of Paraiba, Brazil); Sabine Rotthier (Hogeschool Gent, Belgium); Professor Lili Saghafi (Canadian International College, Egypt); Dr Ilias Said (Universiti Sains Malaysia, Malaysia); Manel Sanroma (Barcelona City Council, Spain); Prof. Chaudhary Imran Sarwar (Mixed Reality University, Pakistan); Angel Saz (Institute on Public Governance and Management, ESADE, Spain); Albert Serra (Institute on Public Governance and Management, ESADE, Spain); Dr Stanka Setn inkar-Cankar (Faculty of Administration, University of Ljubljana, Slovenia); Dr Jamal Shahin (Vrije Universiteit Brussel, Belgium); Dr Hossein Sharif (University of Portsmouth, UK); Omphemsete Sibanda (University of South Africa, Pretoria, South Africa); Dr Carlo Simon (Proovads School of International Management and Technology, Germany); Massimo Simonetta (Ancitl Lombardia, Milan, Italy); Patrick Sinz (Ethica SAS and Dhexon group, France); Oscar Sovani (Lombardia, Italy); Dr. Sasikumaran Sreedharan (College of Computer Science, King Khalid University, Ministry of Higher Education, Saudi Arabia, ABHA, Saudi Arabia); Dr Bernd Stahl (De Montfort University, UK); Dalibor Stanimirovic (University of Ljubljana, Faculty of Administration, Slovenia); Margery Stapleton (University of Limerick, Ireland); Kamelia Stefanova (Sofia University, Bulgaria); Patra Steffens (Fraunhofer FOKUS, Germany); Simon Stephens (Letterkenney Institute of Technology, Ireland); Dr Alan Strickley (Department
for Education, UK); Dr Jakob Svensson (Karlstad University, Sweden); Professor John Taylor (Glasgow Caledonian University, UK); Anil Tete (GGV, India); Doug Thomson (RMIT University, Australia); Prof Milan Todorovic (University Union Nikola Tesla, Serbia); Tim Turner (University of New South Wales, Australia); Dr Joan-Josep Vallbe (Universitat de Barcelona, Spain); Rudi Vansnick (Internet Society of Belgium, Belgium); Dr Mirko Vintar (Institute for Informatization of Administration, Slovenia); Dr Vasiliki Vrana (Technological educational institute of Serres, Greece); Prof. Fang Wang (Business School of Nankai University, Tianjin, China); Stuart Warden (Cape Peninsula University of Technology, South Africa); Diana Wilson (Trinity College Dublin, Ireland); Rob Wilson (University of Newcastle, UK); Dr. Gamel Wiredu (Ghana Institute of Management and Public Administration, Accra, Ghana); Professor Les Worrall (University of Coventry, UK); Prof Sunil Kumar Yadav (GNIT-MBA Institute, India); Mete Yildiz (Hacettepe University, Turkey); Dr. Elif Yuksel Oktay (Yalova University, Turkey); Prof Kostas Zafiropoulos (Department of International and European Studies, University of Macedonia, Greece); Dushana Zdravkova (Varna District Court, Varna, Bulgaria); Dr Fang Zhou (American University of Sharjah, United Arab Emirates); Prof Ewa Ziemba (University of Economics, Poland)
Biographies

Conference Chair

Walter Castelnuovo, Ph.D., is Assistant Professor of Information Systems at the University of Insubria (Italy). His research interests concern technological and organizational innovation in Public Administration and Interorganizational Information Systems. He is co-founder of the Research Center for Knowledge and Service Management for Business Applications (K&SM) of the University of Insubria and he is member of the Scientific Committee of the Interdepartmental Center for Organizational Innovation in Public Administration of the University of Milan. He is also member of the Department of Institutional Reforms, E-Government and Institutional Federalism of the Association of the Municipalities of Lombardia (Italy). He served as member of the committee for many international conferences on E-Government and ICT evaluation; and he was the General Chair of The 5th European Conference on Information Management and Evaluation (ECIME). He is co-founder of the “ICT for Development International School” (ICT4DEVIS) and is the Director of the first edition of the school in 2012.

Programme Chair

Elena Ferrari is a full professor of Computer Science at the University of Insubria, Italy and scientific director of the K&SM Research Center. She received the IEEE Computer Society’s prestigious 2009 Technical Achievement Award for “outstanding and innovative contributions to secure data management”. In 2011, she has been named ACM Distinguished Scientist and she received a Google research award for her research on social network privacy. Her research activities are related to various aspects of data management, including access control, privacy and trust in social networks, secure cloud computing and emergency management, secure semantic web, multimedia databases. On these topics she has published more than 170 scientific publications in international journals and conference proceedings. She gave several invited lectures and tutorials in Italian and foreign universities as well as on international conferences and workshops. Prof. Ferrari is in the Editorial Board of the IEEE Transactions on Knowledge and Data Engineering, the IEEE Transactions on Dependable and Secure Computing, the Transactions on Data Privacy, and the International Journal of Information Technology (IJIT). She is a distinguished member of the ACM and senior member of IEEE.

Keynote Speakers

Dr Gianluca Misuraca is a Senior Scientist at the Information Society Unit of the European Commission’s Joint Research Centre, Institute for Prospective Technological Studies (IPTS) based in Seville, Spain. Before joining IPTS, he was the Managing Director of the Global Executive Master in e-Governance at the Ecole Polytechnique Fédérale de Lausanne (EPFL). Previously he held several positions as policy advisor for different International Organisations and bilateral cooperation agencies as well as working with various consulting and industrial organisations in the area of e-Government, regional development, research and innovation. His background is economics with focus on the interface between ICTs and public administration, specialised in the area of business process reengineering and e-Transformation. He holds also a Diploma of Specialisation in European Union Economics and Law, a specialisation in Security Management, an Executive Master in e-Governance and a PhD in Management of Technology from EPFL.

Mini Track Chairs

Dr Jakob Svensson is a researcher with a PhD in Media and Communication Studies. Jakob current research revolves around civic communication, political participation and the construction of citizenship through online communicative practices. He is currently involve in a research project studying relations of power, practices of discipline and surveillance among both outspoken political activists in southern Stockholm. Jakob Svensson is currently holding a position of assistant professorship in Media and Communication Studies at Karlstad University and is the Director of the research network HumanIT.

Prof. Dr Mirko Vintar gained his doctorate in IT and management studies at the Faculty of Economics, Ljubljana. For over 20 years his work has dealt with the informatisation of public administration, with a major focus on the development of e-government in recent years. He is in charge of a series of domestic and international research and development-application projects in this field. He is a member of international scientific and specialist bodies involved in the research of this field (EGPA, Study Group on Informatisation of Public Administration, IFIP, WG 8.5, NISPAcee, WG on E-government). From 1993-2002 he was the editor-in-chief of the journal Uporabna informatika (Applied IT).

Dr Gianluigi Viscusi is currently post-doc research fellow at the Department of Informatics, Systems and Communication (DISCo) of the University of Milan Bicocca. Research interests concern methodologies for policy driven information systems planning, e-Government, convergence and information growth impacts on information systems design, digital information asset evaluation (Information Value), business modelling and IS strategy alignment, data reverse engineering. He has published more than 50 referred papers in books, conference proceedings, and journals as Data & Knowledge Engineering and Government Information Quarterly In 2010 he has co-authored with Carlo Batini and Massimo Mecella the book “Information Systems for eGovernment: a quality of service perspective” (Springer, Heidelberg).

Mehdi Asgarkhani is a principal lecturer in strategic management of ICTs alongside holding the position of Academic Leader (ICT qualifications) at CPIT, New Zealand. Mehdi’s background covers both ICTs and Strategic Management. Prior to accepting his current academic role, he held various strategic advisory, project managerial and technology and business strategy alliance roles. In keeping close contact with the industry developments and ICT governance bodies, he is the National Councillor representing Canterbury at Institute of IT Professionals (IITP) New Zealand.

Milan Todorovic is a Professor of Entrepreneurship and Innovation, Corporate Entrepreneurship and Organisational Changes at Union Nikola Tesla University in Belgrade, Serbia. He holds a MBA from Melbourne Business School and has extensive international experience across diverse industries and government enterprises encompassing lecturing, management consulting, business development, directorships and successful management of global, mission critical business systems for leading international companies. During his career he has combined his significant professional experience and leadership skills with excellent knowledge of business strategy to conduct consulting assignments and deliver strategic projects worldwide. Currently, he is involved in several research projects including how public policies impact on innovation and entrepreneurship.

Terry Keefe a Senior Lecturer at Sheffield Hallam University, UK. He has 6 years in Higher Education teaching Project Management, IT Professional Ethics, Business Analysis and Strategy. His extensive experience in public sector change comes from 6 years managing research and development in an innovative public e-learning service and 20 years in the UK Civil Service, much of it providing IS consultancy in IT enabled organisational change projects. Research experience includes e-government, e-learning, government strategy, social inclusion and accessibility.

Dr Zaigham Mahmood is a Principal Researcher and Reader in Applied Computing in the School of Computing and Mathematics, University of Derby, UK. He has an MSc in Mathematics, an MSc in Computer Science and a PhD in Modeling of Phase Equilibria. He is also a Chartered Engineer and a Chartered Information Technology Professional. Zaigham has in excess of 50 publications in proceedings of international conferences and journals as well as chapters in books. He is also Editor-in-Chief of Journal of E-Government Studies and Best Practices. His research interests are in the areas of software engineering, project management, enterprise computing and e-government.
Biographies of Presenting Authors

Dr, Hany Abdelghaffar is a lecturer of Information Systems at the German University in Cairo (GUC), Egypt. He holds MSc. and PhD from Middlesex University, London, UK. He has several publications in the e-government field. Dr. Abdelghaffar taught several courses in information systems and e-business in and he is a SAP certified consultant.

Ireni Akoijam, Scientist D working in National Informatics Centre, Govt. of India under Ministry of Communication and Information Technology. Working for eGovernance projects in Maharashtra responsible for initiation of digitization of ration card holders data for Food and Civil Supplies Department, also various other eGovernance projects such as introducing paperless offices and tendering project. MS in Computer Engineering, Tashkent State Technical University, Tashkent.

Ibrahim Alfadli is PhD student and researcher in the School of Engineering and Computing Sciences at Durham University. His main research focus is in the areas of e-Government evaluation and assessment. He is also been involved with areas in Quality Assurance in regards of the information technology and self services in the field of banking.

Obaid Almalki is a PhD candidate at BMRI/IRAC at the University of Bedfordshire, Luton, United Kingdom. In 2007, he awarded his Master of Engineering in Software Engineering from the University of Queensland in Australia. He received his Bachelor degree in computer and information systems from King Saud University in Saudi Arabia in 1995.

Mohammed Alsiaif. PHD researcher at Inst Local Government Studies, School of Government and Society, University of Birmingham, UK. Master degree in Information System Management at University of Sheffield, UK. BCS Information Technology and Computing at Saudi Arabia. I am interesting in technology implementation and adoption of e-government, e-business and ERP systems.

Dr. Mohammed Al-Sudairi is currently an Associate Professor in College of Business Administration for MIS Department at King Saud University at Riyadh, Saudi Arabia. He is also holding a number of reputable, key administrative and professional positions in Saudi Arabia.

Dr. Leonidas Anthopoulos is an Assistant Professor at the Project Management Department of the TEI of Larissa, Greece. He has IT research, planning and Management experience within organizations, such as the Hellenic Ministry of Foreign Affairs, Information Society S.A., Smart City of Trikala etc. His research interests main concern e-Government, Smart Cities, Enterprise Architecture, etc.

Dr. Muhammad Irfanullah Arfeen is working as Assistant Professor, Department of Management Sciences, and Deputy Director, Board of Advanced Studies and Research (BASR) at the Virtual University of Pakistan, Islamabad Campus. He has presented many research papers in different conferences. Recently, he attended short course titled “Seminar on eGovernance for Developing Countries” sponsored by Government of China.

Alina Badulescu is Professor of Economics and PhD coordinator at the Faculty of Economics and Doctoral School in Social Sciences of the University of Oradea, Romania. She graduated Bucharest University of Economics and since has authored and co-authored numerous journal articles and books. Her interests include economics, but promoting young researchers’ activity as well.

Daniel Badulescu graduated Bucharest University of Economic Studies and has a PhD in Economics. He is Associate Professor in Business Economics and Business Financing at the Department of Economics, University of Oradea, Romania. His current research interests include economics, business economics and business finance.

Janina Banasikowska, PhD is employed at the University of Economics in Katowice as lecturers on Faculty of Informatics and Communication, at Department of Informatics. She is taking part in the research into computer science, systems analysis and computer system design, management information systems, e-business and public informatics.

Frank Bannister is an Associate Professor in information systems in the School of Computer Science and Statistics in Trinity College Dublin. His research interests include e-government, e-democracy and IT evaluation. He is editor of the Electronic Journal of e-Government and Co-Director of the European Group for Public Administration permanent study group on e-government.

Mithun Barua is the officer in Government of West Bengal, India and PhD student at Thapar University, Patiala, Punjab, India. The research area is E-Government, Technology Management and Public Policy. The author had completed two months research visit at Tallinn University of Technology, Estonia on Estonian Government scholarship. The author has five publications in his credit.
Iréne Bernhard Lecturer in media-and communication studies, University West, Trollhättan, Sweden and PhD Candidate in Urban and Regional Studies, Royal Institute of Technology, Stockholm, Sweden, School of Architecture and Built Environment, Urban Planning and Environment. Researched eGovernment with a group supported by VINNOVA, the project was to support and evaluate development of municipal contact centres in Sweden. Experienced in applied organisation communication eg coordinator for international scientific symposia.

Sanja Bogdanović-Dinić BSc and MSc degrees in computer science at the University of Niš, Serbia. She is currently a PhD student at the Faculty of Electronic Engineering and research associate at the Faculty of electronic engineering in Niš. Her PhD research involves Sensor Web, GIS and E-systems with special attention given to Open Data and Linked Open Data applications.

Choompol Boonmee Lecturer at Thammasat University. PhD in information and control system engineering (1998) from Nagasaki University of Technology, Japan. Research interests include eGovernment, electronic data interchange and interoperability, ICT benefit management and computer simulation. Been working as ICT consultant for many Thai ministerial departments. He is also a president of electronic data interchange promotion association.

Roberto Boselli is currently working as professor assistant in Computer Science at University of Milan-Bicocca. He worked in several international research projects in the field of Information Systems. His research activities focus on Semantic Web, Web2.0 and e-government services. In 2006 he took his Ph.D in Information Society at the University of Milan-Bicocca.

Alexopoulos Charalampous is a PhD Candidate at the University of the Aegean working on high-level policy making, research and pilot application in FP7. A computer science graduate from the University of Peloponnese with MSc in management information systems from University of Aegean he has published in scientific conferences on IS evaluation and open data.

Yu Jui Chen is a Graduate student in the Department of Public Administration at National Chengchi University. Chen is interested in e-government/e-governance, ICT development, and he has two years of experience for legislative assistant in Taiwan.

Pin Yu Chu Professor in Department of Public Administration at National Chengchi University. Research interests include technology development and management, electronic governance, and environment and conflict management. Serves on Advisory Board, Research Development and Evaluation Commission, the Personnel Policy Council, Central Personnel Administration of Taiwan, the Committee of Government Technology Program Review, the Review Expert Board of Higher Education Evaluation & Accreditation Council of Taiwan, etc.


Giuseppe Ciaccio works at DIBRIS, Universita’ di Genova, where he holds a permanent position as a researcher. His interests are in the field of distributed systems. He is currently involved in a project concerning web, architectures and technologies for Open Data.

Flavio Costa, Master of Science in Computer Engineering from Politecnico di Milano (Italy), IT project leader at Henkel Italia and STMicroelectronics SA (France), CIO at NEC Italia; since 1998 at CERN – European Organization for Nuclear Research (Switzerland) and member of the Invenio Team since 2011, outreach and relationships with users.

Michaeline Cox is Associate Professor in the Department of Politics and Government at Illinois State University. She teaches courses in international law, international relations and European Politics, and has authored a number of publications on political participation, social capital, cultural identity and corruption. Her interest in e-Government also reflects the interdisciplinary nature of her research.

Stephen Darlington is a PhD candidate in the School of Politics and International Relations at the Australian National University in Canberra. His area of research is stakeholder rights in e-health systems and the potential of e-health to transform medical service delivery.

Dr Martin De Saulles is a Principal Lecturer at the University of Brighton where he teaches and carries out research in the areas of information management and digital innovation.

Ameneh Deljoo started my PhD in Delft University of technology in 2012, in Technology, Policy and Management (TPM) faculty and my supervisor is Prof.dr.ir. Marijn Janssen. My research focused on improves and evaluate public and private network by using Complex adaptive systems.
Lesego Tshегофатсо Ditibane I am a Masters student at North West University (NWU), currently doing a research on systems development methodologies and the development of e-Government systems. I have a good communication and interpersonal skill, a fast learner and a team player.

Andrey Elizondo, Eng. Is a consultant/researcher for INCAE Business School. He is interested in understanding the implications of the Internet for society and challenges associated with its governance. Master in International Business from the Monterrey Institute of Technology, Master in European Business from ESCP-EUROPE, and Computer Sciences Engineer from the Costa Rica Institute of Technology.

Kaja Fietkiewicz (23) from Poland, has been living in Germany since 2008 in order to study at the Heinrich-Heine-University Düsseldorf. Since 2011 she has been studying Information Science and Language Technology on Master’s Degree and Law for state examination. Her main field of interest is the Informational Cities, especially the Japanese cities and information law.

Dr. Panos Fitsilis is a Professor at TEI Larissa, Greece, Head of School of Business and Economics. He has extensive project management experience with the development and deployment of large IT systems. He worked, as business unit manager at large software development companies. His research interests include: Project Management, Software Engineering, Business Process Reengineering, etc.

Dr. J.V. Fonou Dombeu received a PhD in Computer Science in 2012 and MSc. in Computer Science in 2008. His is currently a Senior Lecturer at the Department of Software Studies at The Vaal University of Technology. Dr. Fonou-Dombeu’s research interests are in Semantic Web, Ontology, and Semantic Knowledge representation and development in e-Government.

Muriel Foulonneau specializes on semantic interoperability of digital resources, semantic data quality, and personalization. She has worked in particular in the eGovernment domain in the scope of the European project SPOCS. She is involved in the SEMIC working groups to create core vocabularies to support the interoperability of eGovernment applications.

Mariagrazia Fugini is Professor of Computer Engineering at Politecnico di Milano. She holds a Ph.D. in Computer Engineering. Her interests are in information system security and development methods and tools, environmental risk management, E-science, power grids, and Green IT. She participated in several EU Projects. She has been a Visiting Professor at University of Maryland, Technical University of Vienna, Technical University of Stuttgart, and UPC Barcelona.

Olivier Glasse assistant professor at Swiss Graduate School of Public Administration (IDHEAP) is in charge of research and teaching unit "Digital Governance". Within the Swiss Public Administration Network (SPAN), teaches public management, quantitative research methods, and management of information systems. Current research topics are public registers' harmonization and data governance of population registers, identity and privacy management, open access and transparency, and more generally eGovernment and eParticipation.

Piotr Goetzen, PhD, CCNP is the director of Operating Systems and Computer Networks Department at University of Management (Lodz, Poland). He is also Cisco Certified Academic Instructor. IT systems, their security and interoperability are his main scientific interests. He is also the Clark University teacher at European campus and the owner of Network of IT Experts (NOITE) company.

Dr. Anastasia Golubeva PhD, Senior Lecturer (Public Administration Department), Graduate School of Management, St. Petersburg State University. Engaged in research for over 10 years on e-government development in Russia, participated as expert and consultant in number of international projects. Teaches various courses on modern approaches to public management and government-society interaction (including course on e-government). Research focuses on innovations in public administration, e-government and public e-services.

Kenneth Griggs is a Professor of Information Systems at the Orfalea College of Business at Cal Poly in San Luis Obispo, California. His current research interests focus on electronic commerce, emerging technologies, collaboration systems, information systems audit and control, and the use of social media networks to optimize knowledge management within organizations.

Kerstin Grundén is senior lecturer in informatics at the West University of Sweden. She has also a background as a sociologist. She was participating in the research project Innoveta funded by VINNOVA for the study of customer centres implementation within municipalities in Sweden 2009 – 2011. Her main field of research is e-Government and e-Learning.

Luisita Guanlao is a Lead Information Officer, Rapid Application Development, Innovation and ICT Directorate, World Bank Group. Experience in IT sector supporting software architecture/ development, project planning, management/IT management, business development/solution support. Focus includes enterprise architecture, information management, data management, business intelligence, identity and access management. Technical assistance to government institutions ensuring
alignment of IT investments with government strategic priorities. MSc in Technology Management and BSc in Business Administration.

**Jonas Hedman** is an Associate Professor at the Department of IT Management, Copenhagen Business School, Denmark. His research covers topics such as greening processes, business model evolution, payment, payment eco-system, and business benefits of IT. He is currently working with Copenhagen Finance IT Region to create a cashless society.

**Stefan Henningsson** Associate Professor, Copenhagen Business School, Department of IT Management. Researches managerial aspects of IT in contexts including corporate mergers and acquisitions, global IT infrastructures and international trade processes. Previously published 70+ peer-refereed papers published in journals such as Information Systems Journal, Journal of Strategic Information Systems, Communications of the Association for Information Systems and Management Information Systems Quarterly Executive.

**Paul Jackson** is Senior Lecturer in Information Management at Oxford Brooks University. He previously worked for the Chartered Institute of Public Finance and Accountancy, delivering e-Government training and consultancy for a range of public bodies. He has been a lecturer at Brunel University and has a PhD from Cambridge University.

** Kamalia Azma Kamaruddin** finished her Masters of Science in Information Technology at Universiti Teknologi MARA, Shah Alam, Malaysia, in 2006. Later, she joined the university as a lecturer in Information Systems Department. She is currently a PhD student at Faculty of Computer and Mathematical Sciences, UiTM. Her research focus is on transformational government.

**Asaneew Kawtrakul** is currently the Associate Professor of Department of Computer Engineering, Kasetsart University and Deputy Executive Director of National Electronics and Computer Technology Center (NECTEC), Thailand. Her specific research interests are Knowledge Engineering and Language Engineering. Now she has also responsible for many project initiatives related to service innovation in Health Care, e-Government and Agriculture area.

**Mehmet Sinan Kilic** is R&D and Software Development Manager, in Universal Information Technologies. Graduated from Istanbul University Business Administration Department. Started his career in Universal Information Teknologies as Project Leader in 2001. He obtained his PMP certificate in 2011. He is specialized on ERP solutions and software applications for local governments.

**Rembrandt Klopper** interdisciplinary scholar publishing results of research focusing on aspects of research methodology, informatics, communication science and cognitive science. In cognitive science has written several papers on central role of metaphor in human thinking. Supervises masters and doctoral students at several South African universities and is special issues editor of South African interdisciplinary scholarly journal, *Alternation*.

**Luc Lagrandeur** is Professor of Marketing at Laurentian University teaching courses in marketing and consulting. Luc has 10 years of practical marketing experience for one of Canada’s largest information technology outsourcing company. His research interests are on the impact of government e-services on the organization and the relationship/interaction with citizens.

**Sam Lubbe** is an associate professor at UNISA in the School of Computing. He has a PhD from Wits and he teaches SISP, SCM and other IS courses. He has published many articles, attended and delivered many conference papers as well as three books. He is also supervising many postgraduate students.

**Carolina Martín-Vázquez** obtained her BSc degree in Psychology from the University of La Laguna in 2006. She has six years of experience working on projects for social participation and appreciative inquiry. She is collaborating on the European Project “Puzzled by Policy” focused on online citizens debate. Her interests include appreciative inquiry, social participation and e-participation.

**Michele Martoni** is a Contract Professor in ITLaw at University of Bologna. She has a Ph.D. in ITLaw and Legal Informatics at University of Bologna. Professor in the Master of Law and New Technology (University of Bologna), of the Erasmus Mundus Ph.d. Program Law, Science and Technology at ItLaw Master (University of Bologna) and at the Master on eHealth (University of Bologna). Member of the Italian Association of Legal Informatics, of Italian Telemedicine Society and of the Cloud Security Alliance Italy Chapter.

**Ronald Meijer** graduated in science of public administration. He worked in universities, doing policy research (Amsterdam, Leiden). He is engaged in research at the Research and Documentation Centre (WODC) of the Ministry of Security and Justice of the Netherlands. His interest is focused on information management, data archiving, open data, and privacy in the domain of Justice.
Jeroen Meij is a manager at KPMG Advisory N.V. in the Netherlands since 2008. With experience in design and consultancy, the link between technology and business always has his special attention. Topics include data mining, ontologies, open source and open standards. He has been involved in many Agile software development projects, often using innovative concepts.

Adela Mesa is a Ph.D. teacher at the Department of Political Science and Administration in the University of the Basque Country. She has directed several eGovernment research since 2002. She currently heads a research funded by the Spanish Ministry of Science and Technology titled: Barriers to electronic government and intergovernmental relations in the Spanish regional administrations system (2010-2012).

Mohamed Ali Mohamed is a PhD researcher at Faculty of Computers and Information, Cairo University. He has Syrian nationality, He holds BSc in Informatics Engineering and MSc in Information systems, and his research interests include: E-government, Enterprise Architecture, Software Engineering, Project Management, SOA and Cloud Computing.

José María Moreno-Jiménez received the degrees in mathematics and economics, and the Ph.D. degree in applied mathematics from the University of Zaragoza (Spain), where he is a Full Professor of Operations Research. He is also the Chair of the Zaragoza Multicriteria Decision-Making Group. He has published more than 180 papers in scientific books and journals.

Ricard Munné is Project Manager in the Public Sector Unit in Atos Research and Innovation since 2011. Previously, he had worked in Atos as Project Manager and Consultant in Public Sector projects for four years. Ricard has a degree as Telecommunications Technical Engineer and pursued a Master in Information Technology Management.

Professor Malcolm Munro is emeritus professor of Software Engineering in the School of Engineering and Computing Sciences at Durham University. His main research focus is in the areas of Software Visualisation, Software Maintenance and Evolution. He has also been involved with research in Web Services, protocols for fair exchange of electronic goods, and Reputation Systems.

Fattah Nazem is an Associate Professor. He has been vice-president of the research department for the last five years. His research interests are in the field of Higher Education Management. He has written 2 books and 94 articles. He is Chief Executive of the Quarterly Journal of Educational Science.

Francesco Niglia worked more than 10 years as consultant for Technology Transfer and holds focus expertise in the ICT for government solutions domain. Key assignment: manager of the NET-EUCEN network within which he is responsible for the development and validation of eGovernment indicators for measuring the application of User Centricity methodology in services to citizens.


Donald F. Norris is a specialist in public management, urban politics, and the application, uses and impacts of information technology (including e-government) in public organizations. He holds a B.S. in history from the University of Memphis and both an M.A. and a Ph.D. in government from the University of Virginia.

Olaseni Muritala Okunola is a PhD student; his research focuses on the ICT user experience, user satisfaction, user experience of mandatory technology acceptance and ICT Policy, and e-inclusion. He holds a Master of Science degree in Business Information Systems and a Master of Business Administration. He is preparing a Ph.D on User Experience of e-Government Services.

Svein Ølnes I work as a full time researcher at the Western Norway Research Institute, in the ICT departement. My field of research is eGovernment and within that field I have worked mostly with quality and benchmarking issues as well as interoperability and the use of semantic technologies.

Wolfgang Palka is a research associate and PhD student at the Chair for Information Systems at the Technische Universitaet Muenchen. His research interests include open government data, e-government, and mobile commerce. He was awarded for the best research of the year in the Journal of Information Technology (2009) for a contribution on mobile viral marketing.

Monica Palmirani is an associate professor of Computer Science and Law at Bologna University, School of Law, Italy. She teacher of several courses since 2001 on Legal Informatics, eGovernment, Legal drafting techniques, and Legal XML. She is director of Italian Society of Legal Informatics, of the LAST-JD Ph.D programme and consultant of the government agency for Italian Digital Agenda.
Jeroen Pastoor Project manager Monitoring e-Government Netherlands. Jeroen works at ICTU, an impartial and professional organisation by and for government organisations. Jeroen working experience with Dutch government organisations improving their e-Government solutions and strategies. Jeroen was involved in coordination of ICT-related projects at national/regional level – on implementation and usage of e-Government solutions. Jeroen is currently interested in measurement of benefits realization, big data and web3.0 solutions.

Cristina Pérez Espés is a Business Administration graduate in the Faculty of Economics , and Business (Zaragoza, Spain). She has participated in several international congresses, such as Aspelt 2012, WSKS 2012 e.t.c, as well as in public and private projects. Currently, Cristina is pursuing Doctoral Thesis in Effectiveness of E-cognocracy from financial and economic perspective.

Igor Pihir is a research and teaching assistant and a PhD student at the University of Zagreb, Faculty of Organization and Informatics in Varazdin. His research interests are in business process modelling and improvement through IT and e-business especially with focus on measurement of e-business effects in SMEs processes.


Zoran Radojičić is an associate professor at Faculty of Organizational Sciences in Belgrade, Department of Operational Research and Statistics. He holds a B.A. in Organizational Sciences, a M.Sc. in Statistics and a Ph.D. in Statistics, all from University of Belgrade. His research interests are computational statistics, applied statistics, biostatistics, information systems, Internet and e-business.

Rajash Rawal Principal Lecturer in Politics at ESCM, The Hague University, The Netherlands. His publications include Politics & the Internet in Comparative Context (with P.G. Nixon & D. Mercea) and Understanding E Government in Europe (with V Koutrakou and P G. Nixon 2010) He specializes in the impact of media on political agents in the modern era.

Arthur Riel is the Chief Enterprise Architect at the World Bank where he is responsible for the overall architectural framework for the Bank and the management of many technology initiatives. Arthur has worked with dozens of companies over a 30+ year period and is a published author/entrepreneur with original research dating back to 1988.

Kassandra Rothernstadt has a BA Honours in Communication studies and an MA in the same field from the University of Calgary, Canada. She is currently a researcher at iMINDS - SMIT while also pursuing her interdisciplinary PhD degree (Faculty of Communication sciences and Faculty of Philosophy and Morals Sciences).

Elena Sánchez-Nielsen obtained her Ph.D. degree in 2003 in Computer Science from the University of La Laguna. Since 2003, she has been associate professor in the University of La Laguna. She has over 10 years of experience working in projects related to e-Government and eParticipation. Her interests include intelligent systems, eGovernment, audiovisual contents and social media.

Ninoslava Savić is a lecturer at Higher School of Professional Business Studies in Novi Sad, Department of Informatics. She holds a B.A. in Mathematics from Novi Sad University and a M.Sc. in Information Systems from University of Belgrade. Her research interests are information society, e-business, information systems and methodologies for measuring e-development.

Laura Schina is Consultant at the Centro Cultura Innovativa d’Impresa – University of Salento providing functional support for the development of studies focused on the implementation of the user centric approach In Public Administrations. She worked as Consultant at Innova S.p.a. and was involved in activities related to the thematic networks in the eGovernment domain.

Shareef Shareef is a Software engineering lecturer, University of Salahaddin. BSc Physics, Mousel University, Iraq (1990). MSc Digital Communications Networks (2005), London Metropolitan University. Shareef worked in ICT Centre, Ministry of Higher Education and Scientific Research in Kurdistan Region, Iraq (2007). Shareef was a PhD student (2009) School of Architecture, Computing and Engineering, University of East London. Shareef researches E-government/cloud computing initiatives in developing countries. Published and reviewed conferences.

Vjaceslavs Sītikovs obtained Dr.sc.ing. in Technical Cybernetics from Riga Technical University in Latvia in 1982. His main research field is computer-assisted learning systems. He has thirty years experience of teaching in the field of computer science. He has participated in and has led a variety of projects related to improvement of study process.
Aelita Skaržauskienė is a Doctor of Social Sciences from ISM, University of Management and Economics in Vilnius, Lithuania. Applies both knowledge of management and modern leadership-correlated disciplines in her work, such as Business dynamics, Systems thinking, Chaos and complexity theories. Was the coach in Self-managing teams building project in European Parliament together with DEMOS Group Belgium

Anna Softerysik-Piorunkiewicz, PhD is employed at the University of Economics in Katowice as lecturers on Faculty of Informatics and Communication, at Department of Informatics. She is taking part in the research into computer science, systems analysis and computer system design, management information systems, e-business and public informatics.

George Sourmelis holds a MSc in e-commerce and a BSc in Information Technologies and Telecommunications. From 2008 he works as an IT advisor at National Business Registry of Union of Hellenic Chambers. He has teaching experience in e-commerce and requirements engineering. His research interests are in the areas of e-government, requirements engineering and system development cycle.

Dalibor Stanimirovic is a researcher in the field of Informatics in public administration. His research work has been published in several national and international journals. His general research interests include ICT in public administration, Enterprise Architecture, e-government, evaluation models and indicators of ICT projects, e-democracy and social dimensions of ICT policy.

Virgil Stoica, Ph.D.: Head of Political Science Department – Alexandru Ioan Cuza University of Iasi, Romania, Faculty of Philosophy, Social and Political Sciences; Courses taught: Public Policy, Public Administration, and Political Science Research Methods; Scientific research fields: e-government, public policies, local government, and political elites.

Klaus Stranacher He is working at the E-Government Innovation Center in Graz. His main topics are E-Government and IT-security. During his activities he participates in several European research projects. He was involved the pilot-project STORK and he was leading work-package 2 in the large-scale-pilot SPOCS. Additional he is working on his PhD-thesis on interoperability of electronic documents.

Sun Yueh Yun Graduate student in Department of Public Administration at National Chengchi University. Sun is interested in e-government/e-governance, ICT development. As a research assistant, has engaged in few research projects such as “A Performance Evaluation Model and Empirical Study of E-Governance” and “A New Business Model and International Collaboration Direction for Taiwan e-Governance Research Center.”

Jakob Svensson is Assistant Professor in Media and Communication studies at Karlstad University where he directs the MA program in Global Media and the BA program in Media and Communication Studies. He is also director of the research network HumanIT at Karlstad University. His research focuses on political communication from a participatory and civic perspective.

Dr. Gopikrishna Vasista Tatapudi is currently a Researcher at King Saud University, Riyadh, Saudi Arabia. He has former experiences in the field of IT as a programmer analyst in USA and as a senior Lecturer/Asst. Professor in academic field in the area of Systems and IT, E-Business and E-Governance.

Luiza Teixeira has a BA in Administration and M.A from Bahia’s Federal University in Local Power and Organizations, a specialist degree in Distance Education from Madrid’s National Distance Education University (UNED), is Assistant Professor at the State University of Santa Cruz (Bahia) and Doctorate student at Getulio Vargas Foundation’s Public Administration and Government Program.

Prof Alfredo Terzoli is the Head of the Telkom Centre of Excellence at Rhodes University and the Research Director of its equivalent at Fort Hare (South Africa). His areas of academic interest include e-services, ICT-for-development and wireless connectivity for marginalised areas. He is the leader of the Siyakula Living Lab and of Reed House Systems.

Slim Turki is a senior researcher at PRChenri Tudor. He holds a PhD in IS engineering. He has been involved in many national and international projects addressing multiple business sectors like e-government, financial and social services. He developed a solid experience in multi-actors systems modelling (goal, value, information), service analysis, design, re-design and compliance.

Nataša Veljković received the BSc and MSc degrees in computer science at the University of Niš, Serbia. She is currently working as a Teaching Assistant at Faculty of Electronic Engineering with the Department of Computer Science. Her PhD research is concerned with Sensor Web systems, E-systems as well as GIS.

Konrad Walser is a full time professor for information management at University of Applied Sciences Berne, Switzerland. He teaches in the following domains: E-Government, IT Governance, IT Servicemanagement. Konrad Walser holds a PhD in Busi-
ness Informatics of the University of Bern. His current interests are IT project governance, E-Government front offices and organizational optimization through ICT in the E-Government domain.

**Dr. Fang Wang** is a professor of Information Science in Business School of Nankai University, China. She got her Doctor’s degree from the Department of Information Management, Peking University in 2004. She was a Fulbright visiting scholar (2009-2010) at the National Center for Digital Government in UMASS Amherst, Massachusetts, USA. Her research field is e-government.

**Dr. Maria A. Wimmer** is a full professor and chair of research group, University of Koblenz-Landau, Germany. Research focus: e-government and e-participation (holistic design, enterprise architecture, conceptual modelling, ontology and knowledge management, procurement, standardisation and interoperability, stakeholder involvement, evaluation and measurement, policy development). PI and coordinator of EC-funded research, co-chair of IFIP EGOV

**Ewa Ziemba** is an Associate Professor of Economics at the University of Economics in Katowice, Poland. She received her Post Ph.D. in management with the specialization in management information systems. Her principal research areas are focused on information society, e-business and e-government, especially information systems and technology in knowledge-based economy.
The Roadmap to e-Democracy in Arab Spring Countries via Social Networks

Hany Abdelghaffar and Lobna Sameer
German University in Cairo, Cairo, Egypt
Hany.Ismail@guc.edu.eg
Lobna.Sameer@guc.edu.eg

Abstract: Electronic democracy has been in use in many countries around the world with mixed success. With the power of the web 2.0 technologies, there are more opportunities to enhance the democratic process through the use of social networking tools. Social networks showed potential for facilitating democracy and democratic change during the Arab spring revolutions, suggesting that they could be utilized as an e-democracy tool. This research proposed a new model of how the decision making process for local governments in Arab spring countries could be improved via social networks. Quantitative approach was used to investigate how the use of a social network amongst people living in the same suburb could improve decision-making on the local level. Findings showed that awareness building, deliberation and consultation factors could be used to affect the decision making for their local governments.

Keywords: e-democracy, social networks, decision making, Arab spring

1. Introduction

Electronic democracy (e-democracy) is a way to engage citizens and politicians with their government through Information and Communication Technology (ICTs) (Riley and Law, 2003). Its main objective is to change citizens from being passive to become active and to engage in the democratic processes in their governments (Lee and Berry, 2011). Recently citizens in the Arab spring areas, specifically in Egypt, demonstrated how the different ICTs could be used as tools of democracy and political change. Protestors used social networking sites, mobile phones and text messaging to bring about change in their countries (Arthur, 2011; Shenker, 2011).

Web 2.0 is one of the technologies that could potentially have an impact on achieving e-democracy (Chadwick, 2008; Hull et al, 2010). The different web 2.0 technologies such as social networks, wikis, and blogs are available for governments to interact with citizens for very cheap costs (Hull et al, 2010). Nevertheless; some governments lack the motivation to adopt new web 2.0 technologies. On the other hand, citizens are moving from using the traditional bureaucratic means of information sharing to use new web 2.0 technologies such as social networks. This movement towards the use of social networks is hard for governments to control (Murugesan, 2007). Social networks help people to group their opinions and improve the public policy decision making which will lead to improving the democratic process and to reshaping public services (Chadwick, 2003; Flak et al, 2005).

This paper is presenting a model of how governments can use social networks to improve their decision-making and consider citizens’ opinions in decision making on the local level. Accordingly, the paper is aiming to answer the following research question: How social networks support the local government decision making to enhance e-democracy? The paper structure starts by presenting the theoretical background for understanding e-democracy followed by proposing the suggested e-democracy model. This is followed by the methodology used in research and ended by the discussion section.

2. Theoretical background

E-democracy is about how citizens add to the decision making process of their governments through the use of the ICTs. It could be treated as a tool or a mean of providing a system that empowers citizens to say their opinions regarding government issues (Mahrer and Krimmer, 2005). Several benefits could be achieved from e-democracy. It enhances participation and inclusion of citizens in the political life (Riley and Law, 2003; Thomas and Streib, 2005). Citizens can have their input into the decisions made by their government which shifts the communications methods from one way of communications to become a two way (Stahl, 2005).

There are different classifications of e-democracy (Paivarinta and Saebo, 2006). Partisan e-democracy is one of the e-democracy classifications that focuses on the implicit and embedded citizen participation and contribution in the decision making process. Another type is the direct e-democracy which focuses on how the
network-based groups takes over or replaces traditional institutions that could lose their power against the network-based groups. Liberal e-democracy occurs when citizens participate in the decision-making processes with agendas that have been set by the government itself. Finally, deliberative e-democracy considers that both citizens and government are connected in the decision-making processes. Accordingly, politicians and citizens share their ideas in a dialogue and thus can form a shared political opinion. Deliberative e-democracy represents a perfect model for e-democracy as the co-operation between citizens and politicians represents and explains the display of power for both sides.

Williamson (2007) explains the lifecycle of e-democracy and how it emerges and develops in a society. In his model, Williamson identified a group of different users with different roles who will map the e-democracy lifecycle. There are four primary roles that could be played by actors or citizens in the e-democracy lifecycle: reformer, rebel, citizen, and change agent. These four roles are very important in order to sustain and ensure social movements to e-democracy. An efficient social movement to have a functional electronic democracy system will require responsible citizen. The rebels have the power and the willingness to protest against founded policies while change agents are put in place in order to educate and organize the public to become fully aware of the changes. In order to complete the system, we are in need of reformers who will have to integrate ideas (Williamson, 2007).

The e-democracy lifecycle model is not limited to identifying the actors' roles only, but it introduced five stages of change to be able to adopt a successful e-democracy system (figure 1).

- **Stage 1**: pre-contemplation, in which the person will not be aware to how extent this change will be needed.
- **Stage 2**: the contemplation stage, in which there will be some awareness of the change, is necessary and should occur.
- **Stage 3**: the preparation at which the people become receptive to the change that will occur.
- **Stage 4**: the action stage occurs when the people are engaged in the change processes as the change will be taking place.
- **Stage 5**: finally, the maintenance stage at which the change has been complete and looking for new ways to maintain it is in progress.

![Figure 1: E-democracy life cycle (Williamson, 2007)](image)

Applying e-democracy differs greatly from developed to developing countries. In developing countries, for example, the digital divide is an issue that could negatively affect the success of e-democracy (Coldow, 2004; Riley, 2003). The Internet reach in many developing countries ranges from 1% to 5% of a country’s population (Riley, 2003). Consequently, when citizens don’t have the same computer literacy skills or Internet access
3. Research proposed model and hypotheses development

Reviewing the literature shows that there is almost no research conducted on the use of social on improving e-democracy on the local government level and its impact on improving decision making. To overcome this gap, this research answers the following question: How social networks support the local government decision making to enhance e-democracy? Accordingly, a conceptual model is introduced (figure 2) which is based on the e-democracy lifecycle model developed by Williamson (2007). List of constructs and definitions are listed in table (1).

![Figure 2: Proposed conceptual model](image)

### 3.1 Information provision

The first area of e-democracy is information provision. Information provision is the use of internet applications by the government in a top-down approach to provide citizens with important information (Paivarinta and Sæbo, 2006). A citizen that is well informed is able to holistically see and understand the problems government could face and is better able to develop solutions for the government and effectively participate in its decision making process (Irvin and Stansbury, 2004). The effect of information provision would be evident during the pre-contemplation and contemplation stages, where citizens realize the problems in their society and start searching for solutions. Social network, as web 2.0 tool, is considered to be a powerful internet tool that allows users to access government information (Murugesan, 2007). It is flexible which allows the government to customize the look and layout of their page with text and rich media contents that help citizens to understand the pushed information to them (Cormode and Kirshnamurthy, 2008).

Using social networks help citizens to follow the information updates provided by the government without having to log into several governmental websites. Not only this, but the government has the ability to tag the content of the pages allows for the categorization of pages, photos and videos, making it easy for users to find information relevant to the keywords they are searching for (Murugesan, 2007). The content creator on the social network can publish the content to subscribers on different web 2.0 websites, and then this information is pushed to citizens or pulled by them in different ways. Therefore, social networks would be a good tool for information provision to citizens as governments could easily update their pages online with the information
they see important and citizens could get automatically notified with the updates making it more likely that they would read the updated information. Based on this, we posit the following hypothesis:

\[ H1: \text{Information provision via social networks significantly influences the local government decision making.} \]

3.2 Deliberations and consultations

The second and third factors in the proposed model are deliberations and consultations. Deliberation is the use of ICT for political discussions between citizens themselves which helps into making citizens more involved in the community and its problems as well as in forming the public opinion (Dahlberg, 2001). Consultation is similar to deliberation; however the government or other organizations takes an official role in the discussion over the internet. Deliberation is exercised by all the actors in the society and is not limited to a certain group of people. It is highly present through all the stages of changes presented by Williamson (2007) and it has a major rule in moving the society through the change stages.

The features of social networks would allow for deliberations. Social networks provide social interaction and collaborative abilities (Murugesan, 2007). Users are not only able to read the contents on the social network, they are also able to write their comments (Breindl and Franq, 2008; Murugesan, 2007). Such interactivity enable citizens to collectively create and discuss content with each other (Chadwick, 2008; Hull et all, 2001). By its nature, a social network gives citizens equal rights for freedom of speech where no one can force unwilling citizens to participate or twist their stated opinions (Hull, et all, 2011). Deliberations and consultations would be conducted on separate forums and discussions boards created on the social network which would be conducted on the individual pages of the social network members. These deliberations and discussions are expected to come up naturally after citizens have been provided with information that they would feel the need to discuss it together, consequently we can say that deliberations are not contradicting with the governments’ provision of information, but rather that information provision might lead the citizens into new deliberations.

Citizens who are using social networks could get in touch with any other citizen, including public figures such as politicians (Mislove et al, 2007; Pena-Lopez, 2010). Even more, these public figures could get in touch with citizens and consult them in matters of importance. It is thought that, if citizens are willing to participate in deliberations over a social network, they are more likely to take part in consultations sponsored by the government. Hence, we hypothesize that:

\[ H2: \text{Deliberation via social networks significantly influences the local government decision making.} \]

\[ H3: \text{Consultations via social networks significantly influences the local government decision making.} \]

3.3 Communities building

Community building is concerned by the collaborative work of citizens to form a unified community that has a common set of interests and supports a shared goal (Paivarianta and Sæbo, 2006). The government is usually better able to take decisions when it can easily assess the opinion of different groups they govern (Irvin and Stansbury, 2004). Social networks allows for the creation of communities for people who already have common interests and goals (Birdsall, 2007; Murugesan, 2007). Community building is essential before the action stage of social change towards e-democracy. It is important that the community should be well organized and collaborated before starting action movements on ground.

Social networks especially is one of the most suited tools for community building as these tools allow for collaboration between users horizontally or as equals which eliminates any hierarchies that might inhibit the community creation process. Communications between the community members are done using different form such as text, audio, and video (Birdsall, 2007). These features of social networks makes this research assumes that the use of a social network in e-democracy would lead to forming of community or interest groups that have common interests and opinion. Hence, we hypothesize that:

\[ H4: \text{Community building via social networks significantly influences the local government decision making.} \]
3.4 Campaigning and awareness building

ICT could be used by government organizations for campaigns to achieve certain goals such as organizing election campaign and increasing awareness of a certain issue (Paivarinta and Sæbo, 2006). Since social networks allow for two way communications between the campaign organizers and the public, and vice versa, it can be an effective campaigning tool in elections (Williams and Gulati, 2007). Activists believe that the features of social networks would make campaigning cheaper and more effective (Williams and Gulati, 2007). Obama’s presidential campaign in 2008 is a clear example of how he used the internet and specifically social networks in campaigning. Social networks such as MySpace, Facebook, and Youtube were utilized in connecting with the public, seeking volunteers and better organizing the activities of the campaign (Kes-Erkul and Erkul, 2009).

Social networks campaigns and awareness building activities have especially shown a transformational role of the society. The Arab spring revolutions in 2011 emphasize the importance of campaigning and awareness building via social networks (Lotan, et all, 2011). Social networks illustrated their reach amongst citizens and how they helped in changing the political system in several countries. For example, Facebook and Twitter had a strong influence on grouping protesters during the Egyptian revolution in 2011 (Lotan, et all, 2011; Timeline, 2011) that forced the Egyptian government to cut down the Internet connection to minimize the influence of the social networks on citizens (Timeline, 2011). Based on this, we can conclude that campaigning and awareness building are essential during the contemplation and action stages of change. For instance, in the Egyptian revolution, any successful change required good campaigning in the contemplation stage which should continue at the action stage to make sure that the actual action on ground is matching its goals.

Since social networks have already shown a great impact in organizing campaigns and change, this research proposes that the use of social networks would have massive impact in campaigning and awareness for the community. It is assumed that citizens would be willing to use social networks in organizing social campaigns related to local political matters. Hence, we hypothesize that:

**H5: Campaigning via social networks significantly influences the local government decision making.**

**H6: Build awareness via social networks significantly influences the local government decision making.**

Table 1 below: presents each of the variables measure through the developed hypothesis and their definition.

**Table 1: Constructs summary**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Provision</td>
<td>- provision of laws, regulations, issues of interest etc online&lt;br&gt;- takes a bottom approach from government to citizens</td>
<td>Coleman and Norris, 2005&lt;br&gt;Riley and Law, 2003&lt;br&gt;Williamson, 2007</td>
</tr>
<tr>
<td>Awareness Building</td>
<td>- Political awareness in general.&lt;br&gt;- Awareness of local issues.</td>
<td>Williamson, 2007</td>
</tr>
<tr>
<td>Deliberation</td>
<td>- Discussion of political matters amongst citizens</td>
<td>Chadwick, 2003&lt;br&gt;Riley and Law, 2003&lt;br&gt;Williamson, 2007</td>
</tr>
<tr>
<td>Consultation</td>
<td>- government’s discussions of matter of concern with the citizens&lt;br&gt;- initiated by the government&lt;br&gt;- aims at helping the government with taking a decision regarding the issue at discussion</td>
<td>Kersten, 2004&lt;br&gt;Caldow, 2004&lt;br&gt;Williamson, 2007</td>
</tr>
<tr>
<td>Campaigning</td>
<td>- citizens ability to organize themselves&lt;br&gt;- citizen’s ability to mobilize themselves in the service of a certain cause</td>
<td>Coleman and Norris, 2005&lt;br&gt;Päiväranta and Sæbo, 2006&lt;br&gt;Williamson, 2007</td>
</tr>
<tr>
<td>Community building</td>
<td>- The ability of citizens to build communities amongst themselves&lt;br&gt;These communities share a common set of values, causes or ideologies</td>
<td>Paivarinta and Sæbo, 2006&lt;br&gt;Birdsall, 2007&lt;br&gt;Murugesan, 2007</td>
</tr>
</tbody>
</table>
4. Methodology

The proposed model was tested to answer the research question of how social networks could support the local government decision making to enhance e-democracy. A survey method was employed to collect data from citizens. Egypt has been selected for investigation which is considered as a good example of a Arab Spring country where social network such as Facebook and Twitter had great impact on the success of the Egyptian 25th January revolution in 2011 (Timeline, 2011). Moreover, citizens after the revolution have become more active in the political life and share their opinions online.

Prototype

In order to make it easier for citizens to understand how social networks work, a prototype of social network has been created to allow citizens to visualize the social network. The website that has been developed for the demonstration of the suggested social network was created using “wordpress” open source Content Management System (CMS) and necessary “plugins” were added to improve the functionality of the network.

Sample and Instruments design

Since the research investigating the impact of social network on enhancing the e-democracy, therefore, participants should be able to use computers and the internet. Accordingly, the survey was distributed online to Egyptian internet users to ensure that the respondents have digital literacy.

Only 24% of Egypt’s population (19.2 million) during the time of the study had stable internet access, mostly through internet cafés, internet clubs, or mobile phones (Arthur, 2011). The sample consisted of citizens above eighteen years old as this is the minimum age for voting in Egypt. A total of 150 participants successfully completed the questionnaires which were used in the analysis. Questionnaires were divided into several sections. Each of these sections measured a different variable of the proposed model through Likert scales.

Table 2: Demographic description of the sample

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Less than 18</td>
<td>5.3%</td>
</tr>
<tr>
<td>18-30</td>
<td>70.7%</td>
</tr>
<tr>
<td>31-45</td>
<td>17.3%</td>
</tr>
<tr>
<td>Above 45</td>
<td>6.7%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>44%</td>
</tr>
<tr>
<td>Female</td>
<td>56%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>40.7%</td>
</tr>
<tr>
<td>Bachelor</td>
<td>44.7%</td>
</tr>
<tr>
<td>Master</td>
<td>10%</td>
</tr>
<tr>
<td>PhD</td>
<td>4.7%</td>
</tr>
<tr>
<td>Internet usage</td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>92.7%</td>
</tr>
<tr>
<td>Weekly</td>
<td>5.3%</td>
</tr>
<tr>
<td>Rarely</td>
<td>2%</td>
</tr>
<tr>
<td>Social network effectiveness in</td>
<td></td>
</tr>
<tr>
<td>communication</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>96.7%</td>
</tr>
<tr>
<td>No</td>
<td>3.3%</td>
</tr>
<tr>
<td>Political usage of Internet</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>94%</td>
</tr>
<tr>
<td>No</td>
<td>6%</td>
</tr>
<tr>
<td>Political participation on ground</td>
<td></td>
</tr>
<tr>
<td>Participated in both the referendum</td>
<td>72%</td>
</tr>
<tr>
<td>and elections</td>
<td></td>
</tr>
<tr>
<td>Participated in only one of them</td>
<td>11.3%</td>
</tr>
<tr>
<td>Did not participate at all</td>
<td>16.7%</td>
</tr>
</tbody>
</table>

Demographic data

Respondents’ demographics profile included information about age, gender, income level and educational levels presented in table (1). 71% of the participants were from age 18-30. 44% of respondents were females while 56% were males. Regarding the internet usage, access, and familiarity with the Internet and social, 92.7%
of respondent used the internet daily. 96.7% of the respondent answered that they see the internet an effective tool of communication with the government and with other citizens.

When it comes to the political awareness and political participation of the surveyed participants, it was found that 94% of the respondents agreed that they used the internet to follow political news and contributing with their opinions. Furthermore, 96% of respondents agreed on the impact of the social network as a tool of communication between citizens. 72% of the respondents have participated in both the referendum on the constitutional amendments in 2011 and the parliamentary elections in 2012.

5. Analysis and results

Validity and Reliability

The composite reliability of each construct was assessed using Cronbach’s alpha. A reliability coefficient of 0.70 is marked as a lowest acceptable limit for Cronbach’s Alfa (Robinson et al, 1991). The calculated Cronbach’s Alpha for this research is equal to 0.862.

Convergent validity has been used to check validity which shows that there is a significant correlation and relation among all dimension and sub factors. The correlation was high as shown in table (3), which is an evidence of a convergent validity. All the independent factors are significant at level 0.05. Discriminant validity is assessed to measure the extent to which constructs are different. To evaluate discriminant validity, the AVE is used. All constructs have an AVE of at least 0.5 (Fornell & Larcker, 1981) and all the square roots of each AVE value are higher than the off-diagonal correlation elements.

The table 3 presents the correlations between the different factor and each other and decision-making. As a result of the correlation, all factors are at a positive direction meaning that the decision making is affected by each factor.

Table 3: Correlation analysis

<table>
<thead>
<tr>
<th>Decision Making</th>
<th>Campaigning</th>
<th>Information Provision</th>
<th>Deliberation</th>
<th>Consultation</th>
<th>Awareness Building</th>
<th>Community Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision Making</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campaigning</td>
<td>0.580</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Provision</td>
<td>0.396</td>
<td>0.422</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliberation</td>
<td>0.245</td>
<td>0.343</td>
<td>0.526</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consultation</td>
<td>0.612</td>
<td>0.524</td>
<td>0.461</td>
<td>0.318</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Awareness Building</td>
<td>0.657</td>
<td>0.649</td>
<td>0.547</td>
<td>0.463</td>
<td>0.706</td>
<td>1</td>
</tr>
<tr>
<td>Community Building</td>
<td>0.569</td>
<td>0.589</td>
<td>0.440</td>
<td>0.302</td>
<td>0.482</td>
<td>0.601</td>
</tr>
</tbody>
</table>

Since multicollinearity might exist in regression analysis and negatively affects the predictive ability, computing the variance inflation factor (VIF) of each variable might help to detect multicollinearity (Myers, 1986). If the VIF of an explanatory variable exceeds 10, the variable is considered to be highly collinear and it can be treated as a candidate for exclusion from the regression model (Kleinbaum, et al., 1988). Findings show that VIF range from 1.98 to 2.56 suggesting that multicollinearity is not an issue with this data set.

The multiple regression analysis has used to test the hypotheses. The R calculated through the regression analysis table (2) is equal to 0.733, R Square 0.537 as presented in table (4). The regression test notes that there is a positive strong relationship between the independent and the dependent variables. Any change in the independent variable would affect the dependent variable in the same direction and in a certain degree.
The R value is above 0.5 meaning that there is a high probability that any changes in the independent variable would affect the dependent variable by 73% change.

Table 4: Regression analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.733</td>
<td>0.537</td>
<td>0.518</td>
<td>2.08089</td>
</tr>
</tbody>
</table>

6. Discussion, recommendations and limitations

Social networks such as Facebook and Twitter played a vital role in the Egyptian revolution and almost all of the Arab spring revolutions. During the uprisings, protesters organized themselves mainly through the use of such networks and through mobile phone SMSs (Arthur, 2011). In hopes of controlling the uprisings in Egypt, the government cut down internet and mobile phone services completely for few days (Arthur, 2011; Shenker, 2011). When the services were back again, the government in vain used mobile SMSs as a counter weapon and sent anti-revolutionary messages in hopes of controlling the protestors (Shenker, 2011). These events demonstrate how the protestors were able to utilize social networking to enforce democratic change, and raises the question on wither social networks could become a governmental tool to improve democracy in any country.

This paper proposed a hypothetical model to investigate how social networks could be used by governments to support decision making on the local government level, and to enhance the e-democracy process. The research provided a theoretical contribution by validating the proposed model. Findings confirmed that awareness building ($\beta=0.657$, $p<0.05$) is the highest independent factor that significantly affect the local government decision making. Respondents thought that the use of social networks to spread awareness of political issues would help the decision makers in their decisions. The explanation is that when citizens are aware of their local issues, they are able better to form a precise opinion and exercise political pressure on the decision maker. Respondents believed that consultation ($\beta=0.612$, $p<0.05$) would improve the local decision-making as the government could ask citizens for their input on a certain issue and consequently would be used to form a decision.

While study participants believe social networks could facilitate the organization of campaigns ($\beta=0.580$, $p<0.05$) as is also practically evident in the use of social networks for organization and communication during the Arab springs revolutions (Arthur, 2011), they also believed virtual campaigning would not have much effect on local decision making if it is not successfully transferred from the virtual world to real life. Community building is thought to affect local decision making ($\beta=0.569$, $p<0.05$). When citizens form communities and unify their opinion in some major directions, it makes it easier for them to channel their opinions to the government. Accordingly, the government would be able to expect and analyze the opinions of each of the communities they govern and thus would be able to make better decisions.

The variable that have the most insignificance impact on decision-making is deliberation ($\beta = 0.245$, $p=0.791$). Respondents agreed that the use of a social network to debate on matters of interest with other citizens is of the least importance to decision-making. This is because deliberation allows discussion members to argue about different viewpoints without a mechanism to facilitate reaching a final decision that could then be communicated to the government. Respondents believed that information provision ($\beta = 0.396$, $p=0.665$) from the government to the citizens would not influence the decision making of the government. The reason is that the simple act of providing information could be faced by a passive reception by citizens and this it would not affect decision making. On the other hand, information provision is significantly correlated with awareness building as sharing information is essential to build awareness which is a factor that can significantly affect decision making.

Recommendations

The research suggests recommendations for politicians and practitioners for the effective use of social networks in local e-democracy. Social networks could be used by governments to improve the e-democracy process on the local government level which would improve their decision making. Consequently, this would lead to reducing the gap between government decisions and citizens’ expectations. Governments could use social networks to facilitate increase awareness of vital issues among citizens and support citizens in building
their communities so they have more input in the governmental decision making. It is important to consider that social networks should be free of government surveillance so the citizens can freely share their opinion even if they are opposing the government. Since not all citizens are using social networks, it is crucial for politicians and governments to keep in mind the opinions of the other groups that might be unrepresented on the social network due to inhibiting factors such as the digital divide.

Research limitation

Although this research surveyed internet users in Egypt, the sample size is considered limited and could be expanded in future research. The study only examined the perspective of citizens on the use of a social network to improve the decision making of their local government. However, there is a greater need to investigate the government’s opinion regarding involving citizens in the decision making process.

7. Conclusion

More and more citizens have been asking to be given the chance to participate in the decision making of their governments. The Arab spring revolutions demonstrated the revolutionary rule of social networks could have. The use of the internet technology and social networks during these revolutions offered an excellent opportunity to enhance the democratic process of how citizens could participate in decisions. This research proposed a model that investigates how social networks could be used to support the local government decision making to enhance e-democracy. Findings show that awareness building, deliberation and consultation could be used by citizens to affect the decision making for their local governments. Moreover, governments could use social networks to facilitate awareness of information among citizens and support citizens in building their communities. Citizens also believed that the use of a local social network can improve the decision making of local government.

References


Pinkett, R (2000). Bridging The Digital Divide: Sociocultural Constructionism And An Asset-Based Approach To Community Technology And Community Building. Proceeding of the 81st annual meeting of the American educational research association (AERA).


Case Study of the Implementation of Business Process Management in Public Administration in Germany, Switzerland and Austria

Norbert Ahrend¹, Konrad Walser² and Henrik Leopold¹
¹Humboldt-Universität zu Berlin, Unter den Linden 6, Germany
²Bern University of Applied Sciences, Morgartenstraße 2a, Bern, Switzerland

norbert.ahrend@hu-berlin.de
henrik.leopold@wiwi.hu-berlin.de
konrad.walser@bfh.ch

Abstract: In the private sector business process management is a common and well-established practice. In the public administration in Europe, this does not hold true to the same degree. However, currently we observe some considerable challenges. Important keywords such as eGovernment, networking, interoperability, compliance and governance and their relation to the administration processes are getting increasing focus. As a result, process management is gaining importance in public administration, especially where the execution of business activities or electronic integration of the process handling is concerned. However, many insights about the successful implementation of process management cannot be directly transferred to public authorities, as there exist important differences to the private sector. For instance, traditional process reengineering approaches cannot be applied in public authorities due to the legal and political conditions. Further, public authorities often face other challenges than industrial enterprises. The wide range of services which are typically offered by public authorities represent a particular challenge in this context. Hence, this paper focuses on the different implementation strategies of BPM in public administration. We investigated and compared the approaches to business process management in the public administration of three countries, namely Germany, Switzerland, and Austria. We conducted 13 interviews in the respective countries and examined the different ways in which these countries handle process management. The goal of the paper is to provide insights on how process management can be successfully introduced in public authorities. As there exist almost no insights on the implementation of process management in public authorities, our findings represent a first step towards a solid understanding of how BPM can be successfully brought to public authorities.

Keywords: business process management, public administration, BPM strategies, success factors

1. Introduction

Nowadays business process management (BPM) and business process modeling are well-established practices in the private sector (Ahmad et al. 2009). However, considering the public authorities in Europe, it turns out that the process orientation in the public administration is still in its early stages. Nevertheless, due to new demands and budget cuts at the same time, business process management is also gaining more and more importance in public authorities (Becker et al. 2006).

While some insights about the successful implementation of process management might be directly transferred to public authorities, there are also some important differences, which need to be taken into consideration. First, the legal and political conditions in public authorities often prohibit the application of traditional process reengineering approaches as for instance proposed by Hammer and Champy (Hammer and Champy 1993). Second, the specific challenges in public authorities partially significantly vary from those in industrial practice (Palkovits et al. 2003; Scott et al. 2004). Taking for instance a look at the service portfolio of municipalities, there are more than 1000 interconnected and interdependent service processes (Becker et al. 2006). Hence, the overall question is how BPM can be successfully implemented in the context of public administration.

Accordingly, the goal of this paper is to shed some light on the question how BPM can be successfully taken to public authorities. Building on prior work (Ahrend et al. 2012), our contribution is a list of success factors resulting from the comparative analysis of three case studies from Germany, Switzerland and Austria. As there are, to our knowledge, almost no insights on the successful implementation of BPM in public administration, we consider our findings to be an important first step towards a solid understanding of implementing BPM in the public authorities.
Norbert Ahrend, Konrad Walser and Henrik Leopold

The rest of the paper is structured as follows. Section 2 gives an overview of our research methodology and explains the data collection procedure. Section 3 presents the actual comparative analysis of the three case studies. Section 4 discusses the implications of our work before Section 5 concludes the paper.

2. Methodology

This section introduces the methodology of our research. In Section 2.1 we explain the general design and data collection. In Section 2.2 we systematically derive the criteria for the comparative analysis.

2.1 General design and data collection

The research method of our work is a comparative analysis based on a multiple case study design. In general, case studies allow the researcher to investigate a phenomenon within its real-life context (Yin, 2009). The advantage of multiple case studies is possibility to additionally gain insights from the comparative analysis of the cases.

For the data collection we conducted interviews with different employees of public authorities in the respective countries. In total we conducted 13 interviews: six in Germany, five in Switzerland and two in Austria. In each country we included employees from different positions to avoid biases resulting from a particular viewpoint. In the six interviews from Germany, we interviewed three clerks from municipalities and federal authorities, two lower authority managers, and one top manager. In Switzerland we interviewed two clerks from municipalities and federal authorities, two lower authority managers, and one top manager. In Austria we interviewed two top managers.

Table 1: Overview of conducted interviews

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>Switzerland</th>
<th>Austria</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of interviews with clerks</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>No. of interviews with lower managers</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>No. of interviews with top managers</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total No. of interviews</td>
<td>6</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

For the analysis of the interviews we used the qualitative content analysis as described by Mayring (Mayring 2007).

2.2 Derivation of comparison criteria

For the derivation of suitable comparison criteria, we investigated literature on BPM in public administration. In this context the so-called system models are of particular interest as they deal with the question how BPM can be positioned in public administration (Becker et al. 2012).

Building on the insights from (Traummüller and Wimmer 2005) and (Schaffroth 2012) the administration (process management) can be represented as a system - with input and output (see Figure 1). The input usually comes from the suppliers (private sector or other administrations) or customer requests by means of forms. The output typically takes the form of bilateral service exchanges between the customer and administration. The elements of the BPM system, which is determined by the input and output as well as by the system limits, respectively exist on each organizational level of the administration, such as German Federal Government/federal states/local authorities. The division of tasks between these elements and the relationships are clearly defined in accordance with the constitution, legislation, and directives (subsidiarity). These determine the tasks of the administration, which can in turn be accessed through services. From a technological point of view, this system includes methods, tools (for the BPM as well as for the technical implementation of business processes) that are in turn used by the administrative units. The system of process management in turn is determined by means of external factors: Politics, market, justice system.
From the presented system we can derive certain comparison criteria for the case studies at hand. Adding a consideration of the remaining challenges, we will focus on the following five criteria:

- Framework conditions (politics, justice system, culture and market)
- Input variables
- Methods and standards
- Tools (modeling, application and implementation tools for process management)
- Challenges

In the following, we will use these criteria for analyzing and comparing the three case studies from Germany, Switzerland and Austria.

### 3. Comparative analysis of case studies

In this section we present the results from the comparative analysis of the three case studies. Table 2 provides a first overview of the cases based on the comparison criteria we derived in Section 2.2. In the remainder of this section we will elaborate the details of the comparison. Therefore, we will discuss each comparison criterion in detail.

#### 3.1 Framework conditions

In general, it can be stated that BPM has reached the practice in public administration. The diffusion is not very high yet, but various initiatives are in progress on all federal levels in all of these countries.

Overall, the framework conditions in the investigated countries can be considered to be rather similar. In all three countries we observe a federal structure of the administration. Although Switzerland is based on consensus-oriented democracy, the structure of the public administration is similar to Germany and Austria. However, the size of the overall population in Switzerland cannot be denied as an influencing factor. In Further, in
Austria the federalism is less strict since the autonomy of the federal levels is a bit smaller than in Germany or Switzerland.

Table 2: Overview of the investigated cases

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Germany</th>
<th>Switzerland</th>
<th>Austria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framework Conditions</td>
<td>Federal decision making / strict separation of economy and administration / only beginning partnerships</td>
<td>Federal decision making / direct democratic Partnership between economy and administration Consensus-oriented culture</td>
<td>Federal decision making / strict separation of economy and administration / only beginning partnerships</td>
</tr>
<tr>
<td>Input Variables</td>
<td>Predominantly paper-based</td>
<td>Predominantly paper-based</td>
<td>Comprehensive electronic inputs via ELAK system (Elektronischer Akt)</td>
</tr>
<tr>
<td>Methods &amp; Standards</td>
<td>No BPM guidelines BPM</td>
<td>eCH standards</td>
<td>No BPM guidelines / orientation towards technical implementation</td>
</tr>
<tr>
<td>Tools</td>
<td>Adequate tool support for current maturity level</td>
<td>Adequate tool support for current maturity level</td>
<td>High level of integration with respect to technical infrastructure</td>
</tr>
<tr>
<td></td>
<td>Interorganizational exchange platform available</td>
<td>Broad acceptance of standards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tool is deployed (yet no or minor standardization)</td>
<td>Interorganizational platform is prepared</td>
<td></td>
</tr>
<tr>
<td>Challenges</td>
<td>BPM initiative is either driven by business or IT / but no sufficient interlocking of business and IT Externalization of process knowledge</td>
<td>BPM initiative is either driven by business or IT / but no sufficient interlocking of business and IT Externalization of process knowledge</td>
<td>BPM initiative is strongly driven by technology / no sufficient interlocking of business and IT Externalization of process knowledge</td>
</tr>
</tbody>
</table>

Nevertheless, all in all, we did not observe a significant impact of the framework conditions. Although the framework conditions are similar, the current implementation of BPM is rather different. Consequently, we may conclude that the opportunities resulting from the local conditions are realized to a different extent. For instance, in Germany the federal structure of the public administration is frequently used as justification for the current state of affairs and thus is one of the most significant de facto obstacles for a faster implementation of the BPM approach. Although Austria and Switzerland have similar conditions, we did not encounter such problems in these countries.

Nevertheless external factors act on the system and can cause an acceleration of the implementation of the BPM approach. The German Federal Government and the federal states have set themselves significant consolidation targets by means of the Schuldenbremse (debt brake); this means the administrations have to slim down considerably. This can only be achieved by means of automation of the business processes (among other measures). The European financial and debt crisis is likely to accelerate this process even further. Simultaneously, the demographic developments in Germany are creating an enormous pressure to preserve the expertise of employees who leave the organization. This expertise can be preserved in process modules, with the additional benefit that this creates a basis for redesigning the processes, if this should become necessary. Comparable measures for reducing the reducing the overall administration costs are also taken in Austria and Switzerland.

In all of these three countries, the approaches in part also have political backing. This has to be strengthened in future, as the political support and the support of the management of the administrative units are central success factors for the introduction of BPM. Since the introduction of BPM is always accompanied by significant changes in culture and operational procedures, the implementation of BPM should be understood as part of a huge change process. As frequently reported in literature on change management (e.g. Hiatt and Creasey, 2003), this again emphasizes the importance of a strong management support.

3.2 Input variables

Input variables are an integral and important factor in the BPM system model as they represent the starting point of every process. Moreover, they may have significant implications for the execution of the process. The processes in the administrations of Germany and Switzerland are predominantly initiated by paper-based input variables (which are also referred to as process data). Hence, the data must be digitalized for further process-
Norbert Ahrend, Konrad Walser and Henrik Leopold

By contrast, Austria uses the ELAK system for electronically initiating and executing their processes. As a result of the central storage of input variables, interorganizational processes can be efficiently designed and executed.

3.3 Methods and standards

The most significant differences can be found in the form and procedures of the standardization. Germany is pursuing the path of first setting up a process exchange platform and hoping that standardization (with regard to notation) will slowly but surely occur in consequence. This strategy could be successful, solely on account of the power of accomplished facts. Facts are for example created by the Nationale Prozessbibliothek (National Process Library), which is in an advanced state of completion. The initiators of this endeavor are aware of the fact that standardization is unavoidable in the medium or long term. However, the intention is to let this standard take shape in an open process in which suitable methods and tools for the different aspects of the process management can establish themselves. Nevertheless, concerning the modeling notation, there has been an attempt on the level of local authorities to establish a common standard called FAMOS.

Switzerland chose to build on standardization by introducing the so-called eCH standards (see www.ech.ch). The eCH standards for business process management are divided into a framework, descriptive standards, reference directories and help documents. It has to be emphasized that eCH has specified BPMN 2.0 as descriptive language. The tools for BPMN use have not been standardized. Starting with the eGovernment strategy of Switzerland as a basis, the focus has been placed on customer-oriented governance. This means that the private business sector can conduct all communication with the authorities electronically; the authorities communicate with each other electronically; the general public can conduct important formalities with the authorities electronically (E-Government Strategie Schweiz 2007-2011). In the so-called prioritized eGovernment projects, the BPM standards are also used almost exclusively. With this approach, Switzerland has succeeded in setting up a BPM ecosystem. However, this cannot be considered to be equal to a successful implementation of the BPM approach. Instead, it provides the prerequisites for achieving organizational changes towards process orientation within the administrative units themselves. From the current point of view, this seems to be a very slow process.

![Figure 2: BPM ecosystem, in account with eCH-0138 (Schaffroth 2012)](image)

In Austria the administration has the opportunity to enforce process standardization via regulations. Accordingly, for the purpose of concretizing general laws, process definitions are integral part of regulations. In addi-
tion, Austria continuously builds up competence centers for maintaining, and also modeling support processes. Consequently, these centers are in charge of process management and also of the roll out of specific support processes as for instance IT services.

3.4 Tools

All three countries maintain different tools for supporting the BPM initiatives. Germany has introduced a so-called National Process Library (NPB). It is the first attempt at implementing a comprehensive cross-institutional and cross-level approach. A conscious decision was made not to enforce (standardized) restrictions with regard to tools or methods, in order to make sure that at least this aspect does not restrict the exchange of process expertise. The initiators of this endeavor are aware of the fact that standardization is unavoidable in the medium or long term. However, the intention is to let this standard take shape in an open process in which suitable methods and tools for the different aspects of the process management can establish themselves. In this context the xProess interface of XOV (project for standardization of XML in public administration) deserves special mention. This interface makes it possible to integrate existing and future registers (for example, there are plans for connecting the federal state of Saxony and its process library to the NPB). Furthermore, all BPM tool manufacturers in the German-speaking region will implement this standard and integrate it into their tools. Through the bidirectional usage options for tools and manufacturers that this offers, the establishment of the BPM approach in public administration is supported significantly.

Now, after the first wave of standardization, Switzerland is following a logically consistent path by setting up and providing a process exchange platform to allow exchange of process expertise across all institutions and levels. The platform http://www.ech-bpm.ch/de (in addition to www.ech.ch) already makes some content available (project guidelines for BPM implementation, BPM starter kit, etc.). The focus lies on the distribution of the eGov BPM starter kit.

The development of eGovernment in Austria began in the nineties with the creation of portals and the introduction of business process management for finance. The initial purpose of eGovernment was the reduction of costs and the efficiency enhancement of the Austrian administration. As a result from introducing forms for administrative services, the first process repositories were build up. Today, Austria maintains portals for enterprises and citizens, so-called One-stop-Portals. These portals play an important role in facilitating process integration. They implement the previously discussed input variable concept and thus help to avoid media disruptions.

3.5 Challenges

The main challenge in all three countries is to increase the interlocking of business and IT. For Germany, it can be said that BPM is currently still, to a large extent, initiated either by the business or the IT departments of the individual administrations and, on the other hand, the support provided by the executive personnel is not adequate. The initiatives mentioned in this article do not change this basic finding in any way. Thus, Germany needs to integrate the IT and business perspective accordingly. In Switzerland the continuous harmonization with the corporate architecture management, which falls in the area of responsibility of the Federal IT Steering Unit (FITSU), is of central importance. The current initiatives in the fields of BPM and architecture are mainly technology-driven and are only inadequately being supported by the management of the administrations. This is one of the possible reasons for the slow progress of BPM in public administration, as many executives do not give full commitment to such initiatives and BPM thus does not become a strategic initiative of the respective administrations. Furthermore, the BPM and architecture initiatives are being pushed by the Federal IT Steering Unit (FITSU), which is associated more with informatics than with management in the public administration. Especially, for Austria the interlocking of business and IT represents a significant challenge.

A further common challenge is given by the externalization of process expertise. As described in the process management system from Section 2.2, the employees of the administrative unit are actually both, affected parties and participating parties. Accordingly, they play a significant role. They provide expertise and are users of the respective systems. In the field of knowledge management in general and in process management in particular, the externalization of process expertise can be seen as a huge challenge.
4. Discussion

Summarizing the findings from the comparative analysis, we can make the following statements. The public administrations of all three countries have recognized the necessity of introducing BPM. The deviating strategies towards the implementation of BPM result from differences in culture, differences in complexity due to the overall size of the country, and the preexistence of different technical solutions. As far as it can be assessed from the current analysis, there are no indicators that one of the strategies will be more successful in the future. Rather, it can be expected that all three strategies will eventually result in the implementation of BPM in public authorities. However, some maturity levels can be only reached, if according measures are taken. For instance, it is rather unlikely that the full potential is used if there is no opportunity for public authorities to exchange knowledge and experiences with regard to process management and optimization. Another aspect is given by the overall pace of the BPM implementation. From the analysis, we derived the following suggestions for accelerating the BPM implementation:

- **Germany**: Standardization might accelerate and improve the orientation of the current BPM initiatives in Germany. Since there are currently hardly any standards available, the process of voluntary agreement among the public authorities may unnecessarily slow down the success of the overall BPM initiative.

- **Switzerland**: Strengthening the business side could accelerate the BPM implementation in Switzerland. In particular, stronger impulses from the business side are needed. Consequently, the business must be accordingly integrated in the decision processes.

- **Austria**: Making the acquired knowledge available via process exchange platforms, could increase the success of Austria with respect to the interlocking of business and IT. As a result, the acquired knowledge will be readily available to a big audience.

Finally, we can use the analysis to derive some general success factors for the implementation of BPM in public administration. Note, that these findings are not representative, but rather represent first insights. Following the structure of the employed comparison criteria, the subsequent list summarizes the main hypotheses we derived from the conducted analysis:

- **Framework conditions**: The analysis suggests that the framework conditions do not have a big impact on the overall BPM success. Although, the three countries have similar conditions, they followed totally different strategies. A critical point in this context is the political backing. Without management commitment a holistic approach as BPM cannot be successfully implemented.

- **Input variables**: For the efficient execution of processes it is important to avoid media disruptions. Accordingly, it is significant that the process data is available in a digital format. Here Austria impressively demonstrated its success. However, the Austrian success must be discussed against the background of the small size of Austria. In Germany, the enforcement of a consequent digitalization would be much more challenging.

- **Methods and standards**: Especially for administrations it can be a promising strategy to first focus on support processes. By harmonizing processes, which are shared by all administration authorities, BPM success can be effectively realized. Concerning standards, it is essential that partnerships among the different authorities can be easily and effectively established. The example of Switzerland has shown that standards can be actually the result of a bottom-up process. However, therefore it is of prior importance that the authorities are well connected.

- **Tools**: The most important characteristic of a tool is the support of the previously mentioned partnerships. Tools should not be a self-purpose, but consequently support authorities in exchanging ideas and insights.

- **Challenges**: The consequent interlocking of business and IT must be considered as an important factor for the BPM implementation.

Finally, the findings of this paper have to be discussed from the perspective of some limitations. As discussed in Section 2, the methodology of this paper falls in the category of qualitative research methods. Hence, our findings are not representative. The limited number of cases and interviews do not allow us to draw generalizable conclusions. However, the goal of qualitative research is of a different nature. As the insights in the research field of BPM in public administration are currently very limited, the findings of our paper represent an important first step. As a result, the insights from this paper have implications for both, theory and practice. In further research our findings can guide future qualitative research initiatives or they could form the basis of a
quantitative study. Public administrations could use the identified factors for complementing their BPM implementation strategy.

5. Conclusion

In this paper we investigated the BPM implementation in the public administration of Germany, Switzerland and Austria. We conducted 13 interviews and compared three case studies with a set of systematically derived comparison criteria.

We found that the public administrations of all three countries have recognized the importance of BPM. Due to differences in culture, size, and technical preconditions, all three countries pursue their own BPM implementation strategy. Currently, Switzerland is ahead of Germany and Austria with regard to standardization. Germany, on the other hand, builds on an interorganizational platform including a wide range of free tools for process modeling. Austria is more focusing on the technical implementation and the harmonization of support processes. As a result, they currently have reached the highest degree of process harmonization.

Currently it is not possible to predict which BPM approach will be potentially more successful in the long run. In general, we concluded that political backing is one of the main factors for BPM success. Further, partnerships among the administration authorities represent a key point. Only by facilitating partnerships, a holistic management concept as BPM can be successfully implemented in the organizational environment of public administrations. Here, tools can effectively support such partnerships by offering social network components in the context of platforms. Although, the findings of the presented research are not generalizable, they might serve as an important guidance for research and practice. Due to the lack of research in that field, this work represents a first step towards an understanding of BPM in public administrations.

In future research, we plan to extend our study with cases from other European and also Non-European countries. We further strive for increasing the total number of interviews such that our findings reach a higher degree of external validity. Finally, we will continue to investigate the three presented cases in order to learn how these BPM initiatives evolve.

References

E-Government Strategie Schweiz 2007-2011
Developing a Conceptual Framework to Evaluate e-Government Portals’ Success

Obaid Almalki, Yanqing Duan and Ingo Frommholz
University of Bedfordshire, Luton, UK
obaid.almalki@beds.ac.uk
yanqing.duan@beds.ac.uk
ingo.frommholz@beds.ac.uk

Abstract: Many governments around the world have invested heavily into the e-government systems. They have been making significant efforts to provide information and services online. However, previous research shows that countries are varied in the rate of adoption and success of e-government systems. Some countries stand in better positions than the others in terms of success that is defined in this research as individual’s level of use, satisfaction, and their perceived net benefits. In fact, drawing a clear picture of how and why individuals use e-government portals is the way to know the factors that lead to their success. A review of the literature shows that much of the research on e-government in developing courtiers focuses on the issues of the acceptance and the adoption of this emerging technology by individuals. Also, with the limited reported studies on e-government systems success, most of these studies focus on certain specific issues (e.g. trust) rather than looking at further global and contextual factors which will lead to success. It is difficult to make a judgment regarding what findings and results exist in the literature of Information Systems (IS) success or its applications that are applicable to fully understand e-government portal's success. Therefore, this paper proposes a conceptual framework which uses different theories/models for evaluating e-government portals' success from individual’s point of views. The proposed framework will be tested in a future study in the context of e-government portals in Saudi Arabia. This framework integrates the updated DeLone and McLean IS success model, Technology Acceptance Model (TAM), self-efficacy theory and perceived risk. Also, culture issues have been taken into consideration by using personal values theory introduced by Schwartz (Schwartz 1992). The framework consists of thirteen constructs including: system quality, information quality, service quality, perceived risk, self-efficacy, personal values, perceived ease of use, perceived usefulness, attitude towards using, behavior intention to use, use, user satisfaction, and perceived net benefit.

Keywords: e-government, Saudi Arabia, e-government evaluation, e-government portals success, e-government success factors, e-government systems success

1. Introduction

Governments all over the world have invested hugely in the ICT in general and e-government systems in particular. For example, Canadian government has allocated $880 million to invest in the e-government technologies in more than six years (2000-2005) (Arrivals et al. 2007). Another example from the eastern world is the South Korean government. It invested $5 billion in ICT within five years, between 1996 and 2001 (Lee et al. 2005). Saudi Arabia as one of the Middle Eastern and developing economic countries has invested about $800 million in e-government (AMEinfo 2006). This big spending on e-government technologies is, however, offset by the great fear of failure. As a matter of fact, it was found that 35% of e-government initiatives were total failures (i.e. "the initiative was never implemented or was implemented but immediately abandoned"), 50% were partial failure (i.e. "major goals for the initiative were not attained and/or there were significant undesirable outcomes"), and only 15% of e-government initiatives have been reported successful (i.e. "most stakeholder groups attained their major goals and did not experience significant undesirable outcomes") (Heeks et al. 2003).

Therefore, this research paper aims to develop a comprehensive framework for evaluating e-government success. The study is important to the e-government research and practice. A review of the literature on IS success and e-government evaluation reveals that there is very limited research on evaluating e-government success from both: adoption and impacts from individuals’ perspectives. This research will respond to this need by developing a comprehensive framework for evaluating e-government portal success based on major IS success theories, perceived risk theory and values theory.

The proposed framework will be tested in a future study in the context of e-government portals in Saudi Arabia. As e-government portal’s success is relatively new phenomenon, a multifaceted outcome tends to be highly contextual. Therefore, it is not proper to decide what findings and outcomes reported in the literature are applicable in understanding the e-government portals’ success in the context of Saudi e-government. This proposed future study will be consistent with (Agourram 2009) argument regarding IS success and its
applications; It will contribute to the literature by conducting specific research that deals with how people in different cultures absorb and operationalize the success of particular e-government portals.

2. E-Government research and relevance issues

The research on e-government has a relatively short history (Dwivedi 2009). Governments all over the world have started launching their e-government initiatives since the late 1990s (Torres et al. 2005; Meijer et al. 2009), which aim at delivering their information and services in electronic forms to their citizens, residents, and businesses (Torres et al. 2005). E-Government, like any other applications of IS, has been researched since it has emerged. However, its short research history brings up a lot of crucial issues such as e-government success has not been well investigated and needs to be discussed from various angles to understand it.

Analyzing the most cited articles published since 2008 to date in the Government Information Quarterly Journal reveals that what e-government research themes have attracted researchers nowadays. The most cited paper in the list was about assessing the e-government success. This study was conducted by Wang and Liao (2008). The authors of this study argue that it was the first study in the context of e-government systems that empirically tested and validated the updated IS success model of DeLone and McLean (2003). The motivation for this study was to test to what extent the traditional IS success theories/models can fit in the e-government context. The main finding was that, the constructs of DeLone and McLean (2003) are valid measures for e-government systems success.

When considering e-government evaluation research, in 2005, a study that has been conducted by Griffin and Halpin (2005) gives a glance at the specific themes of e-government evaluation: evaluation of the stages of e-government growth, evaluation of the delivery of electronic services via the internet, evaluation of the involvement of e-government stakeholders, and the evaluation of the costs and benefits of e-government. In addition, looking at the recent leading issues in e-government research (Worrall 2011), reveals that: to some extend the evaluation of e-government in general is still one of the leading issues under investigation by researchers.

Generally, studies on e-government have focused on a variety of issues, such as its adoption and acceptance (Shareef et al. 2011; Ozkan and Kanat 2011; Arrivals et al. 2007; Srivastava and Teo 2009; Tung and Rieck 2005), its evaluation (Barnes and Vidgen 2006; Papadomichealaki and Mentzas 2012; Karunasena and Deng 2012; Irani et al. 2005) and success (Wang and Liao 2008; Floropoulos et al. 2010; Gil-Garcia and Pardo 2005). The aforementioned studies within their classified groups look at the e-government from different angles. For instance, the trust of e-government has been investigated from different perspectives (e.g. trust about governments and trust about e-government technology in use). Another important theme of e-government research is the impact of e-government systems on individuals (Irani et al. 2012; Chan et al. 2010).

3. Theoretical background and research model

The proposed framework of this research integrates TAM, the updated IS success model, self efficacy theory, perceived risk theory and value theory. This was based on what the literature revealed as well as what has been confirmed and suggested in the exploratory study conducted by Almalki et al. (2012) as part of this PhD research. The proposed framework was used to inform the establishment of a research hypothesis. The following sections present each of these theories/models and highlight strengths and limitations in the context of the discussion.

3.1 The updated DeLone and McLean IS success model

In this research, the framework utilised by DeLone and Mclean (2003) IS success model with six dimensions portrayed in Figure 1. In fact, DeLone and MacLean’s original model was proposed in 1992 based on their in-depth insight and comprehensive review of IS success literature (Wu and Wang 2006; DeLone and McLean 2003). DeLone and MacLean’s (1992) original model was a crucial milestone in research measuring IS success since it was introduced based on the critical analysis of 180 research articles relevant to the field (Hu et al. 2005). Also, it has been validated, tested and cited by many researchers.

According to DeLone and McLean (1992): “in searching for IS success measures, rather than finding none, there are nearly as many measures as there are studies”. Sedera and Gable (2004) cited in (Petter et al. 2008), tested different success models including the DeLone and McLean and Seddon models, finding that the
Obaid Almalki, Yanqing Duan and Ingo Frommholz

DeLone and McLean model is the best model to measure the success of enterprise systems. The main purpose of DeLone and McLean (1992) review was to synthesize IS research into coherent knowledge. Also, the previous attempts to address IS success were not properly addressed (Petter et al. 2008). This was due to the complexity, interdependency, and multidimensionality of the IS success problem (Petter et al. 2008).

According to DeLone and McLean (2003), their model, which was first proposed in 1992, has been cited by many researchers in their studies. The validation and the use of the model in different applications of IS are strong indicators of the strength of this model (Petter et al. 2008; DeLone and McLean 2004). Also, the proposed model by DeLone and McLean can be applied and used for both the individual and at organisational level (Petter et al. 2008).

![Updated DeLone and Mclean IS success model](image)

**Figure 1:** Updated DeLone and Mclean IS success model (DeLone and McLean 2003)

### 3.2 TAM

Acceptance of technology by users has become an important subject in the field of IS over the last three decades. Many studies attempted to propose models that can interpret and predict system use. TAM is among those models that were widely used and it remains well known by the IS researchers. Thus, it becomes essential in this study to consider TAM when intending to understand the acceptance of e-government technology by users. The first theory that was proposed in the context of understanding human behaviours that influence IT adoption was the Theory of Reasoned Action (TRA) (Compeau and Higgins 1995; Arrivals et al. 2007). This theory was introduced by Fishbein and Ajzen (1975) and it gained attention of researchers in this field (Compeau and Higgins 1995). Figure 2 shows TAM proposed by Davis (1989).

![TAM proposed by Davis](image)

**Figure 2:** TAM proposed by Davis (1989)

The TAM was proposed by Fred Davis in 1985 with the main purpose of investigating the mediating role of perceived usefulness and perceived ease of use and their relation to other external variables and the extent to which they affect system use (Legris et al. 2003). Recently, Davis has suggested a new version of TAM and named it TAM2 with a new construct: ‘subjective norms’ (Legris et al. 2003).
3.3 Self-efficacy theory

Bandura (1986) defined self-efficacy as: “People’s judgements of their capabilities to organise and execute courses of actions required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses”. The term ‘self-efficacy’ originated from psychology. In the context of computing, computer self-efficacy is defined as: “a judgement of one’s capability to use a computer” (Compeau and Higgins 1995). Self-efficacy has become commonly used by researchers in the field of IT to understand individual behaviours towards IT (e.g. (Kim et al. 2010; Reid 2009; Li et al. 2012)). Thus, it has been decided to include it in the theoretical framework of this research and it has been emphasised by some of the interviewees in the conducted exploratory study by Almalki et al. (2012). Furthermore, it is based on a call by (Bandura 1986; Compeau and Higgins 1995) to tailor the measurements of self-efficacy to the specific domain which is undergoing testing to increase prediction accuracy. This study considered computer-self efficacy and adapted the measures proposed by Compeau and Higgins (1995) with some modifications to make it applicable to the context of e-government.

3.4 Perceived risk

Featherman and Pavlou (2003) argued that past research on technology adoption has primarily focused on the positive utility gains which can be attributed to technology adoption. Perceived risk is considered as negative utility or potential losses that can be attributed to e-services adoption (Featherman and Pavlou 2003). They call it “Perceived Risk Theory” in their study, integrate it with TAM, and empirically test it which results in a proposed model for e-services adoption. It is interpreted as to feel uncertain regarding potential negative consequences/results of utilizing a service or a product (Featherman and Pavlou 2003). It is defined in the marketing discipline as “the expectation of losses associated with purchase and acts as inhibitor to purchase behaviour” (Peter and Ryan 1976).

In the world of online services (e.g. e-commerce), consumers have demonstrated reluctance to accomplish purchase in the form of simple on-line transaction (Hoffman et al. 1999). The reason which makes them reluctance to interact with online services is: “consumers simply do not trust most Web providers enough to engage in relationship exchange involving money and personal information with them” (Hoffman et al. 1999). According to Lee (2009), modelling perceived risk as a singular variable construct in previous research of e-banking lead to fail in reflecting the real characteristics of perceived risk and tell why users resist to use online services. In this research, the perceived risk is first modelled as a single variable within the proposed framework, and then will be decomposed into its multi-facets. This is in line with Featherman and Pavlou (2003) and Lee (2009). To deeply understand the role of perceived risk in e-government portals’ success, this study carried out a more in-depth research of what are the sub-facets of perceived risk. Thus, perceived risk has been divided to six categories: performance risk, financial risk, social risk, time risk as theorized by Featherman and Pavlou (2003), security, and privacy as theorized by Featherman and Pavlou (2003) and Fu et al. (2006).

3.5 Personal values

Values were defined by Rokeach (1973) and Schwartz (1992) as cognitive representations of desirable and abstract goals. Personal values can influence the behaviour of individuals in various aspects of life. The ten basic values identified by Schwartz (1992) have the strength of including all the core values that are widely recognized in various cultures in the world (Schwartz 2009). Table 1 lists the ten value types taken from (Schwartz 2009).

Schwartz (1992) justifies the identification and classification of human values in their study, “identification of a universal structure would permit the derivation of basic value dimensions that could be used for the purpose of comparisons”. This will help future researchers who include personal values in their frameworks/models to know what values are most related to their phenomenon and what values have no impacts. Rokeach (1973) states the importance of personal values inclusion in all sciences and when it is vital to study the human behaviours: "The value concept, more than any other, should occupy a central position ... able to unify the apparently diverse interests of all the sciences concerned with human behaviours". Schwartz (1992) commented on these words and stated that these words proclaim the centrality of personal values.
**Obaid Almalki, Yanqing Duan and Ingo Frommholz**

**Table 1:** The value types and their definitions (Schwartz 2009)

<table>
<thead>
<tr>
<th>Value type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Social status and prestige, control or dominance over people and resources</td>
</tr>
<tr>
<td>Achievement</td>
<td>Personal success through demonstrating competence according to social standards.</td>
</tr>
<tr>
<td>Hedonism</td>
<td>Pleasure and sensuous gratification for oneself</td>
</tr>
<tr>
<td>Stimulation</td>
<td>Excitement, novelty, and challenge in life</td>
</tr>
<tr>
<td>Self-direction</td>
<td>Independent thought and action; choosing, creating, exploring</td>
</tr>
<tr>
<td>Universalism</td>
<td>Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature</td>
</tr>
<tr>
<td>Benevolence</td>
<td>Preserving and enhancing the welfare of those with whom one is in frequent personal contact (the 'in-group')</td>
</tr>
<tr>
<td>Tradition</td>
<td>Respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provide the self</td>
</tr>
<tr>
<td>Conformity</td>
<td>Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms</td>
</tr>
<tr>
<td>Security</td>
<td>Safety, harmony, and stability of society, of relationships, and of self</td>
</tr>
</tbody>
</table>

To know which of the ten personal values are most relevant to e-government portals, a Delphi study is conducted with a panel of experts. The aim of this Delphi study is to investigate which value types are particularly relevant to e-government portals’ success or have a significant impact in the context of e-government portals; those values which will be decided as the result of this Delphi study will be used later in this PhD research to examine to what extent and how those identified value types affect e-government portals’ success.

### 4. Proposed conceptual framework

Based on calls, findings and recommendations from previous researchers, and the above discussions on TAM (Davis et al. 1989), computer self-efficacy theory (Compeau and Higgins 1995), the updated DeLone and McLean IS success model (2003), Perceived Risk theory, value theory (Schwartz 1992) as well as the exploratory study conducted as part of this PhD research (Almalki et al. 2012), the proposed theoretical framework for this study assumes that: System Quality, Information Quality, Service Quality, Computer Self-Efficacy, Perceived Risk and Personal Values – as external variables - are linked to e-government portals’ Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using, Behaviour Intention to Use, Use and User Satisfaction. Furthermore, it is suggested in this research that these, in turn, influence the e-government portals’ Net Benefits from individuals’ perspective. Figure 3 represents the proposed theoretical framework. Table 2 lists the proposed framework constructs and their definitions which were obtained from the literature.

![Figure 3: The proposed theoretical framework](image-url)
The original DeLone and MacLean model (1992) was proposed mainly to evaluate IS success based on performance (DeLone and McLean 2004). On the other hand, the TAM model was proposed to measure the acceptance of IT (Lean et al. 2009). Combining constructs from both models will help provide e-government portals’ success from different points of view: firstly, from the point of view of users’ acceptance of this technology, and secondly, this will help evaluating the impact of e-government portals’ success.

The marriage of these literature streams may result in a more comprehensive framework for evaluating e-government portals’ success, and therefore benefit the IS and e-government research disciplines. This developed framework can be seen from different views with regards to the adapted IS theories/models, perceived risk theory and value theory. It can be seen as an extension to the updated DeLone and McLean IS success model (2003) by replacing Use construct with the whole TAM (Davis et al. 1989). Also, it can be seen as using TAM (Davis et al. 1989) with some identified external variables: quality dimensions of the updated DeLone and McLean IS success model (2003), perceived risk, personal values, user satisfaction and perceived net benefits. In fact, this framework looks forward to a better understanding of factors that lead to success in terms of adoption and impact together. This success is viewed by the eyes of individuals who use the e-government portals. More details about this framework, its testing and validation will be reported later in a future study.

**Table 2: The proposed framework constructs’ definitions**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Adapted from</th>
</tr>
</thead>
<tbody>
<tr>
<td>System quality</td>
<td>The desirable characteristics of e-government portal</td>
<td>Petter et al. (2008)</td>
</tr>
<tr>
<td>Information quality</td>
<td>The desirable characteristics of the e-government portal output</td>
<td>Petter et al. (2008)</td>
</tr>
<tr>
<td>Service quality</td>
<td>The quality of services/support which e-government portal users interact with/receive through the portal and/or from the government organization that is responsible for managing the portal</td>
<td>Petter et al. (2008)</td>
</tr>
<tr>
<td>Computer self-efficacy</td>
<td>Perceptions of an individual of his/her ability to achieve a desired task using e-government portal</td>
<td>Compeau and Higgins (1995)</td>
</tr>
<tr>
<td>Perceived risk</td>
<td>The e-government portal users perception of the uncertainty and the negative effects of a desired result</td>
<td>Fu et al. (2006)</td>
</tr>
<tr>
<td>Personal Values</td>
<td>The cognitive representations of desirable and abstract goals</td>
<td>Rokeach (1973) and Schwartz (1992)</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>The extent to which an e-government portals’ users believe that using e-government portals would improve their reception of government information and services</td>
<td>Davis (1989)</td>
</tr>
<tr>
<td>Perceived Ease of use</td>
<td>The extent to which an e-government portals’ users believe that using a particular e-government portal would be free of effort</td>
<td>Davis (1989)</td>
</tr>
<tr>
<td>Attitude Toward Using</td>
<td>Persons’ general feeling of favourableness or unfavourableness as far as the use or not of an e-government portal is concerned</td>
<td>Fishbein and Ajzen (1975)</td>
</tr>
<tr>
<td>Behaviour Intention to Use</td>
<td>A measure of the strength of one’s intention to perform a specified behaviour (i.e. using and interacting with e-government portal)</td>
<td>Lean et al. (2009)</td>
</tr>
<tr>
<td>Use</td>
<td>The extent and manner in which e-government systems users utilize the capabilities of an e-government portal</td>
<td>Petter et al. (2008)</td>
</tr>
<tr>
<td>User satisfaction</td>
<td>E-Government portal user’s response to the use of the product of a particular e-government portal system</td>
<td>DeLone and McLean (1992)</td>
</tr>
</tbody>
</table>

5. **Future work**

Two research activities are currently undertaken. First, the first round of a Delphi study has been conducted to know what value types are most relevant to the success of e-government portals. After finalizing this study, the value types will be added to the current proposed framework under the construct: personal values. Second, a Survey questionnaire is been developed based on the measurement items proposed for each construct in the framework. This survey questionnaire will be distributed for the users in the context of Saudi government portals. Those users will nominate one of the government portals that they have used before and
then answer all the questions regarding the evaluation of that portal based on the dimensions of our proposed framework.

6. Conclusion

This research paper describes an effort to provide a comprehensive framework for evaluating e-government portals’ success. This proposed framework is composed of a set of useful and clear factors that were theorized from a well-known IS theories/models and other discipline theories. Reviewing the literature of IS success and e-government evaluation, revealed that there is a need to consider some major IS theories/models along with personal value theory in order to establish a framework that is better to evaluate e-government portals’ success form individuals perspective. The proposed evaluation framework will be empirically tested in the context of Saudi government in the very near future. It can also be adapted to a specific country situation and modified based on analysing of what factors that apply in the context of the other countries.

This study has a limitation which lies in the absence of the empirical testing and validation of the proposed framework and the measurement items that has not been applied in the fieldwork. In addition, the proposed framework requires an empirical validation which will be performed in the next stage of this PhD research using survey questionnaire. This survey questionnaire will be distributed among the users of e-government portals in Saudi Arabia. More details about this phase will be reported later as well as the results of validation and testing of this proposed framework.

References


Reid, M. 2009. Integrating trust and computer self-efficacy into the technology acceptance model: Their impact on customers’ use of banking information systems in Jamaica. 69, ProQuest Information & Learning.


Evolution Roadmaps for Smart Cities: Determining Viable Paths

Leonidas Anthopoulos and Panos Fitsilis
Technological Education Institute (TEI) of Larissa, Larissa, Greece
lanthopo@teilar.gr
fitsilis@teilar.gr

Abstract: Smart cities have emerged for more than twenty years from their primary website form to modern ubiquitous and environmental sensitive ones and they encounter an extensive number of representative cases, with an international spread. Today they are considered living labs, areas of smart growth and favorable e-Government environments, while they structure a modern and globalized market with a raising and competitive industry. Various alternative approaches to smart city can be observed, which appeared and have evolved during this timeline. These approaches have attracted various and significant cases, which either evolved to other forms or they later declined. This paper recognizes these different smart city approaches and their evolution, and it seeks to answer the following questions: what different approaches to smart city exist or have existed? How have the smart cities evolved? Do particular evolution roadmaps exist for smart cities? In order to answer these questions, this paper presents a worldwide smart city classification, which describes all the alternative approaches that appear in literature and determines representative city cases together with similarities and differences among these approaches. Literature review is combined with data from an investigation of the official websites of the representative cases, which returns groups of e-services that are being offered by different smart city approaches. These e-service groups are used to identify evolution roadmaps for smart city that can show how smart cities have emerged and to which particular directions are being evolved. The evolution roadmaps are depicted via technology roadmapping tool. Moreover, these roadmaps can become a useful tool for municipal decision makers, who have to choose between evolution forms and smart city projects that secure smart city’s viability. Viability is a crucial parameter for every project, especially due to recent financial recession, since smart cities concern extensive and demanding investments, which affect large communities and local life in a significant manner.

Keywords: smart cities, technology roadmapping, e-Government, digital cities, e-services, geographies, ubiquitous technologies

1. Introduction

Various terms have been used to describe the application of the Information and Communications Technologies (ICT) and the deployment of various e-services in the urban areas (Anthopoulos and Vakali, 2012): web or virtual, broadband, wireless or mobile, digital, smart and ubiquitous cities are only some of these terms. Moreover, terms such as knowledge spaces, virtual or digital communities extend the physical urban limits and describe groups of citizens who distantly share virtual spaces for a common reason.

No commonly agreed “umbrella” term can be found in the literature to describe this “booming” phenomenon of the abovementioned metropolitan ICT environments, while the digital city and the smart city ones are the most usual. For the purposes of this paper the term smart city will be used to describe all these alternative terms. Smart cities are crucial because, they deal with important state-of-the-art topics i.e., e-Government service delivery, e-service adoption, smart growth, social networking, living labs etc.

Various cities around the world have approached the smart city. Each of them usually faced different challenges and prioritized alternative objectives, such as improvement of local everyday life; development of knowledge-based societies; narrowness of the digital divide; and promotion of e-Government locally (Anthopoulos and Vakali, 2012). Others emphasized on the enhancement of e-commerce services and on local growth, while recently the environmental protection has been put first on the objectives’ list.

The implementation of a smart city is based on sets of projects, which address these predefined priorities and objectives. However, these various smart city cases did not keep their initial forms and they have updated – even more than once- to different directions and objectives, a fact that questions the strategic purposes, the effectiveness and the viability of a smart city.

This paper tries to answer the following questions: what different approaches to smart city exist or have existed? How have the smart cities evolved? Do particular evolution roadmaps exist for smart cities? The first question sounds simple, but the appearance of so many different terms that describe the same phenomenon can be confused and the similarities and differences have to be specified. The second question is very
interesting, since many smart city cases—i.e., Amsterdam and Barcelona—have changed their approaches even more than twice. And questions rise regarding the reasons that lied behind this change. The third question seeks for answers regarding whether the evolution of smart city approaches is logical and based on technological evolution or it concerns strategic choices and priorities’ update.

The remaining of this paper is organized as follows: in the following background section 2 a classification of different smart city approaches is performed. Moreover, representative city cases for each approach are extracted and the evolution of these cases is presented. Then, section 3 structures smart city evolution roadmaps according to the provided e-services. In section 4 this paper’s questions are discussed according to the extracted outcomes. Finally, in section 5 some conclusions and some future thoughts are given.

2. Background

In this section, a bibliographic review on smart city is performed and many cities appear to follow alternative approaches. Authors combined literature findings with information from the official websites of the extracted cases in order to explore the current condition of the identified cases (Table 1).

According to (Giffinger et al., 2007) the term smart city is not used in a holistic way describing a city with certain attributes, but is used for various aspects which range from mesh metropolitan ICT environments to a city regarding the education (or smartness) of its inhabitants (Giffinger et al., 2007), (Komninos, 2002). Smart city was originally introduced in the Australian cases of Brisbane and Blacksbourg where the ICT supported social participation, narrowness of the digital divide and accessibility to public information and services. Smart City was later evolved to (a) urban spaces for business opportunities, which was followed by the city network of Malta, Dubai and Kochi (www.smartcity.ae); and to (b) ubiquitous technologies installed across the city, which are integrated everyday objects and activities.

Moreover, smart city has been approached as part of the broader term of digital city by (Anthopoulos and Tsoukalas, 2006), where a generic multi-tier common architecture for digital cities was introduced and assigned smart city to the software and services layer of this architecture. For the purposes of this article, the term smart city will refer to all alternative approaches to metropolitan ICT cases.

An investigative literature review returns eight (8) different smart city approaches and 31 representative city cases, which have evolved since the early ’90s and faced different challenges. Web or Virtual City is the primary smart city form with representatives the America-On-Line (AOL) cities (Wang and Wu, 2001), the digital city of Kyoto (Ishida, 2002), (Ishida et al., 2010) and the digital city of Amsterdam (Lieshout, 2001). This approach concerns web environments, which offer local information, online chatting and meeting rooms, and a city’s virtual simulation.

The second approach is the Knowledge Bases, which was adopted by Copenhagen and then ex-industrial area of Craigmillar (Edinburgh, Scotland) (Van Bastelaer, 1998). Copenhagen developed a public database entitled Copenhagen Base, which had crowd sourcing options, it delivered local information and it was accessible via the Internet and via text-TV. The case of Craigmillar concerns a Community Information Service, which capitalized the ICT to structure groups of citizens who shared knowledge and collaborated to deal with unemployment and with other local needs.

The city of Seoul introduced the third approach entitled Broadband City/Broadband Metropolis, where fiber optic backbones were installed in the city and enabled the interconnection of households and of local enterprises to ultra-high speed networks (Townsend, 2007). Last mile connections to the backbone were established with fiber optic channels (Fiber-to-the-Home, FTTH), composing a flourish environment for telecommunication vendors and for private investments in general. Other cities that can be classified in this category is Beijing (China) (Sairamesh et al. 2004), Antwerp (Belgium), Helsinki, Amsterdam and Geneva (Van Bastelaer, 1998). Antwerp and Amsterdam collaborated and interconnected their broadband networks.

Another approach is the Mobile or Wireless or Ambient Cities, with representatives New York City and Atlanta (Ganapati and Schoepp, 2008), which installed wireless broadband networks in the city, accessible (with or without charge) by its inhabitants.
Digital City extends the above approaches and older ones (Moon, 2002) and describes a “mesh” metropolitan environment that interconnects virtual and physical spaces in order to deal with local challenges. Anthopoulos and Tsoukalas (2006) define the digital city as the “ICT-based environment whose priorities concern a) the ICT contribution to local needs and transactions, b) the transformation of the local community to a local information society, c) the direct and indirect, official and unofficial information collection, in order to support the sustainable development of the local community”. This approach has been followed by various cities such as Hull (UK), Cape Town (South Africa), Tampere (Finland) and Trikala (Greece).

Smart City approach was described above and is currently fully applicable in Dubai, where the “media city” (www.dubaimediacity.com) and the “internet city” (www.dubainternetcity.com) offer broadband and media infrastructures to the enterprises. Other smart city representatives are Barcelona, Austin (USA), Tampere (Finland) and European cities (http://smart-cities.eu, http://www.smartcities.info), which recognize several dimensions of intelligence to which the ICT can contribute: economy (Smart Economy), education (Smart People), governance (Smart Governance), transportation (Smart Mobility), sustainability (Smart Environment) and everyday life (Smart Living). Various ICT vendors (e.g., IBM, Microsoft, Hitachi and Oracle) have implemented commercial solutions for the smart city approach.

Ubiquitous City (u-City) concerns the result of broadband costs’ minimization and commercialization of large-scale information systems, cloud services and ubiquitous computing in urban spaces. U-city has representatives New Songdo (Hyang-Sook et al., 2007) (South Korea), Manhattan Harbour and Kentucky (U.S.A.), Masdar city (Abu Dhabi) and Osaka (Japan), where information is accessible anytime, from everywhere by anybody via ubiquitous ICT. In many cases (i.e., in South Korea and Abu Dhabi) this approach is accompanied with the construction of new urban spaces where pervasive computing will is included from the scratch in buildings.

Finally, the Eco-city or Green City approach capitalizes the ICT for sustainable growth and for ecological protection. ICT sensors for environmental measurement and for buildings’ energy capacity’s evaluation; smart grids produce energy for inhabitants’ consumption; encourage smart solutions for renewable energy production are only some of the eco-city services. This approach has been followed by New Songdo and Dongtan (South Korea), Tianjin (Singapore) and Masdar (Abu Dhabi), while it is being followed by others (i.e., Amsterdam).

Except from the above approaches, various cities joined networks of common interests to provide with intelligence their urban spaces or to structure virtual teams of collaborative people. Eurocities network (http://www.eurocities.org), Intelligent Communities (www.intelligentcommunity.org), the World Foundation of Smart Communities (http://www.smartcommunities.org) and Community Networks (e.g. the Seattle Community Network (http://www.scn.org)) are representative cases.

Table 1: The classification and current status of various smart cities

<table>
<thead>
<tr>
<th>Approach</th>
<th>Cases: Started – Current Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual City</td>
<td>America-On-Line {AOL} Cities (1997- today)</td>
</tr>
<tr>
<td></td>
<td>Kyoto, Japan (1996-2001)</td>
</tr>
<tr>
<td></td>
<td>Web prototype finished its experiments by September 2001 <a href="http://www.digitalcity.gr.jp">http://www.digitalcity.gr.jp</a></td>
</tr>
<tr>
<td></td>
<td>Bristol, U.K. (1997- today)</td>
</tr>
<tr>
<td></td>
<td>Amsterdam (1997- today)</td>
</tr>
<tr>
<td></td>
<td>It evolved to other approaches (broadband, smart, eco-city)</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.amsterdamsmartcity.com">http://www.amsterdamsmartcity.com</a></td>
</tr>
<tr>
<td>Knowledge Bases</td>
<td>Copenhagen Base (1989- today)</td>
</tr>
<tr>
<td></td>
<td>Today it operates as a city portal <a href="http://www.kk.dk">http://www.kk.dk</a> and Copenhagen evolved to Eco-City</td>
</tr>
<tr>
<td></td>
<td>Craigmillar Community Information Service, Scotland (1994- today)</td>
</tr>
<tr>
<td></td>
<td>It operates as a community portal <a href="http://www.s1craigmillar.com">http://www.s1craigmillar.com</a></td>
</tr>
<tr>
<td></td>
<td>Blacksburg Knowledge Democracy, Australia (2001- today)</td>
</tr>
<tr>
<td></td>
<td>It evolved to the digital city approach</td>
</tr>
<tr>
<td>Broadband City / Broadband Metropolis</td>
<td>Seoul, S. Korea (1997- today)</td>
</tr>
<tr>
<td></td>
<td>Evolves with 84% broadband penetration, it is expected to reach 1GB web connections by 2012, and it provides with Wi-Fi access its public buildings (Engadget, 2011)</td>
</tr>
<tr>
<td></td>
<td>Beijing, China (1999- today)</td>
</tr>
<tr>
<td></td>
<td>It has been evolved to digital city, which focused on buildings of the Olympic Games 2008</td>
</tr>
<tr>
<td>Approach</td>
<td>Cases: Started – Current Condition</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Wireless / Mobile / Virtual City | New York (1994- today)  
exists various e-services [http://www.nyc.gov/html/doitt/]  
Kista / Stockholm (2002- today)  
Kista has become a thriving Science City and a leader in mobile and ICT development [http://en.kista.com]  
Florence, Italy (2006- today)  
exists and a charter is documented for future similar developments [http://senseable.mit.edu/florence/] |
| Smart City                    | Antwerp, Belgium (1995- today)  
started as Broadband City and today interconnected to Brussels and to Amsterdam (Baeyens, 2008)  
Tianjin, China (2007-today)  
exists and it evolves to eco-city  
Tianjin, China (2007-today)  
exists and it evolves to eco-city [http://www.tianjinecocity.gov.sg]  
Barcelona, Spain (2000- today)  
exists, [http://w3.bcn.es], [http://www.bcn.es]  
Brisbane, Australia (2004- today)  
exists and limited its scope to local e-Government, traffic and parking services, and on waste management [http://www.brisbane.qld.gov.au]  
Malta (2007- today)  
continues to connect ICT companies especially in the field of healthcare and education [http://malta.smartcity.ae]  
Dubai (1999- today)  
exists and continues to integrate top ICT solutions  
Tampere (Finland) (2003-today)  
it began as a thinking tank for innovative ICT applications. today it occupies more than 1,000 professionals who develop various e-Services [http://www.tampere.fi] |
exists and focused on e-Government, on e-learning and on smart TV ([http://www.hullcc.gov.uk])  
Cape Town, South Africa (2000- today)  
exists and offers various e-services such as environmental, for tourism, transportation ([http://www.capetown.gov.za])  
Trikala, Greece (2003- today)  
exists and limited its scope to tele-care and to metro-Wi-Fi services ([www.e-trikala.gr])  
Austin, U.S.A. (1995- today)  
exists and emerges to Eco-City [http://www.cityofaustin.org]  
Knowledge Based Cities, Portugal (1995- today)  
portals of the digital cities do not meet projects' objectives [http://www.cidadesdigitais.pt] |
| Ubiquitous City               | New Sondgo, S. Korea (2008- today)  
under development and evolves to eco-city (Jackson et al., 2011)  
Dongtan, S. Korea (2005- today)  
evolves to eco-city [http://www.udongtan.or.kr]  
Osaka, Japan (2008- today)  
under development (Jackson et al., 2011)  
Manhattan Harbour, Kentucky, U.S.A. (2010- today)  
under development. [http://www.themanhattanharbour.com]  
Masdar, United Arab Emirates (2008- today)  
under development. [http://www.masdarcity.ae] |
| Eco-city                      | Dongtan S. Korea (2005- today)  
evolves to eco-city [http://www.udongtan.or.kr]  
Tianjin (Singapore),  
Masdar, United Arab Emirates (2008- today)  
under development. [http://www.masdarcity.ae] |
Moreover, this investigation identified the following types of e-services that have or are being offered by the examined cases (Table 2):

- **E-Government services** concern public complaints, administrative procedures at local and at national level, job searches and public procurement (they are faced in Digital, Smart and Ubiquitous approaches).
- **E-democracy services** perform dialogue, consultation, polling and voting about issues of common interests in the city area (they are offered by Virtual, Digital, Smart and Ubiquitous approaches).
- **E-Business services** mainly support business installation, while they enable digital marketplaces and tourist guides (met in Digital and Smart city approaches).
- **E-health and tele-care services** offer distant support to particular groups of citizens such as the elderly, civilians with diseases etc. (appear in Digital and Smart city approaches).
- **E-Security services** support public safety via amber-alert notifications, school monitoring, natural hazard management etc. (only available in Ubiquitous approaches).
- **Environmental services** contain public information about recycling, while they support households and enterprises in waste/energy/water management. Moreover, they deliver data to the State for monitoring and for decision making on environmental conditions such as for microclimate, pollution, noise, traffic etc. (met in Ubiquitous and Eco-city approaches).
- **Intelligent Transportation** supports the improvement of the quality of life in the city, while it offers tools for traffic monitoring, measurement and optimization (delivered in Digital and Smart city approaches).
- **Communication services** such as broadband connectivity, digital TV etc. (offered by Broadband, Mobile, Digital, Smart and Ubiquitous approaches).
- **E-learning and e-education services** (available in Smart and Digital city approaches).

### Table 2: E-services that are being offered by smart cities

<table>
<thead>
<tr>
<th>Case</th>
<th>Started</th>
<th>e-Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOL Cities</td>
<td>1997</td>
<td>Online City Guides, Information from local enterprises</td>
</tr>
<tr>
<td>Digital City of Kyoto</td>
<td>1996</td>
<td>GIS information about the city, City Guide, Municipal Transportation, Crowd Sourcing, 3D Virtual Tour</td>
</tr>
<tr>
<td>Bristol</td>
<td>1997</td>
<td>Advertising spaces, Connection with citizens personal sites, Public information</td>
</tr>
<tr>
<td>Amsterdam</td>
<td>1997</td>
<td>Energy Management, Smart Building, Tele-presence Conference Centers, Grid energy solutions, Sustainable Public Spaces, Sustainable Working</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>1989</td>
<td>Local e-Government Services, National e-Government Services, City Guide, e-parking services, Guides for entrepreneurship</td>
</tr>
<tr>
<td>Craigmillar</td>
<td>1994</td>
<td>Self-recycle Services, Local online news, Job opportunities in the city, Marketplace for cars and property</td>
</tr>
<tr>
<td>Blacksburg</td>
<td>2001</td>
<td>GIS services, Crowd sourcing, MAN, 3D Virtual City model with crowd sourcing options, Broadband services, Online guides and training for entrepreneurs</td>
</tr>
<tr>
<td>Seoul</td>
<td>1997</td>
<td>Wired and Wireless broadband internet services, Digital Mobile TV</td>
</tr>
<tr>
<td>Beijing</td>
<td>1999</td>
<td>Wired and Wireless Broadband Services, Smart Olympic Buildings</td>
</tr>
<tr>
<td>Helsinki</td>
<td>1995</td>
<td>Regional Map Service, WLAN hot spots, e-health cards</td>
</tr>
<tr>
<td>Geneva</td>
<td>1994</td>
<td>Wired and Wireless Broadband Services, Public Information and public service guides, Tourist Guides, Job Opportunities, (<a href="http://www.ville-geneve.ch">http://www.ville-geneve.ch</a>)</td>
</tr>
<tr>
<td>Antwerp</td>
<td>1995</td>
<td>e-Government services (e-Counter), Online Tourist Guide, e-Booking Property Database, environmental information and guides for entrepreneurs</td>
</tr>
<tr>
<td>Stockholm (Kista)</td>
<td>2002</td>
<td>residential parking permits, e-government services, elderly care treatment</td>
</tr>
<tr>
<td>Taipei</td>
<td>2004</td>
<td>Intelligent transportation, e-parking, 3D website for virtual tours, public e-services, E-Future Classroom</td>
</tr>
<tr>
<td>Dongtian</td>
<td>2005</td>
<td>Eco services like smart grids, energy/water/waste smart management, green buildings</td>
</tr>
<tr>
<td>Tianjin</td>
<td>2007</td>
<td>Eco services like smart grids, energy, water and waste smart management, green buildings</td>
</tr>
<tr>
<td>Barcelona</td>
<td>2000</td>
<td>e-Government services, mobile services, Online city guide, guides for entrepreneurs, (<a href="https://ws30.bcn.cat">https://ws30.bcn.cat</a>), Intelligent transportation, Open data from city Council</td>
</tr>
</tbody>
</table>
3. Visualizing smart city evolution

The above investigation identified the existence of various alternative smart city forms, with representative cases that concern large scale projects, most of which have been evolved for more than ten years. Additionally, these projects can be recognized as ongoing since they have redefined their scope and objectives, even more than once. Furthermore, this classification and analysis illustrates how the examined cases followed the alternative categories; it is determined which of them and when they changed to other smart city approaches and which of the approaches have been the most popular since the smart city introduction (Figure 1).

(Figure 1) illustrates that (a) knowledge bases appeared first and they updated to digital cities. (b) Broadband cities were next on the timeline and they mostly evolve to smart cities. (c) A relative evolution path is followed by the wireless cities. (d) Today, not all of the approaches are available, but the digital, smart, ubiquitous, ecocities and web cities. Additionally, the evolution path of each alternative approach can be observed. For instance, digital cities appeared in 1994, they are still active and today, they account twelve of the examined cases.

In order to answer the third question of this paper regarding smart city evolution roadmaps, technology roadmapping is used, which is a powerful and flexible technique that is widely used within industry to support strategic and long-range planning (Phaal et al., 2003). Roadmapping provides structured means for exploring and communicating the relationships between technological resources, organizational objectives and the changing environment. Moreover, the path-dependent roadmap (Li et al., 2009; Li and Wang, 2011) that is based on the technology roadmapping has been used to demonstrate several formula changes over time and to interpret how these changes depended on its own past.
In this context, data from investigative analysis that concern the types of e-Services that each of the examined case offers together which of them were adopted by smart cities’ updates (Table 2) can be applied on technology roadmapping. The information of (Table 2) generates e-service groups according to their end-users (Table 3). The values that are contained on the year column concern the earliest year, when a smart city case appears and offers e-services from the e-service group; the frequency column enumerates the cases that match each e-service group.

**Table 3:** E-service groups structured by the examined cases

<table>
<thead>
<tr>
<th>Service Group</th>
<th>e-Services</th>
<th>Year</th>
<th>Freq.</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGroup1</td>
<td>e-business, city guides, urban virtualization</td>
<td>1989</td>
<td>6</td>
<td>AOL cities, Bristol, Copenhagen Base, Craigmillar, Osaka, Blacksburg, Amsterdam</td>
</tr>
<tr>
<td>SGroup4</td>
<td>E-health and tele-care services, e-security</td>
<td>1995</td>
<td>3</td>
<td>Helsinki, e-Trikala, Stockholm (Kista)</td>
</tr>
<tr>
<td>SGroup5</td>
<td>Intelligent Transportation, e-parking</td>
<td>2002</td>
<td>6</td>
<td>Stockholm (Kista), Taipei, e-Trikala, Brisbane, Amsterdam, Cape Town</td>
</tr>
<tr>
<td>SGroup6</td>
<td>Ubiquitous services, communications services</td>
<td>2008</td>
<td>4</td>
<td>Osaka, New Songdo, Masdar, Manhattan Harbour</td>
</tr>
<tr>
<td>SGroup7</td>
<td>Eco-services, smart grids, waste/recycle mgt.</td>
<td>2005</td>
<td>7</td>
<td>Amsterdam, Craigmillar, Malta, Masdar, Tianjin, Dongtan, Cape Town</td>
</tr>
</tbody>
</table>

Data from (Table 3) extract the path-dependent roadmap (Li et al., 2009) of (Figure 2), which demonstrates smart city approaches changes and how each change depends on its own past. Path dependency can explain smart city evolution on the basis of the e-service provision, while paths do not illustrate co-existences of cases in more than one groups (i.e., e-Trikala simultaneously belonged to SGroup1, SGroup2 and SGroup3). Some further findings show that SGroup1 and SGroup2 are root nodes in these paths, while SGroup7 is an end-node, illustrating that this smart city category has not evolved to a different approach yet.

![Figure 2: Path-dependent roadmaps for smart city evolution](image)

### 4. Discussion

The investigation that was previously presented was performed on a 31 smart cities and returned important findings that answer the questions 1 and 2 of this paper. The term smart city does not describe a city with some particular attributes, but various types of municipal ICT environments. Some researchers have used this
term to calculate the intelligence that is produced in urban spaces, while others to depict urban areas that offer smart e-services or encourage the generation of intelligence. The identified alternative approaches generates eight classification groups for smart cities. Another finding confirms that most cases did not retain their initial approach, but they have been updated to other(s). (Figure 1) illustrates the evolution timeline of the smart cities, where five of the smart city categories still exist.

In order to answer the third question of this paper regarding smart city evolution roadmaps, the provided e-services are combined in eight e-service groups (Table 3). Technology roadmapping for these e-service groups shows that smart cities have not evolved to all particular approaches, but five path-dependent roadmaps can be observed (Figure 2). This final finding can be interpreted in the following hypotheses: (a) not all smart city approaches are suitable to be followed by all urban areas, but various parameters could determine to which direction a smart city must evolve. However, it is beyond the purpose of this paper to determine these variants. (b) Not all approaches have attracted smart city evolution, but environmental e-service provision appears the “peak” in recent evolution, while smart cities that provide e-business, broadband and transportation services have also been popular.

These two hypotheses, when they will be confirmed could provide answers regarding smart city viability. Viability stands as “capability of successful operation” (Oxford Dictionary, 2012). This can be interpreted as the “feasibility and the operational continuity of an organization, a business, a facility or a project’s outcome in political, social, legal, environmental, economical, and financial terms” (Salman et al., 2007). Viability should not be confused with sustainability, which can be defined as “the development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 1987). Smart city viability is questioned and is not secured, although the project finishes in time, on budget and aligned to its requirements.

Viability has become crucial for municipal decision makers; San Francisco and Chicago mobile cities have been questioned for their feasibility (New Millennium Research Council, 2007); Iowa Communications Network and California CALNET system have failed to secure incomes; Trikala has shortened its scope; or have changed their priorities in order to sustain (i.e., Amsterdam). In Tampere, decision makers prioritized outsourcing for infrastructure deployment and for e-service delivery in order to sustain, promoted only the self-sustained e-services, while the smart city occupies a significant amount of ICT professionals and researchers in order to secure viability via innovation.

From the viability point of view, various determinants have to be considered (Salman et al., 2007): geographical, financial, legal, cultural, technological, social and environmental are crucial for projects’ viability and various indices have to be determined for each of these variants. In this context, the five path-dependent roadmaps that were extracted in this paper align to technological determinants and could support decision makers in dealing with smart city’s prospect. Moreover, although five different smart city approaches exist today (Figure 1), the eco-city has mostly attracted the evolution.

5. Conclusions – future thoughts

This paper confirmed that smart city is a “booming” phenomenon, while the term smart city is confusing. An investigative review of 31 cities identified eight classification approaches, five of which are still active, while most of the investigated cases have experienced updates from their initial approach.

Furthermore, technology roadmapping on the examined cases returned interesting outcomes, such as five path-dependent roadmaps for smart city evolution. This paper did not try to recognize the reasons lying behind these paths, but it hypothesized the requirement for viability. Since viability is influenced by a number of parameters, these path-dependent roadmaps can be useful for municipal decision makers in determining their smart city prospect. Some future thoughts concern exploration of the variants that influence smart city evolution and of the factors that make eco-city the most popular, and the determination of viability indices for smart city.
Acknowledgements

This paper is supported by the "Enterprise Architecture for Digital Cities (EADIC)" research project, which is being developed between 2012 and 2014, and funded by the Greek General Secretary for Research and Development (ARCHIMEDES III program).

References


New Millennium Research Council (2007), Not In The Public Interest – The Myth of Municipal Wi-Fi Networks.


Oxford Dictionary (2012), Definition for Viable, [online], http://oxforddictionaries.com/definition/viable


Assessing the Effectiveness of Cross-Border Cooperation in Joint Provision of Public Services

Alina Badulescu, Daniel Badulescu and Catalin-Adrian Bucur
University of Oradea, Oradea, Romania
abadulescu@uoradea.ro
daniel.badulescu@gmail.com
polbucur@yahoo.com

Abstract: Cross-border cooperation is an important mean to foster good neighbourhood relations between communities separated / (or better) linked by a political frontier. Even the beginnings of cross-border cooperation date from the first post-WWII years, by the twinning established among European local communities, these forms of cooperation have been progressively extended and developed. One of the results of this process was the creation of the euro-regions, and also the issuing in 1966 of the first recommendation of the European Council. Political changes in the beginning of the last decade of the 20th century have re-drawn Europe’s map, and the accession of Central and Eastern European countries to the Council of Europe and after that to the European Union have considerably promoted cross-border cooperation in the region. The settlement and development of more than 100 euro-regions in last 50 years prove and confirm that the vision of the first promoters was correct. According to AEBR Association of European Border Regions, euro-regions are cross-border constructions assuming various tasks and playing an active role in the management of INTERREG community initiative. The cooperation in public services at euro-regional level creates various opportunities and advantages for local communities on both sides of the frontier and contributes not only to improving the quality and diversity of public services but also to acting as an innovative model of providing public services. In this framework our paper comes to emphasize the results and to analyse the effectiveness of the cooperation actions undertaken within a EU co-financed project. The project was developed within the Bihar - Hajdu-Bihar Euro-region, which is the most recently settled euro-region in Romania, and covers two NUTS 3 units in Romania and Hungary. The actions undertaken within this project covered the joint provision of e-government services, especially in the field of police and public order. The paper investigates, using a survey-based research, the results, effects, limits, constraints and efficiency of the cross-border cooperation actions, as from the perspective of the experts questioned, i.e. police managers and public order management staff. The paper also draws conclusions and provides further recommendation for ensuring the sustainability and enhancing the effectiveness of future cross-border cooperation programs.

Keywords: public services, cross-border cooperation, police and public order, Bihor – Hajdu-Bihar Euroregion

1. Introduction: The origins of cross-border cooperation and Euroregions

Cross-border cooperation refers to establishing neighbourly relations between communities and local authorities on both sides of a border. This simple definition denotes a complex reality of the past 50 years, inseparably related to historical and political developments in Europe (Council of Europe, 2006). Euroregions are usually created to promote common interests across borders and cooperation for the mutual welfare of peoples in the border area (Landesinstitut für Gesundheit und Arbeit Nordrhein-Westfalen, 2007).

The beginnings of cross-border cooperation, as were later formalized in the Madrid Convention (Council of Europe, 1980), date immediately after the Second World War in the form of so-called "twinnings", settled between different municipalities and communities in Europe (Perkmann, 2007, p. 3).

The first "Euroregion" in the modern sense was founded in 1958 along the German-Dutch border and, consequently, the first recommendations on cross-border cooperation from the Council of Europe go back in 1966 (Council of Europe, 2006). Political changes of the early 1990s have redrawn the map of Europe, and the admission of Central and Eastern European countries in the Council of Europe (and later in the European Union) have given new impetus to cooperation.

Creation and development of various Euroregions (or Euregio) (over 100 now), in a relatively short time, is a good confirmation of the first European foresight, and a highly suggestive image of contemporary realities.

According to most recent approaches, "euregios are cross-border structures with their own legal identity, a variety of tasks and comprehensive resources which often play a central role for the development and management of the INTERREG Community Initiative" (Association of European Border Regions; European Commission, 2000) and (Perkmann, 2007).
Euroregions and other forms of cross border cooperation (CBC) do not create a new type of governance across borders, they exercise no political power, and, within the geographical limits and the purpose of their foundation, the structures are based on cooperation arrangements for promoting common interests and improving the living standards of the population in the border area (Council of Europe, 2006). Cooperation between local and regional authorities fosters and enables cooperation between countries, without affecting the territorial integrity of the countries concerned.

2. Literature review on cross-border cooperation and regional development

Studies on cross-border cooperation development begin with core-periphery model, the foundation of the new economic geography. The model was first introduced by Krugman (1991), and describes the interactions between firm’s increasing returns to scale, transportation cost and the mobility of labour factor and how can be initiated and provided a spatial structure of economic development.

Forslid and Baldwin (2000) have integrated Krugman’s model in the new growth theory, arguing that growth can be a destabilizing force, while social learning (or learning spillovers) induces stabilization effects. They also argued that industry agglomeration leads to accelerating growth in both areas: central (core) and peripheral.

Core-periphery model applies to Euroregions just because the border areas are usually peripheral regions. Erkut and Ozgen, and then Brodzicki analysed differences between different regions and countries using NUTS II statistics, and concluded there are both significant regional differences concerning the economic and social development, and persistent and even increasing discrepancies between central and peripheral regions after EU enlargement. This result is also consistent with the research arguing that border regions are the most affected in terms of infrastructure and economic development, thus suggesting that cross-border cooperation is an essential mean to reduce regional underdevelopment of border areas (Uiboupin, 2007).

Similar results were obtained by Economou and Petratsos (2007) analysing data on the development of South-eastern Europe border region. They conclude that the growing differential between metropolitan and border regions requires policy measures to support and accelerate the development of cross-border cooperation.

Analysing EU enlargement effects on the economic development of EU border regions, Niebuhr indicates that the effects of integration on market access are even stronger than expected (Niebuhr, 2005), and empirical results show that factors as similarity and trust are the most important for the success of cross-border economic relations (Uiboupin, 2007).

Topaloglou and Petракos have demonstrated (studying the northern Greece border regions), that the market size of the border and the proximity to a large city are important determinants in boosting cross-border trade and investment flows in those region (Topaloglou & Petракos, 2006).

The concept of growth triangle is another theoretical concept searching to model some aspects of cross-border regional integration. Growth triangle is a border area, including territories belonging to three or more countries. The main positive effects of a growth triangle are scale and scope economies, clusters that generate economic growth, technology transfer, foreign direct investments (Uiboupin, 2007).

Katri-Liis Lepik, based on Etzkowitz research (1998), proposes to apply the triple helix model (triple helix cooperation) to cross-border cooperation. The term of cooperation in triple helix is a concept used to describe cooperation between the main three sectors of society: the public sector, the business community and the education system, on regional, national and multinational levels, or, more suggestively, "university-government-industry relationship" (Katri-Liis Lepik, 2009).

Applying the theory of triple helix to Euroregions reveals various models of cooperation established between the public and private sector and between these two sectors and economic research, in order to find a common strategy, for a greater involvement of all stakeholders. Research has shown, on the one hand, that the advanced Euroregions can act as platforms for cooperation based on this model, but, on the other hand, not all Euroregions have adopted the principle of triple helix. Usually, the Euroregions settled at the border between an EU and a non-EU country did not adopt (yet) this model (Topaloglou, et al., 2005).
However, the optimism about the positive effects of EU neighbourhood programs on the development of border regions – such as TACIS (Technical Assistance to the Commonwealth of Independent States), PHARE (Poland and Hungary Assistance for Reconstruction of Economy), or INTERREG – has to be tempered by significant circumspections about the effectiveness of these programs. Last but not least, Pitoska (2006), analysing EU-Balkans cooperation, has shown that these programs have positive, but quite modest, effects on socio-economic development of border regions.

3. Cross-border cooperation in public services within Bihor – Hajdú-Bihar Euroregion: from premises to achievements

After the transformations occurred in the early 90s, gradually Romania made the first steps on fostering cross-border co-operation, so that at present many counties or regions in Romania are involved in 12 cross-border cooperation structures, with all neighbouring countries (EU or non-EU). The most recent but still one of the most dynamic is Bihor – Hajdú-Bihar Euroregion, located in the north-west of Romania and eastern Hungary, on Romanian-Hungarian border area.

Bihor - Hajdú-Bihar Euroregion was created in 2002 at the initiative of the Bihor County Council (Romania) and Hajdu-Bihar Self-Government (Hungary), who recognized the important role played by cross-border cooperation in common interest areas of the European integration.

Natural and demo-economic features of Bihor – Hajdú-Bihar areal represent favourable conditions underlying the potential for a better cooperation: an important “gateway” of the European Union with eastern Europe, a shared history between the two border communities, the natural complementarities, diversified economic sectors; existence on both sides of two major cities as poles of attraction: Oradea (on the Romanian side) and Debrecen (on the Hungarian side), situated at a distance of 60 km, the presence of a significant Hungarian minority on the Romanian territory and a small Romanian communities in Hungary; easy interconnection of communication routes, location of these two counties on a major road axis, e.g. E60, remarkable tourism potential.

All these favourable conditions were exploited in several cross-border cooperation projects that have received pre-accession funds of PHARE CBC even before 1998 (when the border between Romania and Hungary became eligible for this program). Thus, during 1996 – 2003, there were allocated 28 million Euros for cross-border projects for the Romanian part and 34 million Euros for the Hungarian part (BRECO, 2012). Subsequently, the PHARE CBC (Cross-Border Cooperation) Program was implemented in Romania (from 2004 to 2006), together with INTERREG IIIA sub-program in Hungary.

Overall objective was togetherness of individuals, communities and businesses in the border area in order to facilitate the joint development, based on the key strengths of the border region. Good results achieved up to now in the Euroregional cooperation mechanisms act as a good prerequisite for the future. Until August 2012, according to data presented on the official website of the Hungary-Romania Program, there are 365 beneficiaries of financed projects (234 in Hungary and 120 in Romania) and around 150 projects under evaluation (Hu-Ro CBC Programme 2007-2013, 2012).

Among the projects undertaken in the framework of the Hungary-Romania 2004-2006 CBC Program, in the area of public order and security, we can mention that Bihor County Police Inspectorate has accessed in 2006 EU funds for implementing the project “Operational mirror network and data transfer”, with the final purpose of creating an operational transfer data centre and network in Bihor county’s capital and main city Oradea (Romania). As Liviu Popa, the manager of the Bihor County Police Inspectorate at the time, and project manager stated, "the idea for this project arose from a desire to fill the future structural changes that will occur when Romania will enter in the Schengen area. After the border police dissolving, the role of domestic police will be extremely important in monitoring persons and goods trafficking on the border with Hungary" (Popa, 2007). The project has effectively contributed to improving collaboration between Bihor County Police Inspectorate (Romania) and Hajdu-Bihar County Police Directorate (Hungary), based on the existing cooperation protocol between the two organizations, by developing a system to ensure real time data exchange and enhancing coordination between these institutions in the case of possible crisis situations (Ministry of Internal Affairs, 2010).
The general objective of the project was to develop institutions at European standards in the Bihor County Police, based on common institutional architecture, transfer of knowledge and expertise in the field of European integration from the Hungarian partners’ experience.

The specific objectives of the project were:

Accelerating the exchange of information between the two police Inspectorates (Bihor and Hajdú-Bihar) by:

- the introduction of an audio-visual system via Internet, purchasing computers and communication equipment enabling creation of a local network with six users in Bihor County, meaning to collect operational data, processing network centre in Oradea (Bihor County Police Headquarters, Romania), connected to the existing network at the Hajdu-Bihar County Police (Hungary);
- joint publication of printed and online material (books, brochures, leaflets) on the the prevention of aggression and criminal acts, foreground addressed to citizens;

Staff specialization and development in the field of crime preventing and combating, through cross-border information exchange and collaboration:

- Management training, in order to share managerial experience between cross-border partners;
- Seminars on crime prevention, focused on mutual understanding.

The target group consisted of six police office nominated by the Bihor County Police Inspectorate, and other adjacent institutions responsible for preventing and combating crimes. The final beneficiaries were Bihor and Hajdú-Bihar communities and involved institution staff. The specialized publications were available to around 20,000 people, and the training involved 50 police officers and other officials.

The project was an initial performance in the field, in Romania, and a model for other similar initiative that could be implemented by other county police inspectorates located in border areas.

4. The research: Objectives and methodology

In order to better understanding and anticipation of possible future developments in cross-border cooperation, we conducted a survey-based research by designing a questionnaire and addressing it to specific targeted experts. We targeted experts and cross border project managers involved in public order and civil protection institutions across the Hungarian-Romanian border (from Bihor County – Romania and Hajdú-Bihar County – Hungary). The main interest was to investigate the importance, role, consequences, limits and prospects of local and regional successful cross border cooperation. The questionnaire consisted of 20 questions (9 were opened questions and 11 closed -Yes/No type) and were specifically related to the following issues: involvement in cross-border cooperation projects, objectives and effects, achievements, obstacles and particularities, efficiency. Other questions referred to the nature of beneficiaries, communication and relations among partners, benefits and sustainability, future prospects of such programs. The survey was conducted during November-December 2011, and the questionnaire was administered to 52 experts, project managers or managers/deputy from: Regular Police (36), Border Police (8), Gendarmerie (4), Emergency and special interventions services (4), all located in border areas, i.e. 27 were from Romanian institutions and 25 from Hungarian ones.

5. Research results

The responses to valid questionnaires have indicated a number of 72 actions undertaken within cross-border cooperation projects onto which the respondents have been involved; the majority of them (i.e. 68%) took the form of mixed patrols, followed by PHARE CBC, HU-RO Programs etc. As a first evaluation we can state that the initial stage was dominated by limited and on reduced scale cooperation actions, focused on addressing specific problems, as a primary means for mutual knowledge and identifying common problems.

5.1 Cross-border cooperation in the field of public order has achieved objectives?

According to survey data, the cross-border cooperation, within the assumed initial objectives, fulfilled their goals (in a cumulative percentage of 85%). It is a remarkable result that can denote both commitment and determination in ex ante sizing of fair, realistic, achievable targets, both determinations of involved actors. Moreover, we can mitigate these assessments, partially considering the tendency to “conformity” of
respondents with the overall objectives of the institution, or due to a centralized and hierarchical management of security and public order systems.

If results and objectives are considered by the respondents as more than satisfactory, we must not forget the obstacles and even failure in achieving some targets. Based on their experience in the cross-border cooperation projects, the managers questioned indicated a series of personally experience disruptions. This kind of responses were mainly concentrated in the field of specific laws and regulations, fact that is explicable given the long history of separate development of the national institutions and also the relatively limited convergence. Besides, there were mentioned the insufficient financial resources, the bureaucracy, centralization and hierarchical pyramid management specific to public institution. The fundamentally different nature and purpose of national institutions, or the mentality, attitudes and mutual suspicions (mistrust) cumulate relatively small scores (i.e. 6% and 8%, respectively), but should not be ignored.

![Bar chart showing the distribution of responses regarding obstacles to cross-border cooperation: 42% Nature and different purpose of national institutions in this area, 26% Specific laws and regulations, 18% Mentality and mutual distrust, 8% Bureaucracy, centralization. Source: own calculations based on data set.]

**Figure 1:** Obstacles to cross-border cooperation

These responses cluster on a partner country basis. Thus, most responses of the Hungarian partners’ representatives focused on difficulties such as lack of financial resources, followed by the fundamentally different nature and purpose of national institutions, and, finally, mentalities, attitudes and mutual distrust. On the other hand, Romanian respondents assigned a greater importance to the obstacle represented by different laws (or inexistent laws and regulation adapted to the purposes of cross-border cooperation), bureaucracy, excessive centralization, etc.

### 5.2 The main achievements of cross-border cooperation programs

The responses to this question were numerous and diverse, highlighting the general elements in line with the objectives of their cooperation: purchase or access to common information systems, equipment purchasing, joint specialized training, regular meetings, knowledge on complementary actions in neighbouring county partner institution, reducing the minimum time required for information, less formalities, improvement of the image of the public institutions and increasing trust and confidence in police, enhancing cooperation and joint common (re)actions in case of emergencies or disasters. Another element mentioned was personal and professional contacts, at individual or institutional level. Here we include various situations, such as success in resolving cross border special cases, capability in accessing financing, or building personal relationships. Interestingly, the development of inter-personal relationships is considered as a successful achievement both for Hungarian and Romanian representatives, attesting that underlying activities on trust, confidence and mutual respect is a prerequisite and an essential objective, sometimes neglected in the implementation of large programs.

### 5.3 Quality of communication with national/cross-border partner units

The analysis of responses related to the quality of communication with national/cross-border partner units denotes a medium and high efficiency of communication (scoring 89% and 90% of the answers, see Figure 2).


Figure 2: Quality of communication with national/foreign partner units

As noticed in Figure 2, we found minor differences between the consideration regarding the quality of communication with the two categories of partners involved in such actions (i.e. national partner/Romanian and cross-border partner/Hungarian). The responses indicated similar judgements concerning the efficiency and quality of the communication with partners. Whilst 58% of the experts appreciated the quality of the communication with national partners as maximum or highly efficient and 8% considered it as difficult or very difficult, in the case of the communication with cross-border partners 49% of the experts considered it as maximum or highly efficient and only 6% as difficult or very difficult.

Table 1: The effectiveness of cross-border cooperation (CBC) in the field of public order and security

<table>
<thead>
<tr>
<th>Efficiency level</th>
<th>Accelerating the informational exchange</th>
<th>Joint editing of publications</th>
<th>Staff training and specialization</th>
<th>Improving skills for network’s operator staff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Joint information system implementing</td>
<td>ITC equipment purchasing</td>
<td>New local networks implementing</td>
<td>Scientific studies and researches on CBC</td>
</tr>
<tr>
<td>High efficiency</td>
<td>38%</td>
<td>42%</td>
<td>42%</td>
<td>30%</td>
</tr>
<tr>
<td>Medium efficiency</td>
<td>30%</td>
<td>36%</td>
<td>24%</td>
<td>52%</td>
</tr>
<tr>
<td>Low efficiency</td>
<td>12%</td>
<td>12%</td>
<td>18%</td>
<td>6%</td>
</tr>
<tr>
<td>N/A</td>
<td>20%</td>
<td>10%</td>
<td>16%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Source: own calculations based on data set

5.3.1 Accelerating information exchange

The efficiency of cross border cooperation considered through acceleration of the information exchange have received a positive assessment, i.e. between 38 and 42% of the respondents have evaluate as “highly efficient” the introduction of jointly managed informational systems, purchasing computer and communication equipment, creation and development of local networks. The “high efficiency” associated with the informational exchange is also an expression of an important and specific need for improving the informational and TIC related side of the activities. This is particularly the case of “ITC equipment purchasing” (with 42% of the respondents assessing “high efficiency” and 36% “medium efficiency”) and “joint information system implementing” (with 38% of the respondents assessing “high efficiency” and 33% “medium efficiency”). Between 24 and 36% of the respondents associate a “medium efficiency” for this actions and less than a quarter associate “no efficiency” / or the answers were “not applicable”. The considerable number of non-responses (“not applicable”) can be explained by the wide
variety of cross-border cooperation actions: in some cases, purchasing or implementing an ITC system could not be an end in itself.

5.3.2 Joint editing of materials relating to public order

Editing materials regarding public order and security issues, both targeting the general public and having scientific purposes, also recorded positive scores, signifying that their achievement is a real win-win situation, for both partners and target groups, and meets a real specific necessity in cross-border activity.

5.3.3 Staff training and specialization

Management training, work experience transfer or sharing and improving skills for network operator staff appear to satisfy the most positive responses, scoring, overall, the high score (between 34 and 58% for “high efficiency”). However, the highest score (of 56%) was registered for medium efficiency at “improving skills for staff operators” sub-activity. This testifies that there is further a gap between the necessary and the actual skills of the operating staff. Even the programmes already achieved have exerted an important and effective impact in the direction of improving workers’ skills and abilities to use ICT, the results are not as expected related to the existing need for staff training. Moreover, this result can testify that this is a direction where future co-operation programmes should be focused and also that more attention should be paid to further actions oriented to improving ICT skills of the personnel.

5.4 The most effective and the least effective cross-border activities

Romanian representatives consider as efficient and very efficient actions such as: data exchange and accessing the Schengen Information System; joint border patrols; PHARE CBC Programs; actions against road traffic crime and contraventions; joint supervision on human trafficking; training and work experience exchanges. Particularly interesting are the opinions shared by representatives of institutions with responsibilities in emergency situations, such as joint interventions in case of fire on border area, common tactical application on evacuations, executive staff exercises in emergency situations or disasters, etc.

Regarding less effective actions there were mentioned: inconsistent and irregular information exchange on fraud areas, some excessive theoretical meetings and seminars, formal action (but important for public image), uncertain and costly (in terms of time and human resources) access to finance.

On the other side, the Hungarian representatives’ opinions are unanimously stating that all actions undertaken were highly effective, the only notable exception considering the low-efficiency (probably below expectations) associated to funding access.

The existence of certain benefits, solid and lasting results from cross-border cooperation projects is undeniable, but the meaning of this question lies more in its second part, i.e. how the current results could serve as premises for expanding cooperation, setting goals for a deeper cooperation. From our point of view, the almost “unanimity” of responses (98% “agree” and “strongly agree”) is rather the result of a pattern of “compliance”, as we mention above. Given this fact, we consider that decoding the premises for future cooperation should consider, perhaps, other questions of the survey.

5.5 Equal sharing of the benefits of cross-border cooperation

For this question, 90% of the respondents stated a strongly agreement, considering that cooperation benefits were equitably distributed and experienced by partners and target groups on both sides of the border. It is a case where the expectations are interlocked with the voluntary nature of the entries into partnerships and the results of training programs and joint projects. Thus, it is understandable that the share of responsibilities was followed by mutual benefit results and satisfaction of being involved in joint programs.

6. Conclusion

The euroregional framework for cross-border cooperation and the approach of the contribution of euroregional structures to achieving development goals have been little addressed in the existing literature. Within this context, we tried to investigate the situation of the cross-border cooperation in the field of public services, focusing on a specific euroregion, i.e. Bihor – Hajdú-Bihar Euroregion, located on the Romanian-
Hungarian border. Given that the euroregion itself is a recent creation (since 2002), as expected, cross-border cooperation in the field of public order and security in Bihor – Hajdú-Bihar Euroregion is only at the beginning. Considering also the nature of the police organization, traditionally more reluctant to the idea of openness and cooperation, the results are more than promising and encouraging.

Based on a questionnaire consisting of 20 questions related to cross-border cooperation actions already undertaken, we investigated the opinions of experts and top managers in public order and security institutions on both sides of the Romania-Hungarian border. We approached different issues of the specific way that institutions and persons have been involved in standard cross-border interventions or projects and their experience, how the initial objectives have been achieved, the obstacles and achievements in cross-border cooperation actions, the communication between partners, the effectiveness of cooperation, the effects on beneficiaries, the satisfaction of cross-border partners, how their experiences can be shared as a premise for further deepening cooperation in the same or in other cross border areas.

The main conclusions are, briefly, the following:

- The cooperation actions are still limited on the scale of cooperation stages, have a reduced scale, mainly focused on solving specific problems, having an exploratory role of mutual knowledge and identify common problems;
- Related to initial objectives, the cross-border cooperation actions have been achieved in a greater extent their goals;
- Cross-border cooperation faces various obstacles and failures, and the most important source of them are specific laws and regulations, lack of financial resources, bureaucracy and centralization;
- All activities listed, e.g. accelerating the information exchange, joint publication of materials and brochures related to public order and security, staff specialization and development, partnerships between national/transnational institutions sharing responsibilities in the field of public order and security, developing necessarily skills for more effectively accessing European funds, are considered to have medium or high efficiency. It also emerged the strong necessity to develop further programmes focused on improving ICT skills of operating staff;
- The most important beneficiaries of these programs are the local communities and the region as a whole, i.e. the usual recipients of public order services;
- In terms of perceived threats and dangers to the sustainability of projects undertaken, the experts consider that these programs have an undeniable future and cross-border cooperation will exceed the current initial stage; however, their post-funding continuity remains a difficult issue especially in the current economic crisis.

Local public services and their provision across euro-borders remains an open and interesting area, both for researchers and scientists and for practitioners involved in specific cooperation actions. For many countries in Central and Eastern Europe, cross-border cooperation is, undoubtedly, at its beginnings, but the results obtained in only 10 years by a normal, ordinary Euroregion, such as investigated in our paper, are encouraging and mobilizing.

References


Alina Badulescu, Daniel Badulescu and Catalin-Adrian Bucur

Hu-Ro CBC Programme 2007-2013 (2012) Financed projects, [online], http://huro-cbc.eu/en/financed_projects?status%5b0%5d=0&area%5b0%5d=0&area%5b0%5d=0&page=20.


Ideas for a new Civic Reputation System for the Rising of Digital Civics: Digital Badges and Their Role in Democratic Process

Marco Bani¹ and Stefano De Paoli²
¹Scuola Superiore sant’Anna, Pisa Italy
²Fondazione <ahref=’co.eu’, Vicolo Dallapiccola 12, Trento Italy
m.bani@sssup.it
stefano@ahref.eu

Abstract: For several years governments invested significant resources in the digital management of democratic processes. Furthermore, e-government has moved away from the digitalization of document processes and decision-making within the administration towards a new model that involves citizens in the co-production and sharing of information. These processes require management of a large amounts of information, which raise questions about the protection of individuals and social control. Reputation could be the answer to many problems. People understand that the way they behave online will impact their ability to maintain an online presence as well as perform all sorts of transactions in the future. In the same way, citizens who help their local community would be recognized for the role they play in generating different kinds of wealth for society. A reliable system of “civic reputation” is needed to foster collaboration but also for protecting individuals and avoid social control. In the past year, a plethora of reputation systems have been launched to serve as the connective tissue of reputation and trust across the web. But no one has risen as standard for use in e-government process. This uncertainty prompts a number of key questions: it is possible to rank trustworthiness in the digital public sphere for e-democracy processes? Will a single system of reputation work across multiple platforms? And what procedures are in place to ensure the accuracy of the reputation, the ability to address mistakes and the necessary acknowledgments to reward who is actively involved in civic engagement? This paper analyzes innovative practices in the evaluation of “civic reputation” to support the participation of citizens in a reshaped public sphere, and suggests digital badges and a new badging framework as a solution to these problems.

Keywords: digital civics, democracy, reputation, digital badges, OpenBadge

1. Introduction: Shaping a new kind of democracy

E-democracy can be defined as the pursuit and the practice of democracy using digital media, in online and offline political communication. In the late 90s, with the rising of e-democracy processes (Norris 2001), the belief was that we were going to face a political revolution with an improvement in transparency, accountability, and new mechanisms of participation of people in public decision processes. However, today we are facing a large disillusion toward e-democracy (Hindman 2008). The notion of popular empowerment, the “core of democracy” (Aristotele 2000), has been diluted to the point that most citizens exercise their putative sovereignty only through periodic elections of representatives and thus have extremely limited input into political processes. There are less and less opportunities for direct participation of citizens in favor of other agents: bureaucrats, technocrats, intergovernmental bodies, lobby groups, commercial enterprises and the media (Crouch 2004).

However, several successful projects are emerging under the umbrella of the “open-government” definition. These projects are showing that it is possible to foresee a new way to foster democratic participation via social media. Governments should aim “to use new technology to amplify the voices of citizens to influence those in power, and by insiders as a way to harness and channel those voices to advance their causes. Participation means true engagement with citizens in the business of government, and actual collaboration with citizens in the design of government programs.” (Lathrop and Ruma 2010). Particularly relevant is the practice of crowdsourcing considered as the activity of outsourcing tasks to distributed communities of people (Howe 2008). Expanding the concept to politics, crowdsourcing could lead to proper “cultivation of public consensus to address governance issues, strengthen communities, empower marginalized groups, and foster civic participation” (Lathrop and Ruma 2010). This is a concept that we can define “citizensourcing” (crowdsourcing among citizens). Social media technologies mixed with citizensourcing can foster democratic direct participation in the discussions of policy development, in the implementation and co-production to improve services quality, delivery and responsiveness.
The real challenge for governments is, therefore, to coordinate these different voices in order to reach collective decisions that are an expression of general interest. In recent years\(^1\) many examples have shown that the government can promote transparency, accountability and participation using new media tools. This is a new way to interpret the processes of government that sees not only the empowerment in the bureaucratic component, but also empowerment in the city itself, which has different tools to optimize the approach with the government, becoming a mechanism from collective complaint to collective action (Lathrop and Ruma 2010).

“Digital civics” is a concept that refers to a set of digital tools that are designed for and centered around social interaction. Digital civics aim to foster civic engagement, participation, transparency and accountability.\(^2\) These tools can be considered as the technological infrastructure for a potential new form of democracy that strengthens the social bonds within a community and its value for the co-production of public policies. Digital civics overcome the traditional boundaries of time and space for government and other political processes, which have traditionally involved physical attendance or slow input-seeking procedures.

Each digital civic technology has its own architecture that shapes the types of interactions that can occur (Lessig 2010), however, all together they could help to reduce the barriers of representative democracy, empowering the citizen, fostering an interactive dialog and a sharing framework between governments, people, communities. Digital civics also challenge political stakeholders (parties, institutions and civic society), who need to reshape the relationships between governments and communities, because the boundary between them becomes less clear.

So far, however, digital civics have shown a number of difficulties: 1) difficulties in sustaining long-term projects and reasoned deliberation; 2) difficulties in getting public sphere’s attention and 3) difficulties in reducing the gap between who knows how to use the new technologies and have access to them and who do not. Besides these difficulties, in order to promote digital civics, a good level of trust among the political actors is necessary. The use of Internet services and applications is often a situation that requires trust since, in many cases, we are interacting with people that we have never met in person. Reputation has gained attention as a social mechanisms that can be used to create trust in online communities. Some authors talk about “the reputation society” (Massum and Tovey 2012), a society that leverages the high diffusion of reputation systems to promote positive changes. However, a key problem is the proliferation of reputation systems. Different reputation systems in digital civics could hinder collaboration and stifle participation. A further problem is that many reputation systems designed for the sharing economy are not properly suited to e-governance processes, because they are denying a shared framework, compulsory in the digital public sphere.

What is the possible solution to build effective reputation systems for digital civics then? Because reputation is highly context and platform dependent how different initiatives can join efforts? Furthermore, how is possible to overcome the limits of current reputation systems used nowadays in digital civics? A possible option is to imagine a “civic reputation” shared by many digital civics: a reputation mechanisms that traces of actions performed online through digital civics and that is able to provide a shared framework supporting the various processes of participation and transparency. While several solutions could be envisioned, we propose a possible direction. A growing phenomenon for assessing and displaying reputation for web users are digital badges. Badges, we believe, can foster the creation of a civic web ecosystem based on trust. Badges can act as effective representations of contributions of participants in digital civics.

Certainly if each digital civics come up with its own badge system, the problem of proliferation of reputation systems will not be addressed. In this paper we trace some idea for a general system of digital civics badges that could be shared by several initiatives. Our model consider firstly a “lean federation” of several digital civics via the concept of “web-of-trust”: a decentralized trust model in which peers authenticate each other as trustworthy. This federation of “digital civics” will then share a common set of badges representing reputation for participants (citizens, associations, companies, government) in the bottom-up democratic process. Furthermore, our model takes advantage of the Mozilla Open Badge project which provides a technical Open Source infrastructure for issuing and displaying badges in a standardized way. With a federation of digital civics, a unique and shared badge system and an open infrastructure granting a standardized issuing and

---

1 See paragraph 2: The rising of Digital Civics
2 See [http://www.ethanzuckerman.com/blog/2012/08/30/understanding-digital-civics/]
dissemination of badges it could be possible to design a centralized civic reputational hub based on badges. While we consider this model only as a preliminary step leading to possible further developments, we hope our initial conceptualization will help us in gathering interest.

2. The rising of digital civics

In this paragraph we briefly present some relevant examples of Digital Civics showing the potential of these media in supporting democracy.

One of the first examples of successful digital civics is SeeClickFix4, which was a pioneer in crowdsourcing reporting applications. These tools of civic engagement are interactive websites that enable users to report non-emergency issues in their communities, such as broken street lights, needed crosswalks and potholes. They can be used either via a mobile app or a web platform. Communities and local governments responses are reported and tracked by users. These processes are also called crowdmapping: the capacity for everyone to report “something” on maps. These applications are getting more and more popular in several fields, such as the fight against corruption (Ipayabride4), for monitoring public elections, crisis, or natural disaster. Likely the most known crowdmapping tool is Ushahidi5.

Moreover, new online platforms for crowdfunding seem to increase the scope and potential of a fundraising mode: the collection of money and other financial resources for a joint project. In addition to general platforms like Kickstarter6, civic crowdfunding platforms such as CitizenInvestor7 and Brickstarter8 have emerged.

New intriguing developments are also the platforms for co-legislation, that aim to share, promote and foster legislative acts, either locally or nationally. Examples of this kind of platforms at the national level are We the people9 (USA) and ECI10 (Europe) that allow citizens to propose acts, petitions and documents that have reached a certain number of signatures to the relevant legislative assembly. The political debate between local citizens and political representatives could reach a new level with the capabilities offered by the new digital tools: from brainstorming (IdeaStorm11) to commenting sites (Writetoreply12) till a proper discussion (Politix13) there are many platforms to increase the debate in the public sphere, both offline and online. However these tools are fragmented and not yet mainstream. Mindmixer14 is a platform that models itself after a town hall and rewards points to users who comment and participate in the generation of ideas for the community. These points can be then translated into achievements, perks, and prizes in ways that are similar to a video game. Another app that is gaining attention in USA is Textizen15, designed and used as a way to improve resident feedback around specific projects like city planning initiatives. The app helps cities easily ask questions via public posters and quickly collect feedback via text.

Even the most used social media such as Facebook and Twitter can be considered as digital civics when used for civic action, with the advantage of having a massive user base unthinkable for any other platform entering now the civic landscape.

3. Trust and reputation

In order to promote digital civics a good level of trust among the political actors is required. We can define Trust as an attitude that allows social actors to reduce the complexity of action and take decisions in situations of risk with a lack of knowledge (Luhmann 1979). The use of Internet services and applications is often a situation that requires Trust since, in many cases, we are interacting with people only via the mediation of
online technologies. In online relations, it is quite common to interact with unknown people. This is the reason why in serious and well-established online services, these decisions (from e-commerce to health and government services) are often supported by trust and reputation systems.

Reputation is the summary of a person’s relevant past actions in the context of a specific community. It is a collective value of trust that a community awards to a person. The definition points to two key aspects: the communitarian value of reputation and the temporal frame (reputation is awarded on past actions). People prefer to interact with reputable persons, because their trustworthiness has been assessed by their peers (Dasgupta 1988).

To a certain extent this is also true for online interactions. The problem, however, is that differently from face-to-face interaction, online interactions are dis-embedded from any specific social context. It is indeed quite different to buy a book on Amazon from an unknown seller or from the book store located in the neighborhood where you live. In the second case you can see and touch what you are buying and you can interact directly with the seller. In the first case you are just interacting with the portal interface and you need to place a terrific deal of trust in the seller and the product you are purchasing as they are described on such interface. Online Reputation Systems have been identified a solution: these are systems that collect, maintain and display ratings, votes, comments and reputations more generally on several aspects of the online behaviour of users. Reputation systems in brief try to digitize societal reputational processes and mechanisms (Dellarocas 2010) fostering social order and structure in web communities (Glass and Farmer 2010).

4. Social media as tools for reputation assessment

The need for online reputation in digital civics stems primarily from the flourishing of peer-to-peer (p2p) services that allow resource sharing directly among users, creating what is called "sharing economy" (Botsman and Rogers 2010). The need to judge the veracity and accuracy of a given user with whom we would like to start a transaction is paramount for the stability of online relations. However, nowadays we are facing a proliferation of reputation system: each web service can have, and indeed often has, its own reputation system, which is not comparable with other reputation systems.

A growing phenomenon of recent years has been the attempt to establish central reputational hubs across the web. Services like Trustcloud, Legit, Connect.me, Scaffold, Klout (and similar scores) and MiiCard are taking different approaches in developing a portable reputation systems, compared to the more traditional proliferation approach. Most of them are using algorithms to determine a score: these algorithms are taking data from social media in order to create a final number that represents the online reputation of a user.

The most commonly used social media, such as Facebook and Linkedin, are growing as a tool to determine the reputation, thanks to strict name policies that does not allow anonymity. This approach feeds the trust during the exchanges, because there is a greater identity verification, with the idea of being able to declare reliable who has a public profile with many connections, open and prone to correspondence. Moreover, social media profiles are being used to foster reputation in some e-government process: using the same concept of transparency (public profile = trust), the UK government is experimenting a new national identity scheme, called "Identity assurance"16 which will allow people to access online public services using as official identification documents either via their mobile phones or social media profiles.

5. The need of a new reputation system for e-democracy

Reputation systems designed for the sharing economy are not properly suited for e-governance processes, but are aimed for transactions, often financial. The context is totally different: an excellent reputation on p2p trading systems does not necessarily mean a good behaviour in participatory processes. Important theorizations have been proposed, however, to link the advantages of distributed reputation systems with public governance (Picci 2010). This could ensure a much needed transparency in public decision process. However, actual examples of using reputation systems in this field are not known.

There are further problems in the application of reputation systems to e-governance/e-democracy: for instance many of the numeric values of the reputation systems are calculated with closed algorithms. In public processes, where transparency is necessary to increase trust and exchangeability, we cannot rely on closed

16 See http://digital.cabinetoffice.gov.uk
Anonymity and arbitrary algorithms. Moreover, the use of reputation systems managed by private companies raise several privacy concerns: a report by the European Network and Information Security Agency (ENISA 2011) identified several areas of risk for users. The report warned of security risks that could expose personal data to hackers and the high probability of being attacked by cybercriminals. In addition, the monetization of these models is still unclear. Are they going to sell users data? Are they going to share the analytics behind the behaviour of users, thanks the "linkability" of social platforms?

For all these reasons, reputation systems designed for a p2p economy are not very suitable for the democratic process because they are denying a shared framework, compulsory in the digital public sphere, and for their lack of trustworthiness of their reputation scores. Reputation simply cannot be a currency if individuals have different skills and specializations.

The use of social media as a tool for reputation is an intriguing experiment, but it creates other problems. For instance privacy issues are continuously debated, and the permanent accumulation of data in the hands of private companies raises many concerns. Moreover, a process of identity verification via social media does not increase the reputation of participation processes: certainly a single user social media profile that has much public information can give greater credibility to the person, but it is yet unclear whether it could create a system of "civic reputation" that is based on the behaviors performed by the citizen in various civic actions.

6. The civic reputation

The "civic reputation" aims to give a trace of actions performed online through digital civics, to give a shared framework to the various processes of participation and transparency. The life of a community is based on mutual trust and the digital public sphere should aim at simulating the dynamics of offline participation. The civic reputation could also allow to avoid some of the problems of e-democracy processes that use digital civics: the risk of pollution using anonymity. In fact, the political lobbying by companies or minorities who seek to achieve a particular interest, can hide behind private profiles, pseudonyms, fake id, to influence online decisions in their favor. Moreover, compared with offline actions, participation in online actions was slightly more motivated by cognitive calculations (efficacy) and less by affective factors (identification)(Brunsting and Postmes 2002). Using a reputation system makes it possible a better identification, in order to gain trust and lower the barrier between the online and the offline community.

Anonymity must instead be recommended to use in other digital civics:

- In reporting criminal acts, where there is a risk of exposing themselves to retaliation
- To allow minorities to use a public space to share their problems
- In the reporting process, to speed up reports and not hinder the participation

7. Digital badges: A new reputation model for digital civics?

We believe that a promising approach to foster reputation in digital civics is using the concept of badge. A badge is a visual representation of an accomplishment, skill or reputation gained in the context of a specific community. Badges can act as effective representations of contributions to digital civic life. Digital Badges are often devised in order to make the participation in social media more engaging and motivating (Halavais 2012; De Paoli et al. 2012). Obtaining a badge is something that should motivate users and it is also a mark of achievements within a community. Badges may also support the transferability of skills, reputation and/or achievements to other platforms.

A recent Digital Media and Learning Competition supported by the MacArthur Foundation has been entirely focused on badges in order to foster Online Informal Learning. The competition has had tracks related to pure research on badges as well as on the design of badge systems. Most importantly, the design competition asked for the production of badges that could augment the infrastructure of the Mozilla Open Badge project17.

As stated on the homepage of the project “Mozilla Open Badges helps solve that problem, making it easy for any organization to issue, manage and display digital badges across the web.”. The OpenBadge is an

17 See http://openbadges.org/
infrastructural layer that offers facilities for issuing and sharing badges in the large social media ecosystem based on OpenApi.

These initiatives have had a significant impact on the development of the concept of digital badges. Among other things they have been able to provide a solid socio-technical framework for the design and deployment of digital badges systems. In particular, they formalized several key concepts, indispensable for building an effective badge system:

- **the (badge) issuer**: as the entity awarding the badge to receivers (e.g. informal learners), which also decides what are the rules/actions upon which reputation and badges are awarded.

- **the receiver/earner**: as the person/entity receiving the badge from the issuer.

- **the displayer**: a third party platform which is open to display badges that conform with the OpenBadge standard.

- **the ecosystem**: all the people or other platforms that will recognize badging systems.

- **the metadata**: metadata should be attached to the badge as a way to track the actions-activities that lead to the awarding of the badge.

### 7.1 Civic badges

Our position is that digital badges can constitute the kernel of a reputation system for civic initiatives fostering e-democracy. To this end a civic media badge framework could be deployed. The outcomes of the Mozilla OpenBadge and DMLCompetition can be leveraged for achieving this goal. Besides, some civic media platforms such as Ushahidi (Figure 1) are already starting using badge system to track achievements and foster engagement. Therefore, it would be wise to take advantage of a concept (i.e. digital badge) already being used by leading digital civics initiatives.

![Ushahidi Pack](http://ushahidi.github.com/Badges/)

**Figure 1:** The ushahidi digital badges pack http://ushahidi.github.com/Badges/

In our view, a badge framework should have some basic features in order to tailor badge systems for civic initiatives. These features are somehow context-independent:

- aesthetic characteristics based on principles of "Visual Semiotic";
- graphical features in order to build the graphical look and feel of badges;
- based on established User Experience (UX) patterns;
- able to represent in a granular way civic achievements;
- with a focus on portability of graphical representations;
- supported by the Mozilla Open infrastructure Badge.

### 7.2 The civic badges Issuers

Digital civics platforms, in our model, are the primary issuers of digital badges. There are several civic media platforms and a civic badge framework should work towards a unified model. Several model can be foreseen to achieve this goal:
Marco Bani and Stefano De Paoli

- each platform has its own badge system: different systems, however, cannot be compared or merged. This will not help creating an unified badge reputational framework. While it might be a good idea for each platform to have its own system, performing a general badge system will support the user in collaborating in cross-platforms civic initiatives. [Low engagement];
- each platform joins the others in an unique federation of platforms. This federation becomes the issuer of badges offered to users. However, this direction is not easy to take, as the platforms need to agree beforehand on many rules (e.g. who will manage or design the badges) [High engagement];
- a third option is that the badge framework is offered by a trustworthy entity. Each platform can get an account and authenticate via the framework. The framework independently issues civic badges. This model seems the most viable as there is no need for a prior agreement among civic platforms. [Medium engagement]. This model can also benefit by using the concept of web-of-trust: a decentralized model in which peers authenticate each other as trustworthy.

7.3 The civic badge earners

The second step for a badge system is identifying the receivers and tailor the badge awarding process. Potentially everyone can contribute to the enhancement of civic life using digital civics. At a first glance we have identified four different profiles:

- Citizen
- association
- Company
- Government

However these actors-profiles are very different among themselves and it is expected that their contribution needs to be recognized in different ways. So, while a civic badge framework should be common for all the possible actors, the framework must also be able to differentiate between actors. In using only a single stream of badges it might be that associations or local government can unlock the badges in a much faster way that a single citizen contribution. And while at this stage it is difficult to foresee a possible design addressing this problem, some initial suggestions can be made:

Citizen/company/association profile badges
- Citizen/company/association icon: entity actively participating in digital civics initiatives.
- Verified entity whose identity has been verified by the framework.
- All the data compiled (about profession etc...).
- Mobile user.
- Number of civic actions (from different platforms).
- Badge for every kind of civic action (participation, reporting, commenter....).
- Social media connections.

Government Profile badges
- local/national government icon;
- numbers of civic action promoted;
- number of people involved;

7.4 The civic badge displayers

Who can be then the displayers of badges earned through the framework? In the Mozilla OpenBadge framework displayers are mainly third party platforms. 18 These include social networks site such as Facebook or Linkedin, personal blogs or websites and so forth. The key aspect for engaging displayers should be to focus on the diffusion and viralization of civic badges. In the first place digital civic themselves should host technical

18 https://wiki.mozilla.org/Badges
facilities to allow badge receiver to display their badges. However badges could have a much significant impact if their circulation involves the large digital media ecosystems.

**Figure 2:** Hypothesis for a shared badges framework fostering “civic reputation”

### 8. Conclusion

In this paper we analyzed new systems of participation and transparency, based on the concept of digital civics and the use of civic reputation to build a bottom-up and social media driven democratic process. This is a new way to define democracy, with a major involvement in the public sphere of ordinary people rather than leaders or hierarchical structures or organizations. We believe that reputation will increasingly play a relevant role in the construction of this “we-democracy” based on shared and trusted relations among actors.

In order to foster this vision, we proposed a preliminary vision for a shared reputation framework to federate several digital civics initiatives based on the concept of digital badge. The framework aims to avoid the proliferation of reputation systems that could indeed hinder collaborative initiatives in this field. Clearly the civic badges framework that we have described in this paper is far from being complete. For achieving our goal however we follow an approximation approach seeking to do one step at a time. Here we list some problems that future work should address:

- How the management of the federated framework will be organized? Will there be a third party (transparent and no-profit entity) managing or will there be a sort of scientific board?
- Who will create, design, develop and finally manage the federate framework? A consortium of digital civics or a non-profit organization?
- How and which decisions on the badge system (e.g. what to represent, rules upon which award badges) will be taken?

### References


Measuring the Provision of Public Services by Digital Means

Juan Carlos Barahona and Andrey Elizondo
INCAE Business School, Costa Rica
juan.barahona@alum.mit.edu
andrey.elizondo@consultor.incae.edu

Abstract: Assessing the advancement of e-Government has been used to promote its development. However, over the past decade, debate on models and ways to understand and monitor this advancement has centered on the use of a “maturity model,” that states that governments evolve through a sequential set of phases or stages. The effectiveness of these models on estimating or describing e-Government advancement has been questioned, but more importantly, the information they provide has been of little use for policy-makers and public officials, especially for leaders and project managers at the institutional level, where e-Government actually occurs. Literature also discusses other models that evolved to focus on the provision of e-services through government portals but their design makes self-evaluation and peer-comparison difficult, if not impossible. Other models, have recognized appropriately the complexity of implementation at the micro-level, but have failed to propose an appraisal method that allows for scaling at a national or regional level while still being feasible in terms of time, costs and opportunity. We consider that it is possible to use the quality of information as a proxy to measure both progress and overall quality of e-Government. Because of the nature of how most government services are delivered through a two-way information exchange between citizens and one, or several, government agencies, the level of the quality of that exchange should be a good way to measure the government’s ability to provide its services electronically. We propose three main components to describe the quality of this exchange: the quality of the interaction; the content quality and media quality. We borrow from literature on the quality of information to build an e-Government index based on informational attributes that are constructed using a proposed methodology to observe and measure variables directly from site interaction. By revising other indices and relevant literature, we have defined a set of design criteria for an improved e-Government index. We describe the framework and methodology and discuss its strengths and weaknesses. We also report the result of six years of research using this framework and methodology; the last three years include a national-scale trial conducted in Costa Rica, a country that has adopted our proposal as its official e-Government index. We discuss these results and their theoretical and practical implications for IT use in government operations, public administration and the future of e-Government assessments. Using the resulting panel data from this study, this paper reviews the index and its implementation, validates its claims, explores lessons learned and discusses real and potential challenges.

Keywords: networked society, disruptive innovation, e-government, e-government assessment, it management

1. Introduction

As digitalization of society advances, citizens expect more and better services from their governments. More frequently, their perceptions about the quality and timeliness of how these services are provided imply the intelligent and intensive use of digital means. Supranational, national and local governments have greater presence on the Web, and this has created new ways of influencing services (Henman 2013). In a broader sense, the role of governments and their digital agendas are decisive in the transition to an interconnected society, since a country’s overall digitalization is also linked to the digitalization and sophistication of its public services (Henman 2013) (Margetts 2009) (OECD 2003) (Dutton and Jeffreys 2010) (Tobias and Hellen 2007).

Transformations associated with e-Government are more complex than just the mechanization of public office functions, which has characterized the evolution of service provision over the past few decades (Aman and Kasim 2011). Today’s technological realities and possibilities facilitate and encourage skills for public service provision and design that could lead not only to improved services, but also to totally new and revolutionary methods of organizing public offices; disruptive business models capable of challenging the dominant concepts on national organization and public service provision. This dynamic is not often fully understood in the public sector, and many times no strategy even exists for dealing with it (Dodgson, David and Ammon 2008) (Ambali 2010).

Public services are designed to meet the needs of citizens, and governments are organized to offer those services at some level. Historically, however, public services have been demanded at the level that citizens are capable of calling for them, the same way they have been supplied based on the governments’ capacity. The difference between supply and demand results in stability and trust (Tolbert and Mossberger 2006). The problem we are facing is that the pace of hyper-connectivity is accelerating, making it easier for citizens’ needs to evolve; meanwhile, governments, by their very nature, are seriously limited in their ability to keep up and
innovate. Paradoxically, for most public officials, there are counter-incentives to innovation, making it especially hard for them to lead change.

Throughout the world major investments have been made to increase government presence in digital media (Henman 2013). The magnitude of these investments, together with their operational impacts, create a need to quantify and measure these efforts consistently and rigorously (Kunstelj and Vintar 2004) (Vaclav, et al. 2006). More importantly, the digital connection between a government and a country’s citizenry is based on regular interaction of those citizens with governmental digital platforms or websites (Ifinedo 2012) and is reinforced to the extent that public services can be provided using a variety of digital devices to meet growing user demands (Holzer and Kim 2003) (Tolbert and Mossberger 2006) (Dutton and Jeffrey 2010). Even though it can be argued that the electronic component is just one piece of a complex process of change, these interactions are crucial. Therefore, their evolution must be scrutinized, and feedback and recognition of decisions become important factors in a government’s transition toward being an effective service provider in today’s new interconnected society (Andersen 2006) (Ambali 2010) (Aman and Kasimin 2011).

An assessment of how e-Government has advanced has been used as a means to promote its development. Different assessment models have been proposed and implemented during the past decade. Many were based on maturity models and shared similar shortcomings, while a few evolved to focus on the provision of e-services through government portals. All of them have provided aggregate measurements at the country and regional levels, while a few have done so at the local level.

We developed an index and a user-centered assessment aimed at serving as a proxy for e-Government development, while directly promoting collaboration in the form of knowledge-sharing and involvement of high-level decision-makers, who are critical to the advancement of any major technological innovation. This methodology has many practical and significant implications for IT use in government operations and the future quality of e-Government developments. From 2006-2009 this methodology was tested in Costa Rica and adopted by its government. Since then, three nation-wide evaluations of the methodology have been conducted by an independent, international academic institution.

Using three years of panel data and a supplementary cross-sectional study, this paper reviews the proposed index and its implementation, validates its initial claims, explores lessons learned and discusses real and potential challenges to future monitoring of public service provision by digital means.

2. Evaluating the progress of e-Government

Literature shows a tendency to classify progress in e-Government through the use of the Gartner stages model (Gartner Group 2000). This model describes a set of four or five stages in e-Government evolution or development, with variations depending on the author. A set of criteria is ascribed to these stages for diagnosing the “e-Government maturity” level reached by a government, whether national or local (Laynea and Leeb 2001) (Henman 2013).

There is extensive debate on the practical value of digital government stages and the different instruments – indices, tools and benchmarks – that have been created for international comparison purposes (Henman 2013) (Peters, Janssen and Engers 2004). The discussion derives from the fact that knowledge about these stages or indices provides very limited or useless information to policy-makers; moreover, because of their design, most existing indices are difficult for public officials leading efforts in the development of e-services to replicate, interpret and use directly.

Given the variety of instruments, models and frameworks (UN 2012) (Kunstelj and Vintar 2004) (OECD, Dubai School of Government 2007) (Fitsilis, Anthopoulos and Gerogiannis 2009) (Iribarren, et al. 2008) (Mundy and Musa 2010) (Stanimirovic, Leben and Jukić 2011) (Ifinedo 2012), literature suggests that there is still no “golden rule” on how to prioritize or create profitable or successful projects, or on where nations should invest their resources for effective e-Government progress.

Given the role that websites play as the digital connection between governments and citizens, several methodologies have been developed to measure the progress of e-Government by evaluating government portals (Barahona, Zuleta and Calderón, 2010) (Marco conceptual y herramienta para la evaluación de la calidad de la...
Juan Carlos Barahona and Andrey Elizondo

prestación de servicios públicos por medios digitales 2006) (J. Esteves 2006) (Torres 2006) (Universidad de San Andrés 2006) (Esteves and Victor 2007) (Fitsillis, Anthopoulos and Gerogiannis 2009) (Middleton 2007). We believe that this approach has greater potential to provide pertinent feedback to practitioners and policymakers. However, most of these studies could benefit from a more detailed explanation of their data collection or appraisal methods. Another shortcoming is the absence of a periodic and systematic assessment of the same set of institutions in order to test the proposed instrument and methods and to gather enough data to study the organizational impact over time. The studies also lack a discussion on the resources and mechanisms necessary to ensure scalability and consistency in the assessment process, comparability of results and traceability of data over time and between entities.

Recently, an alternative approach has been revised (Azab, Kamel and Dafoulas 2009), which also seeks to guide the development of e-Government. Instead of proposing to measure a government’s development in terms of compliance with a stage-based model, the authors propose a framework similar to management models for project implementation that examines existing conditions as determinants of the evolution of e-readiness, or the supply and demand of digital services. Although these measurements may inform decision-makers on how to improve the environment for digital development, the complexity of the authors’ proposed methodology would make it difficult and expensive to scale to a level that allows for any sort of data aggregation and results that could be compared at a national level, or even across countries.

In the following section, we describe a framework developed that considers the virtues and shortcomings of different attempts to measure e-Government. This framework has been enriched by implementation at a national level and five years of consecutive trial and data gathering.

3. Proposed framework

Since the start of the past decade, there has been debate on models and ways to understand and monitor progress made by countries in e-Government; however, some models provide information of little use in decision-making, or their designs make self-evaluation and peer-comparisons impossible. In 2006, an alternative methodology was proposed with the following criteria and design restrictions to balance relevance, replicability and trustworthiness (Barahona, Zuleta and Calderón 2006):

- **Relevance:**
  - A clear focus on the interaction between citizens and governments
  - Facilitates collaboration and knowledge-sharing among assessed subjects
  - Scales to a national or supranational level
- **Provides policy-makers, public officials and e-Government project implementers with valuable information for decision-making**
- **Explicability facilitates media access to take e-Government advances to a broader audience**
- **Replicability and trustworthiness:**
  - Data collection and evaluation should be easy to replicate at the institutional level
  - Provides accountability through adequate data granularity and traceability to the observed variables
  - Provides accountability through adequate data granularity and traceability to the assessed subjects
  - Completely avoids dependence on government agencies’ willingness to provide information
  - Avoids the perceived opacity of current measurements available at the time
  - Simplicity is based on a “do-it-yourself” approach

The framework was created after an extensive literature review of available methodologies and instruments. As a result of this work, the abovementioned critiques were made, reinterpreting the issue about the relationship of exchanges made between citizens and their governments. It was identified that the quality of the information is central to the interaction between those two groups.
Information quality frameworks provide a way in which to explore quality in the context of public service provision by digital means. The conceptual framework proposes using quality of the information as a proxy for e-Government capacity at the institutional level, measured by the user experience at the site where the service is provided. Quality is the result of 24 weighted factors used to describe six information attributes: Interaction, Personalization, Relevance, Soundness, Efficiency, and Media Reliability. For communication purposes these attributes are group in three main components to describe the quality of this exchange: the quality of the interaction; the content quality and media quality (see Table 1).

Table 1: Proposed framework

<table>
<thead>
<tr>
<th>Components</th>
<th>Information Attributes</th>
<th>Latent and observed variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction quality</td>
<td>1. Interaction</td>
<td>Presentation</td>
</tr>
<tr>
<td></td>
<td>1.1.1 Information on the organization (*)</td>
<td>1.1.1 Information on the organization (*)</td>
</tr>
<tr>
<td></td>
<td>1.1.2 Information on the services provided (*)</td>
<td>1.1.2 Information on the services provided (*)</td>
</tr>
<tr>
<td></td>
<td>1.1.3 Contact Information (*)</td>
<td>1.1.3 Contact Information (*)</td>
</tr>
<tr>
<td></td>
<td>1.1.4 Recent news, articles of interest (*)</td>
<td>1.1.4 Recent news, articles of interest (*)</td>
</tr>
<tr>
<td></td>
<td>1.1.5 Frequently ask questions (*)</td>
<td>1.1.5 Frequently ask questions (*)</td>
</tr>
<tr>
<td></td>
<td>1.1.6 Terms of Use and Privacy Policy (*)</td>
<td>1.1.6 Terms of Use and Privacy Policy (*)</td>
</tr>
<tr>
<td></td>
<td>Simple Transaction</td>
<td>Simple Transaction</td>
</tr>
<tr>
<td></td>
<td>1.2.1 Online Forms (*)</td>
<td>1.2.1 Online Forms (*)</td>
</tr>
<tr>
<td></td>
<td>1.2.2 Mechanism for consulting/requesting information (*)</td>
<td>1.2.2 Mechanism for consulting/requesting information (*)</td>
</tr>
<tr>
<td></td>
<td>1.2.3 Information on direct benefit services (*)</td>
<td>1.2.3 Information on direct benefit services (*)</td>
</tr>
<tr>
<td></td>
<td>1.2.4 User questionnaire on services (*)</td>
<td>1.2.4 User questionnaire on services (*)</td>
</tr>
<tr>
<td></td>
<td>1.2.5 Provides a way to rate the services received (*)</td>
<td>1.2.5 Provides a way to rate the services received (*)</td>
</tr>
<tr>
<td></td>
<td>1.2.6 Elements to promote visiting (*)</td>
<td>1.2.6 Elements to promote visiting (*)</td>
</tr>
<tr>
<td></td>
<td>Complex Transaction</td>
<td>Complex Transaction</td>
</tr>
<tr>
<td></td>
<td>1.3.1 Services are carried out completely online (*)</td>
<td>1.3.1 Services are carried out completely online (*)</td>
</tr>
<tr>
<td></td>
<td>1.3.2 online Payment(*)</td>
<td>1.3.2 online Payment(*)</td>
</tr>
<tr>
<td></td>
<td>1.3.3 e-Procurement (*)</td>
<td>1.3.3 e-Procurement (*)</td>
</tr>
<tr>
<td></td>
<td>Integration</td>
<td>Integration</td>
</tr>
<tr>
<td></td>
<td>1.4.1 Does not require the user to re-enter information the government has (*)</td>
<td>1.4.1 Does not require the user to re-enter information the government has (*)</td>
</tr>
<tr>
<td>2. Personalization</td>
<td>2.1 Organization by Archetypes</td>
<td>2.1 Organization by Archetypes</td>
</tr>
<tr>
<td></td>
<td>2.1.1 User profile clearly identified (*)</td>
<td>2.1.1 User profile clearly identified (*)</td>
</tr>
<tr>
<td></td>
<td>2.2 Integration by Archetypes</td>
<td>2.2 Integration by Archetypes</td>
</tr>
<tr>
<td></td>
<td>2.2.1 The information the archetype can use is collected from different sources (*)</td>
<td>2.2.1 The information the archetype can use is collected from different sources (*)</td>
</tr>
<tr>
<td></td>
<td>2.3 Personalization</td>
<td>2.3 Personalization</td>
</tr>
<tr>
<td></td>
<td>2.3.1 Option provided for personalizing how the information will be presented on the site (*)</td>
<td>2.3.1 Option provided for personalizing how the information will be presented on the site (*)</td>
</tr>
<tr>
<td></td>
<td>2.4 Intelligent Personalization</td>
<td>2.4 Intelligent Personalization</td>
</tr>
<tr>
<td></td>
<td>2.4.1 The site uses the information provided by the government to foresee user needs (*)</td>
<td>2.4.1 The site uses the information provided by the government to foresee user needs (*)</td>
</tr>
<tr>
<td>Content quality</td>
<td>3. Relevance</td>
<td>3.2 Comprehensiveness</td>
</tr>
<tr>
<td></td>
<td>3.1.1 The information provided is extensive (**)</td>
<td>3.1.1 The information provided is extensive (**)</td>
</tr>
<tr>
<td></td>
<td>3.2 Accuracy</td>
<td>3.2 Accuracy</td>
</tr>
<tr>
<td></td>
<td>3.2.1 Accurate information (**)</td>
<td>3.2.1 Accurate information (**)</td>
</tr>
<tr>
<td></td>
<td>3.3 Clarity</td>
<td>3.3 Clarity</td>
</tr>
<tr>
<td></td>
<td>3.3.1 Information presentation is clear, easy to understand (**)</td>
<td>3.3.1 Information presentation is clear, easy to understand (**)</td>
</tr>
<tr>
<td></td>
<td>3.3.2 Simple, understandable language (**)</td>
<td>3.3.2 Simple, understandable language (**)</td>
</tr>
<tr>
<td></td>
<td>3.4 Applicability</td>
<td>3.4 Applicability</td>
</tr>
<tr>
<td></td>
<td>3.4.1 Information useful for the user (**)</td>
<td>3.4.1 Information useful for the user (**)</td>
</tr>
<tr>
<td></td>
<td>3.4.2 All the sections provide useful information (**)</td>
<td>3.4.2 All the sections provide useful information (**)</td>
</tr>
<tr>
<td>4. Soundness</td>
<td>4.1 Concise</td>
<td>4.1 Concise</td>
</tr>
<tr>
<td></td>
<td>4.1.1 The information is concise, gets to the point, without rambling (**)</td>
<td>4.1.1 The information is concise, gets to the point, without rambling (**)</td>
</tr>
<tr>
<td></td>
<td>4.2 Consistent</td>
<td>4.2 Consistent</td>
</tr>
<tr>
<td></td>
<td>4.2.1 Pages maintain the same design style and diagramming</td>
<td>4.2.1 Pages maintain the same design style and diagramming</td>
</tr>
</tbody>
</table>

1 For a discussion on information quality frameworks see (Eppler 2006).
2 Factors are weighted according to the level of complexity associated with its implementation.
3 For a detailed description of current observed variables and factor weights, see (INCAE 2012).
<table>
<thead>
<tr>
<th>Components</th>
<th>Information Attributes</th>
<th>Latent and observed variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>throughout the site (**)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2.2 Title in the browser is meaningful (**)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3 Correct</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3.1 Free of grammatical errors (**)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.4 Current</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.4.1 The information is updated (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.4.2 Degree of updating (**)</td>
</tr>
<tr>
<td>Media quality</td>
<td>5. Efficiency</td>
<td>5.1 Navigability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1.1 Location of the site’s pages are clearly shown (**)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1.2 The links are easily identified (**)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.1.3 Interactive site map (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.2 Flexibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.2.1 The files for downloading are provided in different formats (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.3 Verifiability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.3.1 The site’s pages show author and source (**)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4 Usability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4.1 The domain works without using www in the address (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4.2 Type size can be adjusted by users (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4.3 There are no pages under construction or lacking content (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4.4 The content is displayed on the same page (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4.5 The site provides a 404 error page to guide the user (*)</td>
</tr>
<tr>
<td>Media reliability</td>
<td>6. Media reliability</td>
<td>6.1 Accessibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1.1 Content in other languages (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1.2 No broken links exist (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1.3 Option to use hotkeys rather than mouse (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1.4 The site facilitates access from a mobile device (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1.5 Images and objects with Alt Text (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.1.6 The site is compatible with the most recent versions of the three main browsers on the market (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2 Security</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2.1 Digital certificate (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.2.2 Data validation (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3 Visibility in search engines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3.1 The site has a “sitemap” file (.txt or .xml) (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3.2 The site has description and keyword metadata (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3.3 The site has a “robots” file (.txt) (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.4 Speed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.4.1 Average load time (**)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.4.2 Page weight (**)</td>
</tr>
</tbody>
</table>

* Dichotomous: 1/0
** Likert scale: 1-7

Currently, there are 55 observed categorical variables (16 are 7-item Likert scales and 39 are dichotomous). The 24 factors are actually a mix of observed (11) and latent variables (13). A weighted average of groups of factors is used to build a score for each informational attribute. Equation (1) describes this framework.

\[
Quality = \frac{100}{\sum_{i=1}^{24} Weight_i} \sum_{i=1}^{24} \left[ \frac{1}{M_i} \sum_{j=1}^{M_i} X_{ij} \right] \times Weight_i
\]

(1)

Where \(i\) is the number of factors; \(M\) is the number of observed variables; \(X_{ij}\) is the observed variable; \(j\) is the number of observed variables for each factor variable; and \(Weight_i\) is the factor weight.

4. Evaluation process

Two independent evaluators performed separate appraisals on each institutional website. Their evaluation was compared and if both agreed on or assigned a similar value, the average of both independent evaluations
was used. If they did not agree, a third independent evaluator assessed the disputed variable and provided a third opinion. The third value was averaged with the closest of the original measurements.

The average review time was estimated at 45 – 60 minutes per site. This review was performed using a computer with manual and automatic metrics on the website. Institutions were not contacted at any time by the reviewer.

Once data was collected and processed, it was aggregated within the described framework and presented to public officials and the media through a national public innovation conference sponsored by the national e-Government authority. This diffusion process was part of the model, serving essentially three purposes:

- To raise awareness among public officials and leaders about the importance of committing themselves and their institutions to providing services by digital means
- To raise public awareness about the availability and quality improvement of public services offered by digital means and to stimulate demand
- To promote collaboration and competition by providing project or site managers with benchmarking information at a disaggregated level in order to guide and foster exchanges and support in areas with specific shortcomings.

This methodology was initially tested in Costa Rica\(^4\) and adjusted between 2006 and 2009 (Barahona and Zuleta 2006) (Barahona, Zuleta and Zamora 2008) (Barahona and Elizondo 2009). During the first trials, attention was mainly placed on the feasibility of capturing data; scaling the model\(^5\) and having the country officially adopt the model and methodology. After three years of trials -and with little information collected-the model was revised and adjusted by a panel of experts. Then, in 2010, the Government of Costa Rica adopted the model, and every year since then, an outside, multidisciplinary team from an international academic institution has systematically assessed government websites (INCAE 2010) (INCAE 2011) (INCAE 2012). In 2012, 132 subjects were assessed, representing more than two-thirds of the country’s public sector (estimated in terms of their aggregate budget compared to the national budget in the year 2011). After running the same model during the last three years, and with five times more institutions measured, we attempt to review some of the strengths and weaknesses of the data in order to suggest future directions for researchers and practitioners.

5. Data analysis and results

Table 2 presents the general results of the evaluation processes in 2010, 2011 and 2012; they suggest that of the factors evaluated, the weakest or lowest scoring variables were F1: Interaction, F2: Personalization and F6: Media. The strongest or highest scoring ones were F3: Relevance, F4: Soundness and F5: Efficiency.

**Table 2:** General results for Costa Rica, by factor, 2010, 2011 and 2012 evaluations

<table>
<thead>
<tr>
<th>Variable</th>
<th>2010 (Obs=108)</th>
<th>2011 (Obs=122)</th>
<th>2012 (Obs=132)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1: Interaction</td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>3.058981</td>
<td>1.91152</td>
<td>3.017541</td>
</tr>
<tr>
<td>F2: Personalization</td>
<td>1.074074</td>
<td>1.902795</td>
<td>.868525</td>
</tr>
<tr>
<td>F3: Relevance</td>
<td>6.061574</td>
<td>1.605256</td>
<td>5.991066</td>
</tr>
<tr>
<td>F4: Soundness</td>
<td>5.927222</td>
<td>1.400716</td>
<td>6.846557</td>
</tr>
<tr>
<td>F5: Efficiency</td>
<td>4.885185</td>
<td>1.20358</td>
<td>5.475246</td>
</tr>
<tr>
<td>F6: Media</td>
<td>2.851667</td>
<td>1.047834</td>
<td>3.008279</td>
</tr>
</tbody>
</table>

National progress or improvement on the Interaction, Personalization and Media factors will require commitment and leadership. The proposed index and methodology will allow public officials to focus their attention and resources on these areas. Both literature reviews and experience show that these three factors, due to their complexity, are those that require the greatest technological capacity and sophistication, elements that are necessary, but not sufficient, for making progress on public services offered by digital means.

\(^4\) Initially it was out of convenience, eventually the choice had to do with government support and funding to pursue a nationwide testing over time.

\(^5\) A total of 24, 34 and 104 institutions were included in for 2006, 2008, and 2009, respectively.
The granularity of the proposed tool contributes to technical knowledge sharing among institutions with different strengths and weakness. There is anecdotal evidence of collaboration between institutions as a result of this process. In addition, there have been clear success cases in several organizations of changes and transformations that have evolved out of this process, as acknowledged by the head of the national e-Government authority and other public officials in different media outlets. See, for example, video interviews of high-level officials at (Fallas 2012). Even though data collection and assessments comply with the abovementioned criteria for trustworthiness, there is room for improvement on how the informational attributes are captured by the observed variables. Three years of gathering data using the same methods allows us to test for reliability. Table 3 shows that most factors and variables are reliable, but there is room for improvement. Special attention should be paid to factors describing efficiency and media infrastructure.

Table 3: Reliability of scales used to describe informational attributes as components of the e-Government index

<table>
<thead>
<tr>
<th>Item</th>
<th>item-test correlation</th>
<th>item-rest correlation</th>
<th>inter-item correlation</th>
<th>Alpha*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x1:Presentation</td>
<td>0.7752</td>
<td>0.5704</td>
<td>0.3698</td>
<td>0.6378</td>
</tr>
<tr>
<td>x2:Simple transaction</td>
<td>0.7588</td>
<td>0.5439</td>
<td>0.3861</td>
<td>0.6536</td>
</tr>
<tr>
<td>x3:Complex transaction</td>
<td>0.7962</td>
<td>0.6049</td>
<td>0.3491</td>
<td>0.6167</td>
</tr>
<tr>
<td>x4:Integration</td>
<td>0.6404</td>
<td>0.3679</td>
<td>0.5033</td>
<td>0.7525</td>
</tr>
<tr>
<td>F1:Interaction</td>
<td></td>
<td></td>
<td>0.4021</td>
<td>0.7290</td>
</tr>
<tr>
<td>Personalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x5:Arquetype organization</td>
<td>0.7550</td>
<td>0.5295</td>
<td>0.3339</td>
<td>0.6007</td>
</tr>
<tr>
<td>x6:Arquetype integration</td>
<td>0.6291</td>
<td>0.3427</td>
<td>0.4553</td>
<td>0.7149</td>
</tr>
<tr>
<td>x7:Personalization</td>
<td>0.7886</td>
<td>0.5845</td>
<td>0.3015</td>
<td>0.5643</td>
</tr>
<tr>
<td>x8:Smart personalization</td>
<td>0.7209</td>
<td>0.4762</td>
<td>0.3668</td>
<td>0.6347</td>
</tr>
<tr>
<td>F2:Personalization</td>
<td></td>
<td></td>
<td>0.3644</td>
<td>0.6963</td>
</tr>
<tr>
<td>Relevance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x9:Comprehension</td>
<td>0.9157</td>
<td>0.8370</td>
<td>0.4910</td>
<td>0.7432</td>
</tr>
<tr>
<td>x10:Precision</td>
<td>0.9047</td>
<td>0.8171</td>
<td>0.5032</td>
<td>0.7524</td>
</tr>
<tr>
<td>x11:Clarity</td>
<td>0.6153</td>
<td>0.3702</td>
<td>0.8236</td>
<td>0.9334</td>
</tr>
<tr>
<td>x12:Applicability</td>
<td>0.8851</td>
<td>0.7820</td>
<td>0.5249</td>
<td>0.7683</td>
</tr>
<tr>
<td>F3:Relevance</td>
<td></td>
<td></td>
<td>0.5857</td>
<td>0.8497</td>
</tr>
<tr>
<td>Soundness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x13:Soundness</td>
<td>0.7166</td>
<td>0.4461</td>
<td>0.2438</td>
<td>0.4917</td>
</tr>
<tr>
<td>x14:Consistency</td>
<td>0.7085</td>
<td>0.4337</td>
<td>0.2511</td>
<td>0.5015</td>
</tr>
<tr>
<td>x15:Correctness</td>
<td>0.6138</td>
<td>0.2962</td>
<td>0.3367</td>
<td>0.6037</td>
</tr>
<tr>
<td>x16:Current</td>
<td>0.6718</td>
<td>0.3785</td>
<td>0.2843</td>
<td>0.5437</td>
</tr>
<tr>
<td>F4:Soundness</td>
<td></td>
<td></td>
<td>0.2790</td>
<td>0.6075</td>
</tr>
<tr>
<td>Efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x17:Navegability</td>
<td>0.6910</td>
<td>0.3557</td>
<td>0.0761</td>
<td>0.1982</td>
</tr>
<tr>
<td>x18:Flexibility</td>
<td>0.5276</td>
<td>0.1303</td>
<td>0.2071</td>
<td>0.4393</td>
</tr>
<tr>
<td>x19:Verificability</td>
<td>0.6659</td>
<td>0.3177</td>
<td>0.0962</td>
<td>0.2421</td>
</tr>
<tr>
<td>x20:Usability</td>
<td>0.5194</td>
<td>0.1202</td>
<td>0.2137</td>
<td>0.4491</td>
</tr>
<tr>
<td>F5:Efficiency</td>
<td></td>
<td></td>
<td>0.1483</td>
<td>0.4105</td>
</tr>
<tr>
<td>Media</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x21:Accesibility</td>
<td>0.6729</td>
<td>0.2789</td>
<td>-0.0285</td>
<td></td>
</tr>
<tr>
<td>x22:Security</td>
<td>0.5974</td>
<td>0.1713</td>
<td>0.0264</td>
<td>0.0753</td>
</tr>
<tr>
<td>x23:Search engine visibility</td>
<td>0.4411</td>
<td>-0.0188</td>
<td>0.1402</td>
<td>0.3284</td>
</tr>
<tr>
<td>x24:Speed</td>
<td>0.4720</td>
<td>0.0159</td>
<td>0.1177</td>
<td>0.2858</td>
</tr>
<tr>
<td>F6:Media</td>
<td></td>
<td></td>
<td>0.0639</td>
<td>0.2146</td>
</tr>
</tbody>
</table>

* Cronbach’s alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct". Construct is the hypothetical variable that is being measured (Hatcher 1994). Alpha>0.7 is generally accepted as a good indicator of reliability.
6. Conclusions

In terms of relevance, the proposed framework and methodology are clearly focused on the interaction between citizens and government agencies and are scalable to a national level. Nevertheless, there is incipient dialogue on defining the evaluation subject. Should it be the institution or the service provided? As interoperability evolves, the service provided will become more relevant to the citizen and it will probably have its own location (for example, a government-wide e-procurement platform). Interesting and important as this discussion is, we believe that focusing on particular institutions and leaders is consistent with the way resources are allocated, thereby helping and motivating institutional leaders to support e-Government projects.

The proposed methodology is easy to understand and replicate, solving the opacity problem of other measures. The granularity of the measurement facilitates identification of specific areas or variables needing improvement. As described, the methodology proves to be feasible, scalable, and citizen-centered.

Altogether, this assessment tool contributes to the development of e-Government by creating awareness, informing demand and facilitating knowledge exchange. An annual ranking is a key mechanism to accomplish these goals, as it has been publicly recognized by practitioners and high-level public officials.

However, greater efforts must be made to improve the methodology’s reliability. The challenge is to do so without violating the design criteria and limitations on relevance, replicability and trustworthiness, which are the foundations of the methodology itself. Using more variables to estimate the latent variables would facilitate further analysis and redesign to improve reliability. Furthermore, the weighting can also be improved using techniques such as factor analysis.

In general, this instrument points us in the right direction to align strategy and the commitment of public officials with public services by digital means. At the same time, it fosters exchanges among technicians to share the technological knowledge necessary in order to compensate for the existing heterogeneity in digital institutional sophistication.

References

Fallas, Gustavo. INS y Municipalidad de Belén mantienen primer lugar de calificación de sitios web. Amelia Rueda, 27 de 11 de 2012.
Juan Carlos Barahona and Andrey Elizondo


Lessons Learned From the Implementation of Contact Centers in Swedish Municipalities

Irene Bernhard and Kerstin Grundén
School of Business, Economics & IT, University West, Sweden
Irene.bernhard@hv.se
kersten.grunden@hv.se

Abstract: Two case studies of the implementation of contact centers (CCs) in Swedish municipalities were compared and analyzed. The purpose of the article is to focus on lessons learned from the perspectives of the management and the employees in the organizations according to the MOA-model. The research method used was semi-structured qualitative interviews with different personnel categories in both municipalities. According to our findings the implementation strategies varied among the two cases. The strategies affected the pace of implementation, attitudes and motivation aspects and understanding of the implementation. The potential of using registered information as a source for planning and decision-making was not fully utilized in the municipal organizations, although some statistics were produced. In both cases there was a combination of formal and informal learning strategies and flexible co-operation among the employees in the CCs which contributed to continuous learning processes and a good, co-operative working climate. Some learning challenges for the handling officers at the back offices were to adapt to a more process-oriented organization. Initially, many handling officers at the back-office were afraid of losing their jobs and work tasks to CC, contributing to negative attitudes towards CC, and hampering the learning process in taking part in the implementation process. The establishment of a CC is a comprehensive organizational change process affecting the whole municipal administration. A challenge for the municipalities is to formulate relevant strategies and manage the implementation in order to involve all employees.

Keywords: lessons learned, municipal contact centers, implementation, e-government, MOA model, planning

1. Introduction

In this article we will focus on learning challenges from an organizational perspective when contact centers (CCs) are implemented in Swedish municipalities. During 2009 – 2011 the authors have studied the implementation of CCs in Swedish municipalities Bernhard and Grundén were responsible for evaluating the implementation process of CCs in the participating municipalities. The evaluation studies were already published in detail (Bernhard, 2009, 2010, 2011; Bernhard & Grundén, 2010; Grundén, 2010, 2011) and therefore we will discuss some aspects of the studies in this article relevant to learning challenges. The MOA model (Grundén, 2009) was used as a frame of reference for the evaluation studies. The main characteristic of the model is a focus on different interest perspectives, including the perspectives of employees, management and citizens. The aim of this article is to discuss lessons learned for employees and management when municipal CCs are implemented in Swedish municipalities.

From an international perspective the usage of Internet and computers is high in Sweden and e-Government in Sweden generally ranks among the top countries according to international evaluation studies (United Nations 2012; Accenture 2007). A Swedish action plan for e-Government was formulated by the national government in 2008 (Regeringskansliet, 2008). E-government was defined as “public business development that takes advantage of information and communication technology combined with organizational changes and new competences” (ibid., 2008:4).

The Swedish multi-level government system is based on three levels: national, regional and local. This approach is meant to strengthen the local autonomy of Swedish municipalities. On the local level, there are 290 municipalities in Sweden responsible for providing services such as building permits, environmental permissions, matters regarding social services and schools, healthcare, daycare and welfare for example (SOU 2008:97, SKL, 2009). They are governed by elected local officials and have a high degree of autonomy, so their internal work can be differently structured due, for example, to variations in geographic location, population and social structures of the inhabitants and economic conditions. Swedish municipalities do not have a statutory obligation to set up offices like CCs or similar service locations for their inhabitants. However, it is mandated by Swedish law that all Swedish municipalities should provide individual service, for example to meet visitors and to answer telephone calls from citizens. The service should be of as high a quality as possible from a financial resource perspective (SFS, 1986:223). The municipalities interpret their responsibility to
provide services in very different ways however. The implementation of e-Government in municipalities also varies greatly (SKL, 2011).

2. Contact centers

The concept and meaning of a CC derives from the concept of a commercial call center, increasingly used in the private sector since the beginning of the twenty-first century (Norman, 2005). A call centre is a place where you deal with phone calls completely dependent on the use of IT. The use of the “contact center” concept in Sweden indicates an extended function, focussing not only on phone calls, but also other contiguous work tasks (Andersson Bäck, 2008). The traditional model of a call center is thus transformed when CCs are established in Swedish municipalities (Czarniawska & Sevón, 1996). Every citizen is supposed to receive the same level of service regardless of economic status. The CC is a front office for citizens and businesses, and the main communication mode is by phone. The employees of the CC answer simple questions and guide citizens in using the municipal website and other e-services. All incoming phone calls are registered in electronic information systems, and initiated matters are transferred by the systems to the case administrators at the back office.

Figure 1 below shows the intermediary function of a CC as a front office, answering questions from citizens and transferring citizen matters to the handling officers in the back office. The arrows in the figure show the main communication patterns, and indicate which group mainly initiates contact. The figure also indicates that the employees at CC answer most of the questions from citizens and transfer matters once initiated to the back office.

![Figure 1: A conceptual model of the intermediary function of a contact center focussing on the main communication patterns. (The model is adapted from Bernhard, 2011)](image)

The phone calls from citizens and businesses to the CC replace their earlier communication patterns, when they used to call the handling officers in the back office directly to resolve their issues. Now the handling officers call citizens only once they have started to deal with a matter.

The implementation of CCs in Swedish municipalities is an example of implementation of local e-Government. E-government is often associated with increased citizen availability to public e-services, but it also means a fundamental organizational change in public organizations requiring new competencies (Grönlund, 2001; Worrall et al., 2010). There is a need for reorganization of back-office routines in order to optimize the efficiency and quality aspects resulting from the implementation of CC. According to a study of more than twenty governments in different countries, Accenture (2007) found many governments at an important crossroad. The main focus for public service organizations has been on improvements of front-end services to citizens, neglecting the importance of also aligning back-end aspects.

Implementation of e-Government does not simply mean implementation of new technology solutions. Implementation challenges are also changes in work practices, work cultures, behaviors, power structures and learning processes (Grundén, 2009; Worrall et al., 2011). Implementation of local e-Government such as CCs is characterized by huge and complex change processes that require new competencies both for employees and management in the municipal organization, as well as for citizens and businesses. The extended use of ICT support for municipal service production and re-organization efforts could contribute to more efficient routines, but will also put demands on continuous learning processes in order to meet the new requirements. As more and more CCs are implemented in municipalities, the possibilities to learn from such experiences will increase. It seems important not simply to try to imitate examples from other organizations, according to a global study of e-Government (Accenture, 2007), but instead use such examples as inspiration and also be aware of the importance of the local context when CCs are implemented.
3. The case studies

Research methods

The research methods used in the case studies were mainly qualitative. In case A 16 and in case B 17, semi-structured recorded interviews were made. The interviewed personnel categories in both cases were employees from CCs and from the back office of the municipalities as well as from the top management of the municipalities. Employed representatives from the unions were also interviewed. The main interviews in municipality A were made in 2010. The interviews in municipality B were made in 2010 and spring 2011. Each interview took about an hour and was tape-recorded and transcribed. Content analysis was used for the analysis of the interviews.

Some characteristics of the cases

Municipality A ranks among Sweden’s ten largest municipalities and is organized in nine operative administrations. Most of these organizational units are led by boards or committees of political representatives. The departments and administrations carry out a wide range of operations such as child and youth care, education, social issues, culture and recreation, building and environment.

Municipality B is a medium-sized municipality by Swedish standards, and is rapidly expanding. The municipality is organized in five operative administrations and like in case A they carry out a wide range of operations. Also similar to case A, most of these organizational units are led by boards of political representatives.

The start of the CC in case A was in December 2009. At that time the CC was not yet open for personal visits, but it was planned to open for physical visits after the move to the centre of the city in late 2010. The start of CC in case B took place in three stages from spring to December 2010. A main difference between the cases was the fact that the work at the CC was organized in response groups in case B, while there were no response groups in case A. In case B, the different response groups were: building and environment, education, and child care. In late 2010 a response group for social services was established. Each response group has contact persons at their authority (or authorities) and usually hold regular meetings together. An employee responsible for the coaching and training of the employees at the CC was recruited externally, and generated work descriptions and competence profiles that were used as a basis for the competence development programs. There were efforts to develop e-learning education for this training, using video and a learning management system. In case A there were also efforts to develop e-learning education.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of CC</td>
<td>Late 2009</td>
<td>Spring 2010</td>
</tr>
<tr>
<td>CC open for personal visits</td>
<td>Not initially but was opened in 2011</td>
<td>Not initially but was opened in late 2010</td>
</tr>
<tr>
<td>Name of the CC</td>
<td>Contact centre</td>
<td>Customer centre</td>
</tr>
<tr>
<td>Name of the employees at the CC</td>
<td>Municipality Guides</td>
<td>Service administrators</td>
</tr>
<tr>
<td>Number of employees at the CC</td>
<td>Initially: 9 municipality guides and 6 switchboard operators</td>
<td>25 (stage 3)</td>
</tr>
<tr>
<td>Work organization of the CC</td>
<td>No response groups</td>
<td>Response groups</td>
</tr>
<tr>
<td>Main competence pro-files of the employees at the CC</td>
<td>Generalists (combination of formal and informal competence strategies)</td>
<td>Specialists (combination of formal and informal competence strategies)</td>
</tr>
<tr>
<td>Implementation strategy of the CC</td>
<td>Top-down (slow process)</td>
<td>Top-down (rapid initial implementation)</td>
</tr>
</tbody>
</table>

4. Analysis and discussion of the implementation of the contact centre from the management perspective

The implementation strategies

In both cases the strategies were mainly top-down, but the ambition to implement the CC very quickly in municipality B seems to have contributed to a lack of anchoring among the employees in the municipal departments, affecting their understanding of and attitudes towards the new CC. The implementation process
went more slowly in municipality A, probably as a consequence of the local culture in this part of Sweden “to use few resources but with good co-operation considering the available resources,” as one of the respondents mentioned. The implementation strategy could have consequences for the learning processes in the organization. The adaption of the working culture, behaviors, changes of communication patterns, and creation of a common mental image of the change requires development-oriented learning processes that usually take time (Svensson & Åberg, 2001). The complex change process could reinforce changes in the power structure of the organization and result in power struggles among different “communities of practice” and professional groups, leading to negative attitudes towards the CC and hampering a learning process towards common mental images and goals (Parding & Abrahamsson, 2009).

There are documented common risks with work in call centers as being monotonous, stressful and lacking variation (Tengblad et al., 2002). This can also be relevant in part for work at CCs. According to Grossberg (2000), workers who receive formal training are likely to remain longer in their jobs. Trained workers also believe that their employers see them as important and valuable members of an organization, further developing loyalty (Sieben, 2007). Participation in project groups could stimulate motivation and the learning of new competencies for the employees (Angelow, 1991; Grundén, 2004). But it is certainly a challenge to engage all employees in big organizations and find relevant participation and learning forms in complex change processes.

In our pre-studies we found examples both of highly formalized and rule-based learning and more informal strategies for the employees at the CCs (Bernhard & Grundén, 2010). There may be pros and cons to each approach (ibid.). In our case studies described in this article we have found combinations of both strategies at the CCs. They could use information databases where they simply had to type the beginning of a question in order to receive an answer, or use their personal knowledge in order to answer the questions from the citizens.

**The financing of the CC and recruitment policies**

The financing of the activities of the CCs and the recruitment policies seemed to have been somewhat related in both cases. In both cases the financing of the CC caused problems and negative attitudes towards CC, but in different phases of the implementation process.

In case B some employees from the back office were recruited to CC against their will, due to a need for the participating departments to reduce their costs, as they had to contribute to the activities of the CC. There were some problems with negative attitudes towards the CC and problems in co-operation, related to this initial recruitment strategy. The project management seemed to have learned lessons from the problems of initial implementation and recruitment strategy and the recruitment and implementation of the response group for social services were more successful. The employees for the response group were voluntarily recruited and the activities of CC were much more anchored among the employees at the department for social services.

In municipality A the municipality guides were handpicked by the manager. The economic model between CC and the first participating departments (the different division within the Technical Office departments) was agreed upon at an early stage of the implementation process, and there was not much in the way of negative attitudes towards CC from these departments. In a later phase of the implementation there was however major problems related to the fact that the department of social services should contribute financially to the activities of CC, but they had difficulties finding relevant work tasks to transfer to the CC. There was for example no special response group for social services at the CC, and the demands of integrity, security and competence were not easy to deal with. There were very negative attitudes towards CC from the social services due to this situation. It seems thus to be important to anchor the applied financing models regulating the contribution of financing from the back offices at an early stage of the implementation process and also to specify what work processes should be transferred to CC related to the financing models.

**The information systems for handling of matters**

The electronic information systems for handling of matters were not fully developed in either of the municipalities initially when the CC was implemented, causing some problems in using them. Management
seemed to underestimate the inconvenience of such problems. As more CCs will be implemented in the municipalities, there will however be more experience to learn from in how to handle such dilemmas.

In case A the information system for handling of matters was developed using open-source software. In case B, there were initial efforts to implement a similar open source-based system, but due to compatibility problems with other systems, it was not possible to use that system. A consequence of this situation was that there was no functioning electronic system for handling of matters in the initial work at CC, which was problematic. Instead e-mails were sent from the service administrators to the handling officers at the departments, when a citizen matter was initiated. An information system for handling of matters, was however fully implemented in phase three. In this system all incoming calls were documented and categorised and the progress of handling matters could also be followed, which facilitated the production of statistics.

In case B the system was to be further developed with implementation time limits for the running time of each matter. If the time for handling of a matter exceeds the time limit, a message will be sent to the responsible manager of the department by the service administrators at the CC.

The implementation of CC contributed to some increase in incoming matters from citizens and businesses, a fact that was not foreseen by project management. However, no extra money was added to the costs of handling more matters. As the work processes became more efficient as a consequence of implementing the CCs, this does not seem to have been a major problem.

Registered information as a source for planning and decision-making

The potential of using registered information as a source for planning and decision-making was not fully utilized in the municipal organizations, although some statistics were produced. The use of the information could be extended if new categories are used when the data is registered, for example. To use, develop and integrate business intelligence IT-based tools includes components that support the follow-up on different levels of an organization (Borking et al., 2011). Poor decision-making is usually related to not knowing how to use available information or whether the information is sufficient (ibid). Organizations often do not have any structured procedure for handling decisions and there is a lack in both methods and the knowledge by which to identify and analyze problems (ibid, p. ix). The use of the registered information from the contacts with citizens and businesses could help management to improve the understanding of their needs and make conscious decisions based on statistics, affecting the information published on the municipal website and changing work procedures for example. The use of the information could also contribute to quality control and benchmarking.

5. Analysis and discussion of the implementation from the perspective of the employees at the contact centre

There was internal training and education to a varying extent in both cases before the CCs started. There were needs however to have continuous updating of skills as the context of the municipalities was continuously changing in both cases.

One dilemma for the employees in both cases was the fact that some employees had specialist knowledge that they were not allowed to use at the work in the CCs. The municipality guide was not allowed to handle issues of a more complicated nature. In case B all service administrators in the response group for social services should have a background as a social worker in order to be recruited to the CC. Some respondents questioned the need to have highly educated social workers in the CC, and thought that lower degrees of competence were sufficient. The social workers at the response group were not allowed to use all of their specialist competence either.

It is thus a general challenge for management to recruit employees to the CC with relevant background competence, and to offer relevant continuous competence possibilities, in order to counter the monotony and routine aspects of the job and meet competence needs. Such competence development needs could for example be related to the transfer of more work procedures from the back office to CC, and/or to have work rotation among different work tasks. The establishment of career paths for the employees at the CCs could be
a first step to highlight the individual competence needs in order to find relevant competence development possibilities.

The working climate was very social and they learned from each other in both cases. The open plan offices facilitated communication among employees in the CCs. A municipality guide in case A comments that, both because the work is not strictly governed by checklists (less formal) and the working climate was very social, i.e., you learned from each other within the working group, she felt more competent now compared to when she worked earlier as a specialist at the back office, because she is now both a specialist within a certain area and a generalist in a broader area. This adheres to both Lave and Venger (1991) and Parding and Abrahamsson (2009), who argued that learning at work usually take place in “communities of practice.”

6. Analysis and discussion of the implementation from the perspective of the handling officers at the back offices

Our results indicate that there is a need for increased focus on the back office when CCs are implemented. For many handling officers in the back office their work was changed due to the implementation and thus they had to learn and adjust to new work situations. Most handling officers received more time to work with the handling of matters, since they were no longer disturbed by incoming telephone calls from the citizens and businesses. They also had to handle somewhat more matters compared with before, due to increased incoming matters. Several handling officers at the departments in case A comment that they wanted to have more time for competence development within their specific competence area. Some handling officers missed the earlier spontaneous contacts with citizens, while others were satisfied with contacting the citizens themselves instead. The initiation of the work with handling of a matter had changed compared with before. Now the matters were transferred to groups of handling officers rather than being initiated by telephone contacts from citizens or private organizations. This change led to more co-operations among the handling officers, and the organization became more process-oriented. Some handling officers who liked to work very individually could have problems adapting to the more process-oriented co-operative work.

7. Conclusions

The implementation strategies varied in each case, and affected the pace of implementation, attitudes and motivation aspects, the mental view and understanding of the implementation. The implementation could initially be carried out quickly using a top-down strategy, but could lead to problems of negative attitudes and lack of motivation due to no participation. There could also be problems with understanding the implementation due to lack of relevant information and participation. A more bottom-up strategy with greater participation by the affected employees will take more time to carry out, but could contribute to a better understanding, and more positive attitudes and motivation.

The financing of the CC caused troubles for the contributing back-office departments in both cases, but in somewhat different ways and in different phases of the process. It is important to anchor the applied financing models regulating the contribution of financing from the back offices at an early stage of the implementation process. The recruitment of municipality guides to the CC in case A, where they were handpicked by the manager, was successful while there was some negative reactions in case B with the initial recruitment process due to the fact that employees from the back office were recruited to CC against their will.

In neither case was the electronic information systems for handling of matters fully developed when the CC was first implemented, causing more problems than expected in using them. These problems initially affected efficiency and quality aspects of the work.

The implementation of CC contributed to a certain increase in the number of incoming matters, a fact that seemed not to have been foreseen by the project management. This increase was handled without an increase in resources.

As all incoming matters were registered in information systems for handling of matters, the managements received a new source of information regarding the needs of citizens or businesses. The potential of using registered information as a source for planning and decision-making was not yet fully utilized in the municipality organizations, although some statistics were produced.
In both cases there were combinations of formalized and informal learning strategies in the CCs which seemed to contribute to continuous learning processes. The flexible and close co-operation among the employees at the CC contributed to a good co-operative working climate facilitating the learning processes. In both cases there was a need to have continuous updating of skills, although there were somewhat different competence needs in the cases related to the organization of the work. Some learning challenges for the handling officers were to adapt to a more process-oriented organization of their work, and more co-operation with their colleagues both in the back office and at the CC. They now had the possibility to plan their work with handling of matters in a better way than before. Initially, many handling officers were afraid of losing their jobs and work tasks to CC, contributing to negative attitudes towards CC, and hampering the learning process of taking part in the implementation process.

The establishment of a CC is a comprehensive organizational change process affecting the whole municipal administration. A challenge for the municipalities is to formulate relevant strategies and manage the implementation in order to involve all employees.

References


Irene Bernhard and Kerstin Grundén


Benefit Maximization of Legacy web Page Application Using Client Side web Page Modification

Choompol Boonmee\(^1\) and Tawa Kham parchua\(^2\)
\(^1\)Thammasat University, Klong Luang Pathumthani, Thailand
\(^2\)King Mongkut’s University of Technology, North Bangkok, Thailand
choompol.boonmee@gmail.com
twk@kmutnb.ac.th

Abstract: Providing a service can be different depending on servant’s experiences, cultures, environments and resources. Software has been designed and developed to fit requirements to support the service provisions. Presently deployed software is typically effective for only services under specific situations. This matter affects user acceptance and becomes an important limitation in widely spread software utilization and maximizing benefits from ICT investment. Presently mostly deployed software systems were developed using web page technology. Software has been designed to broadly cover all core business and data entries required by the service. Data entry web page typically includes text input fields, selection fields of multiple choices and so on. However in some contexts data value can be set by default internally without the need of human typing. In some contexts too many multiple choices make data entry inefficient. In order to contextualize software to fit various contexts, the software modification is required. In this paper we propose a technique of client side web page modification to maximizing benefit from legacy web page software. This method enables existing software systems be modified easier, faster and cheaper to maximize benefit without modification of the web server programs. Experiments have been performed with legacy web applications of government bodies in Thailand. The result indicates that benefit can be increased significantly from existing web application without modification of web server.

Keywords: benefit realization, legacy software reuse, client side web page modification

1. Introduction

Government body is an organization authorized by law to perform any executive, legislative, judicial, regulatory or administrative to provide a specific group of services to public. Information and communication technology (ICT) is a tool which improves performance in conducting business and increases its capabilities. On numerous occasions the significant value of the investments involved in the development of ICT and the expectations of governmental ICT use do not correspond to the rate of effective use. Benefit of ICT could not be realized without effective use. The intention to use is positively affected by performance expectancy, effort expectancy, social influence and facilitating conditions (Afonso et al., 2012). Considerable researches indicate that ICT by itself delivers little business value (Jenner, 2009; Fred et al., 1989).

Providing a service can be different depending on servant’s experiences, cultures, environments and resources. ICT has been introduced as a tool to assist such service provisions. Software systems have been designed and developed to fit the requirements to support the service. However unlike ordinary profit making business, it is hard to design software to cover all requirements in public service provisions and to satisfy all servants with different experiences, cultures, environments and resources. The acceptance and intent to use have become important factors (Ward et al, 2006). Implementing eGovernment has always been a challenge in either economical, technological, political or social in order to gain acceptance of ICT benefit from all stakeholders (Giurgiu, 2012).

Considerable methodologies have been developed to improve the ICT benefit realization, including strategic planning, system development, project management, change management, and benefit management. However evidence indicates that such technical approaches have failed as successful solutions. Rather than focusing on technical issues, many researchers are now focusing on human behavior as a promising area of study. In our prior works we have developed methodologies to achieve ICT acceptance and benefit realizations (Kham parchua et al., 2012; Kham parchua et al, 2013). Those methodologies focus on human factors and require ICT benefit acceptance on each individual context.

Considerable ICT and software systems have already been deployed in order to achieve eGovernment. Although the legacy information systems have been designed to improve public services, they deliver little benefit in the real situations due to various contexts. The variety of contexts is one of the factors that influence the acceptance and intention to use. To maximize benefit of legacy software, the modification is a
possible solution to fit each context. We call this software modification to fit a specific context ‘contextualization’. The contextualization of legacy software improves user acceptant and intention to use, thus maximizes the benefit realization. Since web based software modification affects all users immediately both positively and negatively, it is considerably complicated and requires significant investment. In this paper we introduce a web based software modification technique which can be done easier, cheaper and faster without modification of the legacy web application software. There are four sections in this paper. After the introduction, the concept of contextualization and benefit realization is described in the second section. Web page client side modification technique is introduced for the contextualization in third section. Some field studies are mentioned in the fourth section. The last section is the conclusions.

2. Contextualization and benefit realization

Presently deployed software is typically effective for some servants under some circumstances but does not fit all. This effectiveness influences users’ acceptance and becomes an important limitation to wider utilization of software tools and maximize benefits from ICT investment. Normally software is designed to broadly cover all core business and data entries required by the service. However its users may feel different degree of effectiveness if their use contexts are different. Therefore to maximize its benefits, effective contextualization of software requires individual software modification for each context.

Mostly deployed software systems were developed using web page technology due to its deployment simplicity. It consists of two parts; client side software and server side software as shown in figure 1. For client side software general purposed web page browsers can be used. For server side, centralized server software is deployed using various development tools; ASP, JSP, PHP and etc. They communicate to each other using simple request-response styled protocol called http.

![Figure 1: Web based centralized software is being used by users among various contexts](image)

Data entry web page typically includes text input fields, selection fields of multiple choices and so on. For text input field, users are required to type text data for the corresponding information entity through keyboard. In some specific contexts of use, its value could be predefined for all information records. For example, in the case of data entry of address, ‘province name’ can be set to a fixed known value under the use of a specific context. Some text input fields can be obtained automatically by using programmatic data processing, calculation or using external data source. Reducing or automating known value text input fields improves efficiency, effectiveness, user acceptance and intention to use. Some multiple choices styled input fields have too many choices under a specific context. Reducing their choices also improves efficiency, effectiveness, user acceptance and intention to use then maximize the benefit.

To improve efficiency, effectiveness, user acceptance and intention to use as mentioned above, software modification is required to fit each context of use. Figure 2 illustrates three contexts of use; context#1, context#2 and context#3. The server side web application software is modified to contextualize each context. However modifying legacy web application on server side requires a significant investment due to many reasons; poor documentation, poor source code management, personalized scripting difficulty and etc. In this paper we propose a technique of client side web page modification to customize data entry to fit various contexts and to maximize benefit from legacy web page software.
Figure 2: Software modification of contextualization is required to maximize benefit of legacy web based application.

Each user under a specific context requires diversified customization of web page application to fit his/her needs. To modify centralized web page software to fit all their needs requires significant investment. This method allows modification for only a relatively small group of users with less variety therefore cheaper investment. Moreover this method can be used to customize an application for various groups independently without any effect to each other and to the main software thus multiple modifications can be performed simultaneously with less complexity. As a result this method enables existing legacy web page style application to be contextualized easier, faster and cheaper without modification of the web server programs.

3. Contextualization using client side web page modification

Web page technology is basically a simple request-response style communication between client side web browser and web server using http protocol. Client side software sends a request with required information to the server then receives response data back in html syntax with optional programming scripts. The main idea is to develop a gate way styled pass through tunnel software to mediate between them in order to filter and modify web page content on the fly at client side without modification of web server as shown in figure 3. The web page modification software modules (WebMod) have been developed for each individual context; WebMod#1, WebMod#2 and WebMod#3. These modules are deployed individually for each context users. Each module mediates between server side software and client side web browsers for each context. While tunneling the communication between client and server, it filters for only few pages which need to be contextualized. By modifying the html and script of web page content, web page contextualization can be performed independently, for examples, text input fields can be reduced or can be automated, multiple choices can be reduced depending each context.

Figure 3: Software architecture of client side web page modification for contextualization

Figure 4 shows example of contextualization for text based data entry modification. Left side of the figure shows the screen layout of existing web page application. It consists of four input fields; name, address,
province and occupation. In this context we assume that text value for province name and occupation can be set to default value or can be automated. Right side of the figure shows the modified web page by using this technique. As a result text input fields have been reduced without legacy software modification by using the proposed contextualization technique. Figure 5 shows example of contextualization for text based input fields which can be automated using information from external data source.

Figure 4 Example of contextualization for text based data entry modification

![Diagram of text-based data entry modification]

**Figure 5:** Example of contextualization for 'multiple choice selection' styled data entry modification

Thai government has promoted the citizen identification smartcard since 2004. More benefits are expected from such invested electronic devices. Evidence shows its high diffusion but limited use not only in Thailand (Arteaga et al, 2012). In this example the smartcard can be used as an external data source. Left side of the figure shows the screen layout of existing web page application. It consists of person’s ID, name, address and birth date. In a specific context, this software is used to input citizen’s information and all visited citizens bring their citizen ID smartcards. The information can be retrieved automatically from the card through smartcard reader. By using this contextualization technique this web page is modified by adding button ‘Ex src’ and java script program with corresponding card data retrieving software. Right side of the figure shows the modified web page. If the user presses the button the added java script then run to retrieve data from the smartcard and fill the data entry fields automatically. As a result the data input time is reduced dramatically, the benefit of the legacy application increased without its modification.

Figure 6 shows an example of contextualization for multiple choices styled data entry modification. Left side of the figure shows the screen layout of existing web page application. There is a selection box with too many multiple choices which make users’ selection inefficient. For a specific context less choices are valid, for example these choices can be reduced to five elements for the context. Right side of the figure shows the modified web page by using this technique. The choices are reduced to five elements. This makes users’ selection more efficient, reduces input time without software modification.

![Diagram of multiple choice selection]

**Figure 6:** Example of contextualization for text based data entry modification using external data source

4. Field study

Two experiments have been performed with legacy web applications of government in Thailand. The first experiment is the legacy web page application called ‘e-Plan’. The application has been developed by department of local administration to be used by more than 6000 municipalities and local governments in Thailand for years.

Figure 7 shows software architecture of web based software ‘e-Plan’ contextualization using client side web page modification technique. In the figure, two municipalities are using the software through the web page modification modules; WebMod#1 and WebMod#2. As a result the proposed technique could be applied successfully with the legacy web application software. It reduces time consumed in data entry without modifying legacy software ‘e-Plan’. The software benefit has been maximized easily and independently for individual context of municipality. There are a number of web page applications that require citizen personal information which stored in the citizen ID smartcard. Most Thai people whose age is between seven and seventy do have the ID card. The second experiment is to use this ID card as an external data source to automate data input for legacy web page healthcare applications. Figure 8 shows software architecture of the
web based application ‘Medical Record’ contextualization. Two software modules have been developed; web page modification module (WebMod#1) and citizen ID smartcard data retrieving module. WebMod#1 modifies only the web page which includes input fields of patient’s personal information by adding java script which retrieves the personal information from the smartcard.

Figure 7: Software architecture of web based software ‘e-Plan’ contextualization development using client side web page modification technique

Figure 8: Software architecture of web based software ‘Medical Record’ contextualization development using client side web page modification technique and using Thai citizen ID smartcard as external data source

Figure 9 shows the screen layout of web based application ‘Medical Record’ contextualization development using client side web page modification technique. In the web page on left side, there are four text based input fields; ID, name, address and date of birth. The modified page is illustrated on the right side. The button ‘Card’ has been added to the page with corresponding java script. When the citizen ID card is inserted into the smartcard reader and the button is pressed, the personal information is retrieved from the smartcard and is populated in the text fields automatically.

Figure 9: Screen layout of web based software ‘Medical Record’ contextualization development using client side web page modification technique and using Thai citizen ID smartcard as external data source
5. Conclusions

In this paper we illustrate that generally software has been designed to fit requirements of service provisions for wide circumstances. It covers all data entries required. However it is hard to satisfy all users’ needs with different experiences, cultures, environments and resources. Presently deployed software is effective only for some users under some situations but does not fit all. This matter becomes an important limitation in widely spread software utilization and maximizing benefits from ICT investment. Mostly deployed software systems are web page applications. This research focuses on contextualization of the legacy web based application’s data entry to maximize benefits under various contexts of use. In order to contextualize software to fit various contexts, the software modification is required. However modifying legacy web application on server side is difficult due to many reasons; poor documentation, poor source code management, personalized scripting difficulty and etc. In this paper we propose a technique of client side web page modification to customize data entry to fit various contexts and to maximize benefit from legacy web page software. Instead of modifying the whole old program which requires complete understanding and complete source code, this method allows modification only a few specific web pages that need to be contextualized without or very little side effects to the legacy software. Since less effort is required and multiple developments can be done simultaneously, it can be performed easier, faster and cheaper. Experiments have been performed with Thai government legacy web applications. The result indicates that by using this method, benefits from legacy web applications can be maximized significantly without modification of web server. The increased benefits in the experiments are the efficiency and effectiveness of data entry process under various contexts of use. However since the main idea is to filter and modify web page content on the fly at client side without modification of web server, issues that should be studied further include security, complexity of legacy software and etc. There are some apparent disadvantages of this technique. One of them is that this method is appropriate only in case of simple modification is required. By using this technique the software is modified in presentation layer or in html level. It is hard to be used when complicated modification is required. Additionally after using the technique in software contextualization, the later modification of the central web server application affects all the contextualized software since they all depend on existing application especially in presentation layer. These disadvantages need to be studied further in the future.

References


Rapid Interconnection Development Between Legacy Software Using Client Side web Page Modification

Choompol Boonmee¹, Tawa Khampachua² and Romayong Surakitbunharn³
¹Thammasat University, Klong Luang Pathumthani, Thailand
²King Mongkut’s University of Technology, North Bangkok, Thailand
³Ministry of Labour, Thailand
choompol.boonmee@gmail.com
twk@kmutnb.ac.th
romyong@hotmail.com

Abstract: The software interconnection development is hard, expensive and time consumed since legacy software systems are heterogeneous and have very little interoperability. Thailand electronic government interoperability framework (TH e-GIF) is declared in national ICT master plan to facilitate electronic interconnection development of those heterogeneous software systems of public organizations. Presently mostly deployed software systems were developed using web page technology. In order to achieve the interconnection, those software systems need to be modified according to the TH e-GIF specifications. Modifying legacy software systems is difficult due to many reasons; poor documentations, poor source code management and etc. To enable those systems to interoperate with other legacy systems requires expensive investment and a long period of time. Web page technology is basically a simple request-response style communication between client side web browser and web server using http protocol. Client side software sends a request with required information to the server then receives the correspondence information back in html syntax with optional programming scripts. The communicated message can be filtered and modified on the fly at client side without modification of web server. In this paper we propose a technique of client side web page modification in software system interconnection development using standard data format. This method enables software systems interconnection development easier, faster and cheaper without modification of web server programs. In order to facilitate the electronic data interchange a standard electronic format has been developed and endorsed by Thai government under TH e-GIF. However to force all Thai government body to modify those existing heterogeneous software is hard, expensive, and time consuming. Very few government bodies could realize benefits from the interconnections. In this research we performed two experiments of interconnection development using our proposed technique. The first experiment is the interconnection development of electronic correspondence management system (e-CMS) software. The second experiment is the interconnection development of laboratory information system (LIM) software. Since there are only a few web pages have to be modified, the modification become less pain than expected. The interconnection developments in the experiments are as rapid as months and much less expensive than expected. This technique is independent from web based application development technology and tools; Dot Net, Java Server Page, PHP and etc. It can be applied to wide range of applications including ones developed by using obsolete software tools and supporting technologies.

Keywords: rapid development, client side web page modification, interoperability

1. Introduction

In e-Government development, better public services require the seamless flow of information across government. The seamless flow of information across government agencies requires software systems interoperation. The interoperation cannot be easily realized since their information systems are different (Peng, 2005; Boonmee, 2008). Thailand electronic government interoperability framework (TH e-GIF) was first announced in November 2006 in order to enable the electronic interconnection among Thai e-Government software systems (Thailand, 2006). TH e-GIF includes a collection of guidelines, methodologies and technical standards. TH e-GIF sets out technical policies standards and specifications as well as provides a guideline and procedure to build and manage national XML schemas. In order to obtain high interoperable XML schemas, TH e-GIF also promotes the building of national core component dictionary and national XML schema standards. In 2006 the first national XML schema standard following TH e-GIF was announced. It has been applied in systems interconnection development successfully (Saekow, 2008). There have been considerable attempts to apply such data standardization to various situations (Boonmee 2009; Boonmee 2010). Even the approach solves interoperability problems though the interconnection development still difficult and time consumed due to many reasons. This paper introduces a technique to develop the interconnection easier, faster and cheaper. In Thailand there are a number of government bodies; 20 ministries, about 200 ministerial departments and more than 6000 local government bodies. Normally they send and receive paper based documents to/from each other for communications, notifications, transactions and commanding systems (Saekow, 2008).
Figure 1 shows the paper based document interchange among government bodies. This way of communication is not efficient and not effective. Millions of paper based documents have been delivered among government organizations per one year. The documents includes correspondence letters, notifications, certifications, commanding systems and so on.

Figure 1: Paper based document interchange among government bodies

Nowadays information technology has been used much to enhance efficiency and effectiveness in public sector. There have been attempts to develop software systems to enhance these paper based document management. Most of software systems could not reduce the paper based document delivery. They tend to focus on management of document electronically internally within their organizations as illustrated in figure 2. Although electronic communication tools like e-mail have been used increasingly, paper based document delivery between organizations is still the main stream for formal communications.

Figure 2: Most of software systems, developed to manage paper based document, could not reduce paper based document delivery

To improve efficiency and effectiveness of document interchange, electronic interconnection development is required. Then document can be delivered electronically between heterogeneous software systems across
organizations as illustrated in figure 3. The software interconnection development is hard, expensive and time consumed since the legacy software systems are heterogeneous and have very little interoperability.

2. Problems of software interconnection development

As mentioned earlier, Thailand electronic government interoperability framework (TH e-GIF) is declared in national ICT master plan to facilitate electronic interconnection development of those heterogeneous software systems of public organizations. TH e-GIF includes a set of common rules, interoperability specification and standardized information model and electronics format.

Government software interconnections are required to use the information model, electronic format and interconnection specifications. Therefore information systems that need data interchange have to be modified. However modifying legacy software systems is difficult due to many reasons; poor documentations, poor source code management, use of obsolete technology and etc. To enable those systems to interoperate with other legacy systems requires significant investment and a long period of time. Rather than focusing on technical issues, many researchers are now focusing on human behavior as a promising area of study. Our prior works developed methodologies to achieve ICT acceptance and benefit realizations (Ward et al., 2006; Khampachua et al., 2012; Khampachua et al, 2013). They require faster and cheaper development technique.

![Diagram of software interconnection development](image)

**Figure 4:** Modification of web based software systems to enable electronic interconnections reduces paper based document delivery

Presently mostly deployed software systems were developed using web page technology. In order to achieve the interconnection, those software systems need to be modified according to the TH e-GIF specifications. Web page technology is basically a simple request-response style communication between client side web browser and web server using http protocol. Client side software sends a request with required information to the server then receives the correspondence information back in html syntax with optional programming scripts. To enable software interconnection the web based applications have to be modified. The modification include two parts; legacy function modification (Mod1 and Mod2) and electronic data interchange processing module (EDIPrc) as shown in figure 4. The legacy function modification part strongly depends on each software systems. This part has to do two extra jobs. The first job is retrieving appropriate information for sending out to the peer. The second one is storing the inbound information appropriately. The electronic data interchange part is typically identical for both parties since it sends and receives using the standard data format.

3. Client side web page modification

In this paper we propose a technique of client side web page modification in software system interconnection development using standard data format. This technique makes software interconnection development easier and reduces the development time remarkably. The legacy web based application is not required to be modified.
As mentioned above web page technology is basically a simple request-response style communication between client side web browser and web server using http protocol. The communicated message can be mediated, filtered and modified on the fly at client side without modification of web server.

Figure 5 shows the software architecture of our proposed technique. The legacy web based applications (Soft#1 and Soft#2) do not have to be modified. This makes the software interconnection development much easier. The software design and development process is independent from technology and development tools used by the legacy software. The development includes two main parts; client side web page modification parts (WebMod#1 and WebMod#2) and electronic data interchange processing part (EDI-Prc).

**Figure 5:** Client side web page modification : The proposed rapid interconnection development

For sender party WebMod#1 is mediated and acts like pass through gate way between client and server. It is designed to filter only the specific web pages which contain information to be sent electronically. The required information is retrieved to be processed by EDI-Prc module. This WebMod is legacy web pages dependent. The developer has to study and understand the structure and content of the web pages. Since there are only a few web pages need to be studied and the information appeared on the web page is visibly clear without complete technical document, the studying and understanding become easier. The EDI-Prc module is designed to send and receive information electronically based on well-defined technical standards. The specifications include web services specification, SOAP (Simple Object Access Protocol), WS-Addressing, WS-Security, WS-Reliability and so on.

For receiver party after EDI-Prc module received data from the sender side the module send the information to WebMod#2. The WebMod#2 is mediated between client and server of receiver side. It filters only a specific page which contains data entry elements correspond the received data. Then the module populates the received data into the data entry elements. Since only a few web pages have to be modified and the data interchange processor (EDI-Prc) is well developed, this method enables software systems interconnection development easier, faster and cheaper without modification of web server programs.

4. **Experiment**

In this research we performed experiments of interconnection development using our proposed technique. The first experiment is the interconnection development of electronic correspondence letter management system (e-CMS) software. Thai government organization communicates with each other by using paper based formal correspondence letter for commanding, notification, announcement, and so on. Varieties of e-CMSs have been developed to manage such digitized correspondence letter. Interconnection of those e-CMSs would allow more effectiveness and cost-efficiency. Each e-CMS is different in various dimensions; technology, software vendor, owner organization, software design, investment scale and the way of use. In order to facilitate the electronic data interchange a standard electronic format of correspondence letter has been developed and endorsed by Thai government under TH e-GIF. However to force all Thai government body to
modify those existing heterogeneous e-CMSs is hard, expensive, and time consuming. Therefore very few government bodies could realize benefits from those e-CMS interconnections. The e-CMS interconnection development, using client side web page modification technique, has been performed with ten ministerial departments and many provincial branches.

Figure 6 shows software architecture of e-CMS interconnection development. The figure shows letter sender on the left side and letter receiver on the right. For each side the software development consists of two parts; data exchange part (eCMSX) and client side web page modification (WebMod) part. The data exchange part is identical to all e-CMS software therefore this part is developed once and deployed to all. Since the WebMod part depends on each e-CMS web page design therefore it has to be individually designed and developed. For the sender side WebMod#1 is designed to modify web page in which sending letter information is entered or populated by end user. When the user submits the send letter information, WebMod#1 retrieves the information on the fly and send to the receiver through eCMSX.

![Software architecture for correspondence letter management system (e-CMS) interconnection using client side web page modification technique](image)

Figure 6: Software architecture for correspondence letter management system (e-CMS) interconnection using client side web page modification technique

Figure 7 shows screen layout of the e-CMS sending letter information entry page. It includes letter ID, subject, sender, receiver and letter’s content. On the left side after the send letter information is entered, the button ‘Save’ is then pressed to submit the information. On the right side the modified web page is illustrated. The ‘Save’ button is changed to ‘Send’. When the button is pressed the WebMod#1 catches the information then send the receiver through eCMSX.

![Correspondence letter management system (e-CMS) sender screen’s web page modification](image)

Figure 7: Correspondence letter management system (e-CMS) sender screen’s web page modification
For the receiver side, figure 8 shows screen layout of e-CMS receiving letter information entry page. On the left side the web page before modification is shown. It consists of receiving letter input fields and ‘Save’ button. When receiver party receives paper based letter, the end user uses this screen to enter the letter’s information, then press the ‘Save’ button to store the information entered. On the right side the web page after modification is shown. The ‘inbound letter’ button is added into the page. This appears when some letters have been received through eCMSX. By pressing the button the eCMSX’s received letter information will be populated into the text fields automatically. This mechanism enables letter information to be transferred electronically with user’s recognition. This interconnection development technique helps developing easier by modifying only two html pages without deeper knowledge about the legacy software.

![Letter receiver screen](image)

**Figure 8**: Correspondence Letter Management System (e-CMS) receiver screen’s web page modification

The second experiment is the interconnection development of laboratory information system (LIM) software. The experiment is performed by department of medical science. The department has several sample testing laboratories distributed around the country. Each lab is established to provide sample lab testing services specialized for its located area. For example if the lab is located in industrial area there would be specialized laboratory supporting product testing and environmental testing. So far each lab has developed its own laboratory information systems (LIM). The LIM software is different to each other. The development of various LIM interconnections becomes hard, expensive and much time consumed.

As a centralized administration office, the lab analysis service reports are required to be integrated. The department develops data center software to collect the lab analysis service reports electronically from several LIMs as shown in figure 9. LIM standardized data set and standard XML schema has been developed. The Data center software is connected to several LIMs through EDI-lim module by using the XML standard format. In this experiment, instead of modifying existing LIM software, client side web page modification technique has been used. There are two parts; LIM client side web page modification part (LimMod#1) and data interchange processing part (EDI-lim).

Figure 10 shows an example of LIM screen layout of lab analysis data entry and its mechanism behind. The data entry screen includes sample ID, sample name, test result, tester and ‘Save’ button. No visible change of the page has been modified. Instead when the entry data is submitted by pressing ‘Save’ button, LimMod#1 performs the communication stream filtering then catches the information on the fly then it sends to data center software through EDI-lim as illustrated in the figure. The proposed technique is also used in the interconnection development successfully.

5. Conclusions

The software interconnection development is hard, expensive and time consumed since legacy software systems are heterogeneous and have very little interoperability. In the case of Thailand, data standardization is the selected method to solve the interoperability problem. Presently mostly deployed software systems were developed using web page technology. In order to achieve the interconnection, those software systems need to be modified. Modifying legacy software systems is difficult due to many reasons; poor documentations, poor source code management and etc. To enable those systems to interoperate with other legacy systems requires expensive investment and a long period of time.
Figure 9: Software architecture of lab information management (LIM) interconnection using client side web page modification technique

Figure 10: Lab information management (LIM) user screen web page modification

We propose a technique of client side web page modification in software system interconnection development using the standard data format. This method enables software systems interconnection development easier, faster and cheaper without modification of web server programs. Thai government organization communicates with each other by using paper based formal correspondence letter for commanding, notification, announcement, and so on. In this research we perform two experiments in the real e-Government systems. Since there are only a few web pages has to be modified, the modification become less pain than expected. The interconnection developments in the experiments are as rapid as months and much less expensive than expected.

This technique is independent from web based application development technology and tools; Dot Net, Java Server Page, PHP and etc. It can be applied to wide range of applications including ones developed by using obsolete software tools and supporting technologies. However since the technique is based on web page technology, the legacy software is not web based could be applied easily. This technique can be extended to apply with other types of technology which is considered to be our future work. Moreover since basically the main job of using the technique is to analyze the web page content in html syntax on the fly, there would be cases that the page content is too complicated to analyzed and modified correctly, for example the page includes too complicated script language programming. There are limitations to use this technique in software interconnection developments.
References


Improving Data Cleansing Techniques on Administrative Databases

Roberto Boselli, Mirko Cesarini, Fabio Mercorio and Mario Mezzanzanica
Dept. of Statistics and Quantitative Methods, CRISP Research Centre, University of Milan, Bicocca, Milan, Italy
Roberto.Boselli@unimib.it
Mirko.Cesarini@unimib.it
Fabio.Mercorio@unimib.it
Mario.Mezzanzanica@unimib.it

Abstract: Business and governmental applications, web applications, ongoing relations between citizens and public administrations generate a lot of data, whereas a relevant subset can be considered as longitudinal data. Such data are often used in several decision making activities in the context of active policies design and implementation, resource allocation, and service design and improvement. Unfortunately, the lower the quality of the data, the lower the reliability of the information derived thereon. Hence, data cleansing activities play a key role in ensuring the effectiveness of the decision making process. In the last decade a great effort has been made by both industrial and academic communities in developing algorithms and tools to assess the data quality, by dealing with a wide range of dimensions (e.g., consistency, accuracy, believability) in several fields (e.g., government, statistics, computer science). Nevertheless, scalability issues often affect theoretical methods since the size of real case datasets is often huge, while the lack of formality of a lot of data cleansing techniques may affect the cleansed data reliability. Therefore, the application of such approaches to real-world domains still represents a challenging issue. This work is aimed to exploit both empirical and theoretical approaches by combining their capabilities in assessing and improving the data cleansing procedures, providing experimental results in a motivating application domain. We focus on a scenario where the well-known ETL (Extract, Transform, Load) technique has been used to generate a new (cleansed) dataset from the original one. Then, we enhanced the ETL features by assessing the results through the Robust Data Quality Analysis (RDOA), a model-checking-based technique implemented to evaluate the consistency of both the source dataset and the cleansed one, providing useful insights on how the ETL procedures could be improved. We used this methodology to a real application domain, namely the "Mandatory Notification System", designed by the Italian Ministry of Labour and Welfare. The system stores data concerning employment and active labour market policies for the Italian inhabitants. Such data are stored in several databases managed at territorial level. In such a context, the data used for the decision making by policy makers and civil servants should be carefully and effectively managed, given the social relevance of the labour market dynamics. We evaluated our approach on a database containing more than 5,5 million people career data, i.e. the citizens living in an Italian Region. Thanks to the joint exploitation of both the ETL and the RDQA techniques, we performed a fine-grained evaluation of the data cleansing results.

Keywords: data cleansing, data quality, administrative databases, decision making

1. Introduction and contribution

In the last decade, the diffusion and application of Information Systems has grown apace, providing a relevant contribution in the definition and realisation of many IT services, also in the public sector. As a result, a great number of datasets have become available, a lot of them could be exploited to deeply analyse, observe and explain social, economic and business phenomena. Unfortunately, several studies report that the enterprise databases and the public administration archives data quality is very low, e.g. (Batini and Scannapieco, 2006) (Redman, 1998), causing unpredictable effects on the effectiveness and reliability of the statistics derived. To give an example, the causes of the Challenger Space Shuttle explosion are imputed to ten different categories of data quality problems (Fisher and Kingma, 2001). Organisations are getting more and more aware of the low data quality consequences and costs, therefore several plans, strategies, and actions have been implemented, e.g. as described in (Tee et al., 2007). Data quality is a broad concept and it is composed of several dimensions, e.g., accuracy, consistency, accessibility. A complete survey can be found in (Batini and Scannapieco, 2006). In this paper we focus on the consistency dimension, referring to “the violation of semantics rules defined over a set of data items”.

In this paper we describe how data quality techniques can be used to improve a database quality, by focusing on administrative databases, especially those presenting a longitudinal dynamic (i.e., repeated observation of the same subject at multiple time points). To this aim, we report a successful experience in the domain of the labour market data, in which both ETL and formal-methods-based techniques have been jointly applied. Indeed, a challenge in the field of data quality is the development of techniques able to analyse and cleanse huge data archives, by focusing on several data quality dimensions. From a statistical perspective, this activity
enables the conversion of administrative data (i.e., data collected as single and independent events) into statistical data. The latter data allow one to analyse and describe a phenomenon as result of multiple observations and measurements from both the qualitative and the quantitative point of view. In this streamline, dealing with consistent data is required to guarantee the statistical results believability. An example can help clarifying the matter. The Table 1 shows a cruise ship travel plan. A ship usually travels by sea, then stops at the port of calls (intermediate destinations), making a checkin notification when entering a harbour and a checkout notification when exiting. The reader will notice that the departure date from Lisbon is missing, since the ship should checkout (from the previous harbour) before entering into a new one. In this sense, the dataset is inconsistent.

Missing data and wrong values may be not noticed during the “daily operations”, but they can strongly affect the information derived for decision making purposes. Indeed, even though each single notification of Table 1 can be considered as “correct”, the missing departure from Lisbon is a problem, and several of them can strongly affect the statistics and the indicators computed on the whole dataset. For instance, missing dates create uncertainty when computing an indicator like active travel days/overall cruise duration, and unpredictable effects may arise on the statistics generated, since the missing data frequency is unknown and cannot be precisely estimate.

Table 1: Example of a cruise ship travel plan

<table>
<thead>
<tr>
<th>EventId</th>
<th>ShipID</th>
<th>City</th>
<th>Date</th>
<th>Notification Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>e1</td>
<td>S01</td>
<td>Venice</td>
<td>12th April 2011</td>
<td>checkin</td>
</tr>
<tr>
<td>e2</td>
<td>S01</td>
<td>Venice</td>
<td>15st April 2011</td>
<td>checkout</td>
</tr>
<tr>
<td>e3</td>
<td>S01</td>
<td>Lisbon</td>
<td>30th April 2011</td>
<td>checkin</td>
</tr>
<tr>
<td>e4</td>
<td>S01</td>
<td>Barcelona</td>
<td>5th May 2011</td>
<td>checkin</td>
</tr>
<tr>
<td>e5</td>
<td>S01</td>
<td>Barcelona</td>
<td>8nd May 2011</td>
<td>checkout</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

To avoid this unpleasant side-effect, have exploited the data quality techniques:

Step1: to analyse the source dataset, and to discover and fix inconsistencies, creating a new consistent dataset;

Step2: to provide an assurance of the effectiveness of the technique used at step1, and consequently of the cleansed data reliability, hence increasing the usefulness of the generated statistics.

The former task has been accomplished by means of the well-known ETL technique while the latter has been performed through the Robust Data Quality Analysis (RDQA), a technique we applied as introduced by (Mezzzanica et al., 2011). For the sake of completeness, we highlight that the RDQA has been implemented by applying formal methods, model checking for instance (Clarke, Grumberg and Peled, 1999). A discussion about this hardware/software formal verification technique is out of the scope of this paper. For this reason the RDQA will be presented by avoiding details about formal definitions, models and algorithm pseudo-codes. The interested reader can find all these details in the works of (Mezzzanica et al., 2011), (Mezzzanica et al., 2012).

2. Related works

Data quality has been addressed in different research domains including statistics, management, and computer science as reported in (Batini et al., 2009), (Scannapieco, Missier and Batin, 2005). For the sake of clarity, the works surveyed in this section have been classified into three groups according to the (main) goal pursued: record linkage, error localisation and correction, and consistent query answering. The classification adopted is not strict since several works could be classified in several groups.

Record linkage (known as object identification, record matching, merge-purge problem) aims to bring together corresponding records from two or more data sources or finding duplicates within the same one. The record linkage problem falls outside the scope of this paper, therefore it is not further investigated.
Error localisation and correction works can be further classified in: 1) those exploiting machine learning methods and 2) those exploiting data dependencies (formalised by domain experts) to detect and correct errors. Considering the latter, the effort of domain experts is required to formalise dependencies and rules.

1) Machine learning methods. Possible techniques and approaches are: unsupervised learning, statistical methods, data profiling, range and threshold checking, pattern recognition, clustering methodologies. It is well known that these methods can improve their performance in response to human feedbacks, however the model resulting from the training phase can’t be easily accessed and interpreted by domain experts. In this paper we explore a different approach where the consistency models are explicitly built and validated by domain experts.

2) Dependencies based methods. Several approaches focus on integrity constraints for identifying errors, however they cannot address complex errors or several inconsistencies commonly found in real data (Fan, 2008), (Maletic and Marcus, 2000). Other constraint types have been identified in the literature: multivalued dependencies, embedded multivalued dependencies, and conditional functional dependencies. Nevertheless, according to Vardi, 1987, there are still semantic constraints that cannot be described. In (Arasu and Kaushik, 2009) a context-free-grammar based framework is used to specify production rules, to reconcile the different representations of the same concept (e.g., Univ → University). Such approach mainly focuses on the attribute level, whilst the work presented in this paper focuses on set-of-records consistency.

Works on database repair focus on finding a consistent and minimally different database from the original one, however the authors of (Chomici and Marcinkowski, 2005) state that computational issues affect the algorithms used for performing minimal-change integrity maintenance. Deductive databases (Ramakrishnan and Ullman, 1995) add logic programming features to relational systems and can be used for managing consistency constraints. To the best of our knowledge, few works in the literature focus on deductive databases and data quality. Furthermore, scalability issues have to be investigated when dealing with large datasets.

Consistent query answering works, e.g. (Bertossi, 2006), focus on techniques for finding out consistent answers from inconsistent data, i.e. the focus is on automatic query modifications and not on fixing the source data. An answer is considered consistent when it appears in every possible repair of the original database.

Other works and tools not included in the previous categories are now briefly surveyed. The problem of checking (and repairing) several integrity constraint types has been analysed by (Afrati and Kolaitis, 2009). Unfortunately most of the approaches adopted can lead to hard computational problems. Finally, many data cleansing toolkits have been proposed for implementing, filtering, and transforming rules over data. A detailed survey of those tools is outside the scope of the paper. The interested reader can refer to (Maletic and Marcus, 2000) (Vassiliadis, 2009).

3. The “mandatory notification system”

The Italian Law No. 264 of 1949 requires the employers to report information about their employees to the public administration offices. Those information are called Mandatory Communications (CO) and should be notified to the public administration within five days after the start, the cessation, or the modification of the working contract. Since the 1997, the Ministry developed an ICT infrastructure, called the “Mandatory Communication System” (The Italian Ministry of Labour and Welfare, 2012), for recording data concerning employment and active labour market policies, generating an administrative archive useful for studying the labour market dynamics.

For the sake of clarity, it is important to highlight that a mandatory communications sequence describes how a worker career has changed during the time. In this sense, the longitudinal data extracted by the CO archives allow one to observe the overall flow of the labour market for a given observation period, obtaining insightful information about worker career paths, patterns, and trends. Such information can strongly support the decision making processes of civil servants and policy makers.
Unfortunately the quality of the labour market administrative archives is very low (see, e.g., (Cesarini, Mezzanzanca and Fugini, 2007)). The dataset extracted from an Italian Region administrative archive undergoes some cleansing activities performed during the ETL process, the RDQA approach presented in this paper has been used to assess and improve the overall data cleansing process.

3.1 Domain description

Here we provide an overview on the key domain concepts of the administrative archives analysed. Every time an employer hires or dismisses an employee, or an employment contract is modified (e.g. from part-time to full-time, or from fixed-term to unlimited-term), a Mandatory Communication is notified to the Mandatory Communication System and stored into a local database (job registry or registry hereafter). The registries are managed at “provincial level” for several administrative tasks, every Italian province has its own job registry recording the working history of its inhabitants (as a side-effect).

In the context of the labour market domain, we introduce the following concepts:

- **Event**: It represents a mandatory communication (i.e., a data item) composed by the following attributes:
  - \( w_{id} \): it represents an id identifying the person involved in the event;
  - \( e_{id} \): it represents an id identifying the event;
  - \( e_{date} \): it is the mandatory communication occurrence date;
  - \( e_{type} \): it describes the event type occurring to the worker career. The allowed event types are: the start or the *cessation* of a working contract, the *extension* of a fixed-term contract, or a contract type *conversion*;
  - \( c_{flag} \): it states whether the event is related to a full-time or a part-time contract;
  - \( c_{type} \): it describes the contract type with respect to the Italian law (e.g. fixed-term or unlimited-term contract, etc.).
  - \( empr_{id} \): it uniquely identifies the employer involved in the mandatory communication.

- **Career**: It is composed by an ordered (with respect to the \( e_{date} \) attribute) and finite sequence of events \( \varepsilon_1, \varepsilon_2, \ldots, \varepsilon_n \) describing the personal history of working contracts from the beginning to the end of the data observation period.

We closely look to the consistency of the worker careers, where the consistency semantics is derived from the Italian labour law, from the domain knowledge, and from the common practice. Some constraints can be identified:

- **c1**: an employee cannot have more than one full-time contract at the same time;
- **c2**: an employee cannot have more than \( K \) part-time contracts (signed by different employers); in our context we assume \( K = 2 \), i.e. employees cannot have more than two part time jobs active at the same time;
- **c3**: a contract extension cannot change neither the existing contract type (\( c_{type} \)) nor the part-time/full-time status (\( c_{flag} \)) e.g., a part-time fixed-term contract cannot be turned into a full-time contract by an extension;
- **c4**: a conversion requires either the \( c_{type} \) or the \( c_{flag} \) to be changed (or both).

For simplicity, we omit to describe some trivial constraints e.g., an employee cannot have a *cessation* event for a company for which she/he does not work, an event cannot be recorded twice, etc.

If all the semantics constraints are met a career is considered *consistent*, it is *inconsistent* otherwise. To give an example, a consistent career can evolve signing a part-time contract with company \( i \), then activating a second part-time contract with company \( j \), then closing the second part-time and then reactivating the latter again.
4. The robust data quality analysis technique

The Robust Data Quality Analysis (RDQA) is an iterative technique able to analyse and evaluate the consistency degree of a data source by applying three distinct functions:

- **Function T()**: it takes as input the source (and “dirty”) dataset returning a new cleansed one. Clearly, this function is used as a black box and it can be implemented by means of several paradigms. In the labour case described in this paper, the T() cleansing function has been implemented as a part of a larger ETL process. There are a large number of off-the-shelf tools implementing the ETL paradigms. For our purposes the Talend tool (Talend, 2013) has been used.

- **Function F()**: it is a model-based function exploiting model checking techniques as described by (Mezzanzanica et al., 2011). This function takes as input a data source (a set of sequences) whose consistency has to be analysed and produces as output: (1) a subset of sequences where at least one inconsistency has been found and (2) a subset of sequences where no inconsistencies have been found.

- **Function DIFF()**: It takes as input both the dirty and the cleansed versions of the same data source and, for each sequence stored in one of the analysed datasets, it classifies the sequence into (1) the set of sequences which have been altered by T() during the cleansing process, and (2) the set of sequences left untouched by T().

The Figure 1 shows a schematic representation of the RDQA approach. A RDQA iteration works as follows:

- The T() function analyses the source dataset S creating a cleansed version N of the source. S is composed by several event sequences (whereas an event sequence is a people career in the labour reference scenario), N is composed by the same event sequences, where some sequences are left untouched while others are changed. Hopefully the former are consistent sequences while the latter are the cleansed versions of inconsistent ones. However this is not always the case as it will be outlined later.

- The function F() analyses the consistency of the source S. The set Fs+ (Fs-) will contain all the sequences violating (satisfying) the consistency constraints;

- The function F() analyses the consistency of the cleansed dataset N. The set Fn+ (Fn-) will contain all the sequences violating (satisfying) the consistency constraints;

- The function DIFF() computes the differences between S and N (with respect to event sequences). The set D+ (D-) will contain all sequences changed (unchanged) by T().

- By inspecting the generated set Fs+,Fs-,D+,D-,Fn+,Fn- we can analyse how a sequence (i.e., a career) has been managed by the cleansing process. The result will be a Double Check Matrix, as described in Table 3.

![Diagram](image)

**Figure 1**: Schematic representation of the RDQA approach

The contribution of the Double Check Matrix (DCM) is twofold: on one side it provides an estimation of the quality of the source data (i.e., a data quality analysis), on the other side it allows users to validate the data cleansing process by comparing two distinct cleansing paradigms, namely the empirical and the formal one.
Table 2: The double check matrix cases

<table>
<thead>
<tr>
<th>Case</th>
<th>(F_s^+)</th>
<th>(F_s^-)</th>
<th>(D^+)</th>
<th>(D^-)</th>
<th>(F_p^+)</th>
<th>(F_p^-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>2</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>3</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>4</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>5</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>6</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>7</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>8</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

It is worth noting that the inconsistencies prevent the correct analysis of the labour market data. To give an example, let us consider a person ending his working contract with a company at a given time point. A communication will be sent to the relative job registry to notify the end of the contract through the “Mandatory Communication System”. Let us suppose that the contract started before the observation period, or that no corresponding start contract has been registered, in both cases the career gets inconsistent. This “inconsistency” will prevent the correct evaluation of some typical (and relevant) labour indicators, as the worker turnover, the contract average duration, the occupation trends etc. Hence, data quality analysis and cleansing activities are paramount. The closing contract communication is considered “correct” when it is considered in isolation, and this is very common in the administrative approach for managing data, while the inconsistency emerges when considering the whole career, and such holistic approach is very common in analytical tasks.

5. Experimental results

We performed both the ETL and the formal-methods-based techniques on the labour marked data of an Italian Region. The dataset is composed by 47,154,010 mandatory communications representing the careers of 5,570,991 of citizens observed starting from the 1st January 2004 to the 31st December 2011. Here we report the Double Check Matrix resulting after a single RDQA iteration. For the sake of clarity, we remark that the dataset has been considered as a longitudinal one during the consistency evaluation, i.e. we evaluated the consistency of each single career rather than focusing only on single events.

Table 3: The double check matrix computed on the careers data of an Italian region

<table>
<thead>
<tr>
<th>Case</th>
<th>Row</th>
<th>Consistent in S</th>
<th>Touched by the ETL</th>
<th>Consistent in C</th>
<th># Careers</th>
<th>% Careers</th>
<th># Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>1,984,692</td>
<td>35.63</td>
<td>5,367,306</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>334,097</td>
<td>6.00</td>
<td>1,429,170</td>
</tr>
<tr>
<td>*</td>
<td>4</td>
<td>YES</td>
<td>YES</td>
<td>null</td>
<td>40,520</td>
<td>0.73</td>
<td>126,644</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>1,100</td>
<td>0.02</td>
<td>9,530</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>15,267</td>
<td>0.27</td>
<td>86,364</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>2,858,357</td>
<td>51.31</td>
<td>34,399,674</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>284,569</td>
<td>5.11</td>
<td>5,314,062</td>
</tr>
<tr>
<td>*</td>
<td>10</td>
<td>NO</td>
<td>YES</td>
<td>null</td>
<td>52,389</td>
<td>0.93</td>
<td>421,260</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>5,570,991</td>
<td>100</td>
<td>47,154,010</td>
</tr>
</tbody>
</table>

Roberto Boselli et al.
Roberto Boselli et al.

The cases labelled with ( ) represent the careers dropped from the cleansed dataset by the ETL (in spite of their consistency), since these careers refer to workers living and working in other regions, and their registration should be stored elsewhere.

The computation of a RDQA iteration was performed on a 32 bits 2.2Ghz CPU (connected to a MySQL server through ODBC driver) in about 50 minutes using about 220 MB of RAM. The results of Table 3 are shortly commented in the following.

Case 1: represents careers already clean that have been left untouched by T(). It provides an estimation of the consistent careers on the source archive.

Case 2: refers to careers considered consistent (by function F()) before but not after cleansing, although they have not been touched by T(). As expected this subset is empty.

Case 3: describes consistent careers that have been improperly changed by T(). Note that, despite such kind of careers remain consistent after the intervention of T(), the behaviour of T() has been investigated to prevent that the changes introduced by T() could turn into errors in the future. This set was deeply inspected due to the high impact it has on the overall DCM (i.e., about 6% of the total careers). We have discovered that the T() implementation improperly changed events and values for some kind of careers. We detected two main intervention types performed by the T() on case 3 careers. The size of the affected sets are summarised in Table 4. We discovered that both interventions 1 and 2 are wrong with respect to the expected semantics (although both producing consistent results), therefore the function T() has to be fixed. Note that still remains the 0.08% of other interventions. The emerging of the latter subset (which is actually under investigation) and its size are a witness of the contribution that formal methods can provide to the data quality process improvement.

Case 4: represents careers originally consistent that T() has made inconsistent. These careers were very useful to identify and correct bugs in the T() implementation.

Case 5: refers to careers considered inconsistent by function F() before, but consistent after cleansing, although they have not been touched by T(). Also in this case this subset is empty, as expected.

Case 6: describes inconsistent careers, that T() was able neither to detect nor to correct, and consequently they were left untouched.

Case 7: describes the number of (originally) inconsistent careers which F() recognises as properly cleansed by T() at the end.

Case 8: represents careers originally inconsistent which have been not properly cleansed since, despite an intervention of T(), the function F() identifies them still as inconsistent.

Table 4: Composition of the Case 3, showed in Table 3

<table>
<thead>
<tr>
<th></th>
<th>Composition of the Row 3 of Table 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Careers</td>
</tr>
<tr>
<td>TOTAL</td>
<td>334,097</td>
</tr>
<tr>
<td>ETL Intervention 1</td>
<td>238,794</td>
</tr>
<tr>
<td>ETL Intervention 2</td>
<td>69,213</td>
</tr>
<tr>
<td>ETL Interventions 1 and 2</td>
<td>256</td>
</tr>
<tr>
<td>Other Interventions</td>
<td>26,346</td>
</tr>
</tbody>
</table>
6. Conclusions

In this paper we described both a formal and an empirical data quality technique that have been exploited to evaluate and improve the consistency dimension of an administrative archive, the Mandatory Communication Archive. As first step we used an ETL-based approach to cleanse a source (and dirty) dataset. Then, we enhanced the results provided by the ETL through the RDQA. Table 5 summarises some results achieved by the RDQA, thanks to which we were able to measure the following.

- **The initial consistency degree** (Case1+Case4 of Table 3) of the source dataset before the ETL's cleansing intervention. Note that the initial consistency degree is the 35.65% considering careers data (i.e., the 35.65% of the careers are consistent) whilst it drops to the 12.42% if we consider events data (i.e., the 12.42% of the mandatory communications belong to consistent careers). Hence, one can improperly argue that, by looking at events data, the remaining 88% of the events database is inconsistent. Differently, the 88% of the events belong to worker careers presenting at least an inconsistency along the time. This is due to the incremental nature (with respect to the time) of the administrative database. To clarify this aspect let us consider a simple scenario in which the first communication of a worker career presents an inconsistency (e.g., the career starts with a cessation event). As a result, this career will be marked as inconsistent and then, from here on, all the following events related to this worker (in spite of their consistency) will be marked as "belonging to an inconsistent career", with no chance to modify the inconsistency status of the career in the future. More generally, the consequence of the incremental dynamics of the database can be summarised as follows: "the sooner an inconsistent event happens the higher the impact on the overall database consistency". Differently, we can state that the consistency of the database in terms of careers is the 35%. This result is enough to motivate a cleansing process on the data before using them for decision making purposes. Looking at the consistency degree of the cleansed dataset, we can observe that it has grown from the 35% up to the 87%.

- **The room for improvement** (Case3+Case4+Case6+Case8 of Table 3) of the ETL routines, gives a quantitative estimation about how the ETL process could be improved.

- **The quality improvement** (Case7–Case4 of Table 3) achieved by the ETL approach. Note that the use of formal methods to evaluate the ETL process makes more reliable this value. In other words, this value can be considered as a witness of the ETL effectiveness confirmed by the function F().

**Table 5: Some results achieved by the RDQA**

<table>
<thead>
<tr>
<th></th>
<th>Careers (%)</th>
<th>Events (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistency on S</td>
<td>35.65</td>
<td>12.42</td>
</tr>
<tr>
<td>Consistency on C</td>
<td>86.94</td>
<td>84.25</td>
</tr>
<tr>
<td>Room for Improvement</td>
<td>11.4</td>
<td>14.52</td>
</tr>
<tr>
<td>Quality Improvement Achieved</td>
<td>51.29</td>
<td>71.83</td>
</tr>
</tbody>
</table>

Finally, we would like to remark that the aim of this work is to show how a data quality analysis can be performed on an administrative archive, i.e. by formally evaluating the cleansing process effectiveness with respect to the data consistency.

In this regard, each single RDQA iteration allows one to identify, extract and derive knowledge about the cleansing process, contributing to the identification of bugs and incongruities. Indeed, the RDQA can be iteratively applied by refining the cleansing procedures until a satisfactory data quality level is reached.

Afterward, the cleansed dataset can be investigated by domain experts to support decision makers activities in economic, government and business fields.

**References**


Roberto Boselli et al.

Talend (2013) [www.talend.com](http://www.talend.com) [Online].
A Stakeholder Based Approach to Public Value

Walter Castelnovo
Department of Theoretical and Applied Science, University of Insubria, Varese, Italy
walter.castelnovo@uninsubria.it

Abstract: Despite the widely shared expectation concerning the positive impacts that e-Government can have on government and society as a whole, the evaluation of the e-Government initiatives so far implemented worldwide has provided very little evidence for it. This led some scholars to question whether e-Government can determine positive effects on government and society at all. E-Government initiatives implemented during the past two decades have been largely influenced by the principles of New Public Management and aimed at two main goals: government efficiency and citizens’ satisfaction. However, whereas the private sector value system is mainly based on efficiency, profitably and customer satisfaction, the public sector is characterized by a more complex value system that also includes transparency and accountability, equal treatment of all service recipients, democratic participation, citizens’ well-being, empowerment of individuals and communities. The traditional efficiency based approaches to e-Government, typical of the New Public Management paradigm, cannot account for all these values and this helps explaining, at least partly, why e-Government appears to have so far had only a limited impact on society. This leads to consider a different approach to e-Government based on the concept of public value that appears to better account for the public sector value system. In the paper I discuss a public value based approach to the evaluation of e-Government initiatives based on their capacity of generating value for citizens as they play (even simultaneously) different, and possibly conflicting, stakeholder roles. After a brief discussion of the so-called e-Government paradox in section 1, in section 2 I consider the reasons that support a public value approach to e-Government. In section 3 a taxonomy of stakeholders is considered that can be used to evaluate the impacts of an e-Government initiative. Finally, in section 4 I show how the public value based approach can be used to evaluate an e-Government initiative.

Keywords: e-Government, e-Government paradox, public value, evaluation, stakeholders

1. Introduction

Despite considerable investments in e-Government initiatives made worldwide during the past years, whether e-Government succeeded in achieving the expected benefits in terms of increased efficiency, effectiveness and quality in the delivery of government services and better governance is still under discussion. This led some scholars to explicitly point to a sort of “e-Government paradox” (Bertot & Jaeger 2008; Foley & Alfonso 2009; Castelnovo 2010, 2013; Savoldelli, Codagnone and Misuraca 2012) that under many respects can be considered as similar to the “productivity paradox” (Brynjolfsson 1993; Brynjolfsson & Hitt 1998; Bresnahan, Brynjolfsson and Hitt 2002) and the “performance paradox” (Abhijit 2003).

In its more simplified form the productivity paradox amounts to the observation that there is no relationship between ICT investments and productivity. Similarly, in its more simplified form the e-Government paradox amounts to the observation that there is no relationship between investments in e-Government initiatives and the improvement of Public Administration. This also includes the citizens’ satisfaction toward the services delivered by Public Administration that does not seem to rise in line with objective service improvements (what is known as the “delivery paradox” discussed at length by Blaug, Horner and Lekhi (2006) and by Horner and Hutton (2011)).

During the years an extensive literature has been devoted to the productivity paradox, and some explanations of it have been suggested (Brynjolfsson 1993; Gunnarsson, Mellander and Savvidou 2004; Foley & Alfonso 2009). There are three main arguments that have been used to explain the productivity paradox:

- Lags due to learning and adjustment: it takes time before the productivity-enhancing effects of a new technology can be realized.
- Mismanagement of information and technology: little or no account has been taken of the complementarity between ICT and changes in work practices and skill upgrading.
- Mismeasurement of inputs and outputs: it is not always clear what should be measured in evaluating the possible benefits determined by ICT investments.

In this paper I will consider the third argument above and I will discuss whether it can be used to explain the e-Government paradox as well. More specifically, I will argue that the evaluation of e-Government initiatives based on the traditional evaluation techniques usually applied in the private sector does not account properly
for the complexities of the public sector. Indeed, traditional efficiency based approaches to e-Government, typical of the New Public Management (NPM) paradigm, did not succeed in accounting for the overall impacts of e-Government on society (Kelly, Mulgan and Muers 2002; Bonina & Cordella 2009). As observed by Hellang and Flak (2012, p. 247):

*The public sector is characterized by a more complex value structure than the private sector. Where private sector organizations are primarily occupied with ensuring and increasing profitability, public sector organizations need to balance their focus between e.g. transparency and accountability, equal treatment of all service recipients, promoting democratic participation – all in a cost efficient and legal manner.*

This leads to consider a different approach to the evaluation of the benefits possibly deriving from e-Government initiatives based on the concept of public value that, as argued by Kelly, Mulgan and Muers (2002, p. 3), “provides a broader measure than is conventionally used within the NPM literature, covering outcomes, the means used to deliver them as well as trust and legitimacy”.

In this paper I will discuss a public value approach to the evaluation of e-Government initiatives (a project, a programme, a policy) based on their capacity of generating value for citizens as they play different stakeholder roles. The paper is organized as follows. In the next section I will discuss the concept of public value and the relationship between public value and e-Government. In section 3 a taxonomy of stakeholders will be considered that can be used to evaluate an e-government initiative based on its capacity to create public value. Finally, in section 4 I will show how the public value based approach can be applied in the evaluation of a specific e-Government initiative.

2. Public value and e-Government

The concept of public value, originally developed in the public administration literature (Moore 1995; Benington & Moore 2011; Williams & Shearer 2011), is continuously gaining popularity also within the e-Government community, even outside the limits of the academic debate (Castelnovo & Simonetta 2008; Codagnone & Undheim 2008; Misuraca, Alfano and Viscusi 2011; Karunasena & Deng 2012; Yu 2008). The concept of public value is central for government agencies: as the goal of private managers is to create private (economic) value, the goal of government agencies is to create public (social) value (Moore & Khagram 2004). Despite its apparent simplicity, the concept of public value is difficult to define, and there is not an exact and universally accepted definition of what “public value” means. As a consequence, it is also not clear how exactly e-Government could impact public value. However, since e-Government aims at improving/transforming government through the use of ICT, it is reasonable to expect that e-Government should improve the government capacity of producing public value through public sector innovation.

By reformulating Moore’s original definition of public value as “what the public most values” (Moore 1995), Benington (2011) defines it in terms of “what adds value to the public sphere”. According to Grimsley, Meehan and Gupta (2006), public value is the value that citizens and their representatives seek in relation to strategic outcomes and experiences of public services. Harrison, Pardo, Cresswell and Cook (2011) argue that public value focuses attention on the collective and societal interests that are served by particular institutional arrangements and actions of government.

Public value is a multidimensional concept that includes the sense of economic value, but does not reduce to it; public value includes also a variety of dimensions of value that cannot be measured in strictly monetary terms. Harrison, Pardo, Cresswell and Cook (2011, p. 3) define the set of basic value types reported in Table 1 and the value generating mechanisms reported in Table 2.

According to Harrison, Pardo, Cresswell and Cook, government actions impact on the value generating mechanisms that, in turn, create public value. The use of ICT by government organizations can magnify the value generating mechanisms capability of creating value. Thus, by rephrasing the example considered by Harrison, Pardo, Cresswell and Cook (2011, p. 4), the online release (and renewal) of licenses (a typical e-Government service) may increase efficiency or effectiveness and yield strategic or financial public value for citizens that use such licenses. From this point of view, the impact of e-Government initiatives on public value creation can be represented as in Figure 1.
Table 1: Value types

<table>
<thead>
<tr>
<th>Value type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>impacts on current or future income, asset values, liabilities, entitlements, or other aspects of wealth or risks to any of the above</td>
</tr>
<tr>
<td>Political</td>
<td>impacts on a person’s or group’s influence on government actions or policy, on their role in political affairs, influence in political parties or prospects for public office</td>
</tr>
<tr>
<td>Social</td>
<td>impacts on family or community relationships, social mobility, status, and identity</td>
</tr>
<tr>
<td>Strategic</td>
<td>impacts on person’s or group’s economic or political advantage or opportunities, goals, and resources for innovation or planning</td>
</tr>
<tr>
<td>Ideological</td>
<td>impacts on beliefs, moral or ethical commitments, alignment of government actions or policies or social outcomes with beliefs, or moral or ethical positions</td>
</tr>
<tr>
<td>Quality of life</td>
<td>impacts on individual and household health, security, satisfaction, and general well-being</td>
</tr>
<tr>
<td>Stewardship</td>
<td>impacts on the public’s view of government officials as faithful stewards or guardians of the value of the government in terms of public trust, integrity, and legitimacy</td>
</tr>
</tbody>
</table>

Table 2: Value generating mechanisms

<table>
<thead>
<tr>
<th>Value generating mechanisms</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency</td>
<td>obtaining increased outputs or goal attainment with the same resources, or obtaining the same outputs or goals with lower resource consumption</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>increasing the quality of the desired outcome</td>
</tr>
<tr>
<td>Intrinsic enhancements</td>
<td>changing the environment or circumstances of a stakeholder in ways that are valued for their own sake</td>
</tr>
<tr>
<td>Transparency</td>
<td>access to information about the actions of government officials or operation of government programs that enhances accountability or influence on government.</td>
</tr>
<tr>
<td>Participation</td>
<td>frequency and intensity of direct involvement in decision making about or operation of government programs or in selection of or actions of officials.</td>
</tr>
<tr>
<td>Collaboration</td>
<td>frequency or duration of activities in which more than one set of stakeholders share responsibility or authority for decisions about operation, policies, or actions of government</td>
</tr>
</tbody>
</table>

Figure 1: The magnifying effect of e-Government on value creation

3. Public value and e-Government stakeholders

Citizen orientation has been a leading principle of e-Government since the early 2000s. Under the NPM approach that dominated the last decade, citizen orientation has mainly been thought of as a particular form
of customer orientation (O’Flynn 2007; Bonina & Cordella 2009). This approach led to focus the evaluation of an e-Government initiative almost exclusively on “user/customer satisfaction” with the risk of weakening other fundamental citizenship values such as fairness, equity, transparency, accountability, social justice and democratic participation. As remarked by Brewer (2007, p. 553), the conceptualization of citizen as customer:

*highlights the narrowly defined relationship that public service consumers have with government, based as it is on their personal satisfaction with the services they receive. They are driven by individual self-interest and give little attention to other considerations such as the community interest.*

However, it should be observed that government actions usually impact directly neither on particular citizens nor on citizens in a broad sense; rather, government actions are usually intended to impact directly on stakeholder groups and on their interests. Indeed, as customers are key stakeholders for firms, citizens as users/customers of public services are among the key stakeholders for government organizations. Yet, the customer role is just one of the stakeholder roles that should be taken into account when considering the impacts of government actions. Harrison, Pardo, Cresswell, and Cook (2011, p. 2) argue that “each government action needs to be treated as potentially presenting value to multiple and diverse stakeholders from both inside and outside the organization.” It follows that “to be most useful, the analysis of public value must center on particular stakeholder groups and their interests, not the citizen in a broad sense.”

Government activities involve a wide range of stakeholders and the application of stakeholder analysis to government can lead to the identification of a quite long list of possible stakeholders. Of course, this is also true for e-Government initiatives that are characterized by many stakeholders (see, for instance, Rowley 2011) for a quite comprehensive list of the stakeholders considered in the e-Government literature) with multiple value dimensions (Chircu 2008). Although stakeholders should be conceived of as roles rather than directly as individuals and groups, it is important to stress that those roles are invariably played by individuals, i.e. by citizens. From this point of view, the way in which government initiatives impact on citizens playing a stakeholder role could be represented as in Figure 2:

![Figure 2: Government initiatives and citizens as stakeholders](image)

Conceiving stakeholders as roles played by citizens determines two relevant consequences. On the one hand it explains why the list of the stakeholders involved in government activities can be so long. Actually, even when they are targeted toward a specific segment of the population, government initiatives impact, at least indirectly, on all the citizens (if only because government activities use public resources); this makes the emergence of conflicts of interests among different stakeholders very likely. On the other hand, it highlights the possibility for an individual to play several different stakeholder roles, either concurrently or in sequence.
Thus, for instance, an individual can simultaneously be a taxpayer that “funds” public administration, a “consumer” that uses the services delivered by public administration and a civil servant working in a government agency. This can determine the emergence of conflicts of interests that must be considered in evaluating a government initiative from the point of view of the public value it delivers to citizens. Actually, as a user of the services a citizen would like to receive better services from the public administration. However, this could determine a higher cost for service delivery (at least on the short term), which could mean that the citizen has either to pay a higher cost for accessing the services or to be prone to incur in a higher level of taxation. Similarly, a civil servant a citizen might want a higher wage, which is a private value for him; however, this could mean that public administration has to spend more for salaries and this, as a consequence, could force public administration either to invest less in improving the quality of the services (which means less value for the citizen as user) or to higher the level of taxation (which means less value for the citizen as taxpayer).

For this reason, to understand how an e-Government initiative could impact public value a careful identification of the stakeholders involved, of their interests and of their mutual relationships is needed. This includes also the identification of how the different stakeholders could be impacted by an e-Government initiative and what are the aspects of public value that could be more relevant for them (Castelnovo & Simonetta 2008; Castelnovo 2013; Rowley 2011; Cresswell & Sayogo 2012).

4. Evaluating the public value delivered by e-Government initiatives

The stakeholder perspective is the corner stone of public value assessment (Cresswell & Sayogo 2012); however, there are two aspects that must be carefully considered when applying it to the evaluation of e-Government initiatives. On the one hand, citizens usually play different stakeholder roles and the same individual can simultaneously play conflicting roles with respect to an e-Government initiative. It follows that an e-Government initiative could determine a positive impact on citizens as they play a specific role while some less positive (or even negative) consequences could derive for them as playing different stakeholder roles. On the other hand, what represents a value for a stakeholder group not necessarily can be considered as a public value; stakeholder roles are played by individuals and the value delivered to specific stakeholders could be a private value for the individuals playing those roles.

Public value is strictly related to collective and societal interests instead; the value possibly created by government initiatives “cannot be assessed solely at the level of ‘customer’ or a single organization but needs to include the value for the wider population and also (...) for future generations of citizens.” (Hartley 2011, p. 181) Even in case a government initiative is explicitly targeted toward a specific stakeholder group, it should be designed to deliver, either as a direct or as an indirect consequence of its implementation, a value also to other stakeholders (or, at least, to avoid possible negative impacts on other stakeholder groups). This makes that initiative consistent with the achievement of collective and societal interests, which is the necessary condition for it to create a public value.

This requirement characterizes the public value approach and can be related to two fundamental principles of Edward Freeman’s “managing for stakeholders”, namely (Freeman, Velamuri and Moriarty 2006, p. 7):

- stakeholders interests go together over time; managers must keep the stakeholder interests in balance, hopefully mutually reinforcing each other
- seek solutions to issues that satisfy multiple stakeholders simultaneously; managers need to find ways to develop programs, policies, strategies, even products and services that satisfy multiple stakeholders simultaneously

Based on the observations above, a public value and stakeholder-based evaluation of an e-Government initiative needs to assume a whole-of-system approach - that is, an approach that simultaneously considers all the stakeholders that can be impacted by it, either directly or indirectly. A whole-of-system approach makes it possible to better evaluate the distribution of the benefits that possibly derive from an e-Government initiative, thus avoiding the risk of evaluating as positive an initiative that while delivering value to specific stakeholders, determines less positive (or even negative) results for other stakeholders. For this approach to evaluation the crucial point is the identification of a comprehensive list of stakeholders and of the possible benefits e-Government could deliver to each of them. The evaluation of a specific e-Government initiative can then be based on the analysis of how the benefits deriving from it are distributed among different stakeholder
Walter Castelnovo

groups and on whether that initiative determined positive impacts also for stakeholder group(s) not directly targeted by it.

This approach to evaluation can be exemplified by considering the evaluation of an initiative for reducing the administrative burdens on enterprises through the simplification of the administrative procedures and the implementation of one stop shop for enterprises (which is a typical e-Government service). Such an initiative is directly targeted toward citizens as entrepreneurs; indeed, if successful, it creates an obvious value for the citizens playing that role (this can also include the reduction of the direct and indirect costs enterprises incur for their relationships with Public Administration). However, this value is a private value for those citizens. In order to verify whether that initiative succeeds in creating a public value, it should be considered whether it can determine positive benefits for citizens also as they play stakeholder roles different from that of entrepreneur.

Table 3 reports some stakeholder roles (and some possible benefits that can be associated with them) that could be impacted by an initiative like the one in the example, even without being directly targeted by it.

**Table 3:** Benefits that can be associated with some stakeholder roles

<table>
<thead>
<tr>
<th>Stakeholder roles</th>
<th>Examples of benefits deriving from e-Government initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citizen as policy maker (person playing the role of policy</td>
<td>increase of the transparency, openness, accountability and trustworthiness of government as a whole; cooperation and integration among different agencies and different levels of government.</td>
</tr>
<tr>
<td>maker within public administration)</td>
<td></td>
</tr>
<tr>
<td>Citizen as civil servant (person working for public</td>
<td>increase of the human capital in government organizations; empowerment of the employees that could determine better working conditions for them and better services for citizens and enterprises.</td>
</tr>
<tr>
<td>administration)</td>
<td></td>
</tr>
<tr>
<td>Citizen as participant (person participating in democratic</td>
<td>increase of the transparency and openness of government as a whole; empowerment of citizens that could contribute to a better democracy.</td>
</tr>
<tr>
<td>processes)</td>
<td></td>
</tr>
<tr>
<td>Citizen as tax payer (person who, through taxation, “funds”</td>
<td>increase of the global efficiency and effectiveness of government, which could mean costs reduction and, consequently, a possible lowering of the level of taxation.</td>
</tr>
<tr>
<td>public administration)</td>
<td></td>
</tr>
<tr>
<td>Citizen as such (any person having the right of</td>
<td>increase of the quality of life and the well-being of both the citizens and the communities they live in.</td>
</tr>
<tr>
<td>citizenship)</td>
<td></td>
</tr>
</tbody>
</table>

Depending on how it has been designed and implemented, an e-Government initiative for the reduction of the administrative burdens on enterprises and the implementation of one stop shop for enterprises could determine further benefits in terms of:

- Increased transparency in the procedures for starting, transforming or closing a business; this can create a value both for citizens as policy makers, in terms of government stewardship, and for citizens as participants, in terms of the possibility of exerting more controls on government actions and decisions.
- Increased inter-agency cooperation (as required by the one stop shop model); this can create a value for citizens as policy makers, in terms of the integration among different agencies and different levels of government, and for citizens as civil servants, in terms of empowerment of the employees through the development of interpersonal skills.
- Increased efficiency in the delivery of services to enterprises; this can create a value for citizens as tax payers, in terms of a better spending of public resources.
- Increased ease of doing business and competitiveness; this can create a value for citizens as such, in terms of the country’s better economic conditions that in the long term can contribute to increase the citizens’ well-being and quality of life.

An e-Government initiative that, despite being specifically targeted to citizens as entrepreneurs, would nevertheless determine benefits like those listed above creates a public value. Actually, it not only simultaneously addresses the interests of different stakeholder groups, but it also determines outcomes (in terms of efficiency, transparency and quality of government and contribution to a wealthy society) that obviously respond to collective and societal interests.
5. Conclusions

The productivity paradox (and the e-Government paradox as well) roughly amounts to the observation that there is little or no relationship between ICT investments and productivity. According to one of the explanations discussed in the literature, the productivity paradox arises because of a mismeasurement of inputs and outputs due to the fact that it is not always clear what should be measured in evaluating the possible benefits determined by ICT investments.

The traditional efficiency based approaches to e-Government, largely influenced by the principles of New Public Management, tend to measure the effects of e-Government initiatives simply in terms of increased efficiency and users/customer satisfaction, thus failing to account for other relevant aspects of the public sector value system.

In this paper I argued for an approach to the evaluation of e-Government initiatives based on the concept of public value that provides a better way of thinking about the goals and performance of public administration. Under such an approach, the evaluation of an e-Government initiative is based on its capacity of generating value for citizens as they play different, and possibly conflicting, stakeholder roles. By considering different aspects of public value and the way in which they can impact on different stakeholder groups, a public value based approach allows a better understanding of the possible impacts of e-Government on society, especially those impacts that cannot be measured directly in terms of efficiency and user satisfaction.

Moreover, being based on a whole-of-system perspective, the public value approach can help to better understand another possible explanation of the productivity paradox (and the e-Government paradox as well), namely the one referred to as the “redistribution argument” (Brynjolfsson 1993). This argument suggests that little or no benefit can be seen from ICT investments at the aggregate level because those investing in the technology benefit privately but at the expense of others.

The approach to evaluation described in this paper requires that a government initiative is evaluated with respect to its capacity to deliver value to all the stakeholders involved, not only to those directly impacted by it. By assuming such an approach, the paradox simply does not arise. On the one hand, if the evaluation shows that an e-Government initiative delivered value only to some stakeholders, possibly at the expenses of others, this can be ascribed either to a deliberate political choice or to the inability of the decision makers to foresee unexpected consequences of that initiative. In either case there is nothing paradoxical. On the other hand, if the evaluation shows that an e-Government initiative did not deliver any value to the stakeholders, this simply means that the initiative failed to achieve the expected results. Also in this case there is nothing paradoxical.

References


Walter Castelnovo


An Evaluation Framework for Traditional and Advanced Open Public Data e-Infrastructures

Alexopoulos Charalambos¹, Euripides Loukis¹, Yannis Charalabidis¹ and Anneke Zuiderwijk²
¹ Department of Information and Communication Systems Engineering, Faculty of Science, University of the Aegean, Samos, Greece
² Department of Information and Communication Technology, Faculty of Technology, Policy and Management, Delft University of Technology, Delft, The Netherlands
alexop@aegean.gr
e.loukis@aegean.gr
yannisx@aegean.gr
a.m.g.zuiderwijk-vaneijk@tudelft.nl

Abstract: Considerable investments are made to develop numerous e-infrastructures for the reuse of open government data for scientific, commercial and political purposes. This necessitates a deeper understanding and assessment of the value these infrastructures generate. For this purpose, our paper presents a framework for evaluating open government data infrastructures, both ‘traditional’ ones following the web 1.0 paradigm and also advanced ones influenced by the web 2.0 paradigm. The evaluation framework is based on findings of previous research on the evaluation of public projects, information systems and e-services, and also on technology acceptance and IS success models. The proposed evaluation framework consists of an evaluation model with measurable evaluation dimensions and criteria, as well as a comprehensive evaluation procedure for using this evaluation model, which enables both higher level and detailed evaluation. It includes quantitative as well as qualitative methods in order to provide comprehensive and deep insights. Finally, we describe an application of the proposed framework (both the model and the procedure) for the evaluation of a European e-infrastructure for opening government data. This first application has provided some first evidence concerning the applicability and usefulness of the proposed evaluation framework, and at the same time useful directions and ideas for the improvement of the above-mentioned e-infrastructure.

Keywords: evaluation framework, evaluation model, evaluation procedure, public sector information, open government data, e-infrastructures

1. Introduction

Public organisations are increasingly publishing their data on the internet (Meijer 2009). According to the (European Commission 2003, 2007), these data should be widely available and useable to all in order to maximise its usefulness for research and innovation. Public sector information (PSI) is the single largest source of information in Europe. It is produced and collected by public bodies and includes financial, education, health, poverty, traffic, crime, meteorological and other types of data. Most of this raw data could be re-used for scientific research, for deeper analysis of the effectiveness of previous government action in order to enable a more substantial political discussion, or even integrated into new products and services, which we may use on a daily basis, such as car navigation systems, weather forecasts and financial and insurance services. Re-use of public sector information means using it in new ways by adding value to it, combining information from different sources, making mash-ups and new applications, both for commercial and non-commercial purposes.

However, a recent conference on the pragmatic approach to the use of Open Data (Open Data: Where to begin? 2012) identified a number of issues which are critical for its success:

- The supply-driven approach is insufficient: Involvement of businesses and citizens in the PSI publishing lifecycle and exploitation is widely accepted as beneficial.
- There are strong barriers regarding data relevance and quality: Publishing data is not on its own sufficient; ideally, they should also be accurate, reusable, timely and comparable.
- The use of Open Data “intermediaries” is more effective than the direct access to them: businesses and citizens sometimes find it difficult to identify what type of information exists and by which public authority it is held.
Technical complexity: Despite the technical heterogeneity of the various public sector data sources, ease of data discovery and retrieval by the user is a fundamental requirement.

Organizational barriers: Many EU member state governments and wider public sector organisations still view publishing PSI as an additional burden to their daily working routine, not recognizing the benefits it provides.

These considerable issues are confirmed by literature (Janssen 2012; Zhang 2005; Zuiderwijk 2012). Taking into account the big investments of governments for developing and operating PSI e-infrastructures, and at the same time the above-mentioned inherent difficulties of their exploitation, it becomes absolutely necessary to conduct a systematic evaluation of such PSI e-infrastructures aiming at a better understanding and assessment of value they generate (Alexopoulos 2012). Furthermore, the gradual emergence of a second generation of more advanced PSI e-infrastructures, which are influenced by the principles of the web 2.0 paradigm (with users having a stronger role, which is not limited to consuming passively content, but also increasingly includes commenting, rating and improving or adapt it to specialized needs, and also creating their own content – see section 3), and offer new types of value, makes the systematic evaluation of them even more necessary.

However, a structured and comprehensive evaluation framework for PSI initiatives and projects is missing. This paper contributes to filling this gap, by making the following contributions.

- It develops an integrated evaluation framework scoping the overall impact of an open public data e-infrastructure,
- which includes an evaluation model with measurable evaluation dimensions and criteria, taking into account findings from previous public projects’, information systems and e-services evaluation research, research on technology acceptance and information systems (IS) success models, as well as the objectives and capabilities of the traditional PSI e-infrastructures following the web 1.0 paradigm and the emerging advanced ones influenced by the web 2.0 paradigm.
- and also a comprehensive evaluation procedure for using the evaluation model, which combines the detailed evaluation it provides with a higher level evaluation (scoping to measure general impact), based on both qualitative and quantitative methods in order to get deeper meaningful insights,
- and finally uses the proposed evaluation framework (both the evaluation model and procedure) for the evaluation of the PSI e-Infrastructure developed in the European project ENGAGE and presents some first results.

The current paper is structured as follows. In the following section the background of the proposed evaluation framework is presented. Subsequently, in section 3 the features of an advanced PSI e-Infrastructure are presented. Section 4 introduces the evaluation framework and describes the formation of the corresponding evaluation model, as well as, of the evaluation procedure for using it is defined. Thereafter, section 5 presents the results from their use for the pilot evaluation of the first version of ENGAGE (1.0) PSI e-infrastructure and finally, in section 6, the conclusions and further research directions are proposed.

2. Background

In this section, is presented the background on which our evaluation framework has been based, which includes previous research on the evaluation of public projects, and on the evaluation of information systems (basic concepts and methods, technology acceptance and IS success models and e-services evaluation).

The Organisation for Economic Co-operation and Development (OECD 1998, p.3) defines public projects’ evaluations as “analytical assessments addressing results of public policies, organisations or programmes, that emphasise reliability and usefulness of findings. Their role is to improve information and reduce uncertainty; however, even evaluations based on rigorous methods rely significantly on judgement. A distinction can be made between ex-ante evaluations (or policy reviews) and ex-post evaluations”. Since the beginning in the 1970s, literature classifies types of evaluation by their specific aim and therefore distinguishes between formative evaluation (conducted during a project in order to identify strengths and weaknesses and inform/guide following stages) and summative evaluation (guided after the end of the project in order to assess its degree of success) (Neumann 2002). Many different methods are used in public projects’ evaluation for information gathering and analysis (Bortz 2002), such as: Quantitative surveys, Web analytics, Usability testing, Focused (semi structured) interviews, In-depth interviews, Collective semi-structured interviews. The examination of the existing literature regarding public projects’ evaluation enabled us to design the proposed
There is long and extensive research on the evaluation of information systems (IS) (Hirschheim 1988; Smithson 1998; Willcocks 1996, 2001; Farbey 1999; Irani 2002, 2006, 2008; Gunasekaran 2006; Stockdale 2006), which has revealed its complexities and difficulties. IS offer various types of benefits, both financial and non-financial, and also tangible and intangible ones, which differ among the different types of IS. Thus, it is not possible to formulate one generic IS evaluation method, which is applicable to all types of IS. The major outcome of this research is that a comprehensive methodology for evaluating a particular type of IS should include evaluation of both its efficiency and its effectiveness, and take into account its particular characteristics, capabilities and objectives.

Moreover, a significant part of the IS evaluation research has been focused on understanding IS acceptance. Extensive research has been conducted in order to identify the characteristics and factors affecting the attitude towards using an IS, the intention to use it and finally the extent of its actual usage, which has lead to the development of the Technology Acceptance Model (TAM) and its subsequent extensions (Davis 1989; Venkatesh 2000, 2003; Schepers 2007). This research stream on IS acceptance provides some important dimensions of IS evaluation (ease of use, usefulness, users’ intention for future use and actual use), which can be used as part of our PSI e-infrastructures evaluation model.

Another research stream that can provide useful elements for IS evaluation is the IS success research (DeLone 1992, 2003; Seddon 1997; Rowley 2006; Sumak 2009). The most widely used IS success model has been developed by (DeLone 1992). This research stream suggests that IS evaluation should adopt a layered approach based on the above IS success measures (information quality, system quality, service quality, user satisfaction, actual use, perceived usefulness, individual impact and organizational impact).

Finally, the emergence of numerous Internet-based e-services (e.g. information portals, e-commerce, e-banking and e-government portals) has lead to the development of many models for their evaluation (Rowley 2006; Lu 2003; Fassnacht 2006; Saha 2011). These models suggest useful evaluation dimensions and measures either for e-services in general, or for particular types of e-services. (Loukas 2012) proposed an e-services evaluation methodology, which includes a set of value dimensions and measures assessing different types of value generated by the evaluated e-service, organized in a three-layered value model (concerning e-service efficiency, effectiveness and users’ future behaviour) and the relations among them. Our evaluation model has adopted this structure and organization of evaluation dimensions and measures proposed by the above methodology.

3. Advanced public data e-infrastructures

The ‘traditional’ public data e-infrastructures have been the first step of opening public data. However, this first generation of PSI provision e-infrastructures are characterized by data publishing in non machine-readable formats (i.e. PDF) without providing any contextual information or linkage to other data in most of the cases. These traditional PSI e-infrastructures are limited to offering basic functionalities for downloading data to data users, or for uploading data by the data providers, with minor support and flexibility. They are not considering the possibility their published open data to be improved by users (e.g. through cleaning and further processing) and reused, or how they can get feedback on them by the users in order to understand better their needs. The lack of concern about public data improvement by users and reuse and its importance is being shown by the current calls for advanced service e-infrastructures providing such capabilities, i.e. including tools that enable cleaning, analyzing, visualizing and linking datasets (Charalabidis 2011). In general, this first generation of the traditional public data e-infrastructures has been influenced by the Web 1.0 paradigm, in which there is a clear distinction between content producers and content users.

The advent of Web 2.0, in conjunction with current research advances in the domains of Information and Communication Technologies (ICT) and E-government, offer opportunities to exploit the full potential of PSI providing new features for open data reuse and functions that will enhance scientific research, economic growth and citizens’ trust to the governments. This gradually leads to the emergence of a second generation of more advanced PSI e-infrastructures, which are influenced by the principles of the Web 2.0 paradigm, giving to
users a stronger role, beyond the passive consumption of content. This content increasingly includes commenting, rating and improving or adapting it to specialized needs, and then publishing it again, and also creating their own content. The clear distinction between data consumers and data producers does not exist anymore, leading to the emergence of ‘pro-summers’, who produce and consume such data. These advanced PSI e-infrastructures are also characterized by machine-readable, linkable and context-aware data and services for the use and the improvement and adaptation of open data by the end-users (Papadakis 2012). Although the reuse of open data can be stimulated in different ways, e-infrastructures are expected to play an important role in this direction by providing functions such as data processing, cleaning, curation and rating to the end-users (European Commission 2011). They are designed to allow communication from users (scientists, citizens, journalists, businesses etc.) to publishers (public bodies) and back (the feedback loop). Another characteristic of advanced PSI e-Infrastructures is that in order to enhance interoperability they utilize richer metadata schemata.

4. Evaluation framework

An important objective was to propose a unified evaluation framework that can be used for the evaluation of both traditional PSI e-infrastructures based on the web 1.0 paradigm and advanced ones based on the web 2.0 paradigm. As it is described above, traditional and advanced PSI e-infrastructures are both used by two main groups of stakeholders: the data providers and data users. In the case of traditional PSI infrastructures there are simpler functionalities corresponding either to the data users or to the data providers and these two groups of stakeholders have clearly divided roles. Consequently, different capabilities are provided to each group, so two corresponding evaluation sub-frameworks have to be built. On the other hand, advanced PSI e-Infrastructures are characterized by frequent and repeated role switching when users interact with the platform. The proposed evaluation framework consists of an integrated evaluation model and a comprehensive evaluation procedure that utilises both qualitative and quantitative methods in order to get meaningful insights based on the evaluation variables and measures were identified during the construction of the evaluation model.

4.1 Evaluation model

For the above-mentioned reasons we developed an evaluation model for the most complex and difficult case of advanced PSI e-infrastructures 2.0, which is shown in figures 1 and 2. It consists of evaluation dimensions which are further elaborated into evaluation criteria, and covers both data users’ and data providers’ perspectives. So, if a user interacts with the system taking only the role of data user/provider, he/she will assess only value dimensions/criteria corresponding to data users/providers (denoted with ‘U’/’P’ respectively in the following Figures 1&2), while if he/she has both roles, he/she will have to assess all value dimensions/criteria. Similarly, if the proposed evaluation framework is used for the simpler case of evaluating a traditional PSI e-infrastructures 1.0, it can be easily divided into two parts, one for the data users and one for the data providers.

It consists of the three evaluation levels proposed by (Loukis 2012) mentioned in section 2. Its first efficiency oriented level aims to assess the ease of use of the platform and also the usefulness of the basic capabilities it offers as proposed by TAM stream of research, covering both data and processing capabilities and also technical performance based on the information quality, system quality and service quality concepts proposed by the IS success stream of research. In particular, the capabilities assessed are: data provision, data search and download, data upload, data analysis and feedback, data curation. The second effectiveness oriented level aims to assess to what extent the platform supports the users to achieve their objectives and level of general satisfaction based on the ‘perceived usefulness’ concept proposed by both TAM and information success research, and the ‘satisfaction’ concept by information success research. Finally, the third future behaviour oriented level aims to assess ‘users’ intention to use’ the platform again in the future and recommend it to colleagues. The need for better presentation of the evaluation questionnaires and tools made us to merge the latter two levels in one, this of “overall satisfaction”. Each of the above evaluation dimensions has been further elaborated into a number of relevant evaluation criteria.
4.2 Evaluation procedure

In order to finalise the construction of the evaluation framework, a comprehensive evaluation procedure was developed for the use of the evaluation model that was presented in section 4.1, which includes both quantitative and qualitative evaluation methods to get deeper insights.

The evaluation approach is shown in Figure 3. It consists of internal evaluation (by individuals within the e-infrastructure development consortium) and external evaluation (by individuals not belonging to the development consortium). The internal evaluation includes: i) a semi-structured discussion in a group of experts, ii) Web Analytics and iii) a SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis. The external evaluation includes: i) a similar semi-structured discussion in a group of social, political and management sciences researchers (potential users of the platform) not belonging to the project’s scientific committee, ii) a structured usability test measuring user’s performance on specific tasks (using a 5-Likert scale from very difficult to very easy), iii) a quantitative and structured questionnaire and iv) a Qualitative Discussion with users.

The structured questionnaire follows the complete structure of the evaluation model and could be used for both traditional and advanced PSI e-infrastructures with the appropriate changes. The users who fill the questionnaire are asked to enter the extent of their agreement or disagreement with the statements it includes, answering the question: “To which extend do you agree with the following statements?”

A five point Likert scale is used to measure agreement or disagreement with (i.e. positive or negative response to) such a statement (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree).

The semi-structured discussions in groups of experts (e.g. researchers from the social, political and management sciences who would be interested in using public sector data), on the topics/questions shown in Figure 4.

<table>
<thead>
<tr>
<th>Questions</th>
<th>1. User Experience</th>
<th>1.1 P+U The platform provides a user friendly and easy to use environment.</th>
<th>1.2 P+U It was easy to learn how to use the platform.</th>
<th>1.3 P+U The web pages look attractive.</th>
<th>1.4 P+U It is easy to perform the tasks I want in a small number of steps.</th>
<th>1.5 P+U The platform allows me to work in my own language.</th>
<th>1.6 P+U The platform supports user account creation in order to personalize views and information shown.</th>
<th>1.7 P+U The platform provides high quality of documentation and online help.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Data Provision</td>
<td>2.1 U The platform provides a large number of datasets.</td>
<td>2.2 U The platform provides dataset that are useful to me.</td>
<td>2.3 U The platform provides me with complete data with all required fields and detail.</td>
<td>2.4 U The platform provides accurate data on which I can rely for my studies.</td>
<td>2.5 U There are datasets from many different thematic areas (economy, health, education, etc.)</td>
<td>2.6 U There are datasets from many different countries.</td>
<td>2.7 U The platform provides sufficiently recent data.</td>
<td></td>
</tr>
<tr>
<td>3. Performance</td>
<td>3.1 P+U The platform is up and available without any interruptions.</td>
<td>3.2 P+U Services and pages are loaded quickly.</td>
<td>3.3 P+U I did notice any bugs while using the platform.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Data Search and Download</td>
<td>4.1 U The platform provides strong dataset search capabilities using different criteria.</td>
<td>4.2 U The platform provides several different categorizations of the available datasets, which assists significantly in finding the datasets I need.</td>
<td>4.3 U The platform enabled me to download datasets easily and efficiently.</td>
<td>4.4 U The datasets are in appropriate file/data formats that I can easily use for covering my needs.</td>
<td>4.5 U The datasets have also appropriate and sufficient metadata, which allowed me to understand these data and also how and for what purpose they were collected.</td>
<td>4.6 U The platform provides strong API for downloading datasets (data+metadata)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Evaluation dimensions and criteria of the PSI e-Infrastructures evaluation model (continues)
Figure 2: Evaluation dimensions and criteria of the PSI e-Infrastructures evaluation model (continued)

<table>
<thead>
<tr>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 P The platform enabled me to upload datasets easily and efficiently.</td>
</tr>
<tr>
<td>5.2 P The platform has a good metadata model applicable for all its datasets, that provides full understanding of the data</td>
</tr>
<tr>
<td>5.3 P The platform enabled me to prepare and add the metadata for the datasets I uploaded easily and efficiently.</td>
</tr>
<tr>
<td>5.4 P The platform provides good capabilities for the automated creation of metadata.</td>
</tr>
<tr>
<td>5.5 P The platform provides good capabilities for converting datasets’ initial metadata in the metadata model of the platform easily and efficiently.</td>
</tr>
<tr>
<td>5.6 P The platform provides API for uploading datasets (data+metadata)</td>
</tr>
</tbody>
</table>

6. Data Analysis & Feedback

<table>
<thead>
<tr>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 U The platform provides me good capabilities for visualization of datasets.</td>
</tr>
<tr>
<td>6.2 U The platform provides me good capabilities for processing the datasets.</td>
</tr>
<tr>
<td>6.3 U Platform provides good capabilities for giving feedback on the datasets I download, e.g. for rating datasets, for entering textual comments on them.</td>
</tr>
<tr>
<td>6.4 U Platform provides good capabilities for reading available feedback of other users of datasets I am interested in, e.g. ratings, comments.</td>
</tr>
</tbody>
</table>

7. Data Curation

<table>
<thead>
<tr>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 P The platform provides good capabilities for data enrichment (i.e. adding new elements - fields)</td>
</tr>
<tr>
<td>7.2 P The platform provides good capabilities for data cleansing (i.e. detecting and correcting inconsistencies in a dataset)</td>
</tr>
<tr>
<td>7.3 P The platform provides good capabilities for linking datasets.</td>
</tr>
<tr>
<td>7.4 P The platform provides good capabilities for visualization of datasets before uploading.</td>
</tr>
<tr>
<td>7.5 P The platform allows me to collect user ratings and comments on the datasets I publish, and also needs for further datasets provision.</td>
</tr>
</tbody>
</table>

8. Overall Satisfaction

<table>
<thead>
<tr>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1 U I think that using this platform enables me to do better research/inquiry and accomplish it more quickly</td>
</tr>
<tr>
<td>8.2 U This platform allows me to draw interesting conclusions on government activity</td>
</tr>
<tr>
<td>8.3 U This platform enables me to create successful added-value electronic services</td>
</tr>
<tr>
<td>8.4 P + U My initial motivations for selecting ENGAGE platform have proved to be true.</td>
</tr>
<tr>
<td>8.5 P The platform enables me to open and widely publish datasets I possess with low effort and cost.</td>
</tr>
<tr>
<td>8.6 P + U I am in general highly satisfied with this platform.</td>
</tr>
<tr>
<td>8.7 P + U I have spent a lot of time on the platform.</td>
</tr>
<tr>
<td>8.8 P + U I would like to use this platform again.</td>
</tr>
<tr>
<td>8.9 P + U I’ll recommend this platform to my colleagues.</td>
</tr>
</tbody>
</table>

**Figure 3:** Evaluation approach and tools

- **Engage Consortium (including Experts Scientific Committee)**
  - Semi-structured Experts Questionnaire
  - Semi-structured SWOT-Analysis
  - Web Analytics

- **End user**
  - Structured Questionnaire
  - Structured Usability Test

- **Experts in the field**
  - Semi-structured Experts Questionnaire

**Figure 4:** Topics/questions of the experts’ groups semi-structured discussions
The qualitative discussion can be based on the main evaluation dimensions and criteria of the PSI e-Infrastructures evaluation model described in the previous section, so it focuses on the following topics/questions, presented in Figure 5:

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you find the platform useful for downloading/using open governmental data?</td>
<td></td>
</tr>
<tr>
<td>Do you find the platform useful for publishing/uploading your own data, or improved/enriched versions of government data you have downloaded?</td>
<td></td>
</tr>
<tr>
<td>Which of the platform features (Searching, Metadata, Downloading, Comments and Rating, Linking, Uploading, Other) are useful for your needs?</td>
<td></td>
</tr>
<tr>
<td>Which of the platform features are not useful for your needs?</td>
<td></td>
</tr>
<tr>
<td>Which platform’s features are easy to use?</td>
<td></td>
</tr>
<tr>
<td>Which platform’s features are difficult to use?</td>
<td></td>
</tr>
<tr>
<td>Which features are not provided by the platform, but would be useful for your needs?</td>
<td></td>
</tr>
<tr>
<td>Do you currently participate in communities’ formation (based on shared interest in particular types of government data) within the platform?</td>
<td></td>
</tr>
<tr>
<td>Would you like to participate in communities’ formation within the platform in the future?</td>
<td></td>
</tr>
<tr>
<td>Would you be willing to contribute data to the platform?</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5: Qualitative discussion**

For the usability test, a number of potential users are asked to perform a scenario (= a series of tasks) using the PSI e-infrastructure/platform under evaluation. There are three possible ways of practically conducting the usability testing:

- Peer testing by users: whilst one user is testing the platform and performing the tasks, the other user is monitoring and providing feedback to the session leader by filling in the evaluation form.
- Session leaders evaluate a random sample of users according to their choice.
- Individuals test and evaluate themselves (self-organization principle): users perform the tasks and fill in the evaluation sheet themselves.

**5. Application of the evaluation framework and results**

In this section we report on the application of the proposed evaluation framework and procedure to the first version of the open public sector data e-infrastructure developed in the ENGAGE project. In total, 21 students from Delft University of Technology and 33 students from the University of Aegaean performed the student usability test by executing a series of tasks that require most of the available infrastructure functionalities, filled out the online user questionnaire and participated in a qualitative discussion. In addition, students of Delft University of Technology and the University of Aegaean wrote reports about the usability of the ENGAGE e-infrastructure for conducting open data download, process and upload scenarios. Five project members conducted the internal experts SWOT analysis. The results of these evaluation activities are as follows.

The application of the applied evaluation framework and procedure showed that the current ENGAGE e-infrastructure (ENGAGE 1.0) provides a good basic e-infrastructure to start an open data project. The current e-infrastructure enables searching, downloading, analyzing, uploading and rating data and also the manual linkage of data. Moreover, the ENGAGE e-infrastructure provides a comprehensive overview of which open data e-infrastructures currently exist in Europe. In addition, the ENGAGE infrastructure enables the usage of Application Programming Interface (API) for searching data, as well as, of a Wiki including tutorials. This means that the ENGAGE infrastructure manage to accomplish its technical objectives till the pilot evaluation.

Nevertheless, the e-infrastructure could be improved in many ways. The application of the evaluation model and procedure showed that future versions of the ENGAGE e-infrastructure should mainly focus on 1) difficulties in searching, need for more information about datasets, multilinguality, capabilities for combining datasets, and also for doing more complex analysis and performance, 2) more information about the quality of the data, for instance by providing a comprehensive rating systems for the data and 3) more information about
which data can be linked, in order to meet users’ expectations for using the platform. This means that this first version of the ENGAGE PSI e-infrastructure did not achieve to attract sustainable interest.

In general, the first application of the proposed evaluation framework showed that meaningful insights can be obtained by applying the proposed evaluation framework and infrastructure to such an advanced open public data e-infrastructure 2.0. The insights concern both managerial (categorizing priorities, decision making) and technical aspects of the e-infrastructure. The evaluation results appeared to be useful for defining priorities for improvements and enrichments required for developing the future versions of the ENGAGE e-infrastructure. They provide very detailed information about the features of the e-infrastructure and information about possibilities for improvement. One advantage of the evaluation framework was that the evaluation results are based on users experience with the actual ENGAGE e-infrastructure, instead of feedback on mock-ups of the e-infrastructure and/or presentations about the e-infrastructure. In addition, the evaluation results clearly show that user experience is a critical success factor for the community uptake of the e-infrastructure (navigation, search, user interface, services and features for non-Information Technology savvy users). Furthermore, some ideas were mentioned to improve the e-infrastructure that the consortium had not thought of. For instance, the idea of a ‘shopping cart’, where the user can add different datasets to make the linking process easier, could be considered for future versions of the ENGAGE e-infrastructure. Finally, several other inventive recommendations and solutions were provided by the potential users of the infrastructure.

1. Conclusions

This paper presented an evaluation framework for both traditional PSI e-infrastructures and advanced ones following the web 2.0 paradigm, which consists of an evaluation model and a procedure for applying it. A first application of the evaluation framework to an open public sector data e-infrastructure developed in the ENGAGE project has provided some first evidence for the applicability and usefulness of the proposed framework, as well as useful directions and ideas for the improvement of the above-mentioned e-infrastructure. Further research on this is in progress by the authors, mainly in three directions: i) application of the proposed evaluation framework in the following stages of the ENGAGE project and the next versions of the PSI e-infrastructure it develops, ii) application of this evaluation framework for evaluating other PSI e-infrastructures, both traditional and advanced ones, and iii) estimation of value models of such infrastructures, by elaborating and extending the approach proposed by Alexopoulos et al. (2012) and Loukis et al. (2012). This further research is expected to lead to improvements and extensions of the proposed evaluation framework.

Acknowledgements

This paper is related to the ENGAGE FP7 Infrastructure Project (An Infrastructure for Open, Linked Governmental Data Provision Towards Research Communities and Citizens), that started in June 2011. The main goal of the ENGAGE project is the deployment and use of an advanced service infrastructure, incorporating distributed and diverse public sector information resources as well as data curation, semantic annotation and visualisation tools, capable of supporting scientific collaboration and governance-related research from multi-disciplinary scientific communities, while also empowering the deployment of open government data towards citizens. More information can be found at www.engage-project.eu and www.engagedata.eu.

References

Alexopoulos Charalampos et al.


Open Data: Where to begin? Issy-les-Moulineaux, France, 5 October, 2012


A Comparative Study of Campaign and Non-Campaign Facebook Strategies: The Case of Taiwan’s Legislators

Yu-jui Chen and Pin-yu Chu
National Chengchi University, Taipei, Taiwan
slamdunkrei@hotmail.com
vchu@nccu.edu.tw

Abstract: Facebook, the most popular social media in the world, has changed ways of citizen involvement in governance. Politicians and (elected) public administrators worldwide have adopted Facebook as an important approach to connect with citizens. This study investigates differences in communication strategies and patterns of legislators’ Facebook in Taiwan during the 2011 election periods and during the 2012 regular legislative sessions, with the aim of exploring whether the Facebook phenomenon can improve the process of online political communication and citizen participation. The lessons from this study will help pave the way for future research on political campaign and electronic participation.

Keywords: electronic participation, Facebook, campaign strategy, web 2.0, legislator

1. Introduction

As Web 2.0’s sharing, interaction, and collective creation platforms become increasingly commonplace, a democratically-oriented internet environment has been created, which draws particular attention from the fields of public administration and political communication. With more than one billion users, Facebook now is the most popular web 2.0 and social media in the world. As access increased, Facebook has changed ways of citizen involvement in governance and even has contributed to social changes in countries such as Egypt and Iran.

By and large, politicians and (elected) public administrators worldwide have adopted Facebook as a method for communicating with citizens. Following the trend, most legislators in Taiwan also create personal Facebook accounts and Facebook pages as an additional way to reach their potential voters and citizens in general. Ideally, legislators can efficiently operate their constituents and directly communicate with their “friends.” Facebook pages of legislators seem to offer the promise of electronic participation (e-participation), reaching citizens on a common platform and allowing for citizen comments. On the other hand, citizens can establish a link to legislators via information-sharing, dialogue, and consensus-building on Facebook. If the two-way communication works properly and successfully, Facebook will certainly help to create more citizen participation and more public values.

While previous literatures show that campaign web sites do not utilize two-way communication successfully (Wang, 2009. Jackson & Lilleker, 2010), this study investigates differences in communication strategies and patterns of legislators’ Facebook between the election periods and the regular legislative sessions, with the aim of exploring whether the Facebook phenomenon can improves the process of online political communication and citizen participation, using Taiwan incumbent legislators’ Facebook as a case study.

The paper is organized as follows. In section 2, we first discuss the development of citizen participation and particularly the trend of e-participation. We also utilize studies on political campaign and election websites to summarize a list of strategies commonly used by politicians and (elected) public administrators on their web sites and blogs, such as calling for change, mobilization and participation, emphasis on the future, nostalgia for the past, moral appeal, and emphasis on personal characteristics. To further comprehend strategies and patterns used on Facebook pages, we apply content analysis to review and compare differences in communication strategies and patterns of the Facebook posts of incumbent legislators during the 2011 legislator election and the 2012 regular legislative sessions. We summarize the methodological approach in section 3, present the results of content analysis in section 4, and discuss how lessons we learn from this study will help pave the way for future research on political campaign, e-participation, and e-governance in the last section.
Yu-jui Chen and Pin-yu Chu

2. Literature review

2.1 The development of citizen participation and electronic participation

Citizen participation, an accepted foundation of democracy, can be broadly defined as the processes by which public concerns, needs, and values are incorporated into decision-making (Nabatchi, 2012). To improve legitimacy, transparency, accountability, and other democratic values in governance, public managers at all levels of government are expected to engage citizens in various public issues. Citizen participation occurs in many places and takes many forms. Arnstein (1969) first provides a ladder of citizen participation that explains levels of interaction and influence between governments and citizens in the process of decision making from non-participation to citizen power. To review the historical shifts of civic engagement in America, Cooper et al. (2006) introduce a conceptual model to classify traditional forms of citizen participation such as social movements, voting, polling, legislative and administrative hearings, public forum, citizen jury, etc. into five categories: adversarial approach, electoral approach, legislative and administrative information, civil society, and deliberative approach.

Recently, scholars start to emphasize the concept of deliberative citizen participation, which increases involvement of the public in the affairs and decisions of the policy-setting bodies (Rowe & Frewer, 2005). This recognition has come about as a result of two interrelated phenomena. First, Putnam (1995) indicates that people’s direct involvement in politics and public affairs has fallen progressively. Political participation is unequal in practice, the representation and influence are not dispensed at random but systematically biased on people of privileged, wealth, and better education (Lijphart, 1997). Second, deliberation is one of important factor in the democracy but hard to achieve with traditional participation mechanisms (Fishkin & Luskin, 2005). The decrease of deliberation goes side by side with the increase of political participation, which in turn affects the quality of public policy, and indirectly the well-beings of millions of people (Huang, 2008). Ideally, citizen power or deliberative approach can make up the shortage of representative democracy, but it is limited in practice because of high resource and cost requirements, difficulties in consensus-building, rational ignorance of citizens in mass society, etc. (Irvin & Stansbury, 2004).

The development of information communication technologies (ICTs) provides many new ways of online participation such as online polls, discussion forums, and other forms of online consultation, and generates more deliberative participation from citizens (Milioni & Triga, 2012). Governments all over the world are increasingly becoming aware of the importance of citizen electronic participation in representative democracy. Within the framework of electronic government, government to citizen (G2C) and citizen to government (C2G) interaction particularly, e-participation is defined as a participatory, inclusive, deliberative process of decision-making, which can be achieved via (1) e-information: using ICTs to increase the supply of information useful in the process of consultation and for decision making; (2) e-consultation: using ICTs to enhance consultation, and (3) e-decision making: using ICTs to support decision making by facilitating citizen participation (UN, 2003). This definition describes levels of online interaction and influence in the decision making process from elemental to more in-depth participation (e.g., information communication, consultation, deliberation and decision-making).

To improve the unequal participation, applications of web 2.0 tools are becoming more and more important, especially the use of social networking technologies. Unlike traditional participation, social media enable more direct, real-time and networked ways of citizen participation in governance (Näkki et al., 2011), and offer opportunity to communicate efficiently in deliberative environment (Robertson et al., 2010). Osimo (2008) categorizes six types of citizen engagement and participation using social networking technologies: (1) politicians using web 2.0 applications for a more direct contact with the electorate. For example, Nicolas Sarkozy, Jean-Marie Le Pen, Ségolène Royal, three candidates of the 2007 presidential election in France, all open the head offices in the Second Life. President Obama in the U.S. also uses Facebook pages, Twitter to contact with people and to build his image (Zavattaro, 2010); (2) bringing citizens’ participation upstream: For example, citizens are allowed to share their points of view on government documents in the Commentonthis.com (Osimo, 2008). Slovenian government provides the participative platform “Predlagam vladni” (I propose to government) in order to include citizens in policy process (Obilak-Crnic et al. 2010); (3) monitoring public representatives: For example, Theyworkforyou.com provides useful information to monitor representatives (Osimo, 2008). I-Vod supplies session information of legislative yuan in Taiwan (Ku & He, 2009); (4) monitoring administrative procedures: For example, Planningalerts.com and Farmsubsidy.org enable
monitor the procedure of planning application and public funds (Osimo, 2008); (5) opening discussion forums: For instance, “Nolitics” is an online discussion forum of Nigerian, which allows discussion of public affairs in bloggers (Chiluwa, 2011); and (6) easy creation of pressure groups for specific causes: For instance, Meetup.com and change.org are platforms, where participants can find other people interested in the same causes, and also connect to politicians sharing their views (Osimo, 2008; Shirky, 2008).

Although governments provide many mechanisms to encourage e-participation and discussions about policy and public problems are truly booming online, most participation and conversation is mainly “about” government rather than “with” government (Leighninger, 2011). No matter what the potential social media have, the improvement of democracy is limited without more effective feedback from citizens in public affairs. For this reason, how to improve the relationship between governments and citizens in the web environment is extremely important and worth exploring. A two way deliberative communication is the key factor to better governance in the development of democracy.

2.2 Strategies of public managers’ web 2.0 tools

Politicians and (elected) public administrators worldwide have adopted web 2.0 tools as an important approach to connect with citizens. However, many internet studies are concerned with technology but hardly comprehend the actual uses in a given political context (Danyi & Galacz, 2005). A few scholars classify different strategies of politicians and public administrators in different web 2.0 environments and dissimilar political systems. For example, Bichard (2006), from the perspective of frames, examines election web sites and blogs during the 2004 US presidential election. The study proposes a framing mechanism to analyze candidates’ appeal strategies. Bichard classifies the web strategies used by George W. Bush and John Kerry into five categories: (1) candidate ideology: the positions of candidate on specific issues and/or his agenda for America; (2) campaign trail: focused on campaigning events/activities or discussions regarding strategy and poll data; (3) supporters: recommends from specific supporters or groups of supporters, including official endorsements; (4) call to action: appealing for voter participation, such as donation requests, volunteering, online interaction or voting, and (5) opponent attack: the views of the opponent and criticisms regarding their flaws, inadequacies, or weaknesses. The findings indicate significant difference between candidates and their use of frames. Bush’s key strategies are campaign trail (41.1%), supporters (25.5%), and opponent attack (20%). The main strategies of Kerry are opponent attack (44.5%), campaign trail (22.4%), and supporters (17.8%).

Carlson & Strandberg (2005) investigate strategies use by different web actors in Finnish during 2004 European parliament election. They assign the main strategies used by information types (e.g., candidate’s biography, a list of issue positions held by a candidate, image building for a candidate, etc.), and engagement types (e.g., contact information, online forum, invitation for donation, etc.). Trammell et al. (2006) use the content analysis method to investigate the interactivity of the web sites and blogs of the ten Democratic presidential primary candidates in the 2004 election. They classify the strategies of candidates as voice for masses, calling for change, inviting participation, emphasizing hope for future, yearning for past, traditional values, party philosophical center, statistical support, expert support, identifying experiences with others, emphasis on political accomplishment, attack record of politician, and attack on politicians’ personal qualities.

Image building is an important strategy used by different candidates of different genders. Bystrom et al. (2004) categorize several personality traits that are frequently emphasized by candidates, including ability, toughness, persistence, experiences, amiability, education, political philosophy, professionalism, youthfulness, appearance, moral values, and stylistic qualities.

Owing to the limited research relevant to online strategies in a non-Western political context, Wang (2009) investigates how Taiwan’s 2008 general election campaign web sites and blogs differ in their strategies. Wang categorizes the strategies into six major items: calling for change, mobilization and participation, emphasis on the future, nostalgia for the past, moral appeal, and emphasis on personal characteristics. The analysis shows that the most used strategies are mobilization and participation, emphasis on personal characteristics, and calling for change.
3. Methodology

3.1 Targeted samples and Facebook pages

Using Taiwan incumbent legislators’ Facebook as a case study, the study applies the content analysis method to review and compare differences in communication strategies and patterns of the Facebook posts of incumbent legislators during the legislator election in 2011 and during the regular legislative sessions in 2012. The data collected for the 2011 legislator election began on December 1, and ended on December 31. The 2012 regular legislative session began on October 1, and ended on October 31.

The study employs the stratified sampling method to select a nationally representative sample from the two major political parties in Taiwan. Our final samples cover twenty legislators from Kuomintang (KMT) and ten legislators from Democratic Progressive Party (DPP), the two major political parties in Taiwan. Although some legislators have both personal Facebook account and Facebook page, we choose their Facebook pages from the direction of hyperlink as our targets considering their accessibility to citizens. Table 1 summarizes the Facebook accounts of legislators we study. The unit of analysis is a Facebook post. We totally analyze 1,526 Facebook posts in the election periods, and 897 Facebook posts in the regular sessions.

Table 1: Facebook accounts and pages of study targets

<table>
<thead>
<tr>
<th>Facebook account</th>
<th>Political party</th>
<th>Facebook title of study targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal accounts</td>
<td>KMT</td>
<td>Ting, Shou-chung, Lee, Hung-Chun, Lin, Te-Fu, Chang, Ching-Chung, Tsai, Chin-Lung, Huang, Chao-Shun, Chen, Ken-Te, Hsu, Yao-Chang, Lin, Tsang-Min, Cheng, Ru-Fen, Lin, Ming-Chen, Ma, Wen-Chun, Liao, Kuo-Tung.</td>
</tr>
<tr>
<td>DDP</td>
<td>Huang, Wei-Cher, Lin, Shu-Fen, Chen, Ming-Wen, Su, Chen-Ching.</td>
<td></td>
</tr>
<tr>
<td>Facebook pages</td>
<td>KMT</td>
<td>Tsai, Cheng-Yuan, Wu, Yu-Sheng, Lin, Hung-Chih, Huang, Chih-Hsiung, Yang, Li-Huan, Wong, Chung, Wang, Ting-Son.</td>
</tr>
<tr>
<td>DDP</td>
<td>Chen, Ting-Fei, Hsu, Tain-Tsair, Kuan, Bi-Ling, Lin, Tai-Hua, Liu, Chien-Kuo, Pan, Men-An.</td>
<td></td>
</tr>
</tbody>
</table>

3.2 Strategies and e-participation patterns of Facebook

Based on the amalgamation of the available literature presented above, this study proposes six main strategies for analyzing Facebook pages of Taiwanese legislator as follows:

- Daily information-sharing: Legislators provide their daily information, and connect their daily lives with their supports’ and other citizens’ experience and feelings (Carlson & Strandberg, 2005; Trammell et al., 2006).
- Emphasis on personal characteristics: Legislators emphasize their positive personal characteristics and distinguish themselves from other politicians. Those characteristics include ability, toughness, persistence, experience/education, amiability, moral values, stylistic qualities, political philosophy, professionalism, youthfulness, and appearance (Bystrom et al., 2004; Trammell et al., 2006; Wang, 2009).
- Endorsement: Legislators provide testimonials for specific supporters or groups of supporters, including statistics, expert sources or officials (Bichard, 2006; Carlson & Strandberg, 2005).
- Mobilization and participation: Legislators provide information of activities, in which they invite citizens to volunteer, donate, and participate in various campaign activities (Bichard, 2006; Trammell et al., 2006; Wang, 2009).
- Opponent attack: Legislators attack their opponent about flaws, records, inadequacies, and weaknesses (Bichard, 2006; Trammell et al, 2006; Wang, 2009).
- Political information: Legislators provide information such as statement, positions of public issues, and political ideology to express their points of view on public affairs (Carlson & Strandberg, 2005; Bichard, 2006; Trammell et al., 2006; Wang, 2009).
Adapting the content analysis method, this study uses the six strategies, i.e., daily information-sharing, emphasis on personal characteristics, endorsement, mobilization and participation, opponent attack, and political information to analyze the thirty legislators’ Facebook pages.

In addition, the study goes on to probe the level of political communication and citizen participation within each category. According to the definition of e-participation (Chu & Lee, 2009), and the concept of information flaw of public engagement (Rowe & Frewer, 2005), this study further classifies the degree of participation into three levels: e-information, e-consultation, and non-participation, to investigate the level of citizen participation on the legislators’ Facebook pages. As shown in Table 2, e-information means that legislators provide citizens with helpful information on public issues, and the direction of information flow is from the legislators to citizens only, i.e., one-way communication. E-consultation, on the other hand, means that legislators and citizens exchange information on public issues interactively, and the information flow is two-way.

Table 2: The level of e-participation

<table>
<thead>
<tr>
<th>Level of participation</th>
<th>Definition</th>
<th>The direction of information flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>e-information</td>
<td>Legislators provide helpful information to citizen about public issues.</td>
<td>In e-information, information is conveyed from legislators to citizens only.</td>
</tr>
<tr>
<td>e-consultation</td>
<td>Legislators provide useful information to citizens, and offer the opportunity to discuss public affairs with citizens.</td>
<td>In e-consultation, legislators and citizens exchange information on public issues interactively, and the information flow is two-way.</td>
</tr>
<tr>
<td>Non-participation</td>
<td>The information on Facebook, irrelevant to public issues or public affairs, only focuses on personal feelings.</td>
<td></td>
</tr>
</tbody>
</table>

4. Research results

4.1 4.1 Demographics of legislators

According to web sites of the legislative Yuan in Taiwan (http://www.ly.gov.tw/), we get the demographics of our research targets. The mean age for the legislators is 52.8. There are more male legislators (73%) than female legislators (27%), indicating our targets are most formed with male. Ninety-seven percent of the surveyed legislators have completed college or higher degrees, only Lin, Te-Fu without the degree of college. Our research targets cover twenty legislators from KMT and ten legislators from DPP, the two major political parties in Taiwan.

4.2 Strategies and patterns used on Facebook

We totally analyze 1,526 Facebook posts in the election periods, and 897 Facebook posts in the regular sessions. As shown in Table 3, the average Facebook post per legislator in the regular legislative sessions is 29.9, and 50.86 in the election periods. The findings show that political information, with the average post per legislator 16.83 (56), and daily information sharing, with the average post per legislator 10.17 (34), are the most frequently used strategies on legislators’ Facebook pages in regular legislative sessions. Moreover, the main strategies of legislators’ Facebook pages are consistent throughout the regular sessions and the election periods. Political information, with the average post per legislator 17.33 (34%), and daily information sharing, with the average post per legislator 14.23 (28%), are also the most frequently used strategies on legislators’ Facebook pages in the election periods. The main strategic difference comes from the usage of “endorsement, with the average post per legislator 4.3 (9%)” and “mobilization and participation, with the average post per legislator 6.8 (13%).”

It is worth noting that previous studies indicate that opponent attack is one of main strategies during elections (Birchard, 2006; Trammell et al., 2006; Wang, 2009), however, our results identify a different scenario. The opponent attacking strategy, with the average post per legislator during the regular legislative session 2.27 (8%), and with the average post per legislator in the election sessions 4.4 (9%), is restrictedly used by legislators.
Although Facebook is a self-owned and direct information channel, legislators seldom take advantage of it in emphasizing their personality traits and enforcing their support in regular session (2% for emphasis on personal characterizes, and 0% for endorsement). The results indicate that legislators’ Facebook still emphasize a legislator’s political statement and daily life information. Unlike the results found in blogs and web sites in Taiwan (Wang, 2009), opponent attack is not the main strategy during the 2012 legislative election in Taiwan.

**Table 3: Strategies of the legislator’ Facebook (average post per legislator)**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Regular Legislative Session</th>
<th>Election Period</th>
<th>T-value</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>%</td>
<td>Mean</td>
</tr>
<tr>
<td>Daily information-sharing</td>
<td>10.17</td>
<td>12.71</td>
<td>34</td>
<td>14.23</td>
</tr>
<tr>
<td>Emphasis on personal characterizes</td>
<td>0.53</td>
<td>1.33</td>
<td>2</td>
<td>3.80</td>
</tr>
<tr>
<td>Endorsement</td>
<td>0.1</td>
<td>0.40</td>
<td>0</td>
<td>4.30</td>
</tr>
<tr>
<td>Mobilization and participation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6.80</td>
</tr>
<tr>
<td>Opponent attack</td>
<td>2.27</td>
<td>4.10</td>
<td>8</td>
<td>4.40</td>
</tr>
<tr>
<td>Political information</td>
<td>16.83</td>
<td>17.09</td>
<td>56</td>
<td>17.33</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29.9</td>
<td>100</td>
<td>50.86</td>
<td>100</td>
</tr>
</tbody>
</table>

**Note:** ***p < 0.001

As show in Table 4, e-information pattern, with the average post per legislator in the regular legislative sessions 12.47 (42%) and with the average post per legislator in the election periods 26.7 (52%), is the most frequently used e-participation pattern on legislators’ Facebook pages. Our results reveal that the concept of e-participation achieved a fine rate (64%) on the legislators’ Facebook pages, but most communications are still one-way (42% for e-information in the regular legislative sessions and 52% in the election periods). The two-way communication is not utilized properly or successfully, due to the fact that the Facebook of legislators still lack for dialogue and consensus-building with citizens.

**Table 4: E-participation of the legislator’ Facebook**

<table>
<thead>
<tr>
<th>Participation</th>
<th>Regular Legislative Session</th>
<th>Election Period</th>
<th>T-value</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>%</td>
<td>Mean</td>
</tr>
<tr>
<td>E-information</td>
<td>12.47</td>
<td>13.02</td>
<td>42</td>
<td>26.70</td>
</tr>
<tr>
<td>E-consultation</td>
<td>6.47</td>
<td>11.45</td>
<td>22</td>
<td>1.80</td>
</tr>
<tr>
<td>Non-participation</td>
<td>10.96</td>
<td>13.79</td>
<td>36</td>
<td>22.36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29.9</td>
<td>100</td>
<td>50.86</td>
<td>100</td>
</tr>
</tbody>
</table>

**Note:** ***p < 0.001, **p < 0.01, *p < 0.1

### 4.3 Differences in Facebook strategies used in different periods of time

To explore differences in communication strategies and patterns of legislators’ Facebook, we apply a paired t-test to compare the strategies used in the election periods and in the regular legislative sessions (see Table 3). The three significant differences in strategies used between the regular session and the election period are: emphasis on personal [t (29) = -5.98, p = 0.000 < 0.001], endorsement [t (29) = -4.33, p = 0.000 < 0.001], mobilization and participation [t (29) = -6.77, p = 0.000 < 0.001]. These three strategies, highly related to personal image building and promotion in political campaigns through the Internet, are increased during the legislative election. Legislators in Taiwan tend to use diversified marketing strategies, and political marketing is not the major consideration for legislators to use Facebook during the regular legislative session.

On the other hand, e-participation is significantly different between the regular legislative sessions and the election periods (see Table 4). E-information [t (29) = -2.99, p = 0.006 < 0.01] was increasingly applied by legislators by providing more personal political manifestos through Facebook. The decrease of e-consultation
Yu-jui Chen and Pin-yu Chu

[t (29) = 2.03, p = 0.029 < 0.1] usage reveals that legislators tend to see Facebook as a political campaign tool, instead of a conversation platform during the elections.

Similar to the results of previous research on political campaigns (Jackson & Lilleker, 2010), there is evidence that Taiwanese legislators still favor a monologic approach to manage their interaction with citizens on Facebook. Although Facebook has potential to become the “public sphere” which creates more citizen participation and more public values (Robertson et al., 2010), the premise is that legislators and public administrators accept Facebook as a two-way communication tool that can be used to promote their relationship with their supporters, as well as to learn about and network with other citizens and groups. However, it takes a lot of time to make full use of this two-way “social” tool.

5. Discussions and conclusions

As the Facebook trend continues to grow, this paper uses the content analysis method to explore the strategic difference in legislators Facebook pages during regular sessions and elections. In comparing the strategies of regular sessions and election periods, the study results show that political information and daily information sharing are the most frequently used strategies on legislators’ Facebook pages, and there are significant differences between these two periods in terms of emphasis on personal characterizes, endorsement, mobilization. Unlike previous literature (Bichard, 2006; Trammell et al., 2006; Wang, 2009), opponent attack is not the priority to legislators even in election. This finding is surprisingly different from Wang’s (2009) research result, in which opponent attack is the major strategy used in Taiwan’s 2008 legislative campaign. Facebook have more sociological functions and deliberative characteristics than blogs or web sites (Robertson et al., 2010), which makes it not only the campaign tool, but also the public sphere on-line. In general, Legislators of Taiwan tend to use diversified strategies in elections than in legislative sessions.

This study also reveals that the percentage of e-participation is more than 50%, but most communication on Facebook is one-way. Legislators still favor a monologic approach (Jackson & Lilleker, 2010) to manage their interaction with citizens on Facebook. The result indicates that legislators’ Facebook is another platform to distribute public information to citizens, and may have potential to create more public values. To improve democracy, legislators need to get more feedback from citizens, i.e., improving the two-way communication on Facebook.

As with any research design, this study possesses limitation. First, we focus on difference in legislators’ strategies of web 2.0 tools in regular legislative sessions and in election periods. Facebook, however, is only a type of web 2.0 tools used by legislators. Taiwan legislators may apply different strategies in various web 2.0 environments. Future studies may need to further explore strategies adopted by politicians and (elected) public administrators in various web 2.0 and social media. Second, the concept of e-participation includes citizen participation in the decision-making level of public policy. However, we do not delve much into defining participation in actual policy making, but broadly consider various degrees of citizen involvement. We do not attempt to further analyze whether or not legislators actually take suggestions from Facebook “friends” into consideration while making public policies. Future study may employ the in-depth interview method to explore the actual influence of Facebook pages on legislators’ policy making qualitatively.

References


Yu-jui Chen and Pin-yu Chu


Towards a Socio-Political Foundation of e-Government

Dimitris Christodoulakis1 Natassa Xarcha2, George Sourmelis2 and George Stylios3
1Database Laboratory, Computer Engineering & Informatics Dept. University of Patras, Greece
2Union of Hellenic Chambers of Commerce, Athens, Greece
3Technical Educational Institute of Ionian Islands, Lefkada, Greece
dxri@upatras.gr
nxarcha@gmail.com
george@ibn.gr
gstylios@yahoo.gr

Abstract: A majority of e-Government programs have developed in many countries in order to obtain benefits and good governance. However, many projects fail as a result of a lack of understanding about the relationships between social trends, political and economic contexts and organizational factors. The paper draws a governance model and the basic principles of good governance. Then, we deploy our model using dynamic systems techniques. Through simple analogies we draw conclusions on good e-Government. We prove that excellent knowledge of technical issues is not enough to have good e-Government applications. Good e-Government requires versatile knowledge primarily of government issues. Policy and decision makers should overcome overconfidence concerning the use of electronic media in government and respect the institutions of civil society, business, the media, history, tradition, culture and technology.

Keywords: e-government, governance, public policies, system dynamics, modeling

1. Introduction

Electronic government (e-gov) has been recognized as a powerful strategy for government transformation. Governments around the world have developed e-Government programs in order to obtain important benefits such as cost savings, improved service quality, increased accountability, and more public participation, among others. However, many e-Government projects were characterized as failures. Some of such failures are the result of a lack of understanding about the way technologies, information use, organizational factors, institutional arrangements, and socio-economic contexts are involved and affect e-Government development process.

Before turning to our main subject, it will be appropriate to notice briefly the notions of government and governance.

According to Oxford English Dictionary (Oxford 2012), governance is defined as “the action or manner of governing.” Government is determined as “the governing body of a nation, state or community.” According to the same dictionary government controls:

- The system by which a nation, state, or community is governed;
- The action or manner of controlling or regulating a nation, organization, or people;
- The group of people in office at a particular time.

Obviously governance is not synonymous with government (Graham 2003). “Governance determines how governments and other social organizations interact, how they relate to citizens, and how decisions are taken in a complex world (Graham 2003).” Former UN Secretary-General Kofi Annan noted at the end of the preceding century: “good governance is perhaps the single most important factor in eradicating poverty and promoting development” (Kofi Annan 1998).

In 2003 the Commission of the European Communities determined e-Government as “the use of information and communication technologies in public administrations combined with organizational change and new skills in order to improve public services and democratic processes and strengthen support to public policies” (Commission 2003). Taking into account the above definitions of government and governance, it is obvious that e-Government enables possible ways in order to achieve good governance. Paraphrasing the above well-cited quote of Kofi Annan, we would like consider e-Government as the use of electronic tools (information
and communication technologies) in order to improve the system by which a nation, state, or community is governed, for the eradication of poverty and the promotion of development.

Goal of this paper is to discuss the relationships between e-Government and good governance. We suggest that, dynamic simulation provides the appropriate methodological tool to get a better understanding of those relationships, results and unintended consequences (Richardson and Pugh, 1981). To set a short of foundations of e-Government that provides satisfactory explanation of the current situation and set up a solid basis for planning the next generation e-Government applications.

The remainder of this paper is organized as follows: We start our discussion with a short introduction of the relationships between government and governance. In Section 3 we discuss e-Government in conjunction with good governance and other qualitative/technical characteristics. We conclude in Section 4 where we sketch open problems and our plans for future work.

System Dynamics

System dynamics is a method for studying and managing complex feedback systems (Sterman, 2000). One of the basic principles of System Dynamics is that a system’s performance is closely linked to an underlying structure of endogenous feedback processes. We suggest that the processes of modeling and simulation in e-Government can give a positive effect to all e-gov stakeholders and especially the policy makers to improve their way of thinking and deciding. Since developing e-Government is an aggregation of processes that show dynamic behavior where the pattern can be explained by actors’ decisions and actions, system dynamics becomes a formal way of developing and testing hypothesis about the impact of feedback processes on various social and political behaviors. According to Richardson et al. (2004), a feedback loop exists when decisions change the state of the system, changing the conditions and information that influence future decisions. There are two kinds of feedback loops.

- A reinforcing loop (or positive loop) represents a changing process where the characteristic is growing, decaying, destabilizing, or accelerating.
- A counterbalancing loop (negative or balancing) represents a process implying resistance to change, goal seeking or stabilizing behavior.

2. Governance and government

The purpose of this section is to bring together, partly for reference and partly for closer inspection, some of the ideas and relationships we have presented in the introduction.

Graham et al (Graham 2003) argue that in order to understand the main players of governance at national level, we should identify the major “entities that occupy the social and economic landscape.” In most cases these entities are: Business, the institutions of civil society, government and the media. In some cases important role in governance have also other entities like military, the church etc. Dominant role in governance maintain also entities like history, tradition, culture and technology. The extent the above entities influence governance is of cause different from country to country.

In a more recent study Dawes (2009), states that there are various encompassing interactions among social trends, human elements, changing technology, information management, interaction and complexity, and the purpose and role of government. These interactions affect the development of government and governance in the digital age. The following figure shows in a more analytical way this statement.

In order to understand how the entities of the social and economic landscape (also called SEL-entities) interrelate with government we sketch the causal structure between them, using System Dynamics (Wikipedia 2012, Ghaffarzadegan et al 2011). System Dynamics have been successfully applied for the description of the causal structure of a wide range of systems like social and environmental systems, business, manufacturing etc. In this paper we are primarily using the small system dynamics models as introduced in (Ghaffarzadegan et al 2011). For detailed studies, system modeling and simulations the reader is referred to the bibliography included in (Wikipedia 2012).
Figure 1 shows the causal structure between the SEL-entities of the governance model we have discussed previously.

Apart from the SEL-entities, the picture is enhanced with many more entities which are collected together in three entity groups: Group A represents the circumstances under which the state is governed. Group B represents the factors under which the people are called to comply with the legislation. Group C represent the social interest groups, lobbies etc. Each one of the factors that participate in the groups has its own role in the causal structure. They have been grouped together merely to increase the readability of the graph. The pathway from Public Opinion to Public Policy Issues represents the process of creating political awareness, which in turn entrains several factors of Groups A, B and C. At the end of the political awareness processes a perception of political issues is created that leads to new legislation. Legislation generates laws, agreements, procedures, conventions, policies etc. Consequently, each public policy issue corresponds to a set of legislation factors which in turn affect the public opinion building process. Finally, there is a pathway from public opinion to public policy issues, along which changes are transmitted from public opinion to public policy issues.

As mentioned earlier, part of the government game are: business, the institutions of civil society and the media. Government is also influenced by history, tradition, culture, the economic situation and the technology
conditions of the citizens. Last, government is heavily influenced by the financial and technological position of the state. The formation of a public policy issues is influenced by factors groups B and C. Respectively, these factors influence government in the legislation generation flow. Or working hypothesis is that each factor influences positively its target action. Therefore, there are several reinforcement loops in the graph. For example, the reinforcement loop policies-media-government-legislation-policies represent the criticism and pressures usually exercise the media on governments. Another interesting example is related to the factors of group B: the reinforcement loop from policies to technological or economic position of the citizens, which in turn influences government. The extend governments take account of the economic or technological status of the citizens is of cause doubtful. As we are entering the fifth year of the global economic crisis and the debts strangle the economies of many developing countries (TIME 2012), few of the above reinforcement loops are really taken into account by governments around the world.

Furthermore, real world does not contain only reinforcement loops. Factors influence also negatively their target actions and the causal structure contains many rebalancing loops (examples include: laws and procedures that became inactive due to the negative public opinion, procedures that stuck due lack in appropriate training etc). As mentioned before, for simplicity reason we assume that there are only reinforcement loops, meaning that even negative criticism influence government and force changes in legislation (e.g. replacement or suspension of lows).

3. Governance and e-Government

After the little acquaintance we have had to system dynamics and their application to government and governance, we turn our attention to e-Government. Figure 2 is generated from figure 1 by replacing government with e-Government and incorporating in to the graph the factors of group D. Driven by our experience in the development of e-Government applications (the authors have participated in the design and implementation of a several e-Government projects, among them the e-business-registry in Greece), we assert that e-Government should functioning under the same rules as of good governance. In addition e-Government should provide a set of quality characteristics like these of group D.

Typical reinforcement loop of figure 2 is the E-Government-E-gov apps-Procedures-Peoples technology awareness. We assume that an e-Government application should reflect the people’s technological background and perception, and as the users become more experienced the application should evolve and extend in functionality. In case this golden rule is not followed the reinforcement loop reverse to rebalancing one, expressing the resistance of the users to adopt and use e-Government systems.

Figure 2: E-Governance as a causal structure

Every e-Government application should respect tradition. Hundreds of years of paper communications cannot be changed at once to paperless. As people are used to the traditional communication methods, a sudden change usually creates resistance that may nullify the expected outcome. Similarly, when public administration is forced to use e-Government systems (sometimes even without training), traditional staff often fill unsecure; keep double archives and work twice as previously.
Another major issue of e-Government systems is related to factors group C. Media, civil society organizations and private sector are key shareholders of the society today. We consider that the failure of many e-Government applications is due to the fact that they have been developed in absence if the factors of group C. The role of each factor in group C is unique in the reinforcement loops they participate. For example, an application dedicated to control the consumer prices index cannot be designed without the participation of consumer organizations. In addition it is advisable to seek the involvement of the media as to mobilize the citizens and ensure the dissemination of the objectives.

Considering figure 2 it is easy to understand that e-Government applications are affected by factors that are endogenous or exogenous to the e-Government system (see also Ghaffarzadegan et al 2011). For example, a taxation application is mainly influenced by exogenous factors (e.g. the collection of taxes), and less by the endogenous ones (e.g. content and structure of the e-Government application). As politicians and managers tend to upgrade the exogenous factors and downgrade the endogenous ones, e-Government systems often fail in assessment processes.

In the frame of her Master Thesis at the University of Patras, Eleni Zampou (Zampou 2012) assessed the internet sites of five Greek Ministries that provide e-Government services to citizens. Based on the current literature, the assessment has been carefully prepared and incorporated the following factors: Structure, Content, Reliability, Accessibility and Visibility. For the assessment of each factor a specific weighted formula has been developed that incorporate a set of quality characteristic. For each factor the corresponding characteristics are as follows:

Structure: % of pages that (1) are linked to the home page, (2) fulfill the three clicks rule, (3) have a fixed navigation menu, (4) are reachable by multiple paths and (5) contain less that 100 links.

Content: readability, multilingualism, spelling errors and layout.

Reliability: Page size, loading time, deadened internal and external links, HTML errors and error 404.

Accessibility: Number of accessibility errors/warnings as described in WCAG2-AAA (W3C 2008).

Visibility: Alexa pagerank, Google page rank, external links to the web site, % of pages with title, % of pages with title related to content, % of pages with unique title, % of pages with meta labels, % of pages with keywords that are related to content and % of links associated to the keywords.

The overall outcome of the assessment of the five Ministries is represented in figure 3. Considering figure 3 it is easy to see that only the factor accessibility is rated excellent. Very good is the rate for Reliability and Structure. Content and Visibility scored relatively low.

![Figure 3: Overall outcome of the assessment of the five Ministries](image)

One of the five assessed ministries (see figure 4) scored below average in Content due to the facts that: (1) The content of the e-Government application is not available in more than one language, (2) the written texts
contain spelling and grammar errors, (3) the understandability of the texts is relatively low and finally, (4) the contend is relatively pure concerning audiovisual media like video, image, sound etc.

![Figure 4: The particular assessment of each ministry](image)

It is not a coincidence that the assessment emerged these problems and issues. None of the e-Government applications that have been assessed include any subsystem for user evaluation or feedback measures. Furthermore, throughout the period of operation of the applications neither improvement nor enhancement procedures have taken place.

Obviously, there is still a general lack of a clear strategy to facilitate e-Government as well as evaluation frameworks to assess citizens' needs and expectations. Since in five major ministries the current situation in Group D scores so low, this means that D's affect in groups A and B will have a very low rate. From that point of view the e-Government valve will be less affected by these two groups. On the other hand the group C, which is not affected by this low score directly, should have a more positive rate to keep the system balanced. Also the public opinion which affects directly the Public Policy Issue should be the major parameter in developing e-gov apps. Conclusively, policy makers in their efforts to increase e-Government usage and citizen satisfaction are faced with issues and opportunities underlying public opinion in e-Government usage and a multifaceted changing environment. The valve e-Government in figure 2 can be described with the following equations.

\[
E_{gov,app} = \int_0^t \text{public\_government} \cdot dt
\]

\[
E_{gov} = \int_0^t (p \cdot \text{groupA} + q \cdot \text{groupB} + r \cdot \text{groupC}) \cdot dt
\]

p, q and r denote the probabilities that groups A, B and C affect public policy issues.

To effectively increase the Group D conditions, more effective policies and strategies need to be put in place to help overcome differences and divides. Focus on user needs, further explore and exploit the potentials of media and open data, and provide additional incentives for e-service usage. As also mentioned in (Berlot et al 2008) public web sites and e-Government applications should include practical methods for continuous evaluation and feedback in order improve and enhance their services to citizens.

4. Epilogue

We have presented a governance model and discussed some basic principles of good governance. Through simple analogies we have tried to draw conclusions on good e-Government. Excellent knowledge of technical issues is not enough to have a good e-Government application. Policy- and decision makers should also overcome overconfidence concerning the use of electronic media in government. Good e-Government requires versatile knowledge primarily of government issues.
We from site we will continue to study the issue e-Government vs. good governance. Our goal is to unfold all factors that affect e-Government and present them in a dynamic system together with basic principles and design guidelines.

The focus for further research is to clarify the reinforcement’s loops on system presented in figure 2 in order to expand the equations. We will try to measure the affect of Group D on the other groups and the affect of public opinion to the policy decision process and e-Government development. Measurements need to reflect more accurately citizens’ experience and satisfaction. Since there is no international consensus on how to apply these measures, we should take into account apart from web analytics, customer views and experience replication, the valuable information and open-data that social media may provide.

Measuring e-Government is no doubt challenging, but also very important. After all, without a clear understanding of how to measure e-Government procedure and development, it is difficult to measure the impact of e-governance. Increasing efforts to simulate e-gov development with system dynamics is a good step forward towards gauging the extent of e-Government success and failure, and evaluating progress towards development for the people.

References
http://unu.edu/publications/articles/what-does-good-governance-mean.html
Ghaffarzadegan Navid, John Lyneis, George P. Richardson (2011), How small system dynamics models can help the public policy process, System Dynamics Review vol 27, No 1 (January–March 2011): 22–44Published online 21 October 2010 in Wiley Online Library
W3C (2008) Web content Accessibility Guidelines (WCAG) 2.0 https://www.w3.org/TR/WCAG20/
A Prospective Survey on Future e-Governance Research Directions

Pin-yu Chu and Yueh-yun Sun
National Chengchi University, Taipei, Taiwan
vchu@nccu.edu.tw
100256004@nccu.edu.tw

Abstract: Although many e-Government policies, programs, and services such as e-tax, e-procurement, e-voting have been implemented in various countries, the priorities of future e-Government policy and research emphases and their relationship with resource allocation need to be well studied and justified. The objective of this paper is to identify forward-looking e-governance research topics. In this paper, we utilize studies on e-Government performance rankings such as UN’s e-Government survey and Waseda University’s e-Government ranking, and reports released by influential international e-governance centers to summarize a list of promising e-governance research topics. To gain insight from e-governance experts in various countries and sectors, we conduct in-depth interviews and perform an online survey of domestic and international e-governance scholars and practitioners to rank these topics. We present the focus of intensive literature review and summarize the results of the online survey. The lessons from this study will help pave the way for future e-governance research initiatives.

Keywords: e-governance, e-government, public value of information technology, research initiatives

1. Introduction

“Electronic government” (e-Government), one of the most interesting concepts introduced in the field of public administration in the late 1990, has been the emerging issue with great attention. Governments worldwide have put a lot of efforts not only in information and communication technologies (ICTs) infrastructure but also in public administration process design for better relationships with its multi-stakeholders. Public sector organizations need now more than ever to manage increased speed of reflexivity in their relationship with the citizenry. It is not just a question of e-Government; it is also a question of e-governance (Marche and McNiven, 2003). Many international organizations such as UN, OECD, and APEC all emphasize the importance of e-governance and the aim of e-Government has moved from pure services to create public values for citizens and the society in a country.

Although many e-Government policies, programs, and services such as e-tax, e-procurement, and e-voting, have been implemented in various countries, the priorities of e-Government policy emphases and their relationship with resource allocation demand to be justified. For example, the necessity of cloud services and the application and integration of national big data are increasingly popular, but need to be carefully studied. The objective of this paper is to identify forward-looking e-governance policy and research topics. Specifically, these topics need to be consistent with the emerging e-governance topics of global significance.

The paper is organized as follows. In section 2, we utilize studies on e-Government performance rankings to summarize a list of shared e-Government indicators. We also gather research reports released by influential international e-governance centers to highlight e-governance research topics of global significance. To gain insight from e-governance experts in various countries and sectors, we interview leaders of various e-governance research centers and conduct an online survey of domestic and international e-governance experts to rank e-governance research arenas and topics. We summarize the methodological approach in section 3, present the online survey results in section 4, and discuss how lessons we learn from this study will help pave the way for future e-governance research initiatives in the last section.

2. Literature review

2.1 International e-governance/e-Government indicators

Several important international organizations, e.g., UN, OECD, World Bank, World Economic Forum (WEF), International Telecommunication Union (ITU), and Economic Intelligence Unit (EIU) investigate either the global trends of ICTs or challenges of e-Government, develop economic competitiveness and e-governance performance indices, select best practices, and provide countries with strategic suggestion. These organizations identify a wide variety of indicators and these indicators often highlight e-governance research directions of global significance.
UN has been conducting a series of “E-Government survey” to investigate e-Government environments and capacity to sustain online development of its member states since 2001. E-Government Development Index (EGDI) and E-Participation Index (EPI) are currently used performance indices. EGDI measures the willingness and capacity of nation administrations to use ICT to deliver public services by three sub-indices -- the online services index, telecommunication infrastructure index, and the human capital index. EPI, including e-information, e-consultation, and e-decision making, offers insights into how governments create an environment in which citizens can be more active and supportive of their governments (UN 2010, 2012). In addition to the worldwide comparison, UN also investigates digital governance in large municipalities by evaluating their websites in terms of privacy, usability, content, services, and citizen participation, and ranks them on a global scale (Holzer et al., 2009). Waseda University, in charge of APEC e-Government research center, has published the world rankings on e-Government all over the world since 2005. Seven indicators with Asian perspective are network preparedness, management optimization, required interface-functioning applications, national portal, CIO in government, e-Government promotion, and e-participation. Future trends of e-Government identified in its latest report are cloud computing, social media, big data, digital inclusion, business continuity plan for disaster management, cyber security, mobile government, and ICT applications for aging society (Obi, 2012).

WEF attempts to highlight the prospects for growth in countries that have proven themselves ready to take up new technologies throughout in depth analysis since 2001. Networked Readiness Index, which measures degree to which economies across the world leverage ICT for enhanced competitiveness, consist of four sub-indices: environment, readiness, usage, and impact (WEF, 2012). WEF also points out that future trends of ICT are cloud computing, network neutrality, smart services, and mobile broadband. EIU releases IT industry competitiveness index to explore how companies and governments are addressing major trends affecting the industry. The index is composed of six dimensions: overall business environment, IT infrastructure, human capital, legal environment, R&D environment, and support for IT industry development (EIU, 2011). Besides, EIU uses “digital economy rankings” to reflect the increasing influence of ICT in economic and social progress. The rankings assess each economy on six factors: connectivity and technology infrastructure index, business environment, social and cultural environment, legal environment, government policy and vision, consumer and business adoption (EIU, 2010). ITU utilizes ICT Development Index (IDI) and ICT Price Basket (IPB) to monitor information society developments worldwide. While IDI captures the level of advancement of ICTs, which is divided into ICT access, ICT use, and ICT skills, IPB takes into account the cost and affordability of ICT services based on the price for fixed-telephony, mobile-cellular telephony and fixed-broadband Internet services (ITU, 2011).

Discussion of future e-governance research topics cannot be completed without including the work of OECD and APEC. OECD (2009) emphasizes the importance of front and back office reform and user-centric e-Government services. APEC Telecommunications and information working group (APEC TEL) addresses “Strategic Plan for 2010-2015” with focus on five priorities: develop ICT to promote new growth, enhance socio-economic activities through the use of ICT, promote a safe and trusted ICT environment, promote regional economic integration, and strengthen cooperation in the ICT sector (APEC TEL, 2011). The ongoing efforts toward universal and affordable broadband, decreasing digital divide, and the needs of unserved or underserved communities using ICT in a sustainable manner are all related to e-governance.

We compare the contents of the above ICT development and e-Government indices and categorize them into eight emphases: ICT and telecommunication infrastructure, policy and regulation, human capital, administrative organization and management, types and functions of online services, e-participation, economic and social impacts of ICTs/e-Government, cost and affordability of ICTs/ e-Government (see Table 1).

**2.2 Research domains of global prestigious e-governance research centers**

By studying research topics that prestigious e-governance research centers engage in, we can illustrate present global e-governance features, and identify its forward-looking trend. Six e-governance research centers in the United State and Asia we analyze are: (1) Center for technology in government (CTG), Albany University, (2) Center for the digital future (CDF), University of Southern California, (3) the national center for digital government (NCDG), University of Massachusetts at Amherst, (4) United Nations University International Institute for Software Technology (UNU-IIST center for e-Government), (5) Waseda e-Government research
center, and (6) Taiwan e-governance research center (TEG). It is clear that they overlap in many topics, including institutional innovation of e-governance, performance evaluation of e-Government, open government and e-participation, and cross-boundary collaboration and integration.

Table 1: Re-organization of international e-governance/e-Government ranking indices

<table>
<thead>
<tr>
<th>Index</th>
<th>Sub-index</th>
<th>Sub-index</th>
<th>Main source of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT and telecommunication infrastructure</td>
<td>Internet users</td>
<td>PCs</td>
<td>ITU</td>
</tr>
<tr>
<td></td>
<td>telephone lines</td>
<td>mobile cellular subscribers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>fixed broadband subscribers</td>
<td>Internet bandwidth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>proportion of household with</td>
<td>mobile network coverage rate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>internet access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>policy and regulation</td>
<td>e-Government strategies</td>
<td>government spending on IT</td>
<td>EIU, WEF, Internet Data Center</td>
</tr>
<tr>
<td></td>
<td>government technology neutrality</td>
<td>Internet &amp; telephony competition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>status of national cybercrime</td>
<td>intellectual property protection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>laws relating to ICT</td>
<td>status of national data privacy and anti-spam laws</td>
<td></td>
</tr>
<tr>
<td>human capital</td>
<td>adult literacy</td>
<td>gross enrollment</td>
<td>UNESCOWolrd Bank</td>
</tr>
<tr>
<td></td>
<td>employment in IT</td>
<td>quality of technology skills</td>
<td></td>
</tr>
<tr>
<td>administrative organization and management</td>
<td>management optimization</td>
<td>introduction to CIO</td>
<td>WASEDA University</td>
</tr>
<tr>
<td>types and functions of online services</td>
<td>contents</td>
<td>security &amp; privacy</td>
<td>UN, WEF, ITU</td>
</tr>
<tr>
<td></td>
<td>online services / website function</td>
<td>applications such as the administrative ERP</td>
<td></td>
</tr>
<tr>
<td>e-participation</td>
<td>e-information</td>
<td>e-consultation</td>
<td>UN</td>
</tr>
<tr>
<td></td>
<td>e-decision making</td>
<td></td>
<td></td>
</tr>
<tr>
<td>economic and social impacts of e-Government</td>
<td>impact of ICT on access to basic services</td>
<td>ICT use &amp; govt' efficiency</td>
<td>WEF</td>
</tr>
<tr>
<td>cost and affordability of e-Government</td>
<td>fixed telephone tariff</td>
<td>mobile cellular tariffs</td>
<td>ITU</td>
</tr>
<tr>
<td></td>
<td>fixed broadband Internet tariffs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As the largest university-based e-Government research center, CTG develops various projects on partnerships with international government agencies, technology companies, and academic scholars. Six major research themes of CTG are: (1) open government, (2) e-records, (3) enabling e-Government, (4) IT investment, (5) collaboration & integration, and (6) strategic use of information (CTG, 2012); Since 2000, Center for the Digital Future mainly focuses on: (1) World Internet Project, a research exploring the social, political and economic impact of the Internet and other new technologies on Internet users and non-users, and (2) Digital Future, a study tracking the way in which technology is changing the social, political and economic fabric of our lives (Center for the Digital Future, 2012); Originally established with support from the National Science Foundation, NCDG now is based at the University of Massachusetts Amherst. NCDG commits itself in institutional analysis of digital government, and policy networks as informational and deliberative structures (NCDG, 2012).

UNU-IIST center for e-Government sets its operation mission as the support in strategic use of technology to transform public organizations working and relationships with their multi-stakeholders in developing countries. It derives and explores nine research fields: (1) e-governance for sustainable development, (2) government information leadership, (3) smart cities, (4) measurement, evaluation, and assessment of e-governance, (5) strategies, alignment and architectures for e-governance, (6) knowledge management and information sharing, (7) models and frameworks development for e-governance, (8) software infrastructure and services for e-governance, and (9) international comparative studies for e-governance (UNU-IIST center for e-Government, 2012); Waseda e-Government research center focuses on ICT applications in diverse society issues. Its research fields encompass: (1) competitive policy, (2) e-Government, (3) international information
and telecommunication policy, (4) ICT industry and CIO, and (5) ICT application for ageing society (Waseda e-Government research center, 2012); Taiwan e-governance research center (TEG), sponsored by the Research, Development and Evaluation Commission, Executive Yuan, is operated by the department of public administration, Chengchi University. TEG’s major research arenas are innovation and development, performance and impact assessment, equal participation, social media and e-Government, cross-boundary governance, and open government (TEG, 2012).

2.3 The topics of international e-Government/e-governance conferences

In addition to examination of e-Government rankings and research fields of distinguished international e-Government centers, we further explore the main topics discussed in several leading international conferences.

The European Ministerial e-Government Conference set a shared user-centric vision of innovation in the public sector that has been at the center of the European policies for e-Government since 2003. European Conference on e-Government (ECEG), held annually by Academic Conferences International, continues the user-centric vision and expands the discussion to other domains (based on the themes of ECEG 2013): (1) applications of e-Government, namely innovative ideas for improving the public service efficiency and effectiveness in various fields, (2) challenges to e-Government, including cyber terrorism, identity management, challenges to e-service take-up, etc., (3) dimensions, frameworks, and strategies of interoperability, (4) e-Government 2.0, involving impacts of web 2.0 in e-Government, citizen empowerment, and open data, (5) e-democracy/e-participation, containing technology-driven democracy, social networks political participation, and citizen trust in online/offline participation, (6) economics for e-Government, and (7) legal, agency, trust and governance issues (ECEG, 2012).

Hawaii International Conference on System Sciences (HICSS), held by University of Hawaii, is a long-standing conference in computer science and information technology, and most recently in e-Government. E-Government issues scheduled to be discussed in HICSS 2013 include (1) infrastructure security, (2) cloud services and interoperability, (3) open government and participation, (4) e-Government education, training and professionalization, (5) policy, governance ethics, and law, (6) social media and social networking, (7) transformational government, etc. (HICSS, 2012). Internet Governance Forum (IGF), established in the mandate of World Summit on the Information Society (WSIS) from UN Secretary-General in 2006, expects itself to bring various stakeholder groups as equals, in discussions on public policy issues relating to the Internet, and to serve as a neutral space for all actors (IGF, 2011). Since 2006 to 2012, the meeting themes include (1) Internet governance for development, (2) managing critical Internet resources, (3) security, openness and privacy, (4) access and diversity, (5) Internet governance, and (6) capacity building (IGF, 2012).

It is clear that discussions in these conferences also overlap in many topics, including opportunities and challenges of e-Government, e-services and interoperability, open government, e-participation, and e-Government 2.0, and issues regarding laws, regulations and governance.

2.4 Public values of e-Government

Moore (1995) first introduces the theory of public value, a normative theory for measuring the success of public services. Despite the prosperous development of ICTs and e-Government, only lately have researchers begun to explore public values of e-governance. The concept of public value is now increasingly becoming the innovative driver in modern e-Government endeavors (Bonina and Cordella, 2008). For example, CTG proposes a public value framework for information technology (Cresswell et al., 2006). The European Commission proposes a conceptual framework for examining the various types of public value of e-Government initiatives. Within the framework, the public value of e-Government is assessed with respect to organization, politics, and end user (eGEP 2006, Heeks 2008). Yu (2008) further classifies e-Government related values into five perspectives: e-Government services, public beneficiaries, government services chain, government internal organization and process, and the society and national environments. Friedland and Gross (2010) categorize public values of e-Government into three notions: operational value (measures of effectiveness and efficiency), political value (the extent of public mission and goals achievement), and social value (time, money, and efforts saved). Particularly, the social values respond to the public value impacts, including economic, political, social, quality of life, ideological, and stewardship (Harrison et al., 2012). Similarly, Karunasena and Deng (2010) propose three public value drivers of e-Government as delivery of quality public services, operating effective
public organizations, and achievement of socially desirable outcomes. These discussions clearly show that public administration aims at producing value for citizens and e-Government is a means to improve the public value (Castelnovo and Simonetta 2007).

3. Methodological approach

The general research strategy has two components. This study first examines a multitude of literature of e-Government performance ranking to identify a list of shared indicators and gathers research reports that highlight e-governance research topics of global significance. The other component is to gain insight from e-governance experts in various countries and sectors. We conduct in-depth interviews with the leaders of various e-governance research centers to gain their insights, and perform an online survey of domestic and international e-governance experts from April to August of 2012.

3.1 In-depth interview

Six e-Government experts we interview include (1) Dr. Charlie Schweik, associate director of NCDG, (2) Dr. Toshio Obi, director of WASEDA e-Government research center, (3) Dr. Jeffrey Cole, director of Center for the Digital Future, (4) Dr. Sharon Dawes, senior researcher of CTG, (5) Dr. Tomasz Janowski, director of UNU-IIST center for e-governance, and (6) Dr. Fengchun Yang, director of academy of e-Government. Most of interviewees emphasize the importance of visionary e-Government research and highlight critical trends in e-governance. Particularly, Obi stresses on the development of ICT for an aging society; and Janowski regards smart cities as the main work for local governments.

The intensive review of literature and document has generated a long list of promising e-governance policy and research topics. The in-depth interviews help us further narrow the list down to seven promising arenas, including (1) institutional innovation (laws, regulations, and governing structure and rules) of electronic governances, (2) quality planning and management of e-Government, (3) performance of e-governance, (4) online citizen participation with cross-sector collaboration, (5) strategic foresight planning of e-governance, (6) globalized/regionalized e-governance, and (7) financing e-Government (budget, pricing, fees, etc.).

3.2 Online-survey

Our survey questionnaire is developed by the amalgamation of interview results and literature discussed in the previous sections, particularly those related to (1) comments on the visionary concepts and developmental strategies of the e-Government, (2) trends and impacts of ICTs on e-governance, and (3) continuous improvement and performance evaluation of e-Government services. The final questionnaire includes two major parts. The first part, in accordance to the seven promising e-governance research arenas, is composed of twenty-two topics as shown in Table 2. The second part contains open-ended questions to allow the respondents to write down other significant topics not included in the first part.

This survey is by invitation only. Thirty-five leading e-governance scholars and practitioners, such as associate director of NCDG, senior researcher of CTG, senior advisor of international council for information technology in government administration (ICA), chairman of Global Mobile Corporation, assistant general manager of department of public affairs, IBM Taiwan, editorial director of FutureGov, director of department of informational management, directorate-general of budget, accounting and statistics, etc., participate in this survey.

4. Research results

The online survey uses five-point Likert-type scale descriptors (“1” = “extremely unimportant” and “5” = “extremely important”) to measure the importance of the twenty-two e-Government topics. To choose highly significant topics, we apply t tests with a null hypothesis that the average score of the respondents’ perceived importance is 3.5, and with an alternative hypothesis that it is greater than 3.5. Table 2 provides aggregate descriptive statistics and gives the level of significance (p value) for each research topic. All topics are significantly important except six topics listed in a descending order of “the influence of international norms/standards over national/domestic e-governance (3.77),” “providing mechanisms for driving and sustaining innovation (3.74),” “financing planning and public-private partnership to finance e-Government (3.66),” “the impact of telecommunication rate policy under digital conversion on e-governance (3.63),”...
“organizational and task design for quality information management (3.63),” and “establishing pricing standards and mechanisms for e-service and e-transaction (3.37).”

Table 2: Statistical results in each research arena and topic (n = 35)

<table>
<thead>
<tr>
<th>Research arena and topic</th>
<th>Mean (s.d.)</th>
<th>p</th>
<th>Mean (s.d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PA Experts</td>
<td></td>
<td>MIS Experts</td>
</tr>
<tr>
<td>Performance of e-Government/ e-governance</td>
<td>4.21 (1st)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish performance indicators that are result-oriented and aligned with public values</td>
<td>4.34* (0.87)</td>
<td>0.000</td>
<td>4.35 (0.75)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.33 (1.05)</td>
</tr>
<tr>
<td>Extend performance indicators to include social impacts</td>
<td>4.00* (0.94)</td>
<td>0.003</td>
<td>4.05 (0.89)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.93 (1.03)</td>
</tr>
<tr>
<td>Implementation of e-Government performance systems and utilization of performance information to continuously improve e-Government policies</td>
<td>4.29* (0.89)</td>
<td>0.000</td>
<td>4.40 (0.68)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.13 (1.13)</td>
</tr>
<tr>
<td>Specify topics that are forward-looking, unique, and possessing comparative advantage</td>
<td>4.21 (1st)</td>
<td>0.001</td>
<td>3.95 (1.10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.33 (0.90)</td>
</tr>
<tr>
<td>Establish/implement foresight mechanisms for e-governance policy</td>
<td>4.11* (1.02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applications of ICTs for national emergency management and for addressing various challenges of aging society</td>
<td>4.29* (0.79)</td>
<td>0.000</td>
<td>4.30 (0.80)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.27 (1.03)</td>
</tr>
<tr>
<td>Creation and integration of national “big” data for advancing public values</td>
<td>4.23* (0.88)</td>
<td>0.000</td>
<td>4.20 (0.77)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.27 (1.03)</td>
</tr>
<tr>
<td>Establish and innovate the institutions (laws, regulations, and governing structure and rules) of electronic governances</td>
<td>4.10 (3rd)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information security, digital/electronic privacy, and information standards.</td>
<td>4.14* (0.91)</td>
<td>0.000</td>
<td>4.00 (0.86)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.33 (0.98)</td>
</tr>
<tr>
<td>Establish e-governance mechanisms that help create/add public values (i.e. transparency, accountability etc.)</td>
<td>4.40* (0.69)</td>
<td>0.000</td>
<td>4.40 (0.60)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.40 (0.83)</td>
</tr>
<tr>
<td>Provide mechanisms for driving and sustaining innovation.</td>
<td>3.74 (0.92)</td>
<td>0.127</td>
<td>3.50 (0.95)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.07 (0.80)</td>
</tr>
<tr>
<td>Online citizen participation with cross-sector collaboration</td>
<td>4.05 (4th)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase online citizen participation and improve democratic governance</td>
<td>3.97* (0.89)</td>
<td>0.004</td>
<td>4.05 (0.89)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.87 (0.92)</td>
</tr>
<tr>
<td>Establish rules, regulations, and mechanisms for citizens and organizations to participate in electronic governance</td>
<td>4.26* (0.89)</td>
<td>0.000</td>
<td>4.45 (0.76)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.00 (1.00)</td>
</tr>
<tr>
<td>Research and promote cutting-edge applications (i.e. based on social media) for online participation and collaboration</td>
<td>3.91* (0.82)</td>
<td>0.005</td>
<td>4.05 (0.83)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.73 (0.80)</td>
</tr>
<tr>
<td>Quality planning and management of e-Government</td>
<td>4.04 (5th)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational and task design for quality information management</td>
<td>3.63 (0.88)</td>
<td>0.392</td>
<td>3.40 (0.94)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.93 (0.70)</td>
</tr>
<tr>
<td>Quality management of cross-boundary e-governance</td>
<td>4.46* (0.85)</td>
<td>0.000</td>
<td>4.40 (0.88)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.53 (0.83)</td>
</tr>
<tr>
<td>Rationalization/opimization of personnel, planning, and management across various levels of government</td>
<td>4.00* (0.97)</td>
<td>0.004</td>
<td>3.80 (1.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.27 (0.80)</td>
</tr>
<tr>
<td>Adopt and address emerging management challenges/practices</td>
<td>4.06* (0.97)</td>
<td>0.002</td>
<td>4.10 (1.02)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.00 (0.93)</td>
</tr>
<tr>
<td>Globalized/regionlized e-governance</td>
<td>3.88 (6th)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The influence of international norms/ standards over national (domestic) e-governance</td>
<td>3.77 (0.91)</td>
<td>0.087</td>
<td>3.70 (0.98)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.87 (0.83)</td>
</tr>
<tr>
<td>International cooperation on creating and sharing telecommunication/ internet resources</td>
<td>3.89* (0.76)</td>
<td>0.005</td>
<td>3.70 (0.73)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.13 (0.74)</td>
</tr>
<tr>
<td>Sustain exchange and collaboration with international e-governance organizations</td>
<td>3.97* (0.86)</td>
<td>0.003</td>
<td>4.05 (0.89)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.87 (0.83)</td>
</tr>
<tr>
<td>Financing e-Government (budget, pricing, fees, etc.)</td>
<td>3.55 (7th)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The top six important topics are (1) quality management of cross-boundary e-governance (4.46), (2) e-governance mechanisms to help create/add public values (4.40), (3) development of performance indicators that are result-oriented and aligned with public values (4.34), (4) implementation of e-Government performance systems and utilization of performance information to continuously improve e-Government policies (4.29), (5) applications of information and communication technologies national emergency management and for addressing various challenges of aging society (4.29), and (6) creation and integration of national “big” data for advancing public values (4.23) (see Table 2). We also aggregate the scores of individual topics and identify the top three e-governance research arenas: “performance of e-Government/e-governance (4.21),” “specify topics that are forward-looking, unique, and possessing comparative advantage (4.21),” and “establishing and innovating the institutions (laws, regulations, and governing structure and rules) of electronic governance (4.10).” Our respondents compose two types of experts, i.e., scholars and practitioners with public administration background (PA background) and those with information technology and management background (MIS background). We utilize t-test to determine whether there is statistically significant difference among them. The results indicate that none of the topic importance is significantly different for these two types of experts. However, it is worth mentioning that administration-savvy experts make higher evaluations than technology-savvy experts on topics of “performance of e-Government” and “online citizen participation with cross-sector collaboration” arenas. As for findings from the open-ended questions, important e-governance topics proposed include performance indicators that are result-oriented and aligned with public values, collaboration with international e-governance organizations, provision of public data sets, tools, and education, alleviation of internet addiction, joined cloud partnership, etc.

5. Discussions and conclusions

In this paper, we review diverse literature (including international reports, research fields in prestigious research centers, and international conference themes), and interview leading e-governance scholars and practitioners to identify important future e-governance policy/research topics. According to the preliminary efforts, we first mark out seven promising e-governance research arenas with twenty-two supplementary topics. We further conduct an online expert survey to narrow these topics down to six most important ones: “quality management of cross-boundary e-governance,” “e-governance mechanisms to help create/add public values,” “development of performance indicators that are result-oriented and aligned with public values,” “implementation of e-Government performance systems and utilization of performance information to continuously improve e-Government policies,” “applications of information and communication technologies national emergency management and for addressing various challenges of aging society,” and “creation and integration of national “big” data for advancing public values.” The results imply that public values are the future directions of e-governance. Most importantly, the optimal goal of e-Government/e-governance is to pursue or create more public values that will bring varieties of utility for multi-stakeholders, and also take social equity into account. As a result, we re-classify the seven arenas into three research foci to connect e-governance with public values. The first focus is e-governance performance and innovation, namely, public value driven e-governance innovation, implementation, and performance evaluation. The second one is citizen participation and collaboration between stakeholders for transforming e-governance institutions to enable cross-boundary collaboration and develop rules and regulations for effective citizen online participation. The third one is visionary and competitive e-governance in a globalized or regionalized context, including the pursuit of research topics with unique domestic features and global relevance such as emergency management and aging society. Despite all the care given to this study, there are several limitations that should be noted in any future research. Firstly, there is space to improve the diversity of online survey sample. Except the senior advisor of ICA, most of our respondents are scholars and practitioners from Asia and the US.
We are lack of expert from Europe where governments continuously employ e-governance programs for sustainable development. It is therefore recommended that further research collects global insights as widespread as possible. Secondly, this paper only investigates “what” are the important e-governance issues for future research without examining “how” to carry out these potential issues. Further research is necessary to improve our understandings of these details.

References

Center for the Digital Future (2012) [online], http://www.digitalcenter.org
Center for Technology in Government (2012) [online], http://www.ctg.albany.edu
Hawaii International Conference on System Sciences (2012) [online], http://www.hicss.hawaii.edu/hicss_45/apahome45.htm
IGF Internet Governance Forum (2012) [online], http://www.intgovforum.org/cms/
National Center for Digital Government (2012) [online], http://www.umass.edu/digitalcenter/
Taiwan e-governance research center (2012) [online], http://www.teg.org.tw/index.do
UNU-ISTI Center for Electronic Governance (2012) [online], http://egov.ist.unu.edu
Open Data and Personal Information: A Smart Disclosure Approach Based on OAuth 2.0

Giuseppe Ciaccio, Antonio Pastorino and Marina Ribaudo
DIBRIS, Università di Genova, Italy
giuseppe.ciaccio@unige.it
antonio.pastorino@gmail.com
marina.ribaudo@unige.it

Abstract: Currently, public administration is undergoing significant transformations, driven by a greater demand for transparency and efficiency in a participative framework involving nonprofit organizations, enterprises, and citizens, with the modern network infrastructure as a common medium. The Open Data movement is considered one of the keys to this change. To the best of our knowledge, the current generation of Open Data has to date provided only static datasets in which no data concerning specific individuals could be included, due to obvious privacy issues. Public administrations hold a great deal of data of a personal kind, as do many private entities. Consider, for instance, the huge amount of personal data contributed to the various online social networks, or the electricity consumption data collected and stored by energy providers, or the telephone and internet data collected by telecommunications companies. The lack of such personal data in the Open Data realm, and the static nature of the released datasets, are weaknesses of the current generation of Open Data. Without personal data and without timeliness, it is impossible to build useful services tailored to the actual needs of a given individual at a given time. We argue that, by segregating or “protecting” our personal data, those public and private entities become the “owners” of our data. This means they hold a monopoly on services, while we, the legitimate owners of the data, must abide by their terms and conditions concerning how our data are treated and used. By unleashing personal data “into the wild”, such a monopoly would collapse and a new ecosystem of personal services based on these data could flourish. Of course nobody wants personal data to enter the public domain without any control. We argue that an appropriate policy for online disclosure of personal data is one where the individuals are restored to their role of “data owners” and are allowed to exert online control over data accesses being performed by third parties. This idea of “smart disclosure” of personal data is expected to be one of the forthcoming evolutions of Open Data. Based on the above arguments, we propose a possible implementation of “smart disclosure” that takes advantage of the OAuth 2.0 authorization framework. If properly implemented, OAuth 2.0 guarantees access to selected personal data upon authorization by the individual data owner. An implementation is presented together with possible use cases.

Keywords: open data, smart disclosure, OAuth

1. Introduction and motivation

The Memorandum on Transparency and Open Government signed by the US president Barack Obama (Obama 2009) has fostered a new era for the public sector in which transparency, participation, collaboration and, ultimately, Open Government should become central in the democratic decision process. Administrations should become more transparent and promote the use of new technologies to ensure that the data they routinely produce and manage are made available online so that they can be leveraged by any party: enterprises, private citizens, public entities, and other branches of the public administration. This document marked the official onset of the so called Open Data movement.

Shortly afterwards, several public administrations in the USA and UK started releasing massive amounts of Open Data in the form of aggregated datasets made available on their websites. The first catalog of Open Data was published in May 2009 by the US Government (http://data.gov), followed by the UK (http://data.gov.uk). The British Government is now at the forefront in Europe, engaging in an unparalleled effort towards widespread adoption of the Open Data paradigm.

Quoting (UK Government Cabinet Office 2012), “Data is the 21st century’s new raw material”: by means of handheld devices, social networks, cash dispensers, credit cards, people are directly or indirectly generating an unprecedented volume of data that is deemed to transform our very lives (Hoffman 2012).

The current wave of Open Data released by public administrations is largely made of formatted datasets of a static nature, i.e., they will not reflect changes occurring after the release date. Diverse fields are involved: politics, traffic, local transportation, tourism and culture, the environment, healthcare and welfare, cartography, and many others. Such datasets are roughly of two kinds, namely: aggregated and anonymized data (e.g. number of children in each school of the region); and identification data of public entities (e.g.
names and addresses of restaurants in the region). No data concerning individuals have been released because of obvious privacy reasons. As already stated in a position paper of ours (Ciaccio 2012), such a lack of personal data in the Open Data realm, along with the static nature of the released datasets, are weaknesses of the current wave of Open Data. Without personal data and without timeliness, it is indeed impossible to build useful services tailored to the actual needs of a given individual at a given time.

Many of the data managed by public administrations as well as private entities are of a personal kind. Consider, for instance, the huge amount of personal data contributed to the various online social networks, or the electric consumption data collected and stored by energy providers, or the telephone and internet data collected by telecommunications companies. As these data are not in the Open Data domain, those public and private entities may act as the “owners” of our data. This means they hold a monopoly on services while we, the legitimate owners of the data, must abide by their terms and conditions concerning how our data are treated and used.

By unleashing personal data “into the wild”, such a monopoly would collapse and a new ecosystem of personal services based on these data could flourish. In such a scenario, the various administrations holding our data are responsible for ensuring data authenticity and integrity, preventing any unauthorized access, yet allowing what is called a smart disclosure of personal data to the web.

The importance of personal data as an economic asset on its own is now being acknowledged worldwide (Schwab 2011), along with the need to strengthen trust by people in the possible process of smart disclosure to be undertaken by public administrations (Hoffman 2012). Smart disclosure of personal data is considered a forthcoming process capable of “enormous economic and civic good opportunities” (Howard 2012). A recent white paper from the UK Government (UK Government Cabinet Office 2012) stresses the importance of smart disclosure as an enhancement of the current Open Data movement. The ‘midata’ initiative by the UK Government (www.bis.gov.uk/news/topstories/2011/Nov/midata) and the Smart Disclosure initiative by the White House (www.whitehouse.gov/blog/2012/03/30/informing-consumers-through-smart-disclosure) are two programs aimed at promoting smart disclosure of customer’s personal data held by companies and providers, so as to allow people to make better choices.

It might be argued that adding personal data to the Open Data heap might jeopardize our privacy, if done in the wrong way. However, this risk is also present with the current process of releasing massive anonymized datasets. By definition, these datasets leak personal information, and information from many datasets may be jointly mined in search of individual profiles. The inferred profiles may sometimes be linked to real identities, leading to statistical de-anonymization or “identity disclosure through mosaic effect” (Hoffman 2012). The whole Open Data movement would immediately come to an end, should these confidentiality concerns prevail over the individual and social benefits of transparency and smart disclosure. A balance between privacy and transparency must clearly be sought, with the information technology playing a key role.

Another criticism is that, once disclosed and no matter how “smartly” this is done, our personal data might be copied somewhere else and we, the legitimate owners, would no longer be able to exert control over the copies. But this indeed holds without disclosure as well, as we currently have no choice but to trust the entity that stores and “owns” our data, without any actual control by us. In addition, due to the lack of smart disclosure, we are forced to input our personal information by hand every time we register for a new online service (and abide by their terms and conditions). It would be much easier to refer to a single master copy of our personal data, either centrally stored or scattered across servers in a distributed system, and smartly disclose them to third parties after obtaining their formal commitment online to our terms and conditions (for instance, prohibiting unauthorized distribution of copies).

Last but not least, a proper technology for a “sufficiently smart” disclosure of data remains to be identified, along with a number of practical use cases working as an informal definition of what a smart disclosure is. In this paper we propose a few such use cases, and we advocate the use of the OAuth 2.0 authorization framework (OAuth Working Group 2010) to achieve smart disclosure. On the basis of this approach, individuals are restored to their role of resource owners while administrations (public or private ones) are stripped of their de-facto ownership of personal data and keep a role of bare resource managers. A resource owner (namely, an individual) may grant online authorization to any third party application to use a given item of personal data located on a given resource manager, in exchange for a useful personalized online service that the application
is expected to provide using that data item. The process of granting authorization is based on unforgeable cryptographic tokens released by a trusted authorization server with which individuals, applications, and resource managers, are all registered.

2. Smart disclosure stories

The Department for Business Innovation & Skills in the UK has launched the ‘midata’ project (www.bis.gov.uk/news/topstories/2011/Nov/midata) which aims to give consumers more control and access to their personal data. The program involves various business sectors including energy, telecommunications, finance and retail. By letting customers access data about their purchasing and consumption habits, and safely add new data and feedback of their own, businesses have the opportunity to create rich, new person-centric applications while consumers can make better consumption decisions and lifestyle choices.

The next two examples are related to the medical context. In the private sector, Microsoft has proposed the HealthVault (www.microsoft.com/en-gb/healthvault/default.aspx) as “a trusted place for people to organize, store, and share health information online”. According to the HealthVault website, Microsoft offers an open platform for security enhanced data sharing amongst health services organizations and citizens. Any information entered into HealthVault can be, with the citizen’s permission, re-used across many different apps and supplemented by a growing list of devices.

An interesting success story is the project known as the Blue Button (www.bluebutton.com). Developed in collaboration with the US Department of Veteran Affairs (VA), the project allows veterans to go to the VA website, click a blue button, and download their personal health records. These records can be individually examined or shared for example with doctors or with third parties applications. The Blue Button download capability can help individuals access their information so they can manage their health care more effectively.

Another successful initiative is the Green Button project (www.greenbuttondata.org), similar to ‘midata’, and part of the White House’s Smart Disclosure Program. Thanks to this program, consumers in the US can access and download their energy usage information provided by their utility or retail energy service provider, take advantage of online services and apps, and manage their energy consumption. From the scarce information we were able to retrieve (Wollman nd), it seems that the service leverages Apache Wink (incubator.apache.org/wink/) for exporting data in a RESTful way via the Atom Publishing protocol (IETF 2007), plus Spring Social (www.springframework.org/spring-social) as the authorization framework for user-controlled smart disclosure. Spring Social leverages the OAuth 2.0 (IETF 2012 b), so the overall picture is similar to the one we provide in this paper.

Falcão-Reis and Correia (Falcão-Reis 2010) propose coupling Electronic Health Records (EHRs) with an extended version of OpenID (Recordon 2006) in an effort to implement a user-controlled system of Health Digital Identity for Portuguese citizens. They also propose leveraging OAuth 2.0 as an authorization technology for user-controlled access to EHRs, thus anticipating smart disclosure in the medical care field.

In all these examples, the recurring theme is that the wealth of personal data contained in medical records, telephone or energy usage reports, or other information sources, present a unique opportunity for software developers to build applications that can truly transform how individuals interact with their data to stay healthy and manage their care, to save energy and therefore money, in other words to improve several aspects of their everyday life.

3. OAuth 2.0

3.1 Goals and current status

OAuth 2.0 (OAUTH Working Group 2010, IETF 2012 b, Hammer-Lahav 2010) originated in 2010 from a complete redesign of the previous OAuth 1.0 specification. OAuth 2.0 is too high-level to be defined as a protocol specification. It should be considered as a blueprint of a protocol, within which many implementations are feasible, although possibly not interoperable with one another. The interest around this technology is huge: the IETF OAuth working group includes members like Google, Facebook, Microsoft, Twitter, Deutsche Telekom, and Mozilla (Hammer-Lahav 2010), and OAuth 2.0 has already been adopted by Google (Google Inc. 2012), and Facebook (Facebook 2012), just to cite a few.
OAuth stems from a typical Web 2.0 use case with online social networks. Suppose a third party client application is offering a user a personalized service making use of that user’s personal features provided by a social network (e.g. pictures, contact list, posting a comment) via a RESTful API. The naive approach of requiring users to release their credentials (username and password) to the third party client so that the latter could get those features from the social network is highly risky. A more appropriate solution is to release cryptographic proof of authorization, issued by the user (at least in principle) to the third party application, and to let the latter subsequently spend such authorization proof at the social network API in order to get the required features. In addition, the authorization proof may work as a form of user authentication whenever it grants access to user identification data stored in the social network or elsewhere.

Abstractly, OAuth 2.0 identifies four actors exchanging information in an ordered way (Figure 1). These actors are the client application or just “client”, the resource owner or “owner” for short (or “user” when human), an authorization server (AS, the trusted entity), and one or more resource servers (RS) hosting data or services to be smartly disclosed. The AS and the various RSs may each belong to a distinct administration domain, but this is not mandatory.

![Diagram of OAuth 2.0 protocol](image)

**Figure 1**: OAuth 2.0 abstract protocol, with the four OAuth 2.0 actors (client application, resource owner, authorization server, and resource server) and their interplay. Actions are ordered by increasing number

The protocol is started by the client asking for authorization to access a given resource (e.g. a set of personal data), subject to a set of constraints called scope (e.g. read vs. write access to specific fields of personal data during a specified time window). The resource owner is shown the request and, if they agree with the scope, they may yield an authorization grant bound to the resource and scope. Such a grant is then exhibited by the client to the AS, which validates it and returns an access token valid for the required resource at a specific RS subject to the scope. The client finally passes the access token to the given RS along with the resource request; upon token validation and scope verification, the RS returns the resource to the client.

In practice, the authorization grant can be obtained in four possible ways. These four ways are called flows in OAuth jargon (IETF could not call them “protocols” due to the many details that are omitted or left undefined), and are nothing but instantiations of the abstract protocol scheme discussed above. Due to a lack of space we herein only describe the first and most important of the flows; anyone who may be interested is advised to consult the IETF specifications (IETF 2012 b) or our technical report (Ciaccio 2013).

In such flow the grant is obtained indirectly, with the AS acting as an intermediary under the control of the resource owner. The flow is depicted in Figure 2. With this flow, the client is typically (but not necessarily) a web application on a remote server, and the resource owner is typically (but not necessarily) a human with a browser initially pointed to the web application. The grant is represented by an authorization code issued by
the AS after obtaining consent from the resource owner, and is delivered to the client through the browser of the resource owner via HTTP redirection (see the Figure).

In the current IETF draft, TLS protection is not required when the AS redirects the browser to the client after the authorization step; in other words, it is legal for the client redirection URI (Figure 2) to be an HTTP endpoint of the web application instead of an HTTPS one. On the one hand, this shortcoming is meant to cover client applications that are unable or unwilling to provide TLS endpoints (due to lack of resources, for instance). On the other hand, an authorization code sent to a non-TLS endpoint is transmitted in plain text and could therefore easily be eavesdropped. The stolen authorization code could then be used by an attacker client to obtain an access token from the AS. But if the client application has a persistent identity registered at the AS, that is, it shares a secret with the AS and can prove that it holds it (a “confidential” client, in the OAuth jargon), then the AS will prompt the client application to authenticate before converting the authorization code into an access token, thereby preventing the use of stolen authorization codes. As an additional security measure, the access token itself may be bound to the specific client identity (a so called “proof token” (IETF 2012 a), as opposed to an anonymous “bearer token”). In contrast, if the client does not hold a secure and persistent secret registered with the AS (a so called “public” client) then the flow is insecure, unless the client redirection URI is an HTTPS endpoint.

A security analysis of OAuth 2.0 is beyond the scope of this paper, and can be found in a dedicated IETF draft (IETF 2012 a).

![Figure 2: OAuth 2.0 authorization code flow, for web applications. The “?” denotes an HTTP GET parameter](image)

From the above it is reasonable to deduce that resource owners (users), clients, and RSs should establish a relation with the AS before engaging in any OAuth 2.0 protocols. The current IETF draft explicitly leaves out of scope (but does not forbid) any interaction between an RS and the AS, and seemingly ignores the registration of resource owners, although this is indeed a necessary step if the AS is to issue authorization grants on their behalf. Only client registration to AS is explicitly mentioned in the IETF draft. After registration, the client is given a unique identifier that is valid at the AS.
4. Use cases

This section introduces two possible use cases that show what a smart disclosure is and how to obtain it using OAuth 2.0. For each use case we first informally sketch the problem, then we discuss how OAuth 2.0 could improve current solutions and present aspects which are challenging to the current OAuth 2.0 flows.

4.1 Medical use case

This trivial use case is also found in the work by Falcão-Reis and Correia (Falcão-Reis 2010), although they failed to mention some potential challenges arising from it.

Scenario. Alice needs professional medical care and asks for advice; a friend recommends Dr. John Smith. Alice makes an appointment and takes all the medical certificates she can find at home with her. She then summarizes her medical history, presents her problem and listens to the doctor’s response.

How OAuth 2.0 could help. In many countries, health records are still predominantly paper records, given to patients after medical examinations. Patients’ data are stored in local databases managed by various laboratories, hospitals, or other health care settings, all of which may be using different technologies and data representation that do not usually interoperate; storing data as PDF files is a common practice. Health information is therefore scattered across many places, and accessing the medical history of an individual is a complex task. A possible solution requires the adoption of a machine-readable representation of medical data, along with the definition of an architecture for retrieving and merging records spread over several databases. In the medical context, standard data representations do exist, for instance the HL7 Clinical Document Architecture, a document markup standard that specifies the structure and semantics of clinical documents for the purpose of exchange. OAuth 2.0 could be the enabling technology of this architecture if adopted to get authorization grants across different resource servers (the different medical databases). The use of OAuth 2.0 does not require centralizing data into a single repository: data are kept where they have been produced and are accessed upon authorization by the owner.

Figure 3 shows Alice and Dr. Smith. In order to know Alice’s medical history, Dr. Smith uses a web application that connects to the distinct databases of hospitals that provide online health data upon verification of access tokens (resource servers Hospital1, Hospital2, ..., in the picture).

Figure 3: Dealing with distributed health data via OAuth 2.0

Alice is in front of the doctor, so she can give online consent to access her personal resources (arrows numbered 1 and 2) by interacting with the web application being used by the doctor. After receiving an authorization grant, the web application applies for an access token (arrows 3 and 4) which is subsequently used to collect Alice’s data stored within the resource servers (arrows 5 and 6), thus building a view of Alice’s
medical history without resorting to any paper document and, perhaps more importantly, without missing any of Alice's medical records.

**Challenges.** Alice might not want to show all of her medical records to the doctor. Some illnesses, like HIV infection for instance, pose serious privacy concerns and might not be significant for the specific disease Alice is asking advice for. Scopes in OAuth 2.0 allow to specify which fields in a generic record can be accessed and which cannot, but they are not able to discriminate among distinct instances of the same field in distinct records. A workaround might be to have a specific field for privacy-sensitive information and letting the user decide whether to authorize disclosure of those sensitive fields or not.

In a different scenario, Alice might not be able to give authorization, perhaps because she is unconscious, due for example to a car accident. In this case, there must be another entity which has enough privileges to give authorization without being the data owner. This entity might be the head physician or a close relative of Alice's, and currently this scenario is not explicitly covered by OAuth 2.0, which contemplates a single owner for each data item.

In the medical context it is also very important to have access to aggregated and anonymized datasets for different purposes, for instance to perform statistical analysis for a given disease or to compare the performance of different hospitals. This release of large anonymized datasets is not covered by the current OAuth 2.0 flows which indeed grant access to specific records of an individual user. We will briefly discuss these points in Section 5.

**4.2 Tax payment**

**Scenario.** Bob needs to fill in his annual tax return. As usual, he visits his business accountant bringing lots of pieces of paper: his annual salary, medical expenses, documents concerning his properties, other expenses he can deduct from his income, and so on. The other possibility is to use a web application provided by the government and fill in an online form by manually copying all the data printed into the various paper documents.

**How OAuth 2.0 could help.** Figure 4 shows Bob in front of an innovative online service. He still has access to a web application to fill in the online form for his annual tax payment. This year, however, most of Bob's income information comes directly from various remote databases where it is scattered, upon a simple online authorization by Bob himself. Filling in the form is simpler, quicker and less prone to mistakes.

![Figure 4: Tax payment via OAuth 2.0](image)

Bob is the owner of the data. He applies for the authorization grant (arrows 1 and 2) so that the web application he is connected to can directly access his restricted access resources stored in different databases (the Employer Registry, the Estate Registry, the Medical Expenses Registry shown in the figure). He then fills in the form adding only data that could not be obtained via online third parties.
**Giuseppe Ciaccio, Antonio Pastorino and Marina Ribaudo**

**Challenges.** Even in this case, we can identify entities that might need to access data without being the owners. Consider for instance the Judiciary or the Inland Revenue Office in case of lawsuits related to tax evasion. Moreover, the release of aggregated data is desirable for statistical purposes in this use case too.

In this scenario there is also another subtle point. The same resource, for instance a receipt of payment, involves two people. For example the receipt for plumbing work carried out in an apartment involves the plumber who did the work and received the money, and the owner of the apartment who paid for the work. For the former the resource represents income, while for the latter it is an expense; there is only one resource but it has two distinct resource owners. How to deal with resources of this type is not explicitly specified by OAuth 2.0 (see Section 5).

**5. Work in progress**

In this paper we have made a case for releasing personal data in the Open Data domain by following a smart disclosure approach, and have proposed the use of the OAuth 2.0 authorization framework to this end. If properly implemented, OAuth 2.0 guarantees access to selected personal data upon authorization by the individual data owner.

Currently we have a working implementation of the OAuth 2.0 authorization server that we have called **OAuthwo**. OAuthwo is a free and modular PHP implementation of OAuth 2.0 based on the current IETF draft specification. OAuthwo is free software, written in PHP as a Zend (framework.zend.com) module and available for download at GitHub (github.com/andou/oauthwo_zend/). Details can be found in our technical report (Ciaccio 2013). OAuthwo will allow us to implement proof-of-concept smart disclosure systems supporting a number of interesting use cases that leverage personal data securely disclosed as Open Data.

One challenge has to do with single resources owned by multiple users. OAuth 2.0 seems at odds with such a setting. As illustrated in the medical use case, the life of an unconscious patient might depend upon the rescuing physicians being able to access that patient’s online medical record, yet the resource owner (the patient) would be unable to provide consent. One possible solution is to allow multiple owners, and then asynchronously warn each of the owners when one of them is granting authorization for their common resources. In some cases the set of owners is static (e.g. the plumber and the householder in the receipt for plumbing work, the citizen and the Judiciary in all tax-related data), but in other cases it is not (e.g. the unconscious patient after an accident and the physicians involved in the rescue). This whole point needs investigation.

Another challenge is related to anonymized datasets. OAuth 2.0 lacks mechanisms for defining what is an anonymized version of a resource. It is unclear when and how a resource owner could authorize access to anonymized resources, and it is also unclear whether or not the resource owner should be able to exert ownership at all over anonymized versions of their data. In any case, authorization should be given ahead of time since the aggregation of anonymized data might take place at any time in the future and even repeatedly. The aggregation procedure itself might need special primitives for bulk verification of authorization grants, since verification on an individual basis would be highly inefficient when extracting a large anonymized dataset.

**References**


Facebook (2012) Facebook login – Facebook Developers, [online], developers.facebook.com/docs/concepts/login/


Google Inc. (2012) Using OAuth 2.0 to Access Google APIs, [online], developers.google.com/accounts/docs/OAuth2


Giuseppe Ciaccio, Antonio Pastorino and Marina Ribaudo

IETF (2012 a) OAuth 2.0 Threat Model and Security Considerations, [online], tools.ietf.org/html/draft-ietf-oauth-v2-threatmodel-07
OAuth Working Group (2010) OAuth 2.0, [online], oauth.net/2/
Obama, B. (2009) Transparency and Open Government, [online],
   www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment
Schwab, K. et al. (2011) Personal Data Ownership: The Emergence of a New Asset Class, [online], World Economic Forum,
   www.cabinetoffice.gov.uk/resource-library/open-data-white-paper-unleashing-potential
Wollman, D. (nd) NIST Green Button Presentation, [online], energy.gov/downloads/nist-green-button-presentation

Michaelene Cox
Department of Political Science, Illinois State University, Normal, Illinois, USA
mcox@ilstu.edu

Abstract: Most theoretical literature examining the potential for Information Technology (IT) to advance democratic values, such as transparency and accountability, routinely touts the benefits of e-Government. Empirical studies, however, are divided on the significance of e-Government as an anti-corruption strategy. Most statistical analyses estimate this impact at the cross-national level and findings generally point to considerable disparity among developed and developing countries. This reaffirms conventional wisdom that multiple forces are at work when it comes to assessing drivers and effects of political corruption. The literature also includes a small but growing number of case studies which provide rich insight into the phenomenon at the national level. Nearly all of these examine the relationship between e-Government and corruption in developing countries. Here I seek to supplement this body by examining a narrowed aspect of the topic from U.S. state-level experiences. Specifically, this paper takes into account that one of the value-added services provided by IT is in the training of public servants. G2E generates a variety of electronic educational programs for government employees, including ethics training. The U.S. Office of Government Ethics and a number of state ethics commission offices have implemented these programs, many of them mandated and with certificates issued upon successful completion. While there is some scholarly attention paid to the impact that corporate ethics training has on corruption, critical attention has not yet turned to these G2E programs. I argue that G2E ethics training is positioned to uniquely reinforce institutional and personal norms about integrity and fairness, and may offer one valuable tool for combatting government malfeasance. This paper addresses the following three questions: (1) Is e-Government state capability, especially in respect to employee training, statistically related to state corruption levels? (2) What are the institutional origins and rationales for G2E delivery of ethics training programs, and their pedagogical goals, structure and content? (3) What are implications of G2E ethics training in the U.S., and finally, how is this case study relevant to public administration in other countries?

Keywords: ethics training, public corruption, G2E, U.S. domestic policy

1. A primer on U.S. political corruption

Corruption remains a provocative and ubiquitous facet of political and economic life. Although it is certainly not a new phenomenon, within the past few decades corruption has generated considerable scholarly research on its causes and effects. A voluminous body of literature now routinely touts the domestic and global benefits of curbing government malfeasance in order to minimize its detrimental effects on economic growth, government stability, and societal well-being. The effectiveness of anti-corruption policy measures is also becoming more heavily scrutinized (Rose-Ackerman 1978, Meier and Holbrook 1992, Hill 2003). Political corruption remains central to public policy debates about quality of democratic governance, economic development, and international relations in nearly all countries. The U.S. State Department, for example, stresses that fighting corruption is now a high priority in American foreign policy, and to bring home that point Secretary of State Hillary Clinton recently announced that G20 leaders have adopted a major plan to combat both public and private sector corruption and declared December 9 as International Anti-Corruption Day (Clinton 2010). The new campaign revitalizes the decades-old and fairly ineffectual Foreign Corrupt Practices Act, and together with highly publicized and high-dollar plea bargain settlements of late, illustrates more resources being channeled to the U.S. Department of Justice to enforce anti-corruption strategies abroad and at home.

Corruption is unquestionably a matter of growing import to U.S. domestic policy. For instance, a Gallup poll conducted during the 2012 election year finds that second to job creation, Americans overwhelmingly rank reducing corruption in federal government as a priority for their next president to address. The survey indicates that fighting political corruption is more important to citizens than dealing with terrorism, Social Security, education, health care and environmental concerns (Jones 2012). How corrupt is America? Although the U.S. consistently scores well above average on cross-national corruption perceptions indices produced annually by Transparency International, it generally ranks lower than other OECD countries. Last year, for example, the U.S. scored 73 out of a possible 100 points for least perceived public sector corruption, and was ranked 19 among 174 countries (Transparency International 2012). Yet the extent and variability of public
corruption within the U.S. remains controversial, in part because of the various methods by which it is defined and measured.

There is not a universally accepted definition of political corruption, primarily because the concept is subject to different interpretations. Observers often remark that search for a precise definition of corruption compares to the exhausting and futile pursuit of the Holy Grail. By its very nature corruption is secretive, and thus all incidences are not observable or reported. One observer notes that, “if corruption could be measured, it could probably be eliminated” (Tanzi 1998, 580). Another quips that, “Like pornography, corruption is difficult to quantify, but you know it when you see it” (Wei 1999, 4). This elusive enterprise to precisely define corruption marks one of the difficulties facing U.S. legislators working to craft domestic reform initiatives at the federal, state and local levels. Although there are already more than 20 federal statutes alone to address corruption by government officials, last year both the U.S. House and Senate proposed new bills to further refine and tighten the definition, monitoring, prosecution and criminal penalties for such activities. S.995 Public Officials Accountability Act and H.R. 2572 Clean Up Government Act of 2011 are designed to amend federal criminal code Title 18. Lively discussion emerged in the House subcommittee about how to categorize acts that appeared to fall outside of sharp lines, with concern that aggressive prosecutors would overlook extenuating circumstances or that public officials would be unnecessarily hampered in legitimately fulfilling their duties. Although committee members agreed that intent and disclosure were critical elements to consider in weighing the illegality of an act, one of the authors of the proposal noted that “the whole purpose of this bill is to try to have very clear definitions, so that public officials know what is a violation and what isn’t. And I’m afraid that...witnesses today indicate that there isn’t any agreement on what is a violation and what isn’t” (U.S. House of Representatives 2011).

The difficulties in defining public corruption also challenge academic researchers but despite shortcomings found in any single interpretation of the concept, most studies generally converge upon one serviceable definition. The intentional abuse of public office for private gain is the most widely used and straightforward definition of corruption, and includes illegal acts such as fraud, bribery, embezzlement, extortion, graft, kickbacks, racketeering, and patronage appointments. Effective U.S. domestic policy to control political avarice necessitates systematic investigation into the extent of and the relative determinants of corruption. Measures of corruption are as controversial and varied as its definition. Researchers might turn to risk assessments of government accountability and ethics such as produced by the Center for Public Integrity, one of the country’s largest non-profit investigative organizations. The Center grades the probity of each U.S. state based on more than a dozen categories such as lobbying disclosure, political financing, internal auditing and ethics enforcement agencies. A report released this year revealed that most states scored poorly on risks of political corruption, with many receiving an F. Although a handful scored a high B, no state earned an A. Counter‐intuitively, most of the highest marks for government integrity go to states with a history of indictments against their officials for corruption such as Connecticut, New Jersey and Illinois (Center for Public Integrity 2012). The watchdog organization notes that the most fertile environments for political corruption to occur are those states without a statewide ethics commission and those that offer little public access to information. It should be remembered, however, that the Center for Public Integrity is not reporting actual or perceived corruption levels in making policy recommendations but considering institutional structures and processes believed to dampen illicit activity. Alternatively, while scholars have found polls of public perceptions helpful in measuring political corruption, to date popular survey-based indices such as Transparency International provide only country-level assessments. Still lacking in studies of U.S. political corruption are adequate data-driven analyses.

Consequently many researchers measure political corruption as the number of public officials convicted on corruption charges (Goel and Nelson 1998, Fisman and Gatti 2000). Undoubtedly, conviction rates reflect enforcement policies and/or quality of the judicial system, and so naturally neither arrests nor convictions mirror undiscovered incidences of corruption. Nevertheless, publicity of such cases goes far to influence public perceptions of corruption, and indeed perceptions matter in driving policy debates. The Public Integrity Section of the Department of Justice (DOJ) maintains a database of federal prosecutions of corrupt public officials in federal, state and local government. The most recent publication of these cases was for 2011 and reports a total of 1,184 officials charged with corruption and 554 awaiting trial in that year alone (DOJ 2012). Since 1976, the District of Columbia and Louisiana hold the highest numbers of convictions for political corruption, with Illinois holding the record when state population is factored in Illinois also is home to one of
the decade’s highest profile cases since its former governor Rod Blagojevich was convicted in 2011 of trying to sell a Senate seat and engaging in bribery and wire fraud.

While the most reliable and handy source of corruption levels by state continues to be drawn from the DOJ, researchers have considered numerous dimensions of political corruption, including economic, historical, geographical, cultural and political factors. Broadly speaking, many influences have a bearing on corrupt activity, but scholars come to some consensus regarding the most significant drivers of corrupt activities, at least at the aggregate-level (Serra 2006, Treisman 2007). For instance, it is now widely recognized that as nations attain greater economic prosperity, the level of corrupt activity goes down. Nevertheless, other aspects remain unclear when exploring determinants of corruption at the state level and among federal and state government officials. Some limited research in the 1980s and 90s about corruption in America suggest that district political cultures, education, state level of political participation, gambling arrests, number of government employees and urban population size are positively related to annual convictions for corruption by state (Johnson 1983, Nice 1983). Empirical analyses on the determinants of U.S. state-level political corruption are growing but have not been altogether systematic. Further, to the best of my knowledge, there are no studies to date gauging the relationship between political corruption and government on-line ethics training.

2. An introduction to G2E ethics training

Most theoretical literature examining the potential for information technology (IT) to advance democratic values, such as transparency and accountability, routinely touts the benefits of e-Government. For instance, it is argued that IT innovations in the delivery of value-added services such as open information, well-defined regulations and website interactive features can enhance awareness, participation and oversight of public administration by citizens, government employees and other stakeholders, and so serve as a check on political malfeasance. Thus increasing risks for detection and opportunity costs, e-Government arguably can curb (in)discretionary behavior of officials and foster public trust and the rule of law. Empirical studies, however, are divided on the significance of e-Government as an anti-corruption strategy. Most statistical analyses estimate this impact at the cross-national level, drawing on annual corruption data from Transparency International and e-Government scores produced by the UN Public Administration Programme or rankings from The Economist Intelligence Unit (Andersen 2009). The findings generally point to considerable disparity on the import of e-Government among developed and developing countries, reaffirming conventional wisdom that multiple forces are at work when it comes to assessing drivers and effects of political corruption. The literature also includes a small but growing number of case studies which provide rich insight into the phenomenon at the national level. Nearly all of these examine the relationship between e-Government and corruption in developing countries, most notably India, Bangladesh and some African states such as Ethiopia. Here I seek to supplement this body of case studies by examining a narrowed aspect of the topic from U.S. state-level experiences.

Specifically, this paper takes into account one of the value-added services provided by IT—ethics training of public servants. There is a marked trend in many countries over the past decade or so for government agencies to use online capabilities to interact with their public employees. This government-to-employees (G2E) electronic interaction is one of five delivery models found in e-Government. Among other things, G2E advances knowledge-sharing and streamlines public administration by providing convenient and less costly access to civil rights laws and information on employee compensation and benefit policies, and the like. G2E also generates a variety of electronic educational programs for federal and state employees, including ethics training. The U.S. Office of Government Ethics and a number of state ethics commission offices have implemented these programs, many of them mandated and with certificates issued upon successful completion. While there is some scholarly attention paid to the impact that corporate ethics training has on corruption, critical attention has not yet turned to these G2E programs. I argue that whether outsourced or administered in-house, G2E ethics training is positioned to effectively reinforce both public and private institutional and personal norms about integrity and fairness, and may offer one valuable tool for combating government malfeasance. This paper addresses the following three questions: (1) Most broadly, is e-Government state capability, especially in respect to employee training, statistically related to state corruption levels? (2) What are the institutional origins and rationales for G2E delivery of ethics training programs, and what are their pedagogical goals, structure and content? (3) What are implications of G2E ethics training in the U.S., and finally, how is this case study relevant to public administration in other countries? With the exception
of simple correlation analyses to address the first research question, this study takes a qualitative approach to evaluate G2E ethics training programs. It draws primarily upon content analysis of sample training programs, federal and state legislation, and an interview. The theoretical framework within which my argument falls is consistent with the principle-agent model to explain the contractual relation between government and the public, and rational choice theory to understand how principals and agents make decisions in terms of economic gains and tradeoffs.

3. Political corruption and G2E ethics training

This paper explores correlations between U.S. state-level corruption and facets of e-Government using bivariate analyses to suggest direction and strength of the relationships. Simple correlations cannot examine causal relationships, but can nevertheless demonstrate if there are grounds for further investigation of e-Government as an anti-corruption strategy. While multivariate regressions suggest direction and strength of the relationships, current data limitations prevent examining causality at this moment. Among other things, tests for causality require data analyzed over a period of time, a shortcoming in assessment now since most states implementing G2E training have only done so recently.

Analyses here include all 50 states in the U.S. and draw upon the most recently available data. I consider two measures of political corruption: number of convictions per state by the DOJ and state scores of corruption risk produced by the Center for Public Integrity. Measures of e-Government include e-Government scores per state provided by the think tank Brookings Institute (West 2008), and e-ethics training reported by the National Conference of State Legislatures (NCSL) Ethics Commission (NCSL 2011). The NCSL is a bipartisan organization that reports on state activities such as available ethics training for state executive and legislative officials and employees. I assign each state branch with a 0 if it offers no ethics training for its elected officials or employees, 1 if it offers classroom or paper ethics training; and 2 if it provides on-line ethics training. For an aggregate score to measure availability of e-ethics training in both branches, I tally those values. Finally, a measure for mandatory ethics training is constructed by assigning the state a 0 if it is not available or is optional, and 1 if ethics training is required by statute and/or rule.

Before assessing any links between corruption and ethics training, it is interesting to briefly consider the extent of those phenomena among states. There were a total of 930 federal public corruption convictions in the U.S. in 2011, according to the DOJ. Table 1 reports the five states with the most and least convictions for political malfeasance that year and five states with the highest and lowest rankings for corruption risk. As noted above, this latter ranking does not indicate actual corruption levels but reflects lack of an ethics commission and/or other institutions deemed effective for monitoring and curbing political corruption, inadequate public access to information, and few other provisions to foster transparency and probity in public administration. In short, a high corruption risk score suggests a fertile environment in which corruption might flourish, and may raise a red flag for more careful scrutiny in the future. The NCSL notes that currently nine states do not have an ethics board or commission: Arizona, Idaho, New Hampshire, New Mexico, North Dakota, South Dakota, Vermont, Virginia, and Wyoming. As seen in Table 1, a third of those states are judged by the Center for Public Integrity to provide the greatest risk for corruption. Although we can take into account changes in conviction rates from year to year that reflect a flurry of related and high-profile prosecutions in various states, overall patterns remain fairly consistent over the past decade or so. This in itself suggests that recent developments in e-Government and e-ethics training programs in some states have not yet dramatically affected federal public conviction rates. Time series analyses are required and might feasibly be conducted within a few years.

Table 2 provides a snapshot of e-Government and ethics training programs, listing states with the most and least capabilities in these matters. The Brookings Institute conducts analyses of nearly 1,500 state government websites to construct an overall state e-Government index score based on features such as publications, audio materials, user fees, disability access, privacy policies and the like, as well as the number of online executable services. Although the zero-to-100 point e-Government index does not specifically take into account online ethical training programs, it serves to illustrate general e-Government capabilities across state executive, legislative and judicial branches. For a closer view at states scoring the highest and lowest e-Government scores, Table 2 also reports the e-Ethics training score assigned to states, with the construction of this measure previously described as a combination of executive and legislative training formats. A score of 0 indicates no training, 1 indicates that in-person training in one of the branches is offered, 2 indicates on-line training offered in one branch, and 4 indicates that on-line ethics training is provided to elected officials and
employees of both branches. It is noteworthy that the e-Ethics training scores are overall lower in states with the lowest e-Government scores, and that three of the five top performers in e-Government provide online ethics training to individuals in both state executive and legislative branches.

**Table 1:** U.S. corruption rates and risk for corruption by state

<table>
<thead>
<tr>
<th>State</th>
<th># Convictions</th>
<th>Corruption risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>88</td>
<td>50</td>
</tr>
<tr>
<td>Maryland</td>
<td>58</td>
<td>49</td>
</tr>
<tr>
<td>Virginia</td>
<td>57</td>
<td>48</td>
</tr>
<tr>
<td>California</td>
<td>52</td>
<td>47</td>
</tr>
<tr>
<td>New York</td>
<td>52</td>
<td>46</td>
</tr>
<tr>
<td>Nebraska</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>North Dakota</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Utah</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Connecticut</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 2:** U.S. e-Government and ethics training scores by state

<table>
<thead>
<tr>
<th>State</th>
<th>e-Gov score</th>
<th>e-Ethics score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delaware</td>
<td>83.7</td>
<td>2</td>
</tr>
<tr>
<td>Georgia</td>
<td>78.3</td>
<td>4</td>
</tr>
<tr>
<td>Florida</td>
<td>77.9</td>
<td>4</td>
</tr>
<tr>
<td>California</td>
<td>70.9</td>
<td>2</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>69.5</td>
<td>4</td>
</tr>
<tr>
<td>Lowest score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawaii</td>
<td>35.8</td>
<td>2</td>
</tr>
<tr>
<td>Wyoming</td>
<td>35.7</td>
<td>0</td>
</tr>
<tr>
<td>Maryland</td>
<td>32.9</td>
<td>4</td>
</tr>
<tr>
<td>New Mexico</td>
<td>32.5</td>
<td>0</td>
</tr>
<tr>
<td>Mississippi</td>
<td>31.1</td>
<td>1</td>
</tr>
</tbody>
</table>

Bivariate correlation coefficients (Pearson’s r) can determine the relationship between various measures of state corruption levels and on-line ethics training, and indicate the magnitude and direction of the association. The closer the correlation is to either +1 or -1, the stronger the correlation. Table 3 reports coefficients and level of statistical significance for two-tailed tests conducted on relevant variables for the 50 U.S. states. Not reported here are the statistically significant coefficient correlations between mandatory training and corruption variables. Mandatory training is positively associated with number of convictions, and negatively associated with corruption risk. The table does illustrate a significant relationship between the number of federal public corruption convictions last year and both state e-Government scores and availability of ethics training online to government officials and employees in the executive and legislative branches. The relationship is positive, meaning that greater numbers of convictions are associated with greater e-Government capabilities and online ethics training. This is not the expected direction. The hypothesis generated by supporters of e-Government is that greater G2E should lower corruption rates. As a reminder, however, while bivariate correlation coefficients presume a linear relationship, we cannot extract a causal statement from the tests. There may be a myriad of explanations for the positive association. For instance, state ethics commissions may develop online training as a response to preexisting high levels of corruption, and without time yet to cultivate a more ethical environment through newly developed training programs, corruption rates remain unaffected. Or, we might posit that ethics training increases employee awareness and willingness to report illicit behavior committed by other government employees, and thus leads to more arrests and convictions. On the other hand, there is a statistical and negative relationship between e-Government and online ethics training with corruption risk. That is, greater e-capability is associated with less corruption risk. This latter correlation is expected.

The results of these preliminary analyses indicate several avenues for future research. Time-series analyses will be helpful for discerning causal relationships between G2E capability and public corruption.
Michaelene Cox

Table 3: Correlations between corruption and ethics training in 50 U.S. states

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Significance</th>
<th>Variable 1</th>
<th>Variable 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3392</td>
<td>***</td>
<td># Convictions</td>
<td>e-Government</td>
</tr>
<tr>
<td>0.9265</td>
<td>****</td>
<td># Convictions</td>
<td>e-theics training</td>
</tr>
<tr>
<td>-0.2659</td>
<td>*</td>
<td>Corruption risk</td>
<td>e-Government</td>
</tr>
<tr>
<td>-0.8392</td>
<td></td>
<td>Corruption risk</td>
<td>e-theics training</td>
</tr>
</tbody>
</table>

*p<0.10; **p<0.05; ***p<0.02; ****p<0.01 (two-tailed tests)

Case studies may also be fruitful to develop a richer understanding of the dynamics at work in public administration. A closer look at the circumstances in which relatively low numbers of convictions are not linked to strong e-Government performance may reveal interesting explanations not consistent with predictions.

4. G2E ethics training in the U.S.

Several U.S. state ethics commissions emerged in the nineteenth century as a response to widespread and highly publicized corruption scandals and as an institutionalized vehicle for political reform (Smith 2003). NCSL reports that 41 states now have ethics boards and/or commissions that exercise jurisdiction in issues of probity dealing with public officials and employees. While monitoring and enforcement remain primary functions, most of these bodies also provide training activities. Fifteen states impose some form of mandatory ethics education for public officials and/or employees, while others offer training as an option. Training can be provided on an irregular basis or on regular intervals, and can vary among states in respect to topics being emphasized or focus on ethics laws, rules and/or value-based principles such as fairness and belief in democratic processes. Despite variability among states, most programs have some testing component for the individual and the administrator to assess learning outcomes. There is also a growing trend for more online services and for those to be outsourced to private contractors (Gant, Gant and Johnson 2002). The NCSL reports that on-line ethics training or ethics resources are currently offered to officials and/or employees in 29 state executive branches, and in 21 state legislative branches.

Illinois is a forerunner for online state ethics training, the development of which quickly followed corruption convictions of two of its recent governors, George Ryan and Rod Blagojevich. Some particular features of the state’s ethics training can be illustrated here as they are becoming commonplace in other states. For instance, as professor at a state-funded university in Illinois I must complete the state’s online ethics training each year as a condition of my employment per legislative decree. Completing the program takes 30-60 minutes and can be done in segments. The program is not touted as a test but as a teaching aid. Nevertheless, after relevant ethics and laws are explained, correct answers must be entered for about a dozen hypothetical cases before a certificate is issued. The web-based delivery system is owned and administered to eight Illinois public universities by Workplace Answers, a San Francisco-based company with a global clientele. A generic ethics program was initially developed in 2003 for Illinois state agencies, but three years ago public universities collaborated with the vendor for tailoring content for university employees. Some content is under license by those schools now. While topics stay the same from year to year, there are occasional changes in the hypothetical cases/illustrations to alleviate boredom for test takers and to prevent hurried test taking. The tests are administered manually or in Spanish as needed for accessibility. Each university has an ethics officer responsible for monitoring usage. Shane McCreery, ethics officer at Illinois State University, reports that about 8,000 statewide university employees take the online training each year. Online training is convenient and inexpensive, and presents only a few technical challenges; for example, most employees log in during lunchtime and sometimes cause the system to freeze. In assessing the efficacy of the program, McCreery thinks that the greatest impact is enhancing employee awareness of workplace ethics and notes an increase in whistleblowers since implementation of the training. He believes that what ethics training will not do, however, is to deter wrongdoing. This perspective is at odds with e-Government proponents and so reinforces need for further study.

5. Implications for G2E ethics training

Corruption unquestionably has ramifications for political and economic development in all countries. It unfairly and inefficiently redistributes goods and services, weakens public trust in government, and undermines the rule of law. Specific strategies for successful controlling corruption are plentiful but generally require tailored reform, public and private sector commitment, and limited opportunities and incentives for wrongdoers. It is hypothesized that e-Government can facilitate these measures. It appears that a highly decentralized federal government such as the U.S. grapples to implement best ethical practices despite its considerable IT
capabilities. Integrated service delivery of ethics training among government agencies and states is particularly difficult, even with a shift toward outsourcing because of political—not economic or technological—reasons. Preliminary correlation analyses serve to encourage further testing and case study research on the relationship between G2E ethics training and public malfeasance. Intra- and international explorations on the frontier of government service delivery remain critical; the implication for public policy in all countries is quite clear. For instance, a questionnaire administered to participating members by the Organization of American States (OAS) Committee of Experts indicated considerable legislation now being proposed to standardize mechanisms within countries and the region for overseeing government employee training regarding conflict-of-interest and ethical responsibilities (Raile 2004). G2E service delivery would appear to hold much promise as a method of consolidating such training, but of course rests on e-readiness. As noted earlier, measures of e-Government capability can be drawn from a variety of sources such as the UN Public Administration Programme and the Economist Intelligence Unit, and while scoring varies, the same countries generally rank about the same from source to source. Measures of e-Government readiness for OAS states reveal that the U.S. and Canada are well-poised to implement online ethics training at all levels of government, while other OAS members such as Brazil and Argentina will struggle first with establishing and expanding reliable and basic e-Government services such as network administrative support, desktop/portable PC configuration, and application/software development, and with making political as well as economic decisions as to contract or not to contract out various e-Government services. Like most other well-developed economies, however, South Korea and The Netherlands maintain top rankings in e-Government readiness. As a federal republic with a highly decentralized government, South Korea and its fairly autonomous provinces and self-governing cities face challenges similar to the U.S. in coordinating or consolidating G2E services. The level of political corruption in South Korea remains persistently high, and so perhaps U.S. state-level experience of online ethics training can provide a model for policymakers to consider in that case. Implementation of policy in The Netherlands is likewise decentralized, although responsibility for public administration integrity policy rests with the Minister of the Interior and Kingdom Relations (Kolthoff 2007). Recent anti-corruption legislation in The Netherlands suggests that this consolidation could lend itself to creating viable e-ethics training programs among its dozen provinces, although it should be noted that the country already fares quite well on corruption indices. There is no study yet examining the existence of subnational online ethics programs in either South Korea or The Netherlands, and for that matter, in any other country of the world.

In short, bivariate correlation coefficients reported in this U.S. case imply that e-Government capability and online ethics training for government employees is statistically linked to corruption risk and to conviction rates for political corruption. We are mindful that reform initiatives are often based on a particular viewpoint about the nature and causes of corruption. Cultural perspectives suggest that attitudinal changes be made such as fostering zero-tolerance for public servants, and institutional perspectives propose that controls be established such as ethics commissions and mandatory ethics training. Reforms must give government workers adequate incentives to forego illicit activity in their self-interest for that of the public. A relatively large body of literature thus uses the principal-agent model as a framework for explaining the contractual relation between government and the public when officials (agents) of the state are elected, appointed, or hired to serve the collective (principal) interest and subsequently violate that public trust. Rational choice theory can therefore provide a framework to understanding how principals and agents make decisions in terms of economic gains and tradeoffs. Prevention and enforcement measures are critical, but greater understanding of the phenomena and suggestions for appropriate anticorruption strategies require analyses built upon data over time that complements in-depth case investigations at the state and sub-state levels. This case study suggests that conversations about anti-corruption policies and strategies consequently take place in light of any country’s progress towards G2E capability.

References
Center for Public Integrity (2012) “Grading the Nation: How Accountable is Your State?” [online], http://www.publicintegrity.org/2012/03/19/8423/grading-nation-how-accountable-your-state
Michaeline Cox


U.S. Department of Justice (2012) “Reports to Congress on the Activities and Operations of PIN”, Public Integrity Section, [online], http://www.justice.gov/criminal/gain/


TeleWeaver: An Innovative Telecommunication Platform for Marginalized Communities in Africa

Lorenzo Dalvit¹, Sibukele Gumbo², Lindikaya Ntshinga³ and Alfredo Terzoli³
¹School of Journalism and Media Studies, Humanities faculty of Rhodes University, Grahamstown, South Africa
²Department of Computer Science, Science and Agriculture faculty of Fort Hare University, South Africa
³Department of Computer Science, Science faculty of Rhodes University, Grahamstown, South Africa
l.dalvit@ru.ac.za
sgumbo@ufh.ac.za
l.ntshinga@ru.ac.za
a.terzoli@ru.ac.za

Abstract: Information and Communication Technologies for Development (ICT4D) is becoming an increasingly important and multi-faceted area of research and software development. Particularly through provision via mobile devices, e-services can potentially reach and improve the lives of millions of people living in marginalised areas. The efforts of many governments in sub-Saharan Africa are frustrated by poor telecommunication infrastructure, lack of skills and unsustainable models of intervention. In this paper we describe the holistic solution offered by the TeleWeaver platform. The novel approach to the development of the software, the strong sense of social responsibility of the developers and the collaborative spirit that shaped the ecosystem of which TeleWeaver is part, warrants the adoption of an innovative approach to its marketing and implementation. On the one hand, the project needs to provide returns on investment and generate profit for the key stakeholders (i.e. government at the local and national level, academia, industry and socio-entrepreneurs in the target community). On the other, it must benefit all members of the marginalised communities it is intended to serve as well as the global community of software developers. TeleWeaver was developed in close collaboration with the community of Dwesa, a rural area on the Wild Cost of the Transkei regions in eastern South Africa. To our knowledge, this is the first adaptation of the living lab approach to the co-creation of e-services in an African context. In this paper we discuss three innovative aspects of the TeleWeaver solution which respond to these needs. Firstly, the use of a service oriented architecture within an ICT4D solution enables a community-centred approach in which different services can be “interwoven” around each individual user. Profiles can be shared across applications and the platform does not consider the same person as two separate users of e-health and e-judiciary services, for instance. Secondly, a new cost and revenue stream model was necessary to make ICT infrastructure sustainable in areas characterised by endemic poverty. Contrary to the “bottom of the pyramid” approach followed by many ICT implementations, we envisage local stakeholders such as municipalities or small businesses implementing the platform to generate revenues through advertising, data harvesting and support of third-party interventions. Thirdly, TeleWeaver is released under a dual-licensing model which includes a reciprocal open-source licence. This model protects the interests of the developers and commercial enterprises implementing the platform while allowing for free and open use by NGOs and members of marginalised communities (Heeks 2008). After six years of development, implementation and testing in an actual deep-rural community, TeleWeaver is ready as an organic and sustainable alternative to centralised models of e-services implementation in Africa.

Keywords: middleware, cost and revenue sharing, service oriented architecture, dual licensing, open-source

1. Introduction

The potential of ICT for the social and economic development of marginalised communities has been widely recognized (International Telecommunications Union 2011). Africa lags behind in terms of ICT infrastructure and services as well as Internet connectivity. The continent represents an untapped territory for the provision of new telecommunication services which combine technical innovation with a developmental focus (Tongia 2006). South Africa combines an established telecommunication industry, capable of competing in the global market, with remote areas, representative of many rural African realities. This puts the country in the best position to pioneer the creation and implementation of new solutions (Gillwald 2008). The current socio-political climate and legal framework seem amiable to this type of innovations, at least at the level of political discourse and planning.
In this paper we discuss TeleWeaver, a middleware platform for marginalised communities. TeleWeaver brings efficiency to software production in the ICT4D space and an innovative business model, which monetizes the interest of various parties (governmental and non-governmental) to access poor communities, to provide services, to obtain information or to sell products. TeleWeaver presents itself to the end users as a set of applications.

We look at TeleWeaver from different points of view, highlighting its innovation as a solution, as software and as a product. As a solution, it seeks to benefit a diverse range of stakeholders which make up its ecosystem. Notably, it is implemented as part of a business model that seeks to reduce inequalities and promote a fair sharing of costs and revenues. As a piece of software, TeleWeaver implements a Service Oriented Architecture (SOA). This type of architecture, which is common within software development, is relatively novel in ICT4D. As a product, TeleWeaver is released under a dual licence. The use of a reciprocal (as opposed to permissive) open-source licence protects the interests of the ecosystem of which TeleWeaver is part by encouraging contribution by developers, use by marginalized communities and purchase by government bodies or corporations.

2. TeleWeaver as a solution

TeleWeaver offers a comprehensive solution to the telecommunication needs of marginalised areas in Africa. Developing ICT infrastructure and providing services to marginalised areas is recognised as a priority by the South African Government (African National Congress 2009). In the South African context, marginalised communities can be defined as living in rural or peri-urban areas characterised by endemic poverty, poor infrastructure and lack of services (Cross 2001). TeleWeaver responds to challenges such as cultural difference, limited infrastructure and lack of economic resources with a holistic solution, involving a wide range of stakeholders.

TeleWeaver is an integral component of a complex ecosystem, shown in Figure 1. The platform is developed by Reed House Systems (RHS). The establishment of RHS was part of a two-year project called E-Services and Telecommunication Infrastructure for Marginalised Areas (ESTIMA).

![Figure 1: Ecosystem supporting TeleWeaver (Gumbo 2012)](image)

The project was initiated by a consortium including two academic institutions, Rhodes University (RU) and the University of Fort Hare (UFH), together with a local business based in the Eastern Cape Province of South Africa. RU is considered a historically ‘white’ institution as only white students were allowed to attend under the former apartheid government. In contrast, UFH is considered a historically ‘black’ (and therefore previously disadvantaged) institution. TeleWeaver draws on the ten-year experience in software development of the Centres of Excellence (CoE) hosted in the Computer Science Departments of these two universities. This type of collaboration, still relatively new in South Africa, ensures a combination of technical skills and understanding of marginalised contexts.

The link to academia allows tapping into the expertise of other departments such as Anthropology, Sociology, Media Studies, Communication, Education and African Languages according to various aspects. The holistic solution offered by TeleWeaver includes an analysis of the social, cultural and economic profile of the prospective deployment community, the transfer of relevant skills, the development and testing of appropriate services based on a contextualised needs analysis, an ongoing evaluation of impact and appropriation and customisations such as branding and localisation. Various aspects of the solution are
realised and implemented as part of research project by young researchers and postgraduate students. A considerable research output has already been generated. Such output contributes to obtaining institutional support in the form of infrastructure, resources and expertise by the two universities.

TeleWeaver can also draw on the international academic network to attract contributors as occasional programmers or visiting researchers. As an open-source middleware for marginalized communities in Africa, TeleWeaver can act as a catalyst to build a community of quality developers committed to ICT4D.

The initial test bed for the software is a specific Living Lab (LL). The LL approach to the co-creation of services in partnership with an actual community of prospective users is established practice in developed countries and is gaining momentum in developmental contexts (James 2010). The site of the LL is a coastal rural area in South Africa. The area is characterised by endemic poverty and lack of services and infrastructure. It is representative of many African marginalized realities and has been the site of extensive ethnographic research (Palmer 2002). Since 2005, it has been the site of an ICT4D project to explore the potential of ICT for the social and economic upliftment of the area. Over time, such efforts have attracted the interest of various partners (industry, local government, NGOs) which created the complex ecosystem of which Reed House Systems (RHS) is an integral part.

The Siyakhula Living Lab Management Unit (SILLMU) completes the ecosystem of which RHS is part. This management unit acts as an interface between RHS and the LL which coordinates the logistics of deployment and associated research projects and channels important feedback, suggestions, innovations and user experiences from the community. The unit is instrumental in managing the relationship between academia, government, industry and community. Government bodies at the local, provincial and national level support the initiative, as it is aligned with their developmental goals. Industry partners see this as an exploration of telecommunication deployment in a potentially profitable but relatively untapped market (African National Congress 2009). Either directly or indirectly, the two stakeholders provide funds that support the testing and development of TeleWeaver in a real-life marginalized context.

A strong, two-way relationship with the local community has been a distinctive feature of the ecosystem. Schools in the LL act as points of presence for the project and for access of the respective communities. These schools are connected to the Internet (via VSAT and WiMAX) and receive technical support as well as skills transfer and development. Most of the schools have computers, either for administrative use or clustered into a computer lab. A considerable number of educators, learners and community members have acquired the necessary skills to operate a computer and access e-services and have taken the initiative in training others. As evidence that ICT is becoming part of the life of the community, a group of local entrepreneurs started marketing art and craft products through e-commerce. Providing the tools for a distributed, effective and socially responsible sharing of costs and revenues is an integral part of the TeleWeaver solution.

The goal of the ESTIMA project was the establishment of a commercial software venture with a specific ICT4D focus. In terms of revenue generation and sharing, serving the interests of the whole ecosystem is the distinctive feature of the TeleWeaver solution. Different stakeholders (academia, a community of target users as well as developers, government and industry) can contribute and benefit in different ways. The construction of TeleWeaver was necessary for RHS to take shape and to build sustainability for the venture beyond ESTIMA.

Most similar ventures seem to rely on one of two sets of business models. On the one hand, external funders (government bodies and industry partners) provide grants for the development of marginalized areas or the exploration of new markets. In the immediate future, RHS is in a strong position to attract this type of funding. Grants, however, are generally not a sustainable solution in the long run and limit the scale and so the impact of the activity. A second model followed by most ICT4D initiatives follows established models within the industry (Breest 2006). The idea is that, although individual contributors in marginalised communities are by definition poor, extending the project to a large number of users, and maximizing infrastructure utilization can result in a sustainable revenue-generating stream. In such cases, telecommunications solutions are usually deployed in areas with recognised potential for economic development.

The business model that TeleWeaver proposes is a third one (although the first and second just mentioned are pursued too). In this one, the income will come from entities that have a direct interest in accessing the communities where TeleWeaver is deployed, through a monthly payment, or a per-transaction payment, to
the entity owning the centre where TeleWeaver is deployed. The owner of the centre, in turn, will pay a fixed annual licence fee to RHS. An example of an entity that can make use of the TeleWeaver business model is a municipality.

In this way, government bodies, industry organization and NGOs can use TeleWeaver as a solution to develop marginalised communities or penetrate untapped markets. For members of marginalised communities, TeleWeaver can offer a solution to local telecommunication challenges and offer opportunities for economic empowerment and entrepreneurship. These require appropriate software choices as discussed below. While not a specific characteristic of TeleWeaver per se, the embedding environment that TeleWeaver will make possible through its presence, should address the general problem of economic and technological dependency which contributes to widening the social, economic and digital divide.

3. TeleWeaver as software

TeleWeaver can be defined as an e-service platform, which provides a middleware solution for ICT4D services. The name “TeleWeaver” signifies the defining characteristic of the software, i.e. the inter-weaving of different services and applications, akin to an Enterprise Service Bus (ESB). ESB is largely implemented in software development and telecommunication and offers well documented advantages (Breest 2006). These advantages include the portability of applications and services, improved workflow and a seamless user experience. Most software developed specifically for ICT4D implementations constitutes an ad hoc solution, and does not follow the ESB model. TeleWeaver’s ESB design model is based on SOAs. SOAs are a set of principles and methodologies for designing and developing software in the form of interoperable services. To achieve this, the Open Services Gateway Initiative (OSGi) framework was selected as the core framework for TeleWeaver’s ESB implementation. The OSGi standard also specifies a runtime infrastructure for controlling the life cycle of bundles within the execution environment as depicted in Figure 2 below. This infrastructure allows developers to dynamically add and remove existing services (Rossi 2004).

![Figure 2: OSGi Framework (Ntshinga 2012)](https://example.com/figure2.png)

TeleWeaver’s SOA is based on a peer-to-peer (P2P) transport mechanism. The loosely coupled design of SOA best suits the heterogeneous application environment. Additionally, the P2P transport, allows us to link services that occur at different nodes, while giving each node control over the resources it offers. Nodes can thus be understood as defining boundaries of ownership of services and the resources underlying them.

TeleWeaver specialises the Equinox OSGi implementation and, as far as we could ascertain, it is the first time that a proven ESB architecture is used in ICT for ICT4D. Limitations in the deployment environment, as well as use cases that capture most common user scenarios have shaped the specialization of Equinox (Ntshinga 2012).

Resource brokering uses a variety of Java specifications and open standards. TeleWeaver is organized in the following components:

- the Core Application Components (CAC);
- the Core Service Components (CSC);
- the User Application Component (UAC);
- the Core Data Components (CDC);
Lorenzo Dalvit et al.

- the 3rd Party Application Port (3PAP).

A description of each component follows:

CAC: These are ‘views’ on the user services offered by TeleWeaver and residing in the UAC; they offer a Graphical User Interface (GUI) into the user application. An example of this would be the ‘Profile View’, which allows the user to create and view their profile. (Profiles are used to access appropriate and customised services). Figure 3 below shows a screenshot of the Profile View.

CSC: This component contains generic services to be used by all the applications which implement end user services. Together, they represent the ‘hidden advantage’ of the TeleWeaver, allowing developers to focus on the business logic of the user service they are creating. A simple example is the Email Service: an application that requires email functionality will call this service rather than recreate it.

UAC: This component hosts all the services that are offered to the users, and that typically will represent income streams to the deployer of TeleWeaver. Each income stream originates from an external entity interested in accessing the users of TeleWeaver for commercial or institutional reasons.

![Figure 3: Screenshot of the profile web service view](image)

CDC: This component implements the data layer on which TeleWeaver relies. This, again, simplifies the writing of user applications, as well as the data exchange between the applications.
Lorenzo Dalvit et al.

3PAP: From the beginning, TeleWeaver was designed to easily integrate applications that have been developed independently and run in different software environments. This component facilitates integration, using Open Standards methods. An example would be the ability to integrate with an e-government system via TeleWeaver using Web Services.

4. TeleWeaver as a product

In this section we discuss the strengths and weaknesses of restrictive, permissive and hybrid licences, commonly used for open-source software. Key issues to consider are compatibility and reciprocity. As noted by Fitzgerald (2006), restrictive licences (such as GPL) are often used as a guarantee to possible contributors that the code will not be used for commercial ends. Two dimensions of restrictive licences are the requirement to redistribute modified version under the same licence and restrictions to mingling software with different licences (compatibility). Subsequent versions of the GPL seek to address particularly the compatibility issues but are still reciprocal. A project that bundles together software with different licences needs to work across platforms and intends to operate in a commercial environment, such as TeleWeaver, requires a more permissive licence.

Permissive licences (such as BSD) allow greater freedom to the user. This includes freedom to modify and redistribute the software for commercial gain. Permissive licences make it easier to build a community of contributors, who can benefit from signalling, for instance (Fitzgerald 2006). An example of an open-source middleware project with a permissive licence is OSGi, which is a core part of TeleWeaver. OSGi is a standard implemented by several vendors. The most commonly used implementations are Eclipse OSGi and Apache Felix (open source projects). They are available under the Eclipse Public Licence and Apache Software Licence, respectively. A third common implementation, Knoplerfish OSGi created by a non-profit organisation is available under the BSD licence. None of the three licences (EPL, APL and BSD) prevents commercial use. OSGi, like TeleWeaver, is a platform that can be taken as it is and used to deploy, at run time, without any code modifications, third party programs with different licences. According to (Fitzgerald 2006) this describes “embedded software”, for which permissive rather than reciprocal licensing seems more appropriate. However, the use of a permissive licence does not seem to adequately protect the interests of all stakeholder of the TeleWeaver ecosystem. A model is needed which prevents third parties from modifying, re-branding and distributing the software commercially with no direct benefit to the initial developers.

The Eclipse Public Licence is particularly relevant to the current discussion, in terms of compatibility as well as reciprocity. An Equinox derivative, licensed under the EPL, is an integral component of TeleWeaver. The EPL is incompatible with a reciprocal GPL licence. However, while systems including EPL-licensed components can be released under different licences, the EPL requires that derivatives are released under the same licence. The use of an EPL licence opens two interesting possibilities. On the one hand, TeleWeaver as a whole can be released under a commercial licence, provided that the original EPL licence is preserved for its modified Equinox component. On the other hand, TeleWeaver can be released as free software under certain conditions, and an EPL licence would prevent third parties from using it or its derivatives for commercial purposes. The combination of these two scenarios requires a hybrid model.

In the hybrid model context, permissive licences feature strongly in the open core philosophy. Open-core refers to software for which different licences are used for different components and/or features. A core set of components or features is released under a reciprocal licence while additional features and services are sold commercially. This type of licence allows vendors to build a community of contributors around the open source code while providing an upgrade path to drive community users to become commercial customers. The main challenges associated with this model are to maintain the balance between the core code and commercial extensions. Community users must not feel as “second-class citizens” from which valuable functionality is withheld. This aspect is particularly important for the deployment within marginalised communities, where managing a relationship of mutual benefit and respect is a key success factor. For this reason, a dual-licensing model segmented by type of user seems more appropriate for TeleWeaver.

Dual licensing provides a clear distinction between the community-oriented version of the project and the commercially oriented version of the project. Community users are happy that no features or functionality are being withheld from them, while commercial users are happy that they have all the benefits of a commercial relationship. Segregating the user base by user type makes it more difficult for a vendor to encourage a
community user to become a paying customer. It also means that vendors may face a challenge in prioritizing developments to keep both user groups happy. The features demanded by one group may not match those demanded by the other. Dual licensing requires copyright to be assigned to the vendor, and can therefore limit community contributions. This means that vendors fail to enjoy the full benefits of open source development.

There are a number of examples of projects using dual-licensing to involve an active open source community project in their product. In most cases vendors drive the product development and they steer usage of the product in a community through a reciprocal licence. Many of the companies faced financial losses while a community of users was being built up. This is because the software could be downloaded and used for free and so its use for commercial purposes was difficult to restrict. However, the sales of additional features and services generated revenue once the user base had been grown. MySQL AB is the company originally behind the hugely successful MySQL database software. They may be considered pioneers in the dual-licensing model. Their database is in use in millions of applications around the world. MySQL received no revenue from many thousands of its users who are using the free LAMP stack to run their servers. MySQL had to rely on support contracts to monetize this community despite their dual licensing. The broad user base proved strength of the company. Wide adoption led first to corporates using the software and paying for it in licensing fees, and then a purchase by Sun Microsystems followed by Oracle.

A commercial licence will apply to governmental, non-governmental and private entities who intend to use TeleWeaver as part of a solution to bring ICT in communities that cannot yet afford ICT. The licence entitles the holder to direct support. A free version will be available for non-profit use, most likely under a reciprocal EPL licence. Based on Fitzgerald (2006), reciprocal licences are preferable for both commercial licensing (where users are required to purchase software) and subscription (where users do not actually own the software).

5. Conclusion

In this paper we have presented TeleWeaver, an open-source middleware developed by a South African based startup software house called Reed House Systems. TeleWeaver is specifically designed to support ICT use in marginalised communities in Africa. The software is part of an ecosystem including public funders, industry partners, academic institutions and an actual community of test users.

TeleWeaver proposes an innovative business model through which its presence will create revenue streams for the ICT installations that run it. As a result, ICT infrastructure is becomes more sustainable. Standardised services can all make use of similar shared services available on the platform which are easier to develop and easier to understand for operators who have to explain them to the users. Through the use of modern process technology, such as workflow systems, transparency can be added to the system.

Android is very similar to OSGi and is created by a commercial entity, Google. Android is a strong contender as an alternative basis for TeleWeaver for mobile devices (the two are to a large extent, compatible). It is licensed under the Apache Software Licence, excepting some Linux kernel patches which use GPL v2 for compatibility reasons.

Bonjour is a zeroconf networking software created by Apple Inc. which allows devices to automatically network with each other and requires a high degree of standardisation. It uses the Apache Software Licence. Bonjour is an add-on to the Darwin open source kernel of Mac OS X.

Darwin is released under an Apple Public Source Licence, which is very similar to the Apache Software Licence, with the addition of the copy left requirement, that source code be made available to derivatives of the product. However, as an operating system, the product does not restrict one from using it as the basis of other non-derivative products (i.e. products that are not operating systems but that perform fundamentally different tasks and simply use Darwin as a platform).

As in many parts of Africa, the most common telecommunication devices in the community are cellphones. TeleWeaver relies on the structures of RU and UFH for advice on legal matters. EKhaya ICT is an Eastern Cape Startup Company aligned with the vision underpinning ESTIMA. Besides its comparatively limited resources and experience, it contributes with technical management and views on business models and legal matters,
including licensing. A revenue generation model should first be created in the business plan before a definite decision be can be made on the type of licence.

Acknowledgements

The authors would like to thank Megan Schoeman, a Master of Arts student in New Media, in the School of Journalism and Media Studies at Rhodes University, for her contribution towards shaping this paper.

References

Breest, M (2006) An Introduction to the Enterprise Service Bus, Hasso-Plattner-Institute for IT Systems Engineering, 
University of Potsdam, Germany.
Braamfontain, South Africa.
Innovation in ICT4D: The Siyakhula Living Lab Experience”, Paper read at IST-Africa 2012 Conference and Exhibition, 
Tanzania, May.
June, pp 26-33.
International Telecommunications Union. (2011) The Role of ICT in Advancing Growth in Least Developed Countries: Trends, 
James, T. (2010) Enhancing innovation in South Africa: The COFISA Experience, Department of Science and Technology, 
South Africa.
Africa’s Wild Coast, Human Sciences Research Council (HSRC), Pretoria.
Challenge?”, Paper read at International Conference on Information and Communication Technologies for 
Open Data and Open Government in the UK: How Closely are They Related?

Martin De Saulles
School of Computing, Engineering and Mathematics, Faculty of Science and Engineering, University of Brighton, Brighton, UK
mrd@brighton.ac.uk

Abstract: Over the previous decade a number of initiatives within European Union (EU) Member States, in particular the UK, have attempted to open up access to public sector data for broader economic and social uses. Driving some of these initiatives has been the ambition to increase the transparency of public bodies and, as a result, improve the democratic process. Other initiatives have had an economic agenda that see the opening up of public sector data for commercial exploitation as a way to stimulate economic activity and growth. In the UK, the launch of the data.gov.uk website in 2010 combines both these ambitions by making over 8,000 public data sets available for third parties to download and build information services on top of. This paper examines a sample of these data sets as well as some of the applications that have been developed from them and uses a conceptual model developed by Yu and Robinson (2012) in the US. The model provides a basis for determining the technical characteristics of the data (is it adaptable or inert) as well as the primary purpose of the data (is it to improve service delivery or public accountability). Based on the analysis of the sample of data sets from the data.gov.uk website, it is concluded that Yu and Robinson’s framework provides a useful basis for separating the technical characteristics of public data from the purposes to which they can be put. Further refinements of the model are suggested that would allow governments to benchmark their public data initiatives against programmes in other countries.

Keywords: e-government, open data, open government

1. Introduction

Notions of open government can be traced back to the 18th century with Sweden’s constitutional legislation enabling a free press and revolutions in the United States (US) and France which had the ambition of curbing executive and legislative powers at their core. More recently, the United States Freedom of Information Act in 1966 and similar legislation across Europe since the 1970s have attempted to uphold the principle that providing greater access to information about the workings of the state is good for democracy. The United Kingdom (UK) can be seen as something of a laggard in this area, only passing its own Freedom of Information Act in 2000. While these pieces of legislation have made it easier for citizens and organisations to access government information resources at both local and national levels, it could be argued that they have not gone far enough in opening up the public sector to greater scrutiny. Most legislation forces public bodies to be responsive in the ways they provide access in that they deliver the information in response to requests from individuals. There have also been restrictions, particularly in Europe as to what those receiving the information could then do with it. While in the US there has been a tradition of allowing the private sector to freely commercialise public information assets, in Europe the commercial exploitation of public information has, until recently, been restricted (De Saulles 2007). A 2003 European Directive (2003/98/EC) has attempted to open up the European public information market but the response across the EU has been mixed (Janssen 2011). The UK has been one of the more enthusiastic implementers of this directive and enacted many aspects of it with the passing of national legislation in 2005 and the creation of an organisational infrastructure to manage its implementation.

More recently, there has been a growing realisation that legislation on its own is not sufficient to encourage a thriving market for the commercial and social exploitation of public data. The ways that the data can be accessed and the formats it is presented in will play a large part in what third parties can do with it (Berners-Lee 2009). This paper explores some of the issues and debates surrounding the relationship between open data and open government and, in particular, the data.gov.uk initiative in the UK. The results of an analysis of a subset of the data contained within the data.gov.uk service are presented and discussed using the framework devised by Yu and Robinson (2012) which provides a basis for describing both the technical nature of government data as well as the purposes to which it can be put.
2. Open government and open data

The term, open government, is open to a number of interpretations relating to the democratic processes of the state, the accountability of public bodies and officials as well as access to social and economic information by individuals. More recently, it has been co-opted by sections of the technology industry where analogies between open government and open computing systems have been drawn and a movement calling for governments to be providers of open data has emerged. Janssen (2012) differentiates between those advocating the setting up of open data initiatives and more traditional campaigners for open government that argue for a right to information whilst acknowledging there is an overlap between them.

O’Reilly (2010) talks of ‘Government as a Platform’ and ‘Government 2.0’ by which he means using the potential of collaborative technologies, particularly those based around the World Wide Web (WWW), to help solve some of the civic issues faced by local and national public institutions. He argues that where governments are successful in service delivery it is when they encourage the development of adaptable platforms such as the highway system in the US which was funded and regulated by the state but which allows a range of services to be delivered across it. US economic growth during the latter half of the twentieth century, O’Reilly claims, was partly driven by the opportunities for the transport of goods and people across the country made possible by a modern road network. Technology platforms in the computing world such as the personal computing (PC) architecture set by IBM over 30 years ago and the application stores of Apple and Android, while not completely open, have stimulated massive innovation amongst hardware manufacturers and software vendors of all sizes. Zittrain (2008) calls this the ‘generative’ nature of some technology systems, in particular the Internet, by which third parties are encouraged to develop products and services to run on top of the enabling platform.

While it might be argued that there is a technologically deterministic aspect to O’Reilly’s linking of the characteristics of computing systems to government services, perhaps where public data is concerned the analogies have some relevance. Some public services such as healthcare, policing, rubbish collection and defence do not obviously lend themselves to being seen as platforms on which other services can be developed by third parties outside of government. However, where government is a provider of data the notion of a technology platform may be more useful. One of the key factors driving the popularity of the Internet as a network for accessing and sharing information has been the ease with which hardware and software developers have been able to create products and services which can run across this network. The standards governing the interconnection of devices to the Internet are open and do not require the granting of permissions or paying of royalties to any third parties or governing bodies. Similarly, as long as the agreed standards are conformed to, software such as web browsers and applications such as email, Facebook and YouTube can be deployed to run on these devices. Prior to the mass deployment of the Internet, proprietary networks such as CompuServe, Prodigy and AOL offered email and information services but did not interconnect with each other restricting the extent to which users could interact with friends and family on other networks. By applying the lessons learned from the Internet and other open systems to the provision of public data perhaps some of the economic and social benefits of unlocking this data can be realised.

3. The data.gov.uk initiative

Since 2005 and the passing of the Re-use of Public Sector Information Regulations, the UK has been one of the most active EU Member States in attempts to stimulate a thriving data market for public sector information. One of the driving forces underpinning is a belief that economic value can be unlocked by allowing commercial entities to use public data to create profitable information services. Research carried out by PIRA (2000) for the European Commission compared the economic benefits of the relatively open US public sector information market with the closed one operating in the EU at the time. The authors of the study concluded that the economic benefits of a more open system which allowed the free and unrestricted commercial exploitation of public sector information far outweighed any short-term financial gains public bodies may obtain by selling data. A restrictive market, they argued, discouraged innovators from using this data to create commercially viable information services while an open market was a stimulus to innovation that ultimately created new companies, greater employment and, therefore, more tax receipts for the government.

While a desire to stimulate economic activity was a driving force of the European re-use of public sector information directive and the associated national legislation across many member states, more recently there have been moves to promote the social benefits of a more free data market. In the academic sphere this has
resulted in a growth of open access journals and a belief amongst many in the scientific community that opening up access to the results of leading-edge research can only benefit society (Arzberger et al. 2004). However, this ethos has also permeated to public sector information where, arguably, the data may be less interesting than ground-breaking scientific research but can be put to socially beneficial uses. In the US, this has been applied to tracking and publishing details of where politicians and parties obtain their funding (Bender 2010, Newman 2010), to the freeing of corporate financial data from expensive databases that had been the preserve on investment bankers (Brito 2010). In the UK, one of the more high-profile initiatives has been the creation of crime mapping services that combine crime statistics with mapping services such as Google Maps to produce very localised maps of criminal activity around the country (Chainey and Tompson 2012).

Many of these not-for-profit services rely on the combining of different data sets, what is often referred to as mashups. Crucial to the success of these mashups is for their creators to have access to data which is in a format that can be manipulated via automated routines. This requires the originating data to be presented in a structured format that can be understood by computers i.e. machine-readable. One of the leading proponents of the need for public bodies to offer their data in machine-readable formats has been the British creator of the WWW, Tim Berners-Lee, who has argued the need for ‘linked data’. This builds on the principles behind the success of the WWW which allows for links to easily be made between web pages. This idea has been taken up by the UK Government which in January 2010 launched a web portal (www.data.gov.uk) providing access to many thousands of public sector data sets. As of 28 December 2012 it contained 8,981 datasets from 786 publishers comprising central government departments, local councils, National Health Trusts and an assortment of other public bodies. There is an understandable concentration of data sets from the larger bodies with the ten largest publishers accounting for 45% of all data sets. Much of this data is published under the terms of the Open Government Licence which was released by the UK National Archive in September 2010. This allows for the re-use and re-publishing of the information under the following terms:

“The Licensor grants you a worldwide, royalty-free, perpetual, non-exclusive licence to use the information subject to the conditions below:

You are free to:

Copy, publish, and distribute the Information;

Adapt the Information;

Exploit the Information commercially for example, by combining it with other Information, or by including it in your own product or application.”

(The National Archive 2010)

The restrictions imposed by this licence are relatively minor with the main condition of re-use being an acknowledgement of the original source.

While the data.gov.uk initiative has been welcomed by many in the open data community, there are concerns about how innovative it really is. Janssen (2011) points to the growth in the data sets it contains from 2,500 at launch to over 6,900 18 months later but questions whether it is really presenting any new data that was not already available via other sources,

“Since data.gov.uk does not really seem to be demand-driven, but rather based on what datasets are laying in the public bodies’ cupboards and that may be considered interesting for the citizens by the government, one could wonder whether data.gov.uk will indeed be a considerable contribution to innovation.” (Janssen 2011, p451)

The UK coalition government which came into power in May 2010 has stated it aims to develop and extend the scope of the data.gov.uk initiative and has incorporated it into its ‘transparency agenda’ which aims to make the workings of the state more easily accessible to the electorate. However, a National Audit Office report in April 2012 was critical of how far these intentions were actually being realised (NAO 2012). While the report’s authors acknowledge that progress had been made with the Open Government Licence they were concerned that the disclosure of information by public bodies was not systematic and lacked consistency while it was difficult, if not impossible, for data users to be confident of the quality of many data sets. A UK Cabinet Office White Paper published in June 2012 reinforced the government’s commitment to open data and the data.gov.uk initiative but the proposals it outlined will take several years to be realised.
4. Evaluating open government data initiatives

On the surface, it is relatively easy to measure and describe the structure and contents of the data.gov.uk portal. The site itself provides statistics on the number of datasets it contains, who the publishers are and how many visits the site has had. Some of these numbers have been presented above. However, evaluating the data sets on the basis of their function and format is less straightforward. The importance of machine-readable formats has already been described so whether a dataset is presented as a PDF document, HTML page or XML file will make a difference as to what third parties can realistically do with it. The nature of the content of the dataset is also important; a database of crime statistics which includes times, dates and map coordinates of the incidents may be put to very different uses than a document outlining the strategic objectives of a regional health authority. This is not to argue than one data set has a higher inherent social value than another but that its potential uses may be different. Yu and Robinson (2012) point out that the language used to describe initiatives such as data.gov.uk and other similar programmes around the world can mean different things to the technicians that build the systems and the policy makers that and politicians that promote them,

“The popular term “open government data” is, therefore, deeply ambiguous – it might mean either of two very different things. If “open government” is a phrase that modifies the noun “data”, we are talking about politically important disclosures, whether or not they are delivered by computer. On the other hand, if the words “open” and “government” are separate adjectives modifying “data”, we are talking about data that is both easily accessed and government related, but that might not be politically important.” (Yu and Robinson, 2012 p 181-182)

If this ambiguity is to be removed and a more concrete understanding of what “open government” actually means is to be gained then the authors believe it is important to separate the characteristics of the data from the reasons for which it is being disclosed and ultimately used. To achieve this they propose a stylised framework which describes the government data across two dimensions. The first dimension describes the structure of the data and how it is published and runs from ‘adaptable’ to ‘inert’. Adaptable data being that which can be easily manipulated and repurposed while inert data is presented in a format which makes further changes by third parties difficult or even impossible. The second dimension describes the data on a spectrum running between ‘service delivery’ and ‘accountability’. Yu and Robinson give the example of machine-readable bus timetable data that may provide convenience to individuals, aid commerce and generally help provide a higher quality of life as being on the service delivery end of the spectrum. Data that discloses details of political funding or expenditure by public bodies would be on the accountability end of the spectrum as it could be seen to be increasing transparency. They acknowledge that their definitions may be rather binary and that some data will not neatly fall at one end or the other of these dimensions but as a framework within which to consider initiatives such as data.gov.uk it provides a useful starting point for evaluating public sector information.

The following section describes an analysis of a subset of data.gov.uk which uses Yu and Robinson’s framework in an attempt to determine how useful it is as an evaluative tool.

5. Research methodology

The primary objective of this research was to consider the value of Yu and Robinson’s framework as a way to measure the characteristics of data sets in initiatives such as data.gov.uk. When the research was carried out there were more than 8,000 data sets contained within data.gov.uk and an analysis of all was not feasible for reasons of time. Therefore, a sample of 100 was analysed with the selection based on random sampling using a random number generator. While 100 data sets is relatively small compared to the total, it was considered sufficient to apply Yu and Robinson’s framework and provide the basis for a discussion of its utility.

Once the 100 data sets had been identified they were evaluated according to the extent that they were adaptable or inert and whether their primary purpose appeared to be to improve service delivery or public accountability. A data set was considered inert if it was presented in a static format such as PDF, HTML or Microsoft Word or adaptable if it was presented in a more malleable format such as Microsoft Excel, CSV or XML. It was also considered inert if restrictions beyond those contained in the Open Government Licence governed its re-use. Whether it was designed for service delivery or public accountability was a little more complex and required a more value-based judgement. A relatively large number of datasets detailed the expenditure above a specific threshold of public bodies and others contained salary levels of public employees
and similar data. These were considered to be aimed at increasing public accountability. Data sets which included mapping information, transport statistics and other data that could not obviously be used to hold public bodies to account were classed under service delivery. A score of 1 was given against each of the two dimensions being measured giving a maximum score of 2 for each data set. For example, if a data set was presented as an Excel file, was released under the Open Government Licence and contained details of public expenditures it scored 1 as adaptable and 1 for public accountability and zero for the other variables. On the other hand, if it was a PDF document which outlined milk prices in Wales then it would receive 1 on the inert scale, 1 for service delivery and zero for the other 2 variables. 5 of the data sets were excluded from the final result as it was not obvious what the primary purpose of the data was intended to be. Once the data had been collated it was presented as a 4 spoke radar chart, shown in Figure 1 which is based on Yu and Robinson’s own representation of their framework.

![Figure 1: Summary results](image)

6. The results

It is important to remember that the sample being analysed comprised 100 data sets meaning that any conclusions drawn should be tentative. However, the results show a definite bias towards the data having a service delivery bias at the expense of public accountability. The extent to which the data is adaptable for re-use is less distinct with only a slight bias towards adaptability.

Based on this analysis it might be argued that the data.gov.uk initiative has so far produced data which is less aimed at making the workings of government and public bodies more transparent and more focused on improving the delivery of public services. There also appears to be a lot of work required if the data it is making available is fit for the purpose of re-use by third parties wishing to manipulate it as almost half of the data analysed was inert. It should also be noted that most of the data in the sample considered to be adaptable were presented as Excel sheets and CSV files which, although manipulable, do not conform to the same machine-readable formats which can be found in XML files or well-documented application programming interfaces (APIs). If this more rigid definition of adaptable had been applied to the analysis then the vast majority of the data sets would have been considered inert. Dead links were also an issue for 5 of the data sets where a publisher had uploaded a record to the data.gov.uk service that either had an invalid URL linking to the data or had changed the URL at a later date and not updated the record. For anyone attempting to build a data service on the basis of such data this could be a major problem.

7. Conclusions

As already mentioned, this research presents a first step in testing the value of Yu and Robinson’s framework for evaluating government data. A number of judgements were made during the research process to decide where individual data sets from the data.gov.uk initiative sat on the dimensions of the framework laid out by
Yu and Robinson. For 95 of the 100 data sets analysed this was a relatively straightforward process and produced results that provided a useful overview of the nature of the data contained within data.gov.uk. These judgements could be calibrated depending on the extent to which data characteristics are considered adaptable or not. On the basis of the findings presented here, it could be concluded that this framework offers the basis of a useful method for evaluating government data programmes and providing a more nuanced explanation of both their technical characteristics and potential social value.

Further research may wish to consider analysing initiatives from other territories so that national comparisons can be made. It would also be useful for more work to be carried out on creating formal definitions as to what constitutes adaptable data allowing governments to benchmark their efforts at opening up public data.

References


Practicing Semantic web Technologies in e-Government

Jean Vincent Fonou Dombeu¹ and Magda Huisman²
¹Department of Software Studies, Faculty of Applied and Computer Sciences, Vaal University of Technology, Vanderbijlpark, South Africa
²School of Computer, Statistical and Mathematical Sciences, Faculty of Natural Sciences, North-West University, South Africa
fonoudombeu@yahoo.com
Magda.Huisman@nwu.ac.za

Abstract: Over the last few years, Semantic Web technologies have attracted software developers in several domains such as e-commerce, e-business, e-learning, video and multimedia, e-Government, etc.; where there is need to develop intelligent web-based applications that can be easily integrated and interoperated to perform complex transactions/operations over the Internet. However, the recency of the field of Semantic Web, the scarcity of qualified Semantic Web specialists and the lack of a clear specification of the software development process of Semantic Web applications have hampered the adoption of Semantic Web technologies in the software development community in general and in e-Government in particular. This paper investigates the current state of practice of Semantic Web in e-Government, discusses the underlying technologies and presents a case study of application of these technologies in the field of e-Government. Firstly, a literature review is conducted to learn about the current practice of Semantic Web in e-Government. Secondly, the Semantic Web technologies needed for building semantic-based e-Government applications including ontology, ontology languages and edition platforms, semantic data storage mediums, semantic query languages and semantic web services are discussed. Finally, a case study application of these technologies is carried out. The main contribution of the study is the investigation, identification and discussion of Semantic Web technologies as well as the clarification of the software process for building Semantic Web applications; this may promote the adoption of Semantic Web technologies in e-Government projects and enable e-Government developers to take advantage of Semantic Web technologies to build e-Government systems that can be easily integrated and interoperated. The study would be useful to e-Government developers, particularly those of developing countries where there is little or no practice of Semantic Web technologies in e-Government processes as well as where little progress has been made towards the development of one-stop e-Government portals for seamless service delivery to citizens.

Keywords: e-government, semantic web, ontology, semantic query languages, semantic data storage

1. Introduction

In the past few years, e-Government has been a subject of interest of governments around the world. Governments worldwide are expecting e-Government to improve their internal processes and provide Internet and ICT-based service delivery to citizens, businesses and organizations. This requires the design, implementation and deployment of web-based systems that present government structures and services online, provide mechanisms for online interaction of governments with citizens, and facilitate online citizen participation to government processes and decision making. These mandates of e-Government can only be achieved if a large range of government’s services and processes are delivered seamlessly to citizens and stakeholders through a single web portal (Wimmer, 2002; Lee et al., 2009). This raises the issue of developing heterogeneous web-based e-Government systems of government departments and agencies that can interoperate and be easily integrated. Although the state-of-the-art software engineering techniques including object-oriented and agile methods provide appropriate solutions to the aforementioned engineering problems of services integration and interoperability in e-Government (Sanati and Lu, 2007; Muthaiyah and Kerschberg, 2008; Lee et al., 2009), it has been demonstrated that they have certain limitations (Muthaiyah and Kerschberg, 2008). Therefore, during the past seven years, Semantic Web technologies based on ontology have emerged as promising solutions to these problems.

However, the recency of the field of Semantic Web, the scarcity of qualified Semantic Web specialists and the lack of a clear specification of the software development process of Semantic Web applications have hampered the adoption of Semantic Web technologies in the software development community in general and in e-Government in particular. This paper investigates the current state of practice of Semantic Web in e-Government, discusses the underlying technologies and presents a case study of application of these technologies in the field of e-Government. Firstly, a literature review is conducted to learn about the current practice of Semantic Web in e-Government. Secondly, the Semantic Web technologies needed for building semantic-based e-Government applications including ontology, ontology languages and edition platforms,
semantic data storage mediums, semantic query languages and semantic web services are discussed. Finally, a case study application of these technologies is carried out. The main contribution of the study is the investigation, identification and discussion of Semantic Web technologies as well as the clarification of the software process for building Semantic Web applications; this may promote the adoption of Semantic Web technologies in e-Government projects and enable e-Government developers to take advantage of Semantic Web technologies to build e-Government systems that can be easily integrated and interoperated. The study would be useful to e-Government developers, particularly those of developing countries where there is little or no practice of Semantic Web technologies in e-Government processes as well as where little progress has been made towards the development of one-stop e-Government portals for seamless service delivery to citizens.

The rest of the paper is organized as follows. The methodology of the study is presented in Section 2. Section 3 presents a literature review on the current state of semantic web practice in e-Government. The technologies needed for building semantic web applications in general and e-Government applications in particular are presented in Section 4. Section 5 describes a case study application of using semantic technologies in e-Government process. A discussion is carried out in Section 6 and a conclusion terminates the paper.

2. Methodology

The methodology of this study is based on literature review and experiments. Firstly, a literature search is carried out in both e-Government and Semantic Web domains to identify the technologies and processes required for building Semantic web applications. Secondly, a domain ontology describing a government service domain is presented. Finally, the domain ontology is used to carry out experiments that illustrate the application of Semantic Web technologies in e-Government.


Several e-Government research and projects have adopted semantic web technologies during the past seven years. This is witnessed in the literature review below.

Salhofer et al. (2009) presented an ontological approach for service integration in e-Government. A semantic objective and service discovery technique was used to illustrate how e-services could be derived from citizens’ needs expressed in the form of simple phrases. The derived e-service ontologies were represented in Web Ontology Language (OWL) and the Web Service Modelling Language (WSML). Another ontological approach for semantic interoperability in e-Government was proposed by Muthaiyah and Kershberg (2008). They used a shared hierarchal ontology in which knowledge is organized at different levels with local ontologies. A semantic bridging process methodology was described for the mapping, merging and integration of local ontologies represented in an OWL syntax. In Sabucedo et al. (2010), an intelligent platform to host e-Government services in the form of a customer-oriented e-Government Web portal was motivated. To facilitate services and related public administrations interoperability they introduced the concept of an intelligent document and a Life Event service both of which are semantically modelled with OWL ontology. These allow automatic services composition, advanced searching mechanisms and better usability from the user’s perspective. A multilevel abstraction of life-events for e-Government services integration was presented in Sanati and Lu (2009). In their work, a life-event is defined as a collection of actions needed to deliver a public service satisfying the needs of citizens in a real-life situation and is modelled using three kinds of ontologies: e-Government ontology, regulatory ontology and service ontology. The ontologies are represented in OWL to enable dynamic services integration through semantic searching and matching of concepts. Xiao et al. (2007) present yet another ontology-based approach for semantic interoperability in e-Government. They describe the business process of e-Government services using an E-Government Business Ontology (EG-BOnt). Each business process is described in terms of its input, output, resource constraints and logical relations with other relevant businesses. Thereafter, each class of the EG-BOnt is defined using the OWL language for its strong semantic and logic relation expressiveness. Finally, an architecture describing a semantic interoperability framework between different government systems based on the proposed EG-BOnt was presented. Semantic interoperability solutions for local governments are proposed in the TerreGov (Barthes and Moulin 2005) project with a set of ontologies; these ontologies are used to describe services and documents, and enable the semantic Web services orchestration and discovery processes. Jarrar et al. (2011) present the semantic component of the Interoperability Framework of the Palestinian government, namely government ontology. The government ontology is composed of 15 modules describing data concepts,
services and processes of the Palestinian government, thereby, enabling the interoperability of e-Government systems.

The above review of semantic-based e-Government research and projects highlight key technologies including ontology, ontology languages and semantic web service; further to these, semantic web platforms for implementing ontology and web services as well as semantic data storage and query languages are needed for developing semantic web applications (Oberle et al. 2005). These semantic web technologies are discussed in the next section.

4. Discussion of semantic web technologies

4.1 What is ontology?

The most commonly used definition of ontology was proposed by Gruber (1993). He defined ontology as an explicit specification of a conceptualization. A conceptualization is an abstract and simplified view of a domain of knowledge one wishes to represent for a certain purpose; the domain could be explicitly and formally represented using existing objects, concepts, entities and the relationships that exist between them (Gruber 1993).

With the advent of Semantic Web, ontology has attracted developers in several domains such as e-commerce, e-business, e-learning, video and multimedia, e-Government, etc.; where there is need to develop intelligent web-based applications that can be easily integrated and interoperated to perform complex transactions/operations over the Internet. The Semantic Web languages and platforms for representing and creating ontology are discussed in the next subsection.

4.2 Semantic web ontology languages and platforms

The Semantic Web domain provides various languages for the formal representation and description of e-Government service workflow processes, Web services operations and documents processing using ontologies; they include Extensible Markup Language (XML), Resource Description Framework (RDF), RDF schema (RDFS), DARPA Agent Markup Language (DAML), and OWL (Laclavik 2005). Several software platforms are also used for ontology edition including WebODE, OntoEdit, KAON1, Protégé, and so forth (Calero et al. 2006). In addition to the software platforms used for the edition of ontologies, there exist APIs (Application Programming Interface) such as OWL API (Knublauch et al. 2004), Jena API (Wilkinson et al. 2003), Sesame (Watson 2008), etc., which provide facilities for the database storage and query of ontologies. The next subsection discusses the data storage and query languages for the Semantic Web.

4.3 Semantic data storage and query languages

Developing e-Government systems using semantic technologies consists of modelling and specifying the public administration system, the services (tax return, social grants, etc.) that it delivers to the public (citizens, businesses, etc.) and the services delivery processes, using ontologies. These ontologies must be further written formally with semantic web ontology languages such as XML, RDF, DAML, and OWL (Laclavik 2005). The resulting formal ontologies should then be stored in a traditional relational database management system (RDBMS) such as Oracle, MySQL, PostgreSQL, etc. (Wilkinson et al. 2003) and query through semantic web services in daily running of e-Governments applications interfacing them to provide answers to citizens’ requests. The semantic web domain has developed a set of languages for the technical implementation of these semantic-based queries. These languages include: RDQL, Semantic Web Rule Language (SWRL) (Zhang 2008), XSLT, SPARQL, etc. (Bailey et al. 2009). The next subsection discusses the dynamic part of a Semantic Web application namely semantic web services.

4.4 Semantic web services

Implementing and storing ontologies constitute the static part of the Semantic Web. Web services provide the functionalities that enable the reasoning and extraction of knowledge from the ontologies, within Semantic Web applications. Web services are software components developed to establish communication between e-Government systems and enable their interoperability (Bouguettaya et al. 2006). Semantic web services are web services that have been specified using Semantic Web standards such as WSMO (Web Service Modelling Ontology), SWSL (Semantic Web Services Language) and OWL-S (OWL for services); these standards enable
sophisticated knowledge discovery and reasoning on the Semantic Web. Table 1 provides a summary of the Semantic Web Technologies discussed above. In the next section, some of these technologies are applied to develop a domain ontology for an e-Government application.

Table 1: Summary of semantic web technologies

<table>
<thead>
<tr>
<th>Semantic web technology</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontology</td>
<td>Domain concepts and relationships between them</td>
</tr>
<tr>
<td>Ontology languages</td>
<td></td>
</tr>
<tr>
<td>XML, OWL, RDF(S), DAML</td>
<td>To represent ontology</td>
</tr>
<tr>
<td>Protégé, OntoEdit, WebODE, KAON1</td>
<td>To generate ontology in OWL, RDF(S) or DAML</td>
</tr>
<tr>
<td>Application programming interfaces</td>
<td></td>
</tr>
<tr>
<td>OWL API, Jena API, Sesame</td>
<td>To implement, store and query ontology</td>
</tr>
<tr>
<td>Relational database management systems</td>
<td></td>
</tr>
<tr>
<td>Oracle, MySQL, PostgreSQL</td>
<td>To store ontology</td>
</tr>
<tr>
<td>Ontology query languages</td>
<td></td>
</tr>
<tr>
<td>RDQL, SWRL, XSLT, SPARQL</td>
<td>To query ontology</td>
</tr>
<tr>
<td>Semantic web services</td>
<td></td>
</tr>
<tr>
<td>WSMO, SWSL, OWL-5</td>
<td>To semantically specify Web services</td>
</tr>
</tbody>
</table>

5. Case study practice of semantic web technologies in e-Government

Ontology is the backbone of any Semantic Web application; it serves various needs such as storage and exchange of data, ontology-based reasoning or ontology-based navigation. Semantic Web application comprises more than one software module (See Figure 2) to deliver all these functionalities (Oberle et al. 2005). These functionalities are realised with Semantic Web Services. The design and experiments are carried out in the next subsections to illustrate the ontology building, implementation, storage and query in Semantic Web application development.

5.1 Building e-Government domain ontology

5.1.1 Motivation of the case study

The idea of building the domain ontology used in this study was motivated by the fact that, in developing countries, almost every government department is somehow involved in the implementation of a programme aiming at improving the welfare of its people. These programmes are commonly called development projects and include infrastructure development, water supply and sanitation, education, rural development, health care, ICT infrastructure development and so forth. Thus, an application that could interface all the activities related to development projects implementation in a developing country could bring tremendous advantages; particularly, such a web-based e-Government application would improve the monitoring and evaluation of projects and provide transparency, efficiency and better delivery to populations. In Fonou-Dombeu and Huisman (2010), an ontology support model for such a web-based e-Government application was proposed. The next subsection presents the ontology.

5.1.2 Build the e-Government domain ontology

In Fonou-Dombeu and Huisman (2010) a five step framework adopted from the Uschold and King (1995) ontology building methodology was used to build the e-Government domain ontology (Figure 1). The domain ontology shows the key concepts of the domain (people, stakeholder, financier, monitoring indicator, reporting technique, etc.), the activities carried out in the domain (training, discussion, fieldwork, visit, meeting, etc.) and the relationships between the constituents of the domain. This study does not expand on the framework used to build the domain ontology. The interested reader may refer to Fonou-Dombeu and Huisman (2010) for further information. This study focuses on the process for implementing, storing and querying the domain ontology using some of the Semantic Web technologies discussed earlier.

The steps used to implement, store and query the domain ontology in Figure 1 are presented in Figure 2. Firstly, the domain ontology is semi-formally represented in description logic (step 1 in Figure 2). Thereafter,
the RDF version of the domain ontology is created with Jena API (step 2 in Figure 2) and saved persistently with the MySQL RDBMS (step 3 in Figure 2). Finally, SPARQL queries are written to query the RDF store of the domain ontology (step 4 in Figure 2). The next subsections describe the abovementioned steps in detail.

![Diagram of the domain ontology](image)

**Figure 1**: Domain ontology for e-Government monitoring of development projects in developing countries

### 5.2 Semi-formal representation of the domain ontology in description logic

The ontology engineering field prescribes three layers of ontology development according to the formalisms used (Uschold and King 1995). From a form that can be understood by human beings to one that can be processed by computers, these ontology layers are: informal ontology (as in Figure 1), semi-formal ontology and formal ontology (Uschold and King 1995). Two formalisms are commonly used to represent a semi-formal ontology; they include Unified Modelling Language (UML) class diagram (Ceccaroni and Kendall 2003) and description logic (Fahad et al. 2008; Baader and Horrocks 2005; Pan 2007). In this research, the description logic formalism is used. Description Logic is a formal language for knowledge representation. Its syntax uses basic mathematical logic symbols such as subset, union, intersection, universal and existential quantifications, etc. to represent the relationships between the constituents of a domain. The description logic version of the domain ontology in Figure 1 is obtained by analysing its semantic and logical structures, identifying its classes, class hierarchy and class instances, and defining relationships between classes.

The relationships include inheritance and association/composition relationships. A relationship is also called property or slot. Thereafter, the mathematical logic symbols mentioned above are used to represent the class hierarchy, relationships between classes (inheritance and properties), constraints on properties, etc. For instance, in the class hierarchy of the domain ontology (Figure 1), community worker, community leader, traditional leader, and project staff are people (person class) involved in the development project implementation. Therefore, community worker, community leader, traditional leader, and project staff are subclasses of the person class, representing an inheritance relationship. This relationship is represented in description logic formalism using the subset and existential quantification symbols, and the isA property as follows:
Jean Vincent Fonou Dombeu and Magda Huisman

ProjectStaff $\subseteq \exists \text{isA.Person}$
CommunityWorker $\subseteq \exists \text{isA.Person}$
CommunityLeader $\subseteq \exists \text{isA.Person}$
TraditionalLeader $\subseteq \exists \text{isA.Person}$

Figure 2: Chart of the implementation, storage and query of domain ontology

The isA property represents the inheritance relationship between classes. Similarly, the class hierarchy of the domain ontology in Figure 1 shows that department, agency and municipality are division of government. This relationship between government and its divisions can be represented in description logic with a hasDivision property, the subset, existential quantification, and union symbols as follows:

$\text{Government} \subseteq \exists \text{hasDivision}.(\text{Department} \cup \text{Agency} \cup \text{Municipality})$

Figure 3 presents a part of the description logic representation of the domain ontology...
The RDF formal representation of the domain ontology is created in the next subsection with Java Jena API and stored into a MySQL RDBMS.

### 5.3 Implementation and storage of the domain ontology in RDF

RDF and RDFS are the first standardized Web based languages (Sabou 2006; Kalyanpur 2006). RDF is a data model used to describe resources on the Web, whereas, RDFS is an improved version of RDF which provides facilities for the definition of basic ontology elements such as classes and hierarchy of classes, properties, domain and range of properties (Sabou 2006; Kalyanpur 2006). RDF uses statements in the form of <S, P, O> to represent an ontology. The meaning of a RDF statement is that a subject S has property P with value O. In a RDF statement, S and P are uniform resource identifiers (URIs), whereas, O is either a URI or a literal value (Wilkinson et al 2003).

In light of the above, the RDF syntax represents each class of an ontology as a resource which has properties with values. Thus, ontology will be represented in RDF with several statements. The RDF version of the domain ontology in Figure 1 was created with the Java Jena API (See step 5 in Figure 2).

Firstly, Jena API was downloaded, installed and configured in the Eclipse Java software development kit (SDK). Thereafter, the storable version of the domain ontology in RDF was created based on its semi-formal representation established in the previous section. The bottom left part of Figure 2 shows a part of the generated RDF code of the domain ontology in Figure 1. The generated RDF code of the domain ontology was subsequently stored in a relational database with MySQL RDBMS. This was done by downloading and installing the MySQL RDBMS, configuring Jena and MySQL (instantiating and loading the MySQL driver, creating the connection, etc.), and store the RDF graph of the domain ontology in the database. The screenshot of MySQL nodes of the RDF store of the domain ontology is depicted at the bottom of Figure 2. Further information on the implementation of ontology with Jena API and MySQL is provided in (McCarthy, nd; Dickinson, nd). Finally, SPARQL queries are applied to query the stored RDF version of the domain ontology (See sample SPARQL query and output in step 4 in Figure 2). A detailed explanation of SPARQL can be found in the W3C Recommendation documentation (Prud’hommeaux and Seaborne, 2008). The summary of the Semantic Web technologies applied in this study is provided in Table 2.

**Table 2:** Summary of semantic web technologies applied in this study

<table>
<thead>
<tr>
<th>Semantic Web Technology</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontology</td>
<td>Domain ontology for e-Government monitoring of development projects in developing countries</td>
</tr>
<tr>
<td>RDF</td>
<td>Semantic Web ontology language</td>
</tr>
<tr>
<td>Jena API</td>
<td>Java platform for developing, storing and querying ontology</td>
</tr>
<tr>
<td>MySQL</td>
<td>Relational Database Management Systems</td>
</tr>
<tr>
<td>SPARQL</td>
<td>Semantic Web language for querying RDF ontology</td>
</tr>
</tbody>
</table>
6. Discussion

This study reviews and discusses technologies for building semantic-based e-Government applications including ontology, Semantic Web ontology languages and platforms, semantic data storage and query languages, and Semantic Web Services. As shown in Figure 2, ontology is the main component of any Semantic Web application. Due to space constraints, this study did not expand on the methodology employed to build the domain ontology used (See Figure 1). Interested readers may refer to Fonou-Dombeu and Huisman (2010). Furthermore, the semi-formal representation of the domain ontology in Figure 1 that provides the implementable version of the ontology in terms of classes, class hierarchy, properties/slots, restrictions, etc. was represented in description logic in this study; this could also be done in UML as in Fonou-Dombeu and Huisman (2011).

Moreover, the recent years have witnessed the widespread adoption of Semantic Web technologies in various domains; this has enabled Semantic Web developers to argue that ontology building is a time consuming, labour intensive and expensive task in semantic web development. To address this challenge, studies (Maedche et al. 2003; Ding et al. 2007) have proposed the reuse of existing domain ontologies when building new ones. In fact, ontology reuse may (1) reduce the effort required to formalized new ontologies de novo, (2) increase the quality of the resulting ontologies because the reused ontologies have already been tested, (3) simplify the mapping between ontologies built using shared components of existing ontologies, and (4) improve the efficiency of ontology maintenance (Ding et al. 2007). To support e-Government domain ontologies reuse, Fonou-Dombeu and Huisman (2012) investigated and discussed existing e-Government domain ontologies on the Semantic Web.

The study generates stores and queries the RDF representation of the e-Government domain ontology in Figure 1 with Jena API. A similar process to that in Figure 2 could be used to generate and save the OWL version of the domain ontology with Protégé as in Fonou-Dombeu and Huisman (2011).

The building, implementation, storage and query of domain ontology as it is done in this study constitute the static aspect of any Semantic Web application. The dynamic part of Semantic Web technologies based on Semantic Web services and reasoning was not covered in this study and will be dealt with in our future research.

7. Conclusion

Semantic Web technologies including ontologies, Semantic Web ontology languages and platforms, semantic data storage and query languages, and Semantic Web Services were reviewed and discussed. Thereafter, a domain ontology describing a government service domain is implemented, stored and queried to illustrate the Semantic Web development process. More importantly, the study provides clarification on the engineering process of Semantic Web applications. This may assist e-Government developers, particularly those of developing countries where there is little or no practice of Semantic Web technologies in e-Government processes, to practice these technologies in their projects and build intelligent and interoperable e-Government systems.

However, practicing Semantic Web technologies required expertise in various areas such as ontology and knowledge engineering, programming languages, database, machine learning, etc. This required experienced and qualified people to carry out Semantic Web development in e-Government. This challenge could be dealt with in the long-term by (1) introducing courses on Semantic Web technologies in e-Government studies in information technology, computer science, and software engineering programmes at academic institutions, (2) developing partnerships between academic institutions, industry and government for the efficient utilization of the trained graduates and (3) encouraging collaboration between countries with successful semantic-based e-Government implementation and those with Semantic Web skill shortages through exchange programmes and workshops.

References

Jean Vincent Fonou Dombeu and Magda Huisman


Jean Vincent Fonou Dombeu and Magda Huisman


A Semantic Interoperability Layer to Support the Implementation of the Service Directive

Muriel Foulonneau1, Fergal Marrinan2, Nemunas Karalius3, Olgierd Dziamski4, Thomas Gordon5, Heiko Hartenstein5, Stefanie Rieger6, Katrin Weigend6, David Mitzman7, Slim Turki1, Younes Djaghoul1 and Jean-François Merche1,1 Henri Tudor Public Research Centre, Luxembourg, Luxembourg, 2European Business Register, Brussels, Belgium, 3ITree Group, Vilnius, Lithuania, 4Instytut Logistyki i Magazynowania, Poznan, Poland, 5Fraunhofer FOKUS, Berlin, Germany, 6Federal Office of Administration, Köln, Germany, 7Infocamere, Italy
muriel.foulonneau@tudor.lu
fmarrinan@ebr.org
nemunas.karalius@itreegroup.eu
Olgierd.Dziamski@ilim.poznan.pl
Stefanie.Rieger@bva.bund.de
Katrin.Weigend@bva.bund.de
david.mitzman@infocamere.it
heiko.hartenstein@fokus.fraunhofer.de
thomas.gordon@fokus.fraunhofer.de
slim.turki@tudor.lu
younes.djaghoul@tudor.lu
jean-francois.merche@tudor.lu

Abstract: The main purpose of the paper is to present a case study of the use of semantic technologies within e-Government context. We aim to describe the semantic layer that was designed in the scope of the SPOCS project to enable the validation of documents in the scope of cross border procedures. The SPOCS project (Simple Procedures Online for Cross- Border Services)1 focuses in particular on the transfer of documents to European administrations in the scope of procedures to deliver services across borders. One of the problems that arise is the heterogeneity of documents between countries even they have the same role. With the increase of cross border activities encouraged by the service directive in particular, electronic procedures are more important than ever. The project has therefore set up an infrastructure including the transfer of documents in a metadata container and the validation of documents. Cross-border service pilots have been implemented to show the added value of the SPOCS infrastructure. To overcome the problem of semantic equivalence of documents, the European Commission has encouraged the implementation of a semantic layer to support the interoperability between administrative systems and the reuse of resources across government bodies. In the scope of the SPOCS project, we have implemented a set of pilots to illustrate the added value of implementing a semantic interoperability layer and developing common models and vocabularies. Common ontologies have been designed to describe documents, equivalences, and procedures. Specific access mechanisms have been implemented to automatically verify the status of European companies. Finally, semantic rules have been created to determine the procedure that needs to be used in order to provide a cross border service. SPOCS resources are posted to the JoinUp portal3.

Keywords: service directive, electronic procedures, documents, semantic technologies, ontologies, questionnaire generation

1. Introduction

The SPOCS project (Simple Procedures Online for Cross- Border Services)3 gathers 34 partners from 17 countries to implement an infrastructure that supports the service directive. It focuses in particular on the transfer of documents to European administrations in the scope of procedures to deliver services across borders. For instance, in order to deliver a travel agent service in Poland, it is necessary to provide an insurance contract. Several documents, such as a birth certificate, an ID, a degree or a criminal record are often used in procedures. Local administrations should be able to recognize and use them, whichever the European country in which they were issued. With the increase of cross border activities encouraged by the
service directive in particular, electronic procedures are more important than ever. The project has therefore set up an infrastructure including the transfer of documents in a metadata container, the Omnifarious Container for eDocuments (OCD) (Medimorec et al., 2012) and the validation of documents (e.g., that the document being transferred is a Portuguese birth certificate and that it is accepted as a proof of nationality in the context of a particular Luxembourgish procedure). Cross-border service pilots have been implemented to show the added value of the SPOCS infrastructure.

The SPOCS infrastructure enables the interoperability between administrative procedures across Europe. However, one of the most important challenges was the establishment of relations between documents in order to optimize the performance of e-procedures. Semantic technologies have been proposed as a solution to address the representation, management and processing of data and resources. Over the last years, the European Commission has encouraged the implementation of a semantic layer to support the interoperability between administrative systems and the reuse of resources across government bodies. The SEMIC project (Semantic Interoperability Community) for instance has supported the development of Core vocabularies in order to describe Persons, Locations, and Businesses in eGovernment applications with the support in particular of the European Commission ISA programme (Interoperability Solutions for European Public Administrations). Core vocabularies can help administrations use similar models and describe resources in a similar way. In the scope of the SPOCS project, the objective was to implemente a set of pilots to illustrate the added value of implementing a semantic interoperability layer and developing common models and vocabularies. Two problems have been identified 1) How to establish equivalence between documents .. 2) how to represent rules for the validation information (administrative and citizen information) over the process. Our approach was to propose a set of ontologies and services in order to fix .... We investigate the design of ontologies to support the eDocument delivery process, as well as mechanisms to record equivalences between documents the validation of a document, based on document description or based on the data it contains, finally the importance of using semantic data sources and the challenges encountered.

The paper first presents the problems addressed in the SPOCS pilots (section 2), then the work carried out on ontologies (section 3), finally the experimentations for recording document equivalences in semantic datasets (section 4), for automatically validating documents (section 5) and applications (section 6), and for using semantic data sources in the course of the validation process (section 7).

2. The problem of building procedures to support cross-border services

The problem of cross border services can be formulated as follows: Let X, Y be European countries, let S be a service provider of X that wants to deliver a service in Y. S must submit an application to the competent authority of country Y. The application procedure requires that he records information such as the name of the applicant and that he provides documents potentially issued in different countries, by different competent authorities (e.g., a birth certificate from Portugal to be submitted in the context of an application to the Luxembourgish competent authority). This is a key task to accomplish the application process. However, the acceptability of documents issued in various countries is not always explicitly stated in local procedures. Indeed, the legislation often refers to the name of a document as produced by national competent authorities. Mechanisms are therefore needed to ensure the validity of both the information and the documents provided and the completeness of the application, even though the authorization of delivering the service in the end decided at the level of the local competent authority.

The form and content of official documents differ across Member States. The legal preconditions for services typically require specific kinds of documents to be presented, such as identity cards. The data models underlying documents and the information contained in particular document types are not harmonized across Member States. The attributes of names (e.g., first name, last name, full name) are heterogeneous, since for instance they do not all provide a way to express academic titles. Moreover, the context of the transaction can be important when defining rules for excluding or including certain kinds of documents. For example, a driving licence may be used as identification for transportation services but is not sufficient for border-control services.

1 https://joinup.ec.europa.eu/community/semic/description
2 http://ec.europa.eu/isa/
It is necessary 1) to define a mechanism to transfer information and documents in the context of the cross-border service procedures, 2) to define a mapping of document types, expressing which documents can be provided by a service provider, whichever the country that issued the document (e.g., a birth certificate from Portugal to be submitted in the context of an application to the Luxembourgish competent authority), and 3) to determine and represent rules to validate the documents based on both the mapping information and the information provided over the course of the procedure.

A container has been defined to support the transfer of documents in the scope of the cross-border applications. The container is implemented either as a ZIP file or as a compound PDF. The Omnifarious Container for eDocuments (OCD) includes three layers:

- The Payload Layer, i.e. the document file, the Metadata Layer, and an Authentication Layer.
- The Metadata layer is itself divided into metadata of the OCD (such as the sender and the receiver of the container).
- The metadata that represent the document or payload, including in the best case an extraction of the value of information recorded inside the document (e.g., the birthdate for a birth certificate) (Medimorec et al., 2012).

The semantic layer aims to standardise the information that helps define the acceptability of a particular document in the context of a cross-border procedure. It requires designing a data model to record document type equivalences as well as a set of ontologies, and mechanisms to record equivalences, to verify an application with users, and to implement a document type validation process.

This addresses the issue of transferring information and documents in the context of the cross-border procedures. However, in order to interpret the content of the metadata layer, we had to investigate solutions to represent the representation of document mapping and the implementation of validation rules.

3. A set of ontologies

Ontologies are widely used for sharing and representing knowledge. They support formal description of concepts and their relations. They include associated inference mechanisms to derive information from explicit parts of a model. Semantic technologies include formal languages such as OWL\(^6\) and a set of reasoning mechanisms based on description logics (Horrocks et al., 2003). We therefore experimented the use of semantic technologies to address the representation of document equivalences and associated rules.

A set of ontologies has been developed for supporting various pilots presenting the added value and operating mechanisms for the semantic layer. In particular, the SPOCS set of ontologies supports the collection of data on document equivalences and the procedure of validation of documents against the document equivalence ontology.

Indeed, validating cross-border applications requires mapping document types by expressing which documents can be provided by a service provider to satisfy the legal and administrative requirements of a service description. This problematic can be attached to the one of semantic data integration domain (Ref je vais voir dans ma these). The latter aims to create a full mapping between heterogeneous data sources, in order to use them in transparent way.

Two main ontology are proposed: The Document and the Application ontologies.

3.1 The document ontology

The Document ontology is composed of a representation of concepts Documents and DocumentTypes with the associated concepts, such as the Organization that issues the DocumentType and the Procedure that requires the DocumentType. The birth certificate of Mr. X would be an instance of the Document class, with a document type BirthCertificate.

---

\(^6\) [http://www.w3.org/2004/OWL/](http://www.w3.org/2004/OWL/)
Muriel Foulonneau et al.

The Document ontology represents Equivalences with a target and a source as DocumentType. An Equivalence occurs when a particular document type (source) is equivalent to another document type (target) (Foulonneau et al., 2012). However theoretically simple (e.g., owl:EquivalentClass), the representation of equivalences had to take into consideration a number of constraints. The Equivalence is not represented as a symmetric property for two reasons. On the one hand, the property is conditional. It is possible to restrict the validity of an equivalence to a particular Procedure (its context) and define DocumentOfficialAttributes required for their validity, such as the official translation of the document. On the other hand, the relation of equivalence is not completely symmetric. Even if a document X from Portugal is accepted in all cases as a substitute for document Y from Luxembourg by the Luxembourgish authorities, the Portuguese authorities do not have to accept document Y from Luxembourg as a substitute for document X from Portugal.

An Information class aims to support the definition of the data that is contained in a document, such as the name or the birthdate of a person.

The Document Type taxonomy provides the hierarchical structure of document types. It is also represented as an ontology. It uses the subtypeOf property to represent hierarchical relations. For instance, a French passport is a subtypeOf passport. This mechanism is equivalent to the broaderTransitive property in SKOS (W3C standard for Simple Knowledge Organization System)

3.2 Application ontology

The Documents are included when a user submits an Application (Cf. Figure 1). The Application is represented with concepts such as the submitter of the application or the applicant. An Application is expected to follow a particular Procedure that determines the path and expected Documents, Information (e.g., the birthdate) typically provided through a form, and ConditionRules (e.g., the applicant should be above 18). The Validity of the Application is inferred from the Validity of the individual required Documents and other conditions (such as the provision of certain Information), as determined from the Procedure.

Figure 1: Application ontology

OWL versions of these ontologies have been created. They are used in the semantic pilots developed in SPOCS for the validation of documents transferred through the SPOCS infrastructure. In order to implement a

1 http://www.w3.org/2004/02/skos/
semantic layer that enables the cross-border service delivery application process, it is necessary to set up a number of associated mechanisms, to create data on equivalences, to determine, based on those equivalences the opportunity of putting together an application, and to validate an application. The following sections present the pilots which were developed to implement these mechanisms.

4. Document equivalences with the MADOQS equivalence engine

In order to validate the transferred documents, it is necessary to determine which documents should be provided and which are equivalent, i.e., accepted as substitutes in the particular context of a procedure. The quality of the system depends to a large extent on the reliability of the semantic data source on document equivalences. The mechanism to record and maintain information on equivalences in the corresponding semantic data source is therefore critical.

In the current context, an equivalence can come from various sources, 1) the legal environment, 2) the hierarchical representation of document types (a Lithuanian passport document is a subtypeOf passport), and 3) the manual addition of the equivalence by administrative agents.

4.1 Collecting data from the legal environment

In case a legal framework exists that entails an equivalence between two types of documents (e.g., a French and an Irish driving licence), the equivalence can be inferred from the representation of the legal environment. This requires modelling the legislation related to a particular procedure and/or document. For instance, the directive 91/439/EWG_910729 defines a European driving license. From this piece of legislation, it is possible to infer the symmetric equivalence of all licences issued by the authorities of the European Union countries. The modelling of legislation was investigated in the scope of the Travel Agent case with Poland, Luxembourg, and Germany with the Carneades software (Gordon et al., 2007). However, instead of modelling the validity conditions of a document equivalence, we modelled the conditions for the authorization procedure in order to support the civil servant in the decision process for the delivery of a business permit. The authorization procedures are managed by European and national legislations and often further regulated by delegated legislations and non-statutory legal rules which had to be analysed in order to model the authorization procedures of the respective countries. The activities of travel agents in Luxembourg are considered as regulated commercial activities, subject to a specific business permit. The rules represent the qualifications and insurance required to operate as a professional travel agent. Rules for Travel agent services were encoded for both Luxembourg and Poland with the support of the Fraunhofer Institute. It was then processed by Carneades.

Figure 2 shows the reasoning map generated by Carneades on a particular instantiation of the Polish tour operator insurance requirements
4.2 Inferring equivalences from the document type taxonomy

In case it is possible to gather information on the taxonomy of document types, inference mechanisms can be used to define hypothesis on the equivalence of documents. We represented a set of document types in the Document Type ontology (taxonomy represented in OWL language). A semantic rule (Jena Rule language) transforms the hierarchy into an equivalence as represented in the Document ontology.

4.3 The collection of data from administrative agents

In the third case, data should be collected from administrative agents. It is necessary to develop a mechanism that supports the collection of data on document type equivalences, either new equivalences, or equivalences created through inferences (cases 1 and 2) which have to be validated. An initial mechanism was implemented to demonstrate the possible value of a data collection service that analyses the dataset to identify the needs for validation or new information. It implements a basic set of inferences based on the OWL structure (e.g., symmetric properties) and a set of rules. These aim to generate hypothesis of equivalences which will have to be validated by administrative agents.

The system generates questions from the semantic model and uses the answers to annotate the original model, add data, and remove or replace other data. The system loads the OWL file, implements inferences, and generates questions, i.e., forms to request either the addition of equivalences or the validation of proposed equivalences. The evolution of the OWL file uses an annotation mechanism (Foulonneau et al., 2012) inspired by the Open Annotation specification of the Open Annotation Community. It allows annotating the equivalences, by defining a status (‘valid’ or ‘to confirm’), as well as the author of the equivalence, either an automatic inference process (rule) or a human agent. Forms are generated from semantic constructs, e.g., an equivalence with a status “to confirm” or to support the creation of a new equivalence.

Figure 3 presents the form generated for the creation of a new equivalence. It provides mechanisms to select either the procedure in which the equivalence is valid, or all procedures in case it is valid in the context of all procedures. A user can access detailed information on each equivalence with a dedicated link.

5. The automatic validation of a document

The data source on document equivalences of the previous section can then be used for verifying the validity of a document in the context of a particular procedure.

A semantic pilot was set up to support the application process of a Lithuanian Service Provider willing to provide Travel Agent services in Portugal. During the application process, the Lithuanian service provider has to send a filled application form with supporting documents to the Portuguese competent authority. The

---

8 http://www.w3.org/community/openannotation/
Portuguese competent authority then reviews the documents and makes a decision regarding the application, i.e. issues a permit, requests additional documents or rejects the application.

**Figure 3:** Form generated for the creation of a new equivalence

The SPOCS semantic validator is a SPOCS module capable of validating data transferred from the Service Provider to a Competent Authority during the cross-border application procedure. The SPOCS semantic validator is designed to work on the receiver’s side (i.e. on destination country’s Point of Single Contact/Competent Authority side). It returns validation results for the Competent Authority as an aid in the decision making process.

**Figure 4:** Technical architecture of components used in Semantic Pilot Lithuania – Portugal

The Semantic validator includes several modules. The Validator core module (java library) is capable of extracting application and document type definitions from the semantic model and runs validations using the
rules defined in the model. Validation descriptions must be defined in the model (OWL) and implemented in Java code. The OCD validator module (java library) is capable of validating OCD contents using the validator core module and pre-defined validation rules. The module parses the OCD container and builds an in-memory representation of the OCD content. OCD payload documents are also parsed with document parser modules. Finally, the Validator core module runs validations and returns validation results.

Validation rules are represented using OWL. An OWL model defines names and descriptions for the specific administrative procedure and its requirements. Administrative procedure requirements are treated as validation rules by the semantic validator. Each requirement is validated by the validator to check whether a particular application is valid according to the defined set of requirements. Each validation rule defined in the OWL model must be implemented in Java code. The Validation core module contains general rules (for example, the rule requiresDocumentType can be used to define requirements to provide specific documents for an application procedure). Additional rules may be defined for each administrative procedure.

Validation rules are defined by declaring OWL individuals which must be declared as instances of OWL classes from the SPOCS ontology.

The ontology underlying the validation process includes entities such as an Administrative procedure (the specific administrative procedure, which defines requirements for an application process), a Document type (the types of the documents provided by an applicant during the administrative process), and a Requirement (as defined in the administrative procedure).

In case a Lithuanian Travel Agent applies for a travel agent certificate in Portugal, the Portuguese receiver validates documents provided by the Lithuanian Travel Agent. The Portuguese Travel Agent application procedure is defined as an instance of the class Procedure named ForeignTravelAgentApplicationProcedure. It is assigned a set of Document Types as objects of a statement, with the requiresDocumentType property as predicate.

6. The automatic validation of a document and application based on data

The data source on document equivalences can then be used for verifying the requirements of a procedure and the validity of a particular application. The validation of the application against the procedure requirements is based on a data collection process.

The Polish government has issued very sophisticated rules, which have to be fulfilled in order deliver a service in Poland. There are requirements beyond the mere provision of the document type requested, which have to be fulfilled in order to ensure that a specific procedure form can be used. Regarding the documents themselves, their content has to be taken into consideration. Conditions apply to determine the validity of a bank guarantee for a particular scope of activities. The equivalence is defined based on either the document type or the document content (i.e., the information it contains). A user who applies to deliver a service has to fulfil a condition on a minimum level of financial guarantee. In the scope of administrative procedures, the documents to be provided are not all issued by administrative authorities, but rather by private institutions, such as banks or insurance companies. The insurance guarantee document includes three, i.e., the area of activity, the level of financial guarantee, and the scope of business activity.

The system creates data based on an empty instance of a resource. The required information is represented as questions included in a dedicated online form. When all data are collected, the guarantee for travel agent services is deemed either valid or invalid in the scope of the administrative application procedure. The Polish regulation is encoded as Bank guarantee rules using Jena rules. A Bank guarantee ontology was defined. Each document allows creating an instance of bank guarantee. The instance of bank guarantee is empty at the beginning of the process. It grows as answers are provided to questions created by the system. Rules are applied with the Jena rule engine. A rule is defined with a list of conditions (premises) and a list of outcomes (conclusions) separated by an arrow. Each rule is presented in brackets. It uses a RDF triple structure. After the rule engine interprets the rule, it computes new RDF triples. It identifies new missing information for every stage. The system creates questions whose answers fill the document instance. The instance is updated with each answer to a new question. The last stage of the interaction computes a final analysis which is displayed.
7. Using semantic data sources

The pilots described in the above sections rely on various data sources, some of them created for the purpose of the project (e.g., the dataset on equivalent documents). However, they also reuse existing data sources. In order to check the validity of documents and provide interactive ways of improving the quality of applications, the semantic layer requires additional data sources beyond the equivalence between document types. In particular, information from the EBR registry is used in the SPOCS pilots. The European Business Registry gathers data from the company registration agencies in Europe. It makes data available through a set of services.

7.1 The EBR registry, a set of web services

The SPOCS project and demonstrators consume the suite of EBR web services that supply European company information. In addition, the Web services developed by EBR for SPOCS currently provide access to a Directory of Registers (DoR) and a Legal Status Lookup. The EBR SPOCS Directory of Registers (DoR) offers a secure basis for identifying the competent authorities within the Business Registry domain. The EBR SPOCS Status Lookup service is a lookup facility to determine whether or not the legal status code of a competent authority corresponds to “Normal Activity”.

The European Business Registry data can be accessed through dedicated Web services. A dashboard page has also been implemented as a human interface. It shows the status of all countries available for searching (Figure 6). This is achieved by querying the GatewayAvailable web service. The service also offers information regarding the opening hours of each gateway. This information can be made available to the user by clicking more info on each gateway listed.

In the travel agents pilot between Lithuania and Portugal, EBR services are used to collect company information. The proof of the status of the legal entity (e.g., active or inactive) is transferred as well as information related to its establishment in another EU Member State.

7.2 Supporting the service directive with open data

Data sources are at the core of semantic interoperability. A pilot was set up to experiment the use of open data for a portal on eServices. It is divided into three sections, Open data, Innovation & analysis, and Community. Open data make available information from the operative level up to designs, concepts and benchmarks. Innovation and Analysis offers the developer community opportunities to show mash ups and

---

8 http://spocs.ebr.org/SPOCSWebService.asmx?WSDL
applications based on these data. The community part is the collaborative section of the portal. It provides a space for discussion and if needed voting. The editing and writing is carried out through the CKAN software in version 1.10. The datasets are replicated and stored in the Portal Data Storage (local file-storage). The demonstrator links to two applications doctype verifier and benchmark mashup.

Figure 6: User interface for the EBR Services for accessing structured information on companies

Although only at pilot stage, this portal illustrates the opportunity raised by using various data sources. It also shows the critical issue of maintaining them over time.

7.3 Towards governance mechanisms for semantic datasets

In this paper, we have illustrated the various components to be taken into consideration when setting up a semantic interoperability layer for supporting the implementation of a cross-border procedure. Data collection is a core challenge for creating semantic resources. Their maintenance is however even more of a challenge. While large scale pilots for eGovernment in Europe, such as SPOCS, PEPPOL11 or epSOS12 have defined semantic resources and explored the issues related to their implementation, they all face the major challenge of maintaining the resources, i.e., ensuring the efficiency and reliability of the data collection process over time and the availability of high quality up-to-date datasets.

In the case of the eDocuments validation process, document types must be collected from the various administrations and authorities that issue the documents. This raises questions related to the governance of such datasets, i.e., the distribution of responsibilities and the rules that govern their maintenance. The storage of the registries of document types can be either centralized in a SPOCS infrastructure, or distributed (stored and maintained by each Point of Single Contact in each country).

Each Point of Single Contact can maintain its own Document type registry, possibly aggregating from various national administrations. These Document type registries can contain the equivalences with other countries’ document types. There are two options for the organization of registries. If equivalences are synchronized and potentially created in a central registry, as part of the SPOCS infrastructure, the data model used in the various registries should be similar. In this case, the central registry should use import functionalities. Alternatively, equivalences can be recorded in local registries but the content of local registries can be published as open data. In this case, the synchronizations can be performed through reasoning centrally with data gathered by a semantic aggregator. This requires using a similar data model and sharing concept identifiers. Therefore, each registry should aggregate data from other registries to be able to provide links to identifiers defined in a third party registry. If equivalences and reasoning processes are created in local registries, then synchronization

10 http://ckan.org/
11 http://www.peppol.eu/
12 http://www.eposos.eu/
processes have to be launched on a regular basis by individual registries. Reasoning mechanisms should support suggestions to users for new links.

8. Analysis and conclusion

The experimentations of semantic models and mechanisms to support the cross-border service applications have helped understanding the value of various implementation strategies. In particular, they have addressed the representation of document equivalences to support the provision of information from various sources and the constraints of non symmetric equivalences defined by each national authority. In addition, the implementation of both semantic rules (Jena rules) and rules encoded in Java for distinct contexts show the necessity to define mechanisms to represent different types of rules in a standard manner, associated to the semantic models. Finally, we assessed a mechanism suggested by Weber et al. (2009) to generate questions from semantic models to support eGovernment procedure. We adapted this mechanism to data collection from public administrations by transforming ontology components into questions (Foulonneau et al., 2012).

In this paper, we have presented an overview of innovative services to overcome the challenge of cross border services in Europe. In this case study, a set of ontologies and semantic mechanisms allow interacting with users and administrative agents through the generation of a dynamic questionnaire. The Equivalence engine (MADOQS) suggests new equivalences and assist the agent to manage them. This type of mechanism was implemented for the collection of data from administrative agents as well as from the applicants to verify the data they have recorded. SPOCS resources are being posted to the JoinUp portal13.

Thus, the SPOCS project has set up an infrastructure to support the transfer of documents across European administrations in the scope of the eService directive implementation. It has been instrumental to propose a semantic layer on top of administrative procedures in Europe. While these may evolve, the implementation of a European initiative to create reusable core vocabularies is suggesting new ways of setting up eGovernment applications, based on semantic models and semantic technologies (SEM/JoinUp). The future eSens project which will consolidate the various European large scale pilots is expected to follow up on the implementation of a semantic layer on top of eGovernment applications in Europe. In particular, the governance issues associated with the creation and maintenance of semantic resources is a core challenge for the future eGovernment systems.

Acknowledgements

This work was carried out with the support of the European Commission ICT Policy Support Programme under the Competitiveness and Innovation Framework Programme (CIP), in the scope of the SPOCS project.

References


---

E-Government Typologies, Stakeholder Relationships and Information Systems Support: The Case of Services to Employment

Mariagrazia Fugini¹, Piercarlo Maggiolini² and Ramon Salvador Valles³
¹Politecnico di Milano, Dipartimento di Elettronica e Informazione, Italy
²Politecnico di Milano, Dipartimento di Ingegneria Gestionale, Italy
³Universitat Politècnica de Catalunya, Department of Management ETSEIB, Barcelona, Spain
fugini@elet.polimi.it
piercarlo.maggiolini@polimi.it
ramon.salvador@upc.edu

Abstract The e-Government label is used to frame several activities, such as e-Service, e-Administration, e-Voting, e-Participation, e-Democracy. Leveraging the e-Government “umbrella term” to refer to such set of e-activities (which may be viewed as sub-concepts of the general e-Government concept) highlights from one side the existence of several inter-related concepts and on the other side the lack of a well-defined and commonly-accepted conceptual framework to identify and classify e-Government implementations with respect to the several “e-Government sub-concepts”. e-Government can be portrayed as an empirical driven adoption, since all the e-Government sub-concepts share the exploitation of ICT to support (very) different government activities. In this paper, we classify e-Government projects according to sub-concepts. Since some public services may be classified both as e-Service and as e-Administration, while others can hardly be classified, the exploitation of a general term like e-Government allows for a classification according to stakeholder, relationship types, and information System (IS) typologies. The investigated research question is whether such classification framework can improve the understanding of e-Government scenarios and can help e-Government project design, reengineering and evaluation activities by disambiguating the several involved e-Government sub-concepts. We use Services to Employment as a paradigmatic example of e-Government, due to their inherent nature and to our experience in designing and evaluating employment service systems.

Keywords: ICT for PA, edemocracy, services to employment, service networks, portal data analysis

1. Introduction

Currently, under the label “e-Government”, several significances and activities are included, like, to mention just a few, e-Administration, e-Services for health, labour, social services, Public Administrations (PAs) in general, and e-Democracy. In such streamline, the spreading of “e-Government” is an empirical driven adoption, since all the sub-concepts included within e-Government share the approach of service provisioning and knowledge management towards communities and groups (both customers and citizen groups) and the exploitation of ICT, in particular of (web) services and distributed technologies, to support very different activities concerned with government tasks. Nevertheless, understanding what kinds of e-Government are involved in a project can’t be ignored. The many e-Government sub-concepts may lead to different conflicting goals expressed by the stakeholders, and may generate diverging requirements for the ICT infrastructure. Such issues and conflicts could lead to project failure when not unfolded and appropriately managed. The exploitation of ICT tools to support government activities may introduce divergences with respect to traditional activity goals (e.g., the inclusion issues arising when ICT-based services are introduced). Furthermore ICT may considerably impact the information flows occurring among service stakeholders by improving structured information flow efficiency and by worsening unstructured information flows. The overall result may be positive or negative according to the e-Government sub-concepts affected and to the type of stakeholders involved.

In the literature and in the communities of practice, the term e-Government keeps being extensively used in a somehow fuzzy way, although the meanings vary. For example, e-Democracy is very different from e-Administration (Gregg 2001, Gronlund 2005). There are different requirements (e.g., in terms of privacy required from the ICT platform), goals (e.g., for the number of people needed to be reached and the way of reaching them) and stakeholder roles (e.g., in terms of end users, customers, providers and consequently of interaction modes). From our experience and from the literature (Hevner 2004, Kuhn 1996), we can affirm that classifying a project or initiative (e.g., re-engineering of processes and technologies) related to e-Government into one of the different e-Government sub-concepts is not straightforward. In fact, some projects belong to different e-Government sub-concepts at the same time. For example, projects in public health aimed at offering smart cards for hospitalization services can be classified in both areas of e-Service and e-Administration.
Conversely, some projects find no easy classification, such as projects of sustainability for requalification of urban areas. In such a context, the exploitation of a general term like e-Government allows overcoming these classification issues.

The challenge of our framework consists in classifying all the sub-concepts and the related ICT applications included in the current acknowledged and still confused term of e-Government, as also discussed in its basic principles in [Orlikowski 2001, Lee 2010]. The aim of the paper is to explore how ICT tools for e-Government activities may introduce divergences with respect to traditional activity goals (e.g., the issue of “inclusion of individuals” arising when ICT-based services are introduced). The paper refers to services to employment in the job marketplace, not only because we have experienced such projects directly (Fugini 2009, Cesari 2008), but mainly because these services are an exemplary case since they include all the sub-concepts of e-Government (Boswell 2012). By proposing a unifying framework, the paper wants to achieve a definition of effective e-Government functions. The use of ICT could give the impression of increased efficiency and effectiveness of government functions. However, this is not true: are we witnessing an excusable term misunderstanding (e-Government could be simply substituted with e-Administration) or even an ideological operation? Such operation should transform the citizens in “consumers”, and hence the whole politics in a consumer process based on the choice – through the vote– by the individual of those who are able to offer the most interesting services. This would cancel the idea – dated back to Aristotle but still valid in our opinion – that the individual wellness is first of all the result of the wellness of the “city”.

Then, considering services to employment, and discussing why these services are representative of our hypotheses, we analyze services supporting the job marketplace. Basing on our experience within EU and National projects for employment services, we refer here to the Catalan services to employment on which we worked in the SEEMP European project (Fugini 2009). Considering the Catalan system (Servei d’Ocupació de Catalunya 2012), we discuss what the improvement of functions should be towards a true e-Government system. We observe that the employment market is paradigmatic for a full view of e-Government. We draw some generally-valid conclusions about the applicability of our framework to federated ISs as a necessary (although not sufficient) condition to significantly improve e-Government. We focus on building a framework for classifying e-Government projects according to several dimensions like e-Government activities, stakeholder relationships types and IS typologies. The framework can improve the understanding of e-Government scenarios and of e-Government project design, reengineering and evaluation activities.

2. Classifications of PA functions, information systems and social systems

Public administrative functions can be classified as follows:

- **Internal administration**, for example: human resources and financial management.

- **Service delivery**, for any administered entity (citizens and socio-economic agents), such as water services, street cleaning and garbage removal services, healthcare and education, justice administration, public security, and so on.

- In the field of the job marketplace, we have services of professional education and, most important, examples of information services able to support job offer/ request matching and search for employment in general.

- **Government** (of collectivity and of territory), through tools ranging from urban plans to laws and policies regulating the job marketplace.

On the basis of such classification, we specify the typologies of PA IS.

2.1 Classification of PA information systems

The trend in IS development moves according to two directions: Administrative and Statistical ISs.

**Administrative IS**. These execute well-defined and precise functions of PA management. The systems are fed by documents, as sub-products of administrative acts, which represent the Information Sources. These systems clearly define who uses information and the reasons why such information is used, evidencing the reasons for creating information. Population registries, civil status registries, land registries, car registries, or company registry at the Chambers of Commerce are examples of Administrative IS. Although it can sound odd, we include
in Administrative IS not only the typical formal and structured services (typically bureaucratic) such as those mentioned, but also the petitions, observations and warnings by citizens, claims, and so on, often as an integral part of mandatory/optional procedures of consultation according to laws, rules and statutes.

As far as the job marketplace, IS managing mandatory communications regarding hiring and forwarded to pension organizations are typical administrative systems.

**Statistical IS.** These systems have no specific predefined uses/users. They support decision making processes; users are decision makers. Information collection is typically based on census procedures, polls, market and registry analyses, inquiries, and so on. Samples Statistical IS are those on birth/death rates, on demographic movements, and those derived from census. Administrative and Statistical IS are often inter-related, since their data sources can be used to feed them in one direction or vice versa.

As far as the job marketplace, the statistics – from various sources and under different collection modes – about hiring, resignations/terminations, typologies of work contracts, etc. – are fully included in this category.

### 2.2 A classification of social systems

Considering a PA IS, for instance a Regional IS, the need arises to clarify whether the Region is considered as an Organization (service provisioning and government tasks) or as a Collectivity referring also to the regional territory where it operates. To identify the different ICT strategies in the PAs, we need a classification of social systems interested by the given IS classification.

Social Systems are classified according to integration level parameters as follows: a) **Hyper-integrated Systems**, b) **Meso-integrated Systems**, and c) **Hypo-integrated Systems**.

**Hyper-integrated Systems.** These are a family, a group, or a clan. They need no formal or defined IS due to the nature of the links among their members. Political parties (on - but not limited to - a local scale), where client-type relationships exist between administrators and citizens, represent those social phenomena which, according to our scheme, can be classified as hyper-integrated systems. As both information exchange and communication are informal (they occur in a context where the relevant aspects are the transmission of traditions, moral values and norms, and a strong personalization of inter-individual relationships) even the related IS does not need to be formally structured. Traditions represent the memory of the hyper-integrated organization, which becomes accessible only after a long apprenticeship. A “clan” is not totally extraneous to PA systems, meant as a political system. In fact, such systems are based on trust, values, and norms through relationship sharing.

The job marketplace surely contains “clanic” components. The references/recommendations (meant in a positive sense and physiologic and not pathologic, but also those called “nepotism”), the selections/hiring by cooperation on the basis of the personal acquaintance of individual (“intuitu personae”) are a typical example.

**Meso-integrated Systems.** Organizations in their full meaning, that is, those called *bureaucracies*, are meso-integrated social systems. An industrial company is typically meso-integrated: each department produces specific parts of the whole product. The whole company aims at revenues and profit, related to the production and sales of single units. Analogously, a Municipality is a meso-integrated system: each councilmanship provides services to the administered population, and favors its social and economic development.

As far as the job marketplace, we consider as meso-integrated systems the Agencies (public and private) providing services to employment, in particular the intermediary agencies (Employment Centers, temporary work agencies, head hunters, and so on).

**Hypo-integrated Systems.** A territorial collectivity (Municipality or Region) is hypo-integrated. Each socio-economic unit (agricultural, industrial, commercial, public, etc.) produces goods or services, which are not *per se* oriented to the interest of the whole collectivity, but rather to their own survival and development. Other examples of hypo-integrated systems are collectivities of people, ethnic groups, Nations.
Comparing meso- and hypo-integrated systems, either Municipalities or Regions, Organizations have been conveyed both as meso-integrated systems and, as territorial collectivities, as hypo-integrated systems. The job marketplace is a typical hypo-integrated system. Therefore, to avoid confusion, it is worth detailing the differences between meso- and hyper-integrated systems.

Table 1 compares meso and hypo-integrated systems. In the first ones (which are social artifacts, namely social systems specifically built for a purpose), the organizational structure ruling the sub-systems is well identified, and the autonomy degree of the sub-systems is formally defined. Organizational workflow charts are a valid example. The system dynamics is observable: a clearly located memory exists in the organization, constituted by procedures and by work methods, which are easily accessible and controllable. This means that institutional and organizational tools exist to pilot the system from one state to another: in a meso-integrated system, a manager can order an employee to perform a task, purchases can be activated, sales can be controlled, and so on.

Table 1: Features of meso- and hypo-integrated systems

<table>
<thead>
<tr>
<th>Meso-integrated Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each subsystem is clearly oriented to the common task</td>
</tr>
<tr>
<td>The structure is defined</td>
</tr>
<tr>
<td>The degree of autonomy of subsystems is formally defined</td>
</tr>
<tr>
<td>The system dynamics is sufficiently observable and controllable</td>
</tr>
<tr>
<td>The knowledge (memory) is localized</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypo-integrated Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each subsystem per se is not targeted to the interest of the whole system</td>
</tr>
<tr>
<td>The structure is not evident</td>
</tr>
<tr>
<td>Subsystems have a high degree of autonomy</td>
</tr>
<tr>
<td>The system dynamics is scarcely observable and controllable</td>
</tr>
<tr>
<td>The knowledge (memory) is fragmented</td>
</tr>
</tbody>
</table>

Hypo-integrated systems create observation problems (knowledge), since memory is very fragmented. In fact, there are several operators, each with high operative and decisional autonomy. What is clear in a hypo-integrated system is the structure, since information exchanges exist among agriculture, manufactory industry, services, and PA. However, such structure is fluid, dynamic, fuzzy, and hardly controllable. In hypo-integrated systems, control problems occur. Municipality or Region administrators are not owners of their citizens, e.g., they cannot order a farmer what to plant or a company what to produce.

In the development of a PA IS, the Organization is often regarded as a bureaucratic structure, isolated from the territorial context, and operating to achieve institutional purposes, following well-defined procedures on the basis of laws and norms. In other words, the trend is to confine the PA to a meso-integrated system, while, in a wider vision, Municipalities and Regions are primarily territorial collectivities, hence hypo-integrated systems. The bureaucratic structure is only one portion of a wider system, where we have to consider, in a unitary view, the elective political entities, the administered community and the whole territory of competence.

3. PA Organizations and Models of ICT Adoption

We identify four typologies of PA and the related models of IS that best fit to them, according to the information exchange needs and use.

3.1 Bureaucratic Model

This model conceives a PA as an entity whose task is to emit rules and control their application: the PA are in charge of legitimating public-interest matters. A strong separation between politicians and managers exists in this model, as happens between the time a norm is formulated and the time it is implemented. The Administration is structured around the principle of the conformity of acts, i.e., what is relevant in order to have an action undergoing a juridical function.

Consequently, all data generated by PA, framed in such a view, are constituted by formal acts registering events (both internal and external), and referencing juridical acts. ICT applications mainly take into account registry activities, taxation, certifications and official acts management (deliberations, regulations, ordinances, authorizations, licenses, etc.).
In the job marketplace, the priority given to ICT support to mandatory communications about work contracts by enterprises to the various public entities (e.g. pension registries) is a clear clue that we are within the logic of the bureaucratic model.

3.2 Social model

This regards the Administration as an organization, providing (directly or indirectly) services to citizens. Information technologies are used to perform these services more effectively. In this sense, the target is to move from a PA system (devoted to register juridical facts and execute administrative acts) to a system accomplishing the various needs of the citizenship. Being able to manage public services for the collectivity is of primary importance. Therefore, most ICT interventions for automation consider educational and school registries, health registries, or lists of users of social services. The implementation of new information services based on ICT adheres to this view: Public Organizations create special services to inform the community about service availability, about economic, cultural, or sport initiatives taking place in the territory of competence. Up to now, what is called e-Government is often included in this model of PA and relates to its use of ICT. For sure, ICT as a support to service provisioning, for instance services of job offers/requests matching, or as a support to an effective/efficient functioning of the job marketplace, is fully part of the logic of the social model.

3.3 Political model

According to this Model, PA are qualified as organizations of political government, that is, as the center of socio-economic and territorial planning and governance. The specific nature of the PA as a public entity for political government emerges straightly. We consider the concept of Municipalities, Provinces, Regions, or Nations not in terms of Organizations, but rather as Territorial Areas and Collectivities. Usually, PAs are conceived defined entities with juridical orientations and regulations with their workforce, organizational structure, customers and users. Besides, they represent a part of a complex social and territorial system whose elements are citizens and socio-economic units acting in the administered collectivity. ICT, in this framework, is helpful for:

- governing and controlling political and socio-economic events, creating a qualified information-based network supporting the government activity and planning (in this view, the term e-Government is appropriate);
- favoring the relationships between the Government (in its many institutional forms) and citizens (single and in associations), allowing their participation in, and control of, government interventions (in this case, it is more appropriate to use e-Democracy).

The literature about e-Participation and e-Democracy is wide. A survey is given in (Coleman and Blumler 2009); some experiences in Italy are presented in (De Cindio and Peraboni 2011) and (De Cindio 2012).

From the job marketplace viewpoint, statistical systems, reviews, interviews, and observatories on employment feed the knowledge on the marketplace, support the set of employment policies and the verification of their effectiveness. Hence, such systems are a relevant tool supporting a political approach to the job marketplace.

3.4 Clan model

Finally, we cannot exclude that somehow the view of the Administration as a "clan" coexists with other visions. However, also the “clan” dimension is fundamental in the relationships based on trust between electors and elected (representatives and represented). Often, “clan” assumes a negative connotation. We go beyond this perspective since we evidence a specific mode of exchanging information in a social system, as in clan organizations. "Party-cray" (the occupation of PA by parties), "lobbing" and "favoritism groups" represent the degenerated aspects of such model. However, whenever we face a democratic relationship based on trust involving citizens and representatives, we face a clan logic. Clan-based operation is present in most social systems. Anyway, where such organizational form is privileged, impacts exist also on the way IS are interpreted and created. Information exchange and personal relationships are informal, as they involve elective organizations. The information exchange will be informal also between these entities and the bureaucratic structure, between public administrators and citizens (electors), perhaps through parties, associations, pressing groups, etc.
By ignoring this model, the risk is to disregard a notable part of the information flow, which is relevant also for the government of the collectivity. In this context, the fundamental role of Civic Networks in the various forms of e-Democracy and e-Participation should be analyzed deeply, especially concerning of the use of Web 2.0 and social networks.

For the job marketplace, in some Countries, such as Italy, the relationships and the connected information exchanges of “clanic” type are evident, in particular for highly qualified or managerial jobs. Hence, we can suppose that social networks of professional type (such as LinkedIn) will increasingly play a role. High attention must be given to e-Reputation and to risk of manipulation that can possibly bias it.

3.5 Wrap up

In Table 2, we map the illustrated categories of models onto the various types of E-Government functions which can be achieved.

**Table 2: Models of PA and related types of e-Government functions**

<table>
<thead>
<tr>
<th>PA Models</th>
<th>Types of E-Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bureaucratic</td>
<td>e-Administration</td>
</tr>
<tr>
<td>Social</td>
<td>e-(Public) Services</td>
</tr>
<tr>
<td>Political</td>
<td>e-Governance</td>
</tr>
<tr>
<td>Clan</td>
<td>e-Democracy</td>
</tr>
</tbody>
</table>

Many issues obstacle the diffusion of e-Government. Considering the PA models and their needs for adequate IS support as described so far, we now examine the reasons why ICT is still supporting government activities only to a limited extent. Besides the lack of political wills, there are some objective difficulties. The main difficulty in the realization of hypo-integrated IS -and true e-Government belongs to this typology- (e.g., territorial and socio-economic IS, but also systems supporting the governance of labor markets) stands in that information on the several elements of a community, which means socioeconomic and institutional operators, is minimally owned by Public Organizations. In fact, information belongs to the whole in a scattered way, since it is disseminated and distributed on the territory. Consequently, knowledge is fragmented and is held by single social units. Under which conditions is it possible that single social units share their knowledge within the PA context? According to our approach, this is possible only if information suppliers are, directly or indirectly, involved in the information flow either as users or as simple beneficiaries of its exchange.

Presumably, this is the reason why the Italian System in Lombardy *Borsa Lavoro Lombardia* (Fugini 2009) was designed to ground its success on sophisticated coetpetiton systems, and this is also the reason why it failed. An analysis of Borsa Lavoro Lombardia as a twin of the Spanish/Catalan system is given in e.g. (Fugini 2012) and is not discussed any further in this paper.

4. Concepts at work in the job marketplace: The SOC system

Much has been done in terms of policies and systems for unemployment prevention through information systems, particularly in EU Countries.

- In Italy, our experience regards *Borsa Lavoro Lombardia* and the National System, which have been studied wrt their integration with other EU Countries via EURES (Fugini 2009).

- At the strategic level of policies, (Copeland, P. and ter Haar B. 2013) gives a critical overview about the European Employment Strategies as a governance tool, analyzing the policy measures of the Member States with regard to the commonly agreed guidelines and the country-specific recommendations of the Council.

- The European Job Mobility Portal or EURES (*eures.europa.eu/*) is the EU basic tool dedicated to employment. The purpose of EURES is “to provide information and e-services for the benefit of jobseekers interested in finding a job abroad, employers interested in finding candidates from other countries as well as any citizen wishing to benefit from the principle of the free movement of persons.” However, the critical point for this platform is data storing and its structure and accessibility. Up to now, it is clear that there is a database for jobseekers which includes their personal information and a CV. The search engine of EURES is connected to the national databases of contracting countries and to a local database of EURES which is
related to the employers in the countries who did not yet join EURES and to employers who want to publish their vacancies in different languages. This foundation is working under supervision of the EU commission and is a public service working with public employment agencies.

Now, to illustrate from a practical viewpoint the three main actors of any government system (PA, Community, and Political Bodies organizations) and their ICT based interactions, we present one system as a use case, namely the Servei d'Ocupació de Catalunya (SOC) active as the job marketplace support system of Catalonia. The SOC has a network of 73 public employment offices and uses Internet, a call centre, a network of self-service interactive units (providing access to some Internet services) and a telephone line to each office.

The website (http://www.oficinadetreball.cat) provides services for job seekers, employers and the general public. Citizens – job seekers mainly – are provided with information on the job market such as the skills required for particular jobs, training courses, professional help, counselling, grants, statistics, etc. Selected information on job offers – including a description of the post, the skills required and the deadline for submitting an application – is provided through a link to a portal called Feina Activa (https://www.feinaactiva.gencat.cat), where job seekers can apply for job offers. The website also features services for employing companies, private agencies and training organizations, with information on training programmes in companies, guidance regarding employment contracts and information on finance and employment promotion activities. The website also allows firms to upload, publish and manage job offers and to furnish the SOC with data on employment contracts, provided the firms have already registered at a public agency. The website offers information on regulations and registration to private agencies and training centres and provides services to citizens such as information about the SOC, news and events, links to other job market websites and a suggestions box.

Under our framework, SOC is basically inspired by the social model offering ICT services to various stakeholders in order to support active policies to prevent unemployment. Hence, SOC can be regarded as a system of e-Services. The bureaucratic and purely administrative functions are also present (e-Administration). The statistics on the job marketplace still have a limited role; hence, the political model and the true e-Governance applications are of secondary importance.

Private agencies provide companies with services, which include matching CVs and job offers and selecting potential employees using psychometric tests and interviews. The use of private recruitment websites is quite common in Catalonia, with InfOJobs being the most popular (other popular websites are infofeina.com, monster.es, trabajar.com, laboris.net and infoempleo.com).

The performance of the public employment offices web-based system is perceived to be satisfactory by SOC management, despite being largely determined by the objectives and organization of the institution. Although this web-based system was conceived as a new channel to complement the existing network of offices, nowadays it is becoming the main channel. Services provided through the website, such as the renewal of job applications and benefits management for unemployed people, gathering mandatory information from companies on contracts and information on job searches and applications, among others, greatly add to the overall performance of the SOC. Many other factors contribute to SOC performance. For instance, the website’s usability, layout and vocabulary are fit for purpose. Furthermore, digital certification to access the website’s services ensures privacy and security, thereby further encouraging website use. Nevertheless, there is still room to further develop several functions, so as to improve the quality of services. Moreover, systems exist grounded on public initiatives and external to SOC, e.g., Porta22 promoted by Barcelona City Council. It concerns young people and long-term unemployed people offering professional guidance through a website, with some services provided in classrooms. These activities, promoted by a public administration, are provided on a voluntary basis.

**How the community sphere (as an hypo-integrated system) is organized**

Different initiatives have been created in Catalonia within the community sphere to make it easier to look for a job or a candidate. These initiatives, from individuals, companies and institutions, mainly operate according to market rules but are governed by specific legal regulations. These initiatives, channels or ways to seek jobs or candidates are as follows:

- Self-standing for a job and networking among relatives, friends and acquaintances.
**Stakeholder collaboration within the community sphere**

Within this highly segmented context, cooperation among stakeholders exists, for instance, when a staff selection company hires the services of a specialized website (e.g. InfoJobs) to identify and recruit new staff from a group of job seekers with specific skills.

**Stakeholder collaboration with the administration**

Collaboration is established between the administration and private training companies in order to develop and provide specific courses. The administration could hire the services of specialized websites to identify groups of job seekers with specific skills.

**IS categories within the community sphere**

The role played by ICT (databases, websites, messaging, matching, etc.) is important. Nevertheless, community-promoted initiatives are supported by independent organizations and so it is difficult to include their ISs in an integrated system, due to different data structures and processes. They are thus hypo-integrated systems.

Table 3 reports some functions and issues of the SOC model and relate them with the types of e-Government.

**Table 3: Models of PA and related types of e-Government functions: The SOC case**

<table>
<thead>
<tr>
<th>PA Models</th>
<th>Types of E-Government</th>
<th>SOC Functions</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bureaucratic</td>
<td>e-Administration</td>
<td>Management of unemployment documents. Support to the provision of mandatory information from unemployed people and companies to the PA. Provision of official certificates and information</td>
<td>Improving process efficiency, service quality and accessibility. Managing the dramatic increase in the number of unemployed.</td>
</tr>
<tr>
<td>Social</td>
<td>e-(Public) Service</td>
<td>Connection to National healthcare system. Management of redundancy payment. Management of job offers/requests, relationship with training companies and with agencies which provide job search engines. Support via links to private portals and companies. Evaluation of the quality of the provided services.</td>
<td>Improving processes efficiency, service quality and accessibility. Scarce connection to other public/private systems in Catalonia. Low connection with EURES. Improving processes efficiency, service quality and accessibility. Low efficiency in matching activities.</td>
</tr>
<tr>
<td>Political</td>
<td>e-Governance</td>
<td>Collecting and processing data to support plans, decision making and actions. Providing nets to exchange information and knowledge among stakeholders and the Government in order to promote actions.</td>
<td>New skills provision to meet companies needs. Increased number of stakeholders receiving information and reacting appropriately.</td>
</tr>
</tbody>
</table>
5. Concluding remarks

The framework proposed in this paper classifies the sub-concepts and ICT applications included in e-Government. The paper has given hints to show ICT tools for e-Government and has shown referenced services to employment as a typical case including all the sub-concepts of e-Government. Through our framework, the paper wants to provide a method to achieve effective e-Government functions. In fact, the simple use of ICT, especially in all its innovative forms (services technologies, or enabling platforms for social cooperation) is often used to label services provided by PA as e-Government. This gives the wrong impression of an enhancement in efficiency and effectiveness of government functions by public entities. However, in most cases what happens is a pure enhancement in the supply and exploitation of public services, which is far from being a true improvement of government activities.

References


Design Thinking and Storytelling in e-Government: The Case of ThinkData.ch

Olivier Glassey¹ and Jean-Henry Morin²
¹Swiss Graduate School of Public Administration (IDHEAP), Lausanne, Switzerland
²Institute of Service Science (IIS), University of Geneva, Switzerland
olivier.glassey@idheap.unil.ch
jean-henry.morin@unige.ch

Abstract: ThinkData is an interactive service for raising awareness on data protection and transparency in the organisational context. Originating from a study carried out by an interdisciplinary work group as part of a think tank on services science and innovation (ThinkServices). ThinkData allows its users to become familiar with the concepts of data protection and transparency through short stories, situations involving employees, managers, HR managers and information systems professionals. In this paper we present the design thinking approach used to develop ThinkData.ch and we describe the main features of the service. In the analytical part of the paper we discuss the main challenges and issues brought about by the tentative generalization of our approach, particularly in terms of modelling the multi-jurisdictional aspects of data protection and transparency.

Keywords: design thinking, data protection, transparency, storytelling, reuse, multi-jurisdiction

1. Introduction

Many political processes involve solving wicked problems, such as environmental or socio-economic issues. This paper deals with such problems, where for example public and semi-public organizations have to find a balance between data protection and transparency legal requirements. Oftentimes these legal requirements are very difficult to understand for people who are not legal experts but still have to implement services required to be compliant with legal frameworks, e.g. human resources managers handling employee data or IT specialists dealing with employee emails or mobile devices. We argue, based on a concrete case, that design thinking, co-creation and innovation games can be valid and valuable approaches to address such wicked problems. However, we have found that the use of such techniques is not very frequent (or at least not much documented in the literature).

In this paper we therefore investigate how design thinking and innovation games approaches can be used, based on the concrete case of Thinkdata.ch. Moreover, in this specific case we report on, we also show the value of using storytelling in raising awareness on complex problems. In the first part of the paper we present the design thinking approach that led to the development of ThinkData.ch and we discuss the main features of the service. In the analytical part of the paper we provide an assessment of ThinkData by applying a framework derived from previous work of the authors and initially inspired by the Technology Acceptance Model (TAM) of Davis. Finally we discuss the main challenges and issues brought about by the tentative generalization of our approach, particularly in terms of modeling the multi-jurisdictional aspects of data protection and transparency. We conclude by discussing the hypothesis of the value of Design Thinking and Storytelling as key factors for designing global people-centric awareness services on complex legal and public policy frameworks.

2. Design thinking and gaming approaches

Governments generally support participation in order to improve the efficiency, acceptance, and legitimacy of political processes (Sanford and Rose 2007). As any political process deals with solving wicked problems, governments have to find innovative ways of encouraging participation. Indeed wicked problems are “those that defy conventional approaches to understanding, planning, design, implementation and execution because: (i) The stakeholder interests are so diverse and divisive; (ii) Interdependencies are so complex and so little understood; (iii) Behaviors are so dynamic and chaotic (unpredictable)” (Newman and Gall 2010). Hybrid thinking is one approach proposed by Newman and Gall (2010) to address such issues: it is based amongst others on design thinking and co-creation. One such example is VoiceS research project (Holzner et al. 2009) that uses serious games to foster eParticipation and make “complex EU co-decision procedure accessible to a large audience (especially among younger citizens), thus providing necessary understanding and enabling them to contribute actively to the platform”. Holzner et al. (2009) define gaming “as a structured or semi-structured activity, usually undertaken for enjoyment and sometimes also used as an educational tool. Key components...
of games are goals, rules, challenge, and interactivity.” Furthermore serious game “came into wide use with the emergence of the Serious Games Initiative in 2002” which is “focused on uses for games in exploring management and leadership challenges facing the public sector” (Susí et al. 2007). Furthermore, gaming techniques have been used very successfully for decades in innovation and market research. Early adopters of such techniques were Silicon Valley companies who needed to find alternative ways to create new products. A notable example of this is the Innovation Games initiative of Luke Hohmann (Hohmann 2006) now turned into an online collaborative service 1.

3. Research methodology

ThinkServices is a think tank on Services Science and Innovation that was created in 2008 by the Institute of Services Science of the University of Geneva and the Technology Foresight Office of the Canton of Geneva in Switzerland. The ThinkGroup Data, Society and Transparency (TG-DST) was initiated in 2010 by ThinkServices and the Geneva data protection and transparency commissioners. This group brought together around 20 data protection and transparency experts as well as professionals and academics from various disciplines (law, management, information systems, graphic design, and human resources).

The main research objective of TG-DST was to raise awareness on data protection and transparency issues in the organizational field, i.e. to address one of those wicked problems mentioned in the introduction by making the relevant laws and regulation understandable and usable for an audience of professionals who are not legal experts.

In order to reach that research objective we set up monthly half-day meetings that were held throughout 2011 with the goal of developing a self-assessment toolkit on data protection and transparency. A deadline for launching the service was set for January 28th 2012 on the occasion of the Data Protection Day. The focus on organizations quickly appeared based on the lack of understanding of these issues among the various stakeholders (HR specialists, top management, IT management, employee, etc.). Moreover, the service had to be based on realistic data protection and transparency issues, and to provide recommendations, legal references and links to concrete examples. Four subgroups focused on stakeholder profiles defining scenarios on the basis of a generic storytelling canvas similar to the ones used in fairy tales such as the Little Red Riding Hood. The stories were then reworked in order to ensure coherence and were validated by data protection and transparency commissioners both at federal and cantonal levels. The first implementation of the service was done by a web design agency and was launched in French as planned on the Data Protection Day (January 28, 2012). Currently Thinkdata.ch is also available in German, Italian and English.

4. Description of the solution

Our main objective was to bridge the understanding and awareness gap found between the increasing complexity of legal frameworks and their target audiences. The area of data protection and transparency is a good example of this situation, as these laws impact employees, managers and citizens from both organizational and personal standpoints. Moreover, these requirements are increasingly difficult to meet, with the digitization of our society, cloud computing and the growing use of personal devices in organizations (BYOD, Bring Your Own Device). Indeed connected smartphones along with their many apps, their GPS, etc., raises new issues which were unheard of ten years ago. The EU Data Protection reform (Hustinx 2013, De Terwangne 2013) is currently underway (see European Data Protection Reform) to adapt the 1995 rules in order to offer more control on personal data, with notions such as “explicit consent” or the “right to be forgotten” (European Commission 2012).

We believe that an appropriate way to bridge these gaps between the complexity of legal requirements and the understanding of the target audience is education and training. Indeed we wish to raise awareness on these issues in a way that is both engaging and useful. In order to achieve this we chose a design thinking approach. Indeed some members of the ThinkServices think tank had a technology and innovation background and since the objective was to design a service (artifact), Design Science appeared to be a suitable methodology. These techniques have been used by ThinkServices since the beginning (Glassey & al. 2011). Globally our approach is adapted from techniques originating from design thinking: for an introduction see

---

1 Innovation Games, online service, http://innovationgames.com/ (retrieved Jan 2013)
Olivier Glassey and Jean-Henry Morin

Brown and Wyatt (2010) or Brown (2008); for more on design science we recommend Vaishnavi and Kuechler (2007); several great innovation games are documented in Hohmann (2006).

Based on the initial “design brief”, the first six sessions were used to define the service, its features and requirements through design thinking based workshops. A key moment in this process was when the group identified storytelling and serious games as central elements of the planned service. While serious games as a technique was initially left for later due to the importance of the required work, storytelling immediately appeared as a simple yet powerful approach for our service.

4.1 The use of storytelling

Stories help explain, engage imagination, spark new ideas, create a shared understanding, and persuade as argued in Quesenbery and Brooks (2010). Since one of the key requirements for the ThinkData.ch service was simplicity, both in terms of graphical interface and in terms of content, it was only natural that we relied on a storytelling approach to engage our target audience. Legal jargon is most of the time out of reach for non-specialists, especially when one has to deal with seemingly contradictory requirements in terms of data protection and transparency. We thus put a strong emphasis on writing scenarios that were easy to understand and included practical recommendations. We chose the narrative schema found in most fairy tales, like The Little Red Riding Hood:

- **Introduction**: the girl is asked to bring food to her grandmother;
- **Trigger**: the girl meets the wolf and changes her path;
- **Incident**: the wolf swallows the grandmother and the girl;
- **Resolution**: a lumberjack kills the wolf and saves them both;
- **Conclusion**: one should not go off the rails.

**Figure 1**: ThinkData story and narrative schema
This narrative schema is also emphasized graphically on the service through lettered bullets with visual floating indications when moving the pointer over them (rollover web design technique). This allowed us to structure all scenarios consistently (Fig. 1).

4.2 Service design and implementation

Most of the second half of 2011 was spent specifying and designing the service from a features and interaction point of view. We did loose some time thinking of some fancy round radar like approach for tablets and surface computer. But when the time had come to actually implement the service, it became clear this would not be feasible. The implementation was given to a Web agency in late November 2011 in order to be able to do some testing before the launch in January 2012. The implementation cost was minimal. The respective institutions of the members of the project supported it. In 2012 our main achievements were the translation in German, Italian and English, as well as some new features such as a seal to show authoritative validation of the stories and their recommendations by an official data protection and transparency authority (Fig. 2). Other minor enhancements and features were included in this last release such as RSS feeds, news, donation button for fundraising campaigns, illustrations for the scenarios and comments on the stories. This second version was launched on the 2013 Data Protection Day (January 28, 2013).

4.3 Description of ThinkData service

ThinkData is an online interactive service designed as a simple website implemented on a content management system. Upon accessing the service homepage, users see a question, as a “teaser”, related to data protection or transparency displayed randomly on a carousel (Fig. 3). When clicked, the user is taken to the relevant scenario. Users can also choose to browse the stories by general themes (e.g., biometry, geolocation, surveillance, etc.), activities (e.g., HR manager, IS manager, employee, etc.) or data types (e.g., banking, personal, medical, etc.) Currently, the service holds around 50 scenarios available online. Users also have the possibility to submit their own stories to be included after being edited for the site and checked by data protection and transparency commissioners.

For each scenario, the service provides three key information blocks (Fig. 3). First a plaintext recommendation that outlines what has to be done in a very straightforward way. To some extent this can be seen as a best practice “how to” recommendation to help users undertake the concrete steps towards doing the things right. The second information block contains references to the relevant legal texts and principles prevailing in the described case. Finally, real life examples or external resources are linked to the scenario. These can include press articles, TV clips, or court rulings.

All scenarios can also be displayed on a single page (Fig. 4) where a filtering mechanism allows users to display only relevant scenarios, others being grayed out. In order to facilitate discovery scenarios are also displayed randomly on the page. Another feature is that users can download scenarios with a fixed layout in pdf optimized for print (e.g., for distribution to employees, supervisors or to use as reference material for training).
Olivier Glassey and Jean-Henry Morin

Recommendations
The biometric data usually includes some sensitive data (particularly health). When this is the case, a formal legal basis is required and the persons concerned must be clearly informed and must consent to the processing of this data. The goal must be clear, and the most adequate and least intrusive measures must be chosen. These measures must be adequately communicated. In addition to this, the employer must also consult the employees or their representatives and, in the absence of a formal legal basis, obtain their free and informed consent prior to the introduction of an automated system for the processing of personal data.

Basic principles
UPAD 38 and 42 ; LT 6 ; OLT 26 ; CO 328 and 328b ; DPA 4 al. 4, 12, 13
Protection of privacy, protection of workers, the principle of proportionality: these measures must be necessary and the least intrusive possible.

Resources
The private bank Pictet & Cie in Geneva have been using 3D facial recognition to secure the access to its buildings since 2006. How did they overcome the fears of its 2,000 employees? Through communication. This technology does not monitor the health of an individual or violate their privacy. “The employees feared that their facial scan could affect their health, which is not the case because the machine simply films,” says Jean-Pierre Thionne, in charge of the security of the private bank. The database bank does not contain any photos of the employees either, but analyses the scans of their skulls according to the 40,000 reference points, and from which nothing can be drawn from:

Figure 3: Resources linked to stories.

Figure 4: ThinkData story selection and filtering screen
Finally users can submit their own questions, story ideas or issues. Data protection and transparency commissioners then rework relevant ones in order to publish them online as structured scenarios. As mentioned above, in the 2013 version we introduced a “ThinkData seal” (Fig. 2), in order to show that these recommendations were indeed validated by data protection and transparency commissioners, either at the Federal or at the Cantonal levels. Even if submitted questions or issues are not published, each contributor
receives a personal answer or recommendation by the commissioners. In six months we published a dozen new scenarios and we even created a new stakeholder category, namely citizens. Indeed we received many requests on data protection and transparency regarding citizens’ everyday life. This led to extending our scope, even though it was initially limited to organizations.

5. Assessment of ThinkData.ch

The initial goal of ThinkData.ch was to bridge the gap between legal complexity and end-users’ understanding of data protection and transparency requirements. In order to do so we used the body of research on user satisfaction, most notably Wixon and Todd’s paper (2005). They propose “an integrated research model that distinguishes beliefs and attitudes about the system from beliefs and attitudes about using the system”. To survey the behaviour of using technology Wixon and Todd rely on the well-known technology acceptance model (TAM) developed by Davis (1989). This theory suggests that users confronted to a new technology are influenced in their use by the:

- **Perceived usefulness**: Davis defines it as “the degree to which a person believes that using a particular system would enhance his or her job performance”;
- **Perceived ease-of-use**: Davis describes this as “the degree to which a person believes that using a particular system would be free from effort”.

We have not yet investigated these questions methodically, e.g. with an online survey for ThinkData.ch users or with interviews. However we had feedback on how the service is used:

- **As an FAQ screening tool for organizations on data protection and transparency**: some people reported using the service in their organizations to direct their employees to get more familiar with data protection and transparency issues and to first check there for any related questions before asking the person in charge in the organization.
- **As a training tool in education and awareness training on data protection and transparency**: as part of the public administration training in Geneva, ThinkData is used within a course on data protection and transparency provided to state employees (State of Geneva Continuous Education programs 2012).
- **As a way to alert or warn on a potential data protection and transparency issue**: some people have reported using the print your story takeaway feature of ThinkData to actually give it to their managers or simply leave it on a table somewhere so other people can be alerted.
- **Personal verification use**: many people reported using the service to check on how their personal information are used and as a way to make sure that they are doing the right thing in potential data protection and transparency situations.

This gives us a few elements of response regarding perceived usefulness (service recommended to employees and used in training) and perceived ease-of-use (print a story and show it around). Of course this is only very preliminary and not based on scientific evidence. Future work will be the realization of an online questionnaire that ThinkData.ch visitors will be asked to fill when accessing the website.

Furthermore we wanted to assess the usability of ThinkData.ch, by measuring attributes of electronic services such as accessibility, timeliness, personalization, navigation or online facilities. In order to do so we used an assessment framework we developed in order to measure the “proximity” of e-Government services (Glassey & Glassey 2004). The unit of measure used in this assessment is the Smallest Number of Clicks (SNC) to reach a given element of measure (Table 1).

The version 2 of ThinkData.ch has all of these features available in one-click (or at the most two), apart from personalisation. This topic leads us to our next section, as we would need to develop a multi-jurisdictional model for ThinkData.ch in order to be able to give personal recommendations to users according to their localization (Federal laws in Switzerland are completed by Cantonal laws, and in some cases the Cantonal law is more restrictive that the Federal one, e.g. in the case of data protection).
Table 1: Measuring proximity of e-Government services

<table>
<thead>
<tr>
<th>Proximity Dimensions</th>
<th>Brief Definition</th>
<th>Elements of measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>SNC to find means of communicating directly with public administrations.</td>
<td>Phone/Fax/Postal Address E-mail/Skype/IM/Twitter/Facebook</td>
</tr>
<tr>
<td>Up-to-dateness</td>
<td>SNC to reach elements showing the temporal relevance of information or services or to access up-to-date information.</td>
<td>Last update Newsletter “Push” services, RSS</td>
</tr>
<tr>
<td>Navigability</td>
<td>SNC to find help and support or to reach navigation tools.</td>
<td>Index Search engine Help, FAQ Return to homepage Personalization</td>
</tr>
<tr>
<td>Accessibility</td>
<td>SNC to find elements guarantying that the portal is open to varied users.</td>
<td>Navigation for handicapped Translations Use of life events or other topical navigation</td>
</tr>
<tr>
<td>Transparency</td>
<td>SNC to find elements that help understanding administrative services and to give feedback regarding these services.</td>
<td>Survey Data protection Official publications</td>
</tr>
</tbody>
</table>

6. Generalization of the ThinkData approach

In our opinion the generalization of the ThinkData approach could be done in two directions: (i) in the same thematic domain of making complex legal requirements more understandable and usable, by integrating multi-jurisdictional frameworks in our model; (ii) in other e-Government domains such as eHealth or eTaxation, by reusing and adapting the design thinking and storytelling approach we developed.

6.1 Multi-jurisdictional applications

Based on existing international collaborations among the ThinkData team members, initial contacts were established with several data protection and privacy related agencies and commissioners in other countries in order to share our findings and the service. Among those, South Korea was identified as a likely early adopter of the ThinkData approach given their regular high ranking as number one in the United Nations E-Government surveys. In the latest 2012 survey their rank is respectively #1 for the E-Government Development Index and #1 ex aequo with the Netherlands for the E-Participation Index (United Nations E-Government Survey 2012). In November 2012, ThinkData was presented to the Privacy Protection Policy Division of the Korean National Information Society Agency (NIA). Korea has among the strictest laws on Data Protection and Privacy that entered into force in 2011. The initial approach they followed was a traditional Frequently Asked Questions (FAQ). The ThinkData approach appeared much more effective and appealing to NIA and they decided to implement a quick pilot of the ThinkData storytelling approach in December 2012. This was done with ten scenarios together with an assessment survey to measure service acceptability. The model used was based on a Task Technology Fit (TTF) and Technology Acceptance Model (TAM). Preliminary results indicate that 93% of the respondents are willing to use such a service on a regular basis. These results still need to be formally documented and reported. We actually plan to conduct the same survey in Switzerland and to combine our results in order to also assess the potential cultural differences between Asia and Europe.

Ultimately, our goal is to allow all interested countries to reuse the ThinkData approach in a non-commercial setting. It is for this reason that ThinkData has been released under a Creative Commons license (CC BY-NC-SA 3.0)\(^2\) allowing to share and remix ThinkData under attribution, share alike and noncommercial conditions.

Further, assuming a network of ThinkData services, their interconnection in a linked open data way appeared as a promising direction to help address increasingly complex issues related to the evaluation of necessarily different jurisdictional approaches to data protection. Such interconnections would allow different countries to share stories together with their specific legal basis, thus offering new ways to compare how similar

\(^2\) Creative Commons, http://creativecommons.org/licenses/by-nc-sa/3.0/deed.en (retrieved January 2013)
situations are addressed in different legal contexts. This could in turn offer new insights into how countries shape and design public policies and consequently their legal frameworks. In an increasingly globalized and interconnected world, designing tools and services able to help address global scale wicked problems will become more and more necessary.

Several other interesting use cases can also be anticipated. First in the area of awareness, training and education in data protection, we contend there is an opportunity to help people better understand data protection, privacy and transparency in a way that is closer to users rather than lawyers. Therefore, a global awareness service relying on storytelling might be a promising outcome of a multijurisdictional approach of ThinkData. A second interesting use case can be anticipated in connection with how businesses assess and prepare themselves for global data protection. Many companies, including SMEs, need to deploy activities in different countries, thus facing the issue of how it impacts their operations. One value added service we have anticipated in this context is a service allowing to visually represent how different legal frameworks overlap, or not, thus providing a rather effective way to assess the impact and consequently the cost of doing business in that other context. Further, one could imagine using such visualization tools to study and even shape public policy reforms.

In the background of all these opportunities lie two key issues: first, in terms of representing the legal contexts (much work has been done in the area of legal ontologies and we will need to review the state of the art in this area); second, in terms of linking these different legal knowledge contexts together.

6.2 Design thinking and storytelling in e-Government

Whereas we have already done some preliminary work in the domain of multi-jurisdictional approaches, we have not yet developed concrete applications of our approach in other eGovernement areas. However we already have ideas for future work on the concrete case of eFiles. Indeed the problem of patient’s or citizen’s eFile is a very complex problem (what data are stored, who has access, for which uses, etc.) and we believe such an approach based on storytelling and serious gaming could be absolutely relevant to address these kind of issues.

7. Conclusions

To conclude, we would like to open the discussion on a key question we think is worth tackling to address the challenge of designing people-centric awareness services on general complex legal and public policy frameworks. In other words, we hypothesized the value of Design Thinking and Storytelling are key factors to address this challenge. The ThinkData.ch case is a preliminary step towards establishing this. Our ongoing and future work in addressing the multijurisdictional dimension of the internationalization of ThinkData will provide good insights towards formal validation. The value of Storytelling will also be formally assessed through cross-cultural formal evaluation. Finally, the working group behind ThinkData is also including serious gaming in the evolution of the service in order to enhance the learning experience for users.

References

Davis, F.D (1989): Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly 13, 319-340
Olivier Glassey and Jean-Henry Morin


Newman, D., Gail, N. (2010) Gain a Foundation in Design Thinking to Apply Gartner’s Hybrid Thinking Research. Gartner Analysis

Quesenbery W. and Brooks K. (2010) Storytelling for user experience: crafting stories for better design, NY, Rosenfeld Media


Susi, T., Johannesson, M., Backlund, P. (2007) Serious Games – An Overview. Technical Report School of Humanities and Informatics University of Skövde, Sweden


E-Democracy in Russia: Political Awareness and Participation Among Young Citizens

Anastasia Golubeva and Diana Ishmatova
Public Administration Department, Graduate School of Management St. Petersburg State University, St. Petersburg, Russia
golubeva@gsom.pu.ru
ishmatova@gmail.com

Abstract: It was suggested that the most important opportunity provided by the Internet is the ability to practice democracy. There are two main trends in the Russian political landscape, as far as e-participation is concerned. First is the growth of political awareness and concern especially among the young population which promoted the bottom-up self-organizing e-participation. In the absence of censorship, the Internet is increasingly used as a platform for bottom-up political organizing in the face of centralized control of other media and lack of «official» e-participation mechanisms capable to consider citizens’ input or to enable dialectical discussion on political issues. The second trend - is the increasing attention paid at the official government level to e-democracy development. Nevertheless the lack of institutional involvement and support alongside other negative factors of government-society relations might become a serious obstacle for successful enactment of e-participation. The goal of this paper is to explore the potential of e-participation in Russia for increasing public involvement of young citizens in decision-making, taking into account current conditions and historical legacy. We approach the problem by examining the ability of top-down and bottom-up e-participation mechanisms to overcome the current obstacles preventing young citizens from engaging in conventional participation mechanisms.

Keywords: e-democracy, e-participation, Russia, young citizens

1. Introduction

There is a growing literature exploring the problem of improving democratic decision making by encouraging broad participation through online communication tools.

The advantages of using e-democracy opportunities for involvement of citizens in political participation are discussed in the contexts of the decline in citizen participation in traditional democratic forums, government transparency and accountability, reduced individual costs of participating in civic life, opportunities for overcoming geographic distance and compensating for physical disabilities of the citizens, facilitation of discussions about sensitive subjects such as drugs, domestic violence etc. (Lenihan 2002; Demo-net 2006; Tambouris et al 2007).

In the view of high digital literacy levels among younger populations, special hopes are vested in the information technologies in an attempt to increase the involvement of young people in the political process (Edelmann et al 2009; Macintosh et al 2003; Masters et al 2004; Maier-Rabler & Neumayer 2009; Scherer et al 2009; Spaiser 2011; Theocarlis 2011).

Following other countries Russia is taking actions to implement e-participation mechanisms. These include the recently signed Presidential Decree on Establishment of the Special Presidential Agency on ICT Use and Development of Electronic Democracy, the adoption of the Concept of Electronic Democracy Tools Development in Russian Federation till 2020, approval of Information Society programme stipulating the creation of electronic services and supporting public debate and control over activities of public authorities, as well as the creation of online and mobile mechanisms for public participation in decision-making.

Interestingly, the above mentioned processes take place against a background of an oppressive political environment, characterized by limitation of democratic rights, censoring traditional media, misuse of government power, high levels of political corruption, low accountability to the citizens and weak governance in general (The World Bank 2010; Freedom House 2010).

The replication of e-participation in such political environments has the potential for e-participation projects to become “Potemkin e-villages”, a term introduced by Katchanovski & LaPorte (2005) to denote significant differences between the appearance and substance of electronic forms of democratic governance. Åström et
Anastasia Golubeva and Diana Ishmatova

al (2012) report that the “Potemkin e-villages” phenomena is present in some non-democracies that are offering e-participation mechanisms without providing any means of using them, but enabling filtering and suppressing Internet content, demonstrating the government’s disinterest in public input and actively monitoring users. Implementation of e-participation projects in such countries is used as a misleading symbol communicating to the international community democratic image, openness of government, modernization with the aim to increase their external legitimacy and to secure international investments and resources.

In other words, democracy is not necessarily the conceptual basis of government led e-participation initiatives. It is therefore necessary “to go beyond the appearance and availability of certain types of information and features and undertake more contextual analyses” (Åström et al 2012, p.2).

Despite improvements in democratic decision-making through the use of information and communication technologies, there has been limited research related to similar issues regarding Russian citizens. The goal of this paper is therefore to explore the potential of e-participation in Russia for increasing public involvement in decision-making, taking into account the current political context.

The structure of this paper is as follows. First, the authors present evidence from the literature about the extent to which the use of ICTs for engaging citizens in political decision-making has proven efficient so far in terms of its impact on citizen participation and discussing obstacles of e-participation.

Then we present evidence from 2 surveys of young adults in Russia conducted with 2 year difference which reveal individuals’ attitude to participation in political decision making processes as well to the preferred e-participation mechanisms. Comparing results from two surveys we analyse the potential of e-participation to increase public involvement in decision-making through the prism of the ability of top-down and bottom-up e-participation mechanisms to counter the current obstacles preventing young Russian adults from becoming motivated and engaged citizens. The last section provides some final comments and suggests areas for future research within this topic.

2. Obstacles to e-participation

Prior research has found that the main reason behind citizens’ reluctance to contribute in decision making processes is the lack of the commitment of politicians and policy makers to e-participation projects (Charalabidis et al 2010). This makes citizens feel that even if they are to share their views, they will not be taken into account when making the final decision. The authors also stressed the fact that people had no trust in politicians and policy makers and believed that decisions have been made even before issues were set for public deliberation. The lack of trust along with lack of commitment of politicians results in low contribution to e-participation projects.

At the official level of political democracy, the lack of institutional and political involvement is considered a serious obstacle for successful enactment of e-participation. Evidence of weak support is distributed both across a wide variety of national European research scenarios and the US (Freschi et al 2009; Norris 2010).

One of the explanations of the above mentioned problem is the potential change in the distribution and access to power brought about by e-participation projects. Macintosh et al (2009) argues that this change has implications for both policy makers and citizens. Expanding the mechanisms of participation in political decision-making through e-participation has consequences for citizens’ responsibility for political outcomes and for policy makers accountability to their constituency that require them to consider citizens input in more regular intervals than only during election times. The problem arises when sides do not want to make a commitment to their changed roles and responsibilities.

Thus, the lack of institutional support is not solely the issue of a power shift for influential institutions but for citizens as well. This problem is not new, just like e-participation activities are not new, but rather an evolution of many existing activities given an extra push by the widespread deployment of the Internet (Sæbø et al. 2008). As was discussed decades ago by Verba (1967), the problem of participation concerns both the participants and the decision-makers. The notion of intentionality is central to his concept of participation. The definition of participation involves the intention of the actor to influence a political decision-maker. Therefore, it is as important for decision-makers to respond as it is for community participants to participate.
Anastasia Golubeva and Diana Ishmatova

The same can be applied to e-participation. e-Participation requires a shift in citizens’ and decision-makers’ roles. Reaction of policy makers to the possibility of such changing roles can take various forms from support to resistance, but it is not the only factor that influences the outcome of e-participation processes. Equally, citizens can also be a limiting or facilitating factor in successful enactment in e-participation. The latter requires an understanding from the citizens’ side of their new roles, a willing commitment to exercise new responsibilities and to demand the creation of corresponding conditions.

Institutional and political resistance to e-participation processes was acknowledged as a major problem that connects directly or tangentially to a majority of other e-participation barriers, such as low political efficacy, a lack of trust, a lack of awareness about public affairs and a lack of motivation to engage.

Revealing obstacles affecting people’s willingness and ability to be politically involved online helps to understand major challenges of the e-participation processes, this in turn can be translated into detailed actions to achieve the objectives of e-participation.

3. The data

The authors explored the attitudes of university students of the Graduate School of Management (GSOM), St. Petersburg State University as they represent relatively wealthy young adults, perfectly fitting the current Internet use pattern in Russia; dominated by younger, wealthier, and urban users.

The data set used in this paper is taken from two internet questionnaire surveys carried out in April 2010 and December 2012 that involved purposive sampling of GSOM undergraduate and graduate students. The total number of participants that completed the questionnaire comprised 199 students from a total number of 676 students enrolled in the undergraduate and graduate programs in 2010 and 187 from a total number of 980 in 2012. The participants were between 18 and 24 years old, in both studies about 30% were male. Thus, all participants of the survey had incomplete higher education, were of the full legal age and therefore eligible for all forms of public participation including voting. The respondents were either asked to choose answers from a given list with the possibility to extend the list with their own additional considerations, or to grade from 1 to 5 their level of agreement or disagreement with provided statements. Besides the traditional socio-demographic data, the first part captured the user’s experience with the Internet. The survey revealed that 100% of respondents use the Internet on a regular basis and 99% have home-based access. Thus, all respondents have access and skills necessary for being engaged in electronic participation initiatives.

The second part contained questions revealing respondents’ current degree of involvement in public participation. The third part of the questionnaire revealed respondents perceived barriers for public participation. In the final part the respondents were asked about their preferred mechanisms of e-participation and the basic conditions necessary to ensure respondents’ involvement in e-participation initiatives.

4. Analysis and assessment of findings

The findings from the survey of young Russian adults presented in this paper reveal respondents’ interest in e-participation, and support the initial assumption regarding the potential of ICT to attract new voices to political participation.

The respondents of our survey stated their interest in using at least one e-participation tool listed in the questionnaire. The most interest was directed to information level participation tools such as online access to government reports and opinion polls, and electronic consultation level tools such as e-petitioning and online dialogs with politicians and authorities for discussion of regional problems and drawing possible solutions.

Both surveys showed that only 11% would not use any of the listed e-participation tools (See Figure 1). 10% of them are currently not engaged in any kind of public participation activities, so implementation of e-participation projects will most probably have little impact if any on the public participation of this category of people.

At the same time, the survey revealed that as much as 38% (in 2010) and 75% (in 2012) of those who are currently not engaged in public participation are willing to use at least one of the listed e-participation tools.
Anastasia Golubeva and Diana Ishmatova

This finding supports the earlier suggestion that extending opportunities for participation through ICT has a potential to attract new voices.

![Figure 1: Preference for e-participation tools](image)

However the interest in e-participation is not unconditional. Russian respondents stipulated that e-participation tools must be transparent (more than 80% of respondents in both surveys highlighted transparency as the most important factor) to ensure that the final political decisions are made with effective consideration of citizens’ input (the second most important factor). The respondents also mentioned that in order to make use of e-participation tools, the solutions need to be convenient, easy to use and allow saving time (about 55% in both surveys). While the latter represents common requirements to the quality of electronic services, the first two conditions coincide with the arguments given by the respondents to explain current low engagements through conventional public participation mechanisms, demonstrating the importance of analyzing e-participation in the context of other forms of participation.

The main factor preventing the respondents from being active in civic life is an inability to have an impact on government policy (84% and 63% in 2010 and 2012 survey respectfully). The vast majority of respondents believe they have no opportunity to influence government decisions (approximately 80% in both studies). 67% (in 2010) and 63% (in 2012) of respondents consider actions and decisions of the authorities as non-transparent. Among other significant obstacles of public participation the respondents indicated political ignorance (68% and 53%), lack of information about government activities (59% and 35%) and distrust of government (56% and 43%).

Given that e-participation initiatives, especially those promoted by public institutions, follow patterns of traditional means of participation (Freschi et al 2009), we explore the potential of e-participation for increasing public involvement through the ability of top-down and bottom-up e-participation mechanisms to counter obstacles preventing the respondents from engaging in conventional participation mechanisms.

As was stated earlier, the main factor impeding public participation of the respondents was an inability to impact government policy. In Russia, formal tools for enabling citizens to engage with their government have been substantially constrained during the last decade. It concerns both election proceedings and public participation in manifestations. After the 2005 law amendments, election of representatives to the State Duma of Russian Federation (the lower house of Parliament) is based only on voting for parties and ‘against all’ option is excluded.

The direct elections of regional governors were substituted by appointments by the regional parliaments on the president’s recommendation. In 2012 the new law on elections for governors went into force and restored the direct election of regional governors. Candidates can be both nominated by a political party or self-
nominated. However, the procedure for nomination requires candidates to submit the signatures of up to 10% of municipal legislators from at least ¾ of region’s municipalities. In addition, self-nominated candidates are required to submit the signatures of up to 2% of voters registered in a region. Besides the aforementioned, the law allows the president to initiate consultations with political parties and self-nominated candidates. While the law doesn’t require the candidates to follow a president’s recommendations, this potentially can affect the voters, since a president can make his opinion public.

Expressing public opinions with democratic tools of political behavior has also been made difficult. A 2004 Federal Law “About Assemblies, Meetings, Demonstrations, Marches, and Picketing” requires organizers of a public action to notify the government about it ten days before the planned event, and in this way granting the government an opportunity to sanction the action or ban it if there are procedural mistakes or any obstacles in carrying out the action. In addition, the 2012 amendments impose substantial increase of fines on participants and organizers for failing to comply with the requirements and rules of organization and participation in public actions.

Given current political environment characterized by the consequent legal constraints imposed on election proceedings and public participation in manifestations overcoming the problem of inability to impact government decision-making is doubtful for e-consultation and e-participation level top-down mechanisms. An assurance of transparency for participation results and citizens’ impact on government policy in e-participation projects will likely face problems of institutional and political resistance. In the situation of suppressed political and civil freedoms, e-participation tools if implemented are very likely to become “Potemkin e-villages”.

The next important reason explaining low involvement in conventional public participation mechanisms indicated by the respondents (59% in 2010 and 36% in 2012) is low awareness and lack of information about government activities.

Only about 7% in both studies indicated they knew everything they needed, while 50% had a remote idea about activities. Nevertheless it is worth noting that the number of ill-informed young people decreased from 18% in 2010 to 11% in 2012. The progress in political awareness of young people is probably the consequence of increased information availability due to development of public services portals, as well as more active discussion of political news in social networks. The percentage of young people with experience of visiting government web sites increased from 70% in 2010 to 93% in 2012 and the number of young people using government portals for public services increased drastically from 15% to 44% respectfully.

Given the recognition of low awareness about government activities as a participation barrier, provision of information level e-participation tools which found to be the most in demand in our survey seems more acceptable for government as it affects distribution of power in a lesser extent compared to other e-participation tools. But on the other hand, the implementation of information level tools has little sense for citizens considering low levels of trust to government and government information: only 17% and 22% of respondents in 2010 and 2012 survey respectfully stated that they trust the information provided by government agencies.

Thus, given the current political context and citizens’ attitudes towards politics, implementation of top-down information, consultation and participation level tools fails to counter the main participation obstacles indicated by the respondents and to fulfill their core corresponding democratic aims; to provide citizens with mechanisms for increasing their awareness about the issues of public importance and for influencing over policy formulation.

Now let’s examine whether non-institutional bottom-up e-participation is able to overcome these obstacles.

It was suggested that the most important opportunity provided by the Internet is the ability to practice democracy (Macintosh, 2003). In the absence of censorship, the Internet can be used as a platform for bottom-up political organizing in the face of centralized control of other media and a lack of “official” e-participation mechanisms capable to consider citizen input or to enable dialectical discussion on political issues.
In Russia, in the face of centralized control of other media, discussion on political issues was forced out to the Internet space, making it the only platform where opinions are openly shared between political figures representing opposition, social activists and individual citizens.

Our study in 2012 showed that 77% of respondents use the Internet to read the information on the policies and activities of government. 38% not only read the news, but also share them with friends and participate in discussions online. The rapid development of social networks in Russia contributes to this process. 19% of the respondents are registered in groups focused on addressing social and political issues, 8% of respondents have experience in creating and disseminating political content. Opportunity to add the vote for or against the decision online is a very attractive form of public e-participation for young people. 20% of respondents have experience in signing online petitions, and 49% of respondents expressed a desire to participate in online petitions in the future. Only 18% of respondents do not use the Internet for public and political purposes.

Growth in involvement of young people in the online bottom-up political activity clearly correlates with the growth of faith in the ability of citizens to solve the problems of democracy (45% of respondents in 2010 and 70% in 2012 stated that they believe in this opportunity). These findings are in line with motivation theory, stipulating that experience of participation in political or other social processes has a direct impact on individuals' belief in the efficacy of their acts (Verba 1967).

The character of current non-institutionalized online public participation in Russia demonstrates its potential to impact the distribution and access to power and overcome the factors constraining current low public participation revealed by the respondents, i.e. the inability to impact governments' decisions, a lack of information about government activities and distrust of government.

In fact, it appears that these same factors shaped (if not provoked) the emergence of online political activism in Russia. In a situation of a lack of participation mechanisms capable to consider citizen input, the lack of information about government activities coupled with low trust to government institutions, the public was pushed to turn into producers of political online content. Political blogs are used for spreading knowledge, increasing awareness and debating issues of social and political importance, as well as for mobilizing opposition for offline actions. More importantly some of these actions proved successful not only in placing political issues that were extensively discussed online and collectively determined to be of public importance to government controlled TV and other traditional media, but also in forcing the government to change their decisions, as was in the case of protests against Gazprom tower construction in St. Petersburg which were organized with an aid of Internet technologies (Alexanyan et al 2012).

Thus, non-institutional bottom-up e-participation clearly demonstrates its ability to overcome the obstacles that top-down e-participation has failed to. However, there is another important reason for low participation revealed by the respondents. It is concerned with fear of participating in public activities and reluctance to risk one’s own freedom. So how does bottom-up e-participation compare in this regard?

Using the Internet to criticize the government and to directly appeal to powerful parties abusing their power can have negative consequences for online protesters. These risks have the potential to be reduced by participating in collective action instead of acting individually. Alexanyan et al (2012) reported that those who act as part of larger online communities appear to have some level of protection and be less susceptible to offline government pressures. This is not as apparent for those that act on their own or as a part of traditional brick and mortar civil society organizations.

The above mentioned examples of increased political activism do not allow us to draw conclusions about the scale of the phenomenon. There are also clear limitations in terms of the power of impact; in spite of available examples of online actions making some impact on government decisions, it is more common that they do not, and that decisions that favor the powerful continue.

Another limitation is concerned with the number of people engaged in online political actions, which is obviously influenced by the rate of Internet use in the country. According to the data provided by the FOM survey, Internet penetration in Russia has reached 48% as of the end of 2011 (FOM 2011). It means that half of the country is limited not only in exercising active forms public participation, but even in having access to information about events taking place in the country. This was the case of protests against election
falsification, which were ignored on TV for nearly a week, leaving people relying on TV as a primary source of information unaware about the protests. And though in this particular case the news finally reached TV, proving the potential of online activism for bottom-up agenda setting, the example clearly illustrates the obvious limitation of online activism by the number of Internet users. This limitation is expected to be gradually reduced, as Internet use grows, which in turn might provoke government’s extended presence in or even control into the digital sphere.

But the Internet divide is only a partial explanation for the low online civic engagement. Interesting results were obtained by the journalists of Public Post who interviewed people in other cities regarding their awareness about the protests that were taking place in December in Moscow and St. Petersburg (Public Post 2011). It was found that even those who had Internet access and spend a substantial time online have not come across the news about protests as their interests and activities on the Internet are not concerned with politics and reading news in general. This can be a demonstration of specific Internet usage behavior favoring entertainment activities for example, as well as an indication of a disinterest in political affairs. In our reported survey, citizens’ ignorance was revealed as a significant participation barrier, especially for those respondents who were found disengaged from participation in conventional political life. Notably, the current online activity of these respondents was also found to be limited by reading news; the majority of them indicated that they do not use the Internet for social or political purposes.

5. Conclusions

The goal of this paper was to explore the potential of e-participation in Russia for increasing public involvement in decision-making, taking into account current political conditions. We approached the problem by examining the ability of top-down and bottom-up e-participation mechanisms to overcome the current obstacles preventing Russian young citizens from becoming motivated and engaged in issues of public importance.

Non-institutionalized online public participation demonstrated its potential in overcoming the factors inhibiting public participation revealed in the survey. The emerging political activism in Russian Internet space already showed the potential of committed citizens to impact the distribution and access to power by bottom-up agenda setting and by forcing empowered decision-makers to change decisions. The marginal effects of such activities are evident but should not be dismissed.

Comparison of the results of two studies can lead us to some controversial conclusions and assumptions. On the one hand the overall percentage of informed young people who expressed the willingness to use electronic means of communication with the government grew. This could be a direct result of the recent development of bottom-up online social and political activity in Russia. A positive experience in various online actions contributes to the growth in public participation. In addition, the growing belief in the power of ICT to solve the problems of democracy is also a consequence of these trends. On the other hand, the analysis of the attractiveness of certain e-participation tools shows that the interest in interactive e-participation tools has fallen. The political events of the last two years which have significantly undermined public confidence in the integrity of government and official democratic participation might serve as the explanation. In this regard, the direct influence of government-society relations on the perception of any form of interaction with the government has made itself evident.

Political ignorance has proven to be a serious issue preventing people from becoming engaged citizens irrespective of participation mechanisms. And as Masters et al (2004) noted, there is not a quick fix to achieve any lasting shift in attitudes towards active citizenship. The only way to establish a practice of political awareness and participation is to experiment with democracy. For motivated people opportunity to practice democracy is open and aided by the Internet encompassing various options of active political participation and civic actions.

Our study has not captured causal relationships for the reasons for low public participation and thus we can only speculate whether political ignorance is partly explained by other factors of low engagement in participation processes such as an inability to influence government decisions, a lack of information about government activities, distrust of government and fear of repression. Thus the problem of political ignorance clearly needs further exploration.
References


Public Post (2011) The regions are not aware of street rallies in Moscow and St. Petersburg (In Russian), [online], viewed February 7 2012, http://publicpost.ru/theme/id/547/


Theocharis, Y. (2011) “Young people, political participation and online postmaterialism in Greece”, New Media Society,13(2) 203–223.

E-Identity Cards: Lessons From Hong Kong?

Leo Goodstadt¹, Regina Connolly² and Frank Bannister³

¹Hong Kong University, Hong Kong  
²Dublin City University, Ireland  
³Trinity College, Dublin, Ireland

Francis@internet-Ireland.ie  
Regina.Connolly@dcu.ie  
Frank.Bannister@tcd.ie

Abstract: Electronic identity has become an increasingly complex subject. While problems of identity matter in both private and public sectors, this paper concentrates on the latter and in particular the challenges that must be considered in relation to the successful implementation and citizen adoption of personal electronic ID cards. The purpose of this paper is to discuss the challenges of implementing electronic ID cards in a European context and to examine the success of the Hong Kong smart card – a particularly interesting case because it is set against the background of the transition of the former British colony back to Chinese rule in 1997. Some reflections in relation to best practice and possible implications for the future nature and role of e-identity cards are drawn from this discussion.

Keywords: e-government, electronic identity, e-ID, identity cards, EIC

1. Introduction

One of the many ways in which the world can be divided is into those countries where it is a legal requirement to have one’s identity papers on one at all times and those where it is not. The requirement to ‘produce one’s papers’ on the request of the authorities is normal to, say, a citizen of France or Russia, but not to a citizen of Ireland or the USA.

Identity cards come with considerable historical baggage. During the French Revolution, for example, the introduction of the livret – a record of employment and earnings – was part of a package of measures that was supposed to increase equality between employers and the labour force (Garrioch 2002). It was subsequently denounced as ‘the instrument of industrial slavery’ because, in theory, it drastically reduced the individual’s right to change jobs (Dunham 1955). In the UK by contrast, governments have been unable to mobilise political support for the introduction of identity cards except in time of war. This public hostility towards an obligation to carry any form of state identification (echoed in Ireland) is in marked contrast to the continental European tradition. After World II the British government found the system so convenient administratively that it wished to continue to retain identity cards in peacetime, but public resistance was such that the government had to abolish them in 1952 (Thomas 1995). The more recent failed attempt to introduce an electronic ID (e-ID) card into the UK in 2006 is discussed in the next section. While the debate about e-ID cards starts, therefore, from a much older debate about the rights and duties of citizenship, technology has not only made this debate more pertinent, but has introduced new dimensions to it. More than that, the increasing complexity of the state itself has amplified the importance of identity when it comes to accessing of state services or claiming entitlements.

The e-ID debate rotates about a number of axes of which privacy is one and individual freedom is another. As will be seen in section three, both of these have been factors in the Hong Kong experience. But beyond questions of citizen rights there are additional technical debates regarding the nature of identity and identity management as well as questions of cost, interoperability and wider socio-economic goals such as labour mobility. A full discussion of this topic is far beyond the scope of any one paper. The purpose of this paper is to examine the particular case of Hong Kong which first introduced a smart citizen identity card in 2003 and to reflect both on what lessons other governments can draw from this and on possible directions for future research.

2. Literature review

The development of electronic identity management is of interest to many scholars. A journal dedicated to this subject (Identity in the Information Society) was launched in 2008. In the first issue, Halperin and Backhouse (2008) review the field in a way that situates the e-Governmental aspect of identity management as being just one part of a larger picture. Nonetheless, the use of electronic citizen identity cards (EICs) is growing, driven by
Leo Goodstadt, Regina Connolly and Frank Bannister

a variety of factors from administrative convenience to security concerns. Nonetheless, many counties have not yet adopted such a card. In Europe, notwithstanding European Union (EU) aspirations, the deployment of EICs remains far from universal (Andrade 2012). Furthermore, there has been considerable variety in countries’ experiences with the introduction and adoption of EICs.

Any study of EICs across the world throws up some interesting contrasts. One of the earliest electronic ID cards was introduced in South Africa in 1999 (Breckenridge 2005) where a biometric card developed in the 1990s for the purposes of managing pension payments gradually expanded into a form of public services card. While the card has worked quite well for its original purpose, extending its functionality has proved to be far from straightforward. By contrast, at the time of writing, Korea, which is currently ranked number one in the world for e-Government (UNPAN 2012), has not yet implemented an EIC partly due to public resistance (The Korea Herald, 23rd June 2011)

In Europe, a pioneer in terms of smart cards for citizen identity is Belgium, which made having an e-ID card mandatory for all citizens in 2004 (Fairchild and de Vuyst 2009; 2012). The Belgian card was initially only useable for tax filing, but its range of functions has expanded to encompass various social services and even registered mail. Belgians seems to have willingly accepted the card, but as Fairchild and de Vuyst point out, privacy has never been a strong feature of the system’s design and it is possible that Belgian citizens may become less enthusiastic as the ability of the system to link different types of data increases.

The Austrian card had a more robust form of privacy protection build in from the start (Aichholzer and Strauß 2010). An important difference between Belgium and Austria is that carrying a personal ID is not mandatory in Austria, so the only identity function of the card - which is called the Citizen Card (CC) - is to access government services. Furthermore, the CC is a virtual card that can be embedded in a carrier such as a personal ID card. The Austrian government provides a personal EIC, but only about ten percent of Austrians carry it. Other devices, such as ATM cards or mobile phones, can embed the CC card. However, while almost all Austrian citizens now have a card or device containing their CC, usage of the CC is low though efforts continue to increase it.

The Swedish approach is interesting, not to say curious (Grönlund 2010). The Swedish government provides an e-ID card, but as in Austria it is not mandatory to use it. While there is a government EIC, the government has adopted a market approach which means that there are EICs in Sweden issued by other organizations (notably the banks), all of which makes for quite a confusing picture with different ID being used for different services. Of the various forms of e-ID available, the bank version is the most popular, but uptake and usage is again far from universal. As in other countries, the evolution of the EIC in Sweden is path dependent and reflects Swedish government structures and history.

Spain issued its e-ID card in 2006 (Heichinger and Gallego 2010). Spain has had a requirement for citizens to carry ID for over 60 years. The Spanish adopted a distributed model - issuing of cards via machines in police stations. Although the number of cards issued has been quite high (estimates are problematic, but the number is likely to be greater than 13 million), usage has been light. As elsewhere, the primary application of the Spanish EIC is for tax filing, but even the use of the card even for this purpose has been modest to date with less than one percent of on-line tax filings in 2008 used the card. The pattern whereby many people acquire an EIC (or are obliged to acquire one), but then barely use it is evident in this European country as elsewhere.

The state of the German EIC is examined by Poller et al., (2012). The German card has three levels: a mandatory ID component and two optional components for general applications and for digital signatures. The system was first rolled out in 2010. Uptake of the card is optional. The authors do not provide figures on the number of people who have adopted the card, but they point to what they call a ‘chicken and egg’ problem with the justification for services depending on critical mass of take-up and take-up depending on the availability of services.

Approximately half of European countries now have EICs (Arora, 2008). Other EU countries with such cards include Estonia, the Netherlands, Italy and Romania though the requirement to carry an EIC is not yet mandatory in many of these. Of those yet to adopt EICs, the UK presents a notable case. The then Labour government sought to bring in a biometric national identity card in 2006. A report by the London School of Economics (LSE 2005; Whitley and Hosein 2008) showed that the card was likely, at £19 billion, to cost three
times the government’s estimate and, questions of liberty and personal rights apart, would not deliver value to
the citizen. In 2010 the new Conservative government scrapped the project (Travis 2010). In Ireland there has
not yet been a proposal to bring in a national smart card although a (non smart) Personal Public Services card
is in existence.

From this necessarily brief review, a number of points emerge. First, the evolution of EICs is path dependent
and particularly so when it comes to the historical requirement of having to prove your identity at arbitrary
times. Secondly, there is a clear distinction between EICs that are forms of identity and those that are simply
service access cards (there is much to be said about this distinction, but there is not space here to go into this
question). Thirdly, take-up has been poor except where in cases where it is mandatory. Fourthly, even where
take-up is mandatory, usage has been sporadic. Finally different countries have approached the question of
EICs is a variety of ways, notwithstanding EU and other attempts to agree standards for interoperability and
consistency. Against this background, the case of Hong Kong where a citizen smart identity card has been
successfully implemented and adopted will now be examined and some lessons that result from this
examination discussed.

3. The Hong Kong smart card

3.1 Success of the Hong Kong smart card

When the People’s Republic of China assumed direct rule over the former British Colony of Hong Kong in 1997,
it did so amid widespread fears that personal liberties and civil rights would be subject to much the same
constraints as prevail across the mainland. Paradoxically, however, for the ordinary residents of Hong Kong,
state oversight seemed to diminish after the end of British rule. This improvement was symbolised by a
conspicuous reduction in the oversight to which people were subject when entering and leaving Hong Kong.
From 2003, increasing numbers of Hong Kong residents were issued with smart identity cards that allowed
them to travel in and out of the Hong Kong Special Administrative Region (SAR), as it was now called, without
presenting any form of passport or official document and without speaking to either an immigration or a police
official. In addition, the process of obtaining a card was made far more convenient and consumer-friendly than
getting a credit card (Legislative Council Secretariat 2001). By 2007, in a notable contrast to the pattern in
many European countries, the total eligible population of 5,384,164 individuals had obtained a smart identity
card (Hong Kong Information Services Department 2008). In an age of constant alert about terrorist threats
and identity fraud, the Hong Kong authorities and their constituents felt confident that the identity card was
an effective line of defence. This trust is all the more remarkable given the community’s misgivings about the
post-colonial administration and the commitment of officials to defending Hong Kong’s special way of life after
1997 (Lau Shi-kai et al 1997). In the light of the muted response of many Europeans to EICs, is it useful to ask
why has the Hong Kong card been so successful? To answer this, it is necessary to start with the historical
context.

3.2 Historical background

The underlying factors behind Hong Kong citizens’ attitude to identity cards can be traced back to the 19th
century when the colony’s expatriate minority sought to register the Chinese population and restrict its
freedom of residence and movement. These measures proved unpopular and impossible to police (Munn
1999; 2001) and this legislation did not survive the century. A Registration of Persons Ordinance was enacted
in 1916 but specifically exempted ‘persons of Chinese race’. In 1949, a new Registration of Persons Ordinance
was enacted requiring all residents to register for identity cards, regardless of race. Its enforcement provisions
were vague and compliance was, in practice, voluntary. This law was part of a wider British colonial strategy to
counter communist insurgency in its Asian territories. Identity cards had been haled as a crucial weapon in the
British response to the Malayan Communist Party’s guerrilla campaign in 1948, and, that year, registration for
this purpose started for the entire populations of Malaya (now Malaysia) and Singapore, despite armed
attempts to disrupt the exercise

Hong Kong faced no such threat from the Chinese Communist Party. The primary British anxiety was the
prospect of unlimited immigration from the mainland. The arrival of an estimated 1.2 million former residents

---

and refugees had swollen the population from 600,000 in 1945 to 1.8 million in 1948\(^2\). The 1949 Immigrants Control Ordinance made it a criminal offence to enter Hong Kong without official approval. This law proved ineffectual because it was physically impossible to seal off the land and sea boundaries of the colony. The principal incentive to comply with the new immigration and registration legislation was removed when the government’s 1950 pledge to supply the community with rice was abandoned and registration of adult immigrants for ration cards was suspended the following year\(^3\).

A halt to mass immigration from the mainland required the cooperation of the Chinese authorities. Social controls tightened on the mainland as Maoism became more radical from 1958. Beijing now had an ideological incentive for sealing off the Chinese side of the border from Hong Kong and its capitalism and colonialism which outweighed its previous insistence that since Hong Kong was de jure sovereign Chinese territory, Chinese citizens ought to be able to enter and leave without hindrance.

The retreat from Maoism in 1978 saw a relaxation of the Mainland’s tight controls on movement in the border area with Hong Kong and illegal immigration increased significantly. The post-Mao Chinese leadership was ready to overlook the sovereignty issue involved in allowing the British authorities to ‘deport’ Chinese citizens who had entered the territory in defiance of colonial legislation. The colonial administration was able to persuade the Chinese government to cooperate in the repatriation of persons who entered Hong Kong illegally\(^4\). At this point, the identity card became a powerful weapon in Hong Kong because persons without this document could be arrested and immediately deported to their places of origin on the mainland.

This cooperation was to prove the first step towards solving a problem of great importance to Hong Kong’s future: the creation of a legal identity for Hong Kong residents when they faced two competing sovereignties. Under British law, anyone born in the colony obtained some form of British nationality automatically which was then automatically transmitted to their children and grandchildren (wherever born). Under Chinese law, any child of a Chinese citizen born in Hong Kong was regarded as a Chinese citizen without dual nationality. Much the same sort of ambivalence about national status had existed in Malaya and Singapore under British rule. As the latter territories had progressed to home rule and subsequently to independence, they had to define who was entitled to reside in their separate territories and what their legal identity would be. The identity card system had made a workable solution easier to achieve.

In retrospect, Hong Kong’s consequent tougher identity cards measures of 1980 can be seen as having started the process of defining what would be the qualifications for permanent residence and separate nationalities in the post-1997 SAR. The Chinese government was to adopt much the same formula as the British had done in Malaya and Singapore based on similar compromises between alien permanent residents and national citizens for post-1997 Hong Kong. The exception was the severe restrictions on the right of entry that were to be imposed on Chinese citizens who did not qualify for a Hong Kong identity card. This restriction was acceptable to Beijing, not because Hong Kong was in a separate category but because control of internal migration was not regarded as a sovereignty issue and, in any case, was a long-standing feature of mainland life.

By the start of the 21st century, the identity card had an even more dramatic contribution to make. The rising flood of immigrants has caused no inconvenience at border crossings. The practical benefits of this situation are enormous. The total number of tourists, for example, trebled over this decade, but the Mainland numbers rose by well over six times, accounting for 57 percent of total tourists. As, under the Chinese Basic Law enacted to deal with the 1997 reversion of Hong Kong to Chinese rule, Hong Kong’s people have a separate identity from the rest of the Chinese nation, the identity card plays a key role. There was a good reason for the approach adopted by the Chinese government. As a matter of sovereignty, China could not create a separate citizenship for Hong Kong people. Pre 1997, most Hong Kong families had acquired, either by birth or through application, a foreign nationality (Blake 1982). If this group had been deprived of a Hong Kong identity post-1997, the loss of educated and affluent members of the community through emigration would have been even higher than it was (see below) and the door would have been closed to their return after 1997 even though the Chinese government’s commitment to the maintenance of Hong Kong’s way of life was being honoured (Lee 1997; Lee and DeGoyler 1997). The Chinese government therefore showed considerable ingenuity in

\(^2\) Demographic data for these years were subject to considerable margins of error.

\(^3\) R. R. Todd, Colonial Secretary, Hong Kong Hansard, 29th March, 1950, p. 119; Hong Kong Annual Report of the Director of Supplies, Trade and Industry for the Period 1st April, 1948 to 31st March, 1949 (Hong Kong: n.p., n.d.), p. 1;

devising a solution under Article 24 of the Basic Law which conferred a clear legal right to residence in Hong Kong that was not to be enjoyed by the rest of the nation and that included the right not only to public services, but also to participate in its political affairs5.

3.3 Function and scope of the card today

The identity card is at the heart of the Hong Kong citizen’s relationship both with the state and major providers of goods and services. Personal identity itself became a matter of official definition. The Chinese man or woman traditionally had a variety of names. The identity card could only serve its purpose if the choice of names and any alteration in the registered name could be strictly controlled (Fang and Heng 1983). The role of the identity card in the individual’s life expanded dramatically in 1980 when the government claimed that a surge of immigrants from the Chinese mainland had reached levels that were threatening the employment opportunities of Hong Kong’s legitimate residents, swamping available social services and disrupting law and order (Goodstadt, 2009b). Identity cards were seen as a crucial weapon in halting this influx. Henceforward, everyone would be required to carry an identity card at all times and produce it on demand to any police or immigration officer. In addition, all employers would face criminal penalties for employing any person without a valid identity card6.

The identity card’s initial function as an official document for the purpose of establishing the individual’s status as a legitimate resident of Hong Kong and to facilitate all dealings with the government and its agencies then underwent a transformation as the private sector quickly grasped the convenience of the card in dealing with its customers. Banks, for example, insisted on using the identity card in transactions with depositors well before the introduction of legal requirements to verify a bank customer’s identity to suppress money laundering. The card was routinely photocopied by solicitors and other professionals when drawing up contracts, wills and all property transactions. Access to modern office and residential buildings increasingly required the recording of a person’s identity card particulars. The community, for the most part, was reassured by this development because it reduced the danger of fraud, misrepresentation and identity theft. Indeed, the card was embraced with such enthusiasm that the statutory Privacy Commission felt obliged to introduce codes to restrict the unnecessary use of identity card information acquired by employers, banks and others, even in the absence of significant public complaints about such practices (Office of the Privacy Commissioner for Personal Data 2012).

3.4 Reflections on the success of the card

Hong Kong is one of the most densely populated places on the planet (Abbas 1994; Rooney 2003). For this and other reasons, the potential loss of privacy that an identity card represents has an additional and troubling dimension in the context of Hong Kong. The universality and efficiency of the identity card system offers the state a powerful tool for the surveillance and potential control of the individual. In the case of Hong Kong, citizen mistrust of the Chinese Communist Party’s record was so strong prior to China’s resumption of sovereignty in 1997 that by the middle of that decade some 600,000 people – over 10 per cent of the total population – had emigrated to democratic countries. On the other hand, the holder of the personal identity card was in a privileged position compared with the rest of China’s citizens. For example, the right to reside in the colony under British rule conferred insulation from political demands, especially in the mass campaigns of the Maoist era. In addition, Hong Kong’s public services, earnings and personal consumption have been long been superior to those elsewhere in China, so resistance to adoption of a Hong Kong identity card would disqualify an individual from its higher standard of living and from its modern social services, medical and educational in particular.

Nonetheless, the identity card remains an ambivalent symbol of this superiority as these rights are at the mercy of the Chinese authorities. For example, 1999, in circumstances of considerable legal and constitutional controversy, these rights were removed from 1.675 million individuals who had hitherto possessed a valid claim to a Hong Kong identity, a move which has caused much distress (Newendorp 2008). At the same time, the government, before and after 1997, has been careful to avoid giving the public any commitment that the identity card, and the right to residence that it confers, creates an entitlement to public services above the minimum that the wider community will tolerate. The smart identity cards were introduced during a decade

---

6 Sir Murray (later Lord) MacLehose, Governor, Hong Kong Hansard, 23 October 1980, pp. 104-6.
when the government was actually reducing the supply and the standards of public services and increasing their cost for the first time since the 1950s (Goodstadt 2009a).

As in the cases of Germany, there is an element of public choice about the Hong Kong personal identity card and the functions that it provides. Initially, there was a proposal that cards could incorporate a driving licence, municipal library card and a digital certificate which would facilitate the surge in electronic transactions that officials believed would be generated as a result of their ambitions for expansion of the Hong Kong digital economy. In practice, as has been the experience in Europe, the citizens of Hong Kong have shown little enthusiasm for taking advantage of these voluntary features of the new card. The most revealing public choice in this context was the failure of the identity card to become an ‘electronic purse’.

A number of additional factors also help to explain the success of the Hong Kong EIC. The attractions of the identity card have been described in terms of building a sense of community. This phenomenon developed in the 1970s and strengthened sharply with the 1980 legislation that criminalized failure to carry an identity card at all times and which was accompanied by an extensive campaign to demonize mainland immigrants as a threat to the community’s living standards (Ku 2004a; 2004b). However the card’s principal selling point with the Hong Kong public lies in its contribution to solving the practical problems of a refugee city whose political and legal status was ill-defined as far as immigrants with no English and less knowledge of Western-style law and administration were concerned in the first decade after World War II.

The success of the Hong Kong EIC is thus grounded in several historical and cultural factors. One is identity itself; it enables the Hong Kong Chinese to be differentiated from the mainland Chinese when it comes to services, entitlements and standard of living. But what may be even more important is how the concept of identity is situated in Hong Kong’s history where use of identity has been necessary to try to control the enormous influx of visitors, both tourists and would be immigrants into the colony.

4. Reflections

There are several interesting points and possibilities for further research that emerge from this brief examination.

- The first is that since countries divide into those that have a history of requiring citizens to carry ID and those that do not and that this can be a long standing position or more recent, any study into the take-up of EICs needs to start from this historical context. In countries which historically have not had this requirement there continues to be considerable resistance to its introduction. There is little indication of any country that has tried to use technology as a means of accelerating acceptance having much success so far.

- Second, there is a clear distinction been cards that carry what it sometimes called token identification, i.e. which provide proof of identity, and what might be called ‘public service’ cards which, like a form of credit card, entitle the holder to receive selected public services. Whilst outside the scope of this paper, an interesting point is the evolution or co-evolution of these types and which path might lead to greater success.

- Third, even where there is a requirement to carry identification, only some countries have made the carrying of an electronic version of identity mandatory. Some countries, notably Denmark, the Netherlands and the UK (De Maio 2012), are pursuing a ‘digital by default strategy’, which may in time oblige citizens to use an e-card of some nature when dealing with the state. The progress of such semi-coercive attempts at introduction will provide an interesting research area.

- Fourth, the impact of ‘voluntariness’ in the use of feature of an EIC card needs further study. In Germany and Hong Kong, citizens can elect to use these ‘voluntary’ features (in other countries there is no such choice). The evidence to date suggests that citizens are quite selective when given such a choice. Research is needed into why this is so.

- Fifth, as has been the case in Austria, the identity card can be virtual in the sense that it can be embedded in other technologies. This has parallels with the way that many governments now accept the use of digital signatures when citizens are dealing with the state, though such signatures may be service specific (for example for tax filing). The idea of a virtual EIC opens up many possibilities and may be one way to
Leo Goodstadt, Regina Connolly and Frank Bannister

spread use of electronic identity via devices such as mobile phones. More research is needed into this as a potential solution to low take up.

v Sixth, in many countries, the use of EICs for on-line services has been modest and focused on tax filing/reporting. The reasons for this slow uptake may be due to what Poller et al., refer to as the chicken-and-egg problem (i.e. building critical mass), but it may equally have deeper roots in public concerns about privacy, freedom or other cultural factors. Is Poller et al’s diagnosis correct? Is it really primarily a question of critical mass?

v Finally, it is clear that Hong Kong is exceptional in the degree to which citizens have adopted the electronic card and adopted many of its wider possibilities. That provokes the question as to why and what, if any, lessons can be drawn for European governments?

The success of the Hong Kong card is in large part attributable to the particular and possibly unique set of benefits that having such a card confers on its citizens. When evaluated in terms of the framework of the technology acceptance model (Davis et al 1989), the Hong Kong card is perceived by its citizens to be both useful and easy to use. What is remarkable is that for the citizens of Hong Kong who live in a dense society in which privacy is difficult to achieve, the additional threats to privacy which are associated with an EIC do not raise greater concerns. This paper suggests that one reason for the success of the Hong Kong card is path dependence, i.e. it is grounded in history. A second is the importance of identity to the Hong Kong citizens themselves. A third is the creation of trust through retrained use of the card for policing and coercive political purposes. The card is not therefore seen as an externally imposed means of control and management, but as an integral part of what constitutes being a citizen of Hong Kong. Thus it may be that the speed and success of adoption of EICs may be less a question of how good or even how useful the technology is and more a question of historical path dependence and political culture.

If this is correct, the omens for success in Europe, at least over the short to medium term, are not encouraging. The technical rationalistic belief that the affordances of the technology will automatically lead to acceptance may be ill founded. Rising concerns about privacy, internal problems with identity within certain countries (as well as historical memories of relatively recent brutally repressive regimes) may create obstacles that will be different for governments to overcome. A more detailed comparative understanding of culture and history is therefore critical to any consideration of electronic identity card adoption in Europe.

References


A Social Networking Adoption Model for Communication and Collaboration in e-Government

Kenneth Griggs and Rosemary Wild
California Polytechnic State University, San Luis Obispo, California, USA
griggs.ken@gmail.com

Abstract: The use of social networking as a tool for information dissemination, collaboration, community creation, and feedback has proceeded at an extraordinary pace, yet no comprehensive adoption model for government organizations exists. Such a model is needed to help government organizations weigh the benefits and risks associated with the use of public (external) social networking applications (SNA’s) and it would serve as a basis for the custom design of private (internal) social networking applications tailored to specific types of government organizations. Reliance on readily available SNA services such as Facebook and Twitter poses a number of challenges for government organizations related to privacy, security, and potential negative unintended consequences of their adoption. The intent of the model proposed in this paper is to assist in the development and use of custom SNA’s with high value and low risk. We provide illustrations of each factor and its attributes as well as a discussion of how each can be viewed from an adoption perspective in a government setting. In addition, the paper contains commentary on tools used in social network research, an overview of the mathematical foundations of social network applications, and illustrative cases involving the use of SNA’s at various levels of government accompanied by an evaluation relative to the proposed model.

Keywords: social networking, adoption model, social network mapping, risk model, collaboration

1. Introduction

The growth of the use of social networking applications (SNA’s) within government has proceeded at a rapid pace. An online timeline entitled “U.S. Federal Government use of Social Media” sponsored by the U.S. Government’s General Services Administration illustrates the exponential explosion of the use of social media in government. The timeline begins in 2001 with a single entry for the launch of Wikipedia in January, 2001, continues with a single report of the live video streaming of the Whitehouse Easter Egg Roll for 2002, and finally lists ninety-one separate significant social media initiatives by 2010 - greater than one new initiative per week (The Center for Excellence in Digital Government, 2010). These initiatives involve a wide range of social network applications with various capabilities including text blogging (e.g., Blogger, Wordpress), microblogging (e.g., Twitter), Wikis (e.g., Mediawiki), social networks (e.g., Facebook), video messaging (e.g., YouTube), audio blogging (e.g., Platform Nation), photo sharing (e.g., Flickr), and a great many lesser-known SNA’s. Some government uses of social media, such as those that attempt to encourage citizen engagement via a dialogue with the government, lend themselves to publicly available tools such as Facebook and Twitter. However, many other government applications, both internally and externally, would benefit from custom-designed private social networks that mitigate risks associated with publicly available social media tools.

In this paper, the term “social networking” refers to computer-mediated forms of social connection and the term “computer” includes any appliance containing a computer processor such as a cell phone or a tablet device. A social networking application (SNA) is any technology that enables social networking. There are a number of definitions (D. M. Boyd and Ellison, 2007) for this type of “social networking” (or a variation of the term) that have the following core attributes:

- The maintenance of public or private user profiles
- User defined access and connection sharability
- Connection traversal within or beyond a single network node
- The formation of relationships

A “node” is defined as a network element capable of a connection and could consist of a web page, a text segment, an image, or anything that can be represented in digital form. Thus social networks, as with physical networks, can be viewed as a collection of connectable nodes. The evolution of social networking has been characterized by very rapid increases in system complexities that require a deeper analysis than physical networks. Government organizations are using social networking both internally and externally for a variety of reasons including to collaborate, create client relationships, manage service delivery, disseminate information,
Kenneth Griggs and Rosemary Wild

capture and create knowledge, engage citizens, and advance an understanding of relevant social connections, to name a few.

Typically, government organizations have employed social networking technology without much understanding of the daunting spectrum of factors inherent in a rapidly evolving technology. In addition to its obvious benefits, social networking technology carries with it some not-so-obvious risks and enables forms of unrecognized and unwanted behavior. Thus, social networking adoption is in need of a framework that offers government organizations guidance in the selection of social networking application types and that sheds light on the complex issues that arise from the use of the technology. At a macro level, social networks combine a number of time, space, and behavioral factors that can be described, analyzed and modeled. A relevant SNA framework must contain technological, behavioral, and organizational components as well.

In this paper we describe the many factors that define this new form of social dialogue and connectivity as it relates to use within government organizations. Our proposed model evolved from an exploration of these factions. In the following sections we present (1) an overview of the mathematical foundations of network modeling, (2) a description of the factors and their characteristics that form the basis of our proposed social networking adoption model, (3) two illustrative examples of e-Government applications of social media including a post hoc analysis of potential risk mitigation within the context of our proposed model, and lastly (4) a visual schematic that illustrates how two different candidate social network applications can be compared for intended benefit/risk effectiveness.

2. Social network modelling

Research in social networking (both computer-mediated and human-mediated) is a well-established sub-discipline of a range of social sciences including social psychology, sociology, anthropology, information sciences and others. In addition, graph theory, an area within computer science and mathematics, has been employed to model and explore social networks. Research on social networks began in the early 20th Century and focused on societal structures, whereas later work developed the use of social network graphs to describe the interplay between actors within a social network (White, 2008). Analytic software tools were developed as part of the effort (Freeman, 1996) (Hansen, et al., 2010) and the field grew rapidly. Social network graphing and analysis software has proliferated with a wide range of software tools now available (Ahn, et al., 2011). From an SNA adoption standpoint, these tools offer a means to measure some of the factors in the model described in this paper.

The mathematical study of networks in the form of graph theory has been around for centuries with a myriad of applications, including the study of social networks (Freeman, 1996) (Scott, 2000). With the advent of new social media as a means for both individuals and organizations to communicate and collaborate, there is a notable resurgence of interest in network research. The primary shift in network research represents a shift in scale. It is not uncommon now to study graphs with millions or even billions of nodes. A detailed review of the mathematical analysis of complex networks can be found in Newman (Newman, 2003). For our purposes, we will provide a simple overview of the network techniques and models that have been developed in an attempt to understand and predict the behavior of the communities they represent, a critical ability when designing a social network.

The study of networks addresses three primary goals: (1) to create a visual representation of the connections among individuals or groups in the network; (2) to analyze the network to answer questions about the organization or community it represents using mathematical and statistical analyses; and (3) to create models, such as mathematical or computer models, based on the analyses to make predictions about the behavior of an organization or community. Relative to the first goal, empirical studies are conducted that use a variety of techniques including interviews, direct observation, archives, questionnaires, etc., in an attempt to capture accurately the appropriate connections between people in the community of interest. The connections may represent personal as well as government agency relationships.

Our overview will focus primarily on the second goal: the analysis of complex networks. Empirical data collected can be used to perform network analysis using mathematical and statistical techniques. These analyses attempt to uncover the behavior of a network by helping to answer questions such as who are the most “critical” members of a network (critical members can be defined as members who have the most
influence over others); are there sub-groups within the community that the network represents and, if so, what are they (e.g., “co-worker” in Figure 1); which relationships or connections appear to be the most crucial to the functioning of the group and to the organization as a whole.

To understand how mathematical network analysis is used to answer such questions, a few definitions and concepts are in order.

A network graph is made up of nodes (also called vertices), and lines connecting the nodes (generally called edges). In Figure 1 each picture square represents a vertex and each line emanating from each vertex represents an edge. For example, each vertex might represent a government agency and the edges represent the connections or relationships each government agency has with other government agencies, whether local, state or federal.

In the simplest case, a network can be represented mathematically as an n x n symmetric matrix, called the adjacency matrix A, where n is the number of vertices in the network and the elements of the matrix A are the A_{ij} such that:

\[
A_{ij} = \begin{cases} 
1 & \text{if there is an edge between vertices } i \text{ and } j \\
0 & \text{otherwise} 
\end{cases} \tag{1}
\]

In the analysis of network data questions such as “Who is the most important or influential person or group in the network?” are generally answered using centrality measures. The simplest and often most effective measure of the influence or importance of a node is the *degree centrality*, or simply *degree*, of the node. The degree of a node measures the number of edges (connections or relationships) associated with that node. In mathematical terms, the degree \(k_i\) of a vertex \(i\) is:

\[
k_i = \sum_{j=1}^{n} A_{ij} \tag{2}
\]

Although the degree of a node may provide insightful information about the importance of a particular person or group within a network, it treats all connections as equal. It may be more effective to view the importance of nodes in a network not only by the number of connections associated with a node, but also the importance of the connections associated with a node. For example, a person within a government agency with relatively few direct connections to other employees may be shown to be “important” by virtue of the fact that his/her connections are with other important and influential people in the business (e.g., “Joe” in Figure 1).

A centrality measure used to acknowledge that not all connections are equal is called an *eigenvector centrality* measure. In mathematical terms, if the centrality of vertex \(i\) is denoted by \(x_i\), then this effect can be measured by making \(x_i\) proportional to the average of the centralities of \(i\)’s network neighbors, where \(\lambda\) is a constant:

\[
x_i = \frac{1}{\lambda} \sum_{j=1}^{n} A_{ij} x_j \tag{3}
\]

Thus the eigenvector centrality measure defines a centrality for each vertex that depends both on the number and the quality or importance of each of its connections or relationships. This is a critical factor in an SNA adoption model since it may be representative of the value of the whole social network to the organization.

Two other useful centrality measures that take network paths into account are *closeness* and *betweenness* centrality. Closeness is generally defined as the average geodesic distance to all reachable vertices, where a geodesic path is the shortest path between a specified pair of vertices. Betweenness is a crude measure of the control vertex \(i\) exerts over the flow of information (or other commodities) among other vertices (Newman, 2003). In a collaboration context, if the information flowing among participants takes the shortest path in the
network, then betweenness centrality measures the fraction of that information expected to flow through vertex i on its way to its final destination.

The concept of degree of a node in a network is used extensively in the creation of mathematical models used to predict network behavior. Since “virality” is an important concept in social networks, especially within the context of some government applications, it can be measured by models dependent on the degree of a node. One such measure is the basic reproductive number, \( R_0 \), which predicts the average number of people a person passes an idea or information on to within a given network. If \( k_i \) is the degree of a network node and \( r \) is the independent probability each person who has heard the information passes it on to each of his or her “friends”, then the basic reproductive number \( R_0 \) is

\[
R_0 = r \frac{\sum k_i (k_i - 1)}{\sum k_i}
\]

In terms of virality within a social network, the degree of the node representing each person or group is critical since the number of people hearing the information will rise exponentially if \( R_0 \) is greater than 1, and the spread of the information will dissipate and die if \( R_0 \) is less than 1.

The viral exponential explosive nature of both membership and content transfer is a somewhat unique characteristic of SNA’s. Indeed, this feature of social networking is one of the primary drivers behind social network adoption and a mathematical analysis would add rigor to any SNA classification scheme. Virality, betweenness, centrality, etc., can be planned for through thoughtful SNA design thereby potentially influencing the growth, pathing, formation of “neighborhoods”, and control of the network.

3. Social networking adoption factors

An interesting aspect of the exponential growth of computer supported social networking is that its own growth has, in itself, been viral. The unique nature of the phenomenon has required the creation of new terminology to express the following general factors:

- Time – Participants in social networking can communicate synchronously or asynchronously and information transfer is instantaneous.
- Space – There is no inherent space limitation in the use of social networking. A “neighborhood” is only a metaphor in the social networking virtual space.
- Medium – Connections to social networks are increasingly portable and transparent. Device interfaces allow for easy and direct access. The medium is disappearing in importance.
- Content – Social networking is increasingly characterized by “high touch” rich media including high resolution imaging, audio, and video.
- Organizational Impact – The adoption of a social networking application by an organization is normally done in the service of organizational goals. The likely effect of the technology on the achievement of these goals is a measure of its impact and is an important metric.

During our research we found many references to the fact that there is a need for guidance to mitigate risks in the development of social networking applications (e.g., Turban et al., 2011). However, we generally found government policy guidance or suggested “best practices” but no actual adoption models. In the development of our proposed adoption model we deduced that, from an organizational social networking application assessment standpoint, effective social networking technology should possess the following three relevant characteristics:

1. Expansion related – the depth, breadth, and speed of node interconnection. An application has varying degrees of expansion capability along spatial, temporal, and size scales. In general, a social media application in which nodes and edges develop rapidly at a global level would rank highly on an expansion-related metric. However, expansion can be further sub-divided into additional dimensions such as:
   - Virality – the network growth factor of nodes and edges. Highly “viral” applications are capable of forming nodes and node connections of great breadth and depth. This is a critical category that can be subjected to a statistical and graph theoretic analysis (see above).
Kenneth Griggs and Rosemary Wild

- Locationality – the degree of geographic expansion capability of the network. A highly physically dispersed network would contain nodes physically remote from each other. A high value for this factor would indicate that the network is capable of global expansion. Truly global expansion might include language translation capability, infrastructure flexibility (alternate routing paths), interface localization, the use of GPS, etc.

- Temporality – the speed of network formation. A highly temporal network would be capable of virtual instantaneous node propagation and data transfer.

2. Value-related – a measure of the value of the application to the organization in terms of the quality of media (audio, video, images, etc.) embedded in the application, the importance of the application to all stakeholders including the organization itself, constituents, employees, management, clients, etc., and the information value retention rate of the information transferred on the network (value of the information per unit of time).

A highly value-related application would contain rich, highly valued information that continues to be salient over time. This category can be further divided into the following sub-categories:

- Media quality – a measure of the value and quality of the media that can be captured and transferred in the application. For example, an application supporting high definition video and high resolution audio might be considered relatively valuable in contrast to a text-only application.

- Stakeholder values – a measure of the value of the network to the organization and its stakeholders with respect to node and edge formation, collaboration, information dissemination, organizational efficiency and effectiveness, the development of new relationships, etc. A high value would indicate that the network is an essential tool in which membership supports the goals and values of the organization, whereas a low value indicates the reverse.

- Information value retention rate – a measure of the time value of information that is the prime focus of the SNA (Moody & Walsh, 1999). A network created to contain predominantly information with high value retention would experience little information decay of value over time (e.g., a description of a static government process). An SNA would have a low value if it contains real time data (e.g., stock quotes, weather, commodity prices, etc.) that become relatively valueless in a short period of time (Choy, 2011). An SNA could contain some information that has high Information value retention rate and other information which is low on this scale; but, this metric is a measure of the primary types of information held in the SNA.

3. Risk-related – a measure of the degree to which risk associated with a particular social networking application can be mitigated. Since SNA’s are characterized by viral expansion unhindered by time and space, the possibility of the loss of control, security breaches, and unintended consequences is significant. The following are sub-categories of risk:

- Expansion control – the degree to which an SNA can expand beyond pre-defined borders. SNA’s, by their nature, are frequently designed to allow membership and content to be rapidly propagated. However, the possibility of uncontrolled expansion can result in negative events such as the creation of “flash mobs” or groups whose aims are counter to those of the organization (Rheingold, 2003). A high value indicates that membership can be tightly controlled and a low value indicates a high potential for unintended network expansion.

- Privacy and security assurance – a measure of the degree to which privacy and security could be compromised. Poor privacy controls could result in personal and organizational content being unintentionally and massively propagated. In addition, network membership might be gained via false identities leading to a breakdown in trust, content/data theft, and other negative events. A high value indicates a secure environment. A low value indicates that the SNA is vulnerable to privacy and security breaches.

- Message control – the degree to which it is possible to lose message or content fidelity across a network. When a message or content is alterable by members as it is propagated there is the chance that it will lose its original meaning. This “Water cooler Effect” (Difonzo & Bordia, 2007) refers to the rapid spread of rumors (often corrupted information) in organizations. A high value indicates that some control is exercised over messaging and content to insure fidelity. A low value would be given to SNA’s in which messages or shared content are capable of corruption and sabotage as they transit a network.
Kenneth Griggs and Rosemary Wild

Figure 1 is a graphical representation of the structure of our proposed adoption model. The factors captured in the model are quantifiable so a weighted scoring model or a Delphi technique can be used to perform a comparison of different SNA’s. In addition, the model can be used in the design of custom SNA’s.

4. Explorations of the application of the adoption model in government organizations

The following are recent examples of the use of SNA’s by governments with a commentary about their applicability to the adoption model proposed in this paper: “Low,” “medium,” and “high” rankings were applied to the adoption characteristics to illustrate the concept.

4.1 The use of Facebook and Twitter by the U.S. Embassy in Egypt

In a largely unforeseen political movement in 2008, several Egyptian citizens launched a pro-democracy Facebook group to protest their government’s policies. In addition, the group used Twitter during the incipient movement to coordinate its activities. Within a week of its inception, the group had attracted 40,000 members. Years later and largely in response to the effectiveness of SNA’s by the movement, the U.S. embassy in Cairo created its own comparatively sophisticated Facebook and Twitter presence. By using Facebook and Twitter in a relatively unrestricted mode, the embassy had chosen a high risk, high value, and highly expansionary design with the following characteristics:

- Expansion-related
- Virality – High; with no restrictions on viral expansion
- Geospatiality – Medium; confined to the Middle East region; self-reporting of locations allowed, but no automatic location/interactive map reporting (known as geotagging)
- Temporality – Low; with apparent monitoring for temporality (speed of posting is delayed based on the context of political events)
- Value-related
- Media quality – High; use of media including video, audio, graphics with monitored insertion by non-embassy-affiliated posters. Postings can be made in Arabic and an English language translation capability is a clickable feature
Kenneth Griggs and Rosemary Wild

- Stakeholder values – High; supported by content (the diplomatic position of the U.S. government and commercial and consular operations)
- Information value retention rate – Medium; most information has high value retention since the site is largely a focus for consular operations (e.g., Visa applications) and various government programs
- Risk-related
- Expansion control – High; expansion (initially) not controlled by design
- Privacy and security assurance – Medium; basic Facebook and Twitter controls for embassy-affiliates with monitoring of non-embassy-affiliated posters
- Message control – Medium; with a high risk of message corruption with a demonstrated disconnect between the Department of State and local embassy personnel in Cairo

The use of a high risk SNA approach at the U.S. embassy in Cairo is a good example of the applicability of the model with regard to the selection of an SNA that allows (by design) partially monitored messaging. The embassy has made clearly embarrassing tweets (called “rogue tweets”) on Twitter concerning several recent political events and the embassy official charged with creating the tweets has been recalled as a consequence. (Rogin, 2012)

4.2 The “change we see” campaign by the Labour Party in the United Kingdom

In 2010 the Labour Party of the United Kingdom created a Flickr social media campaign to highlight its past achievements (particularly in infrastructure development) and as a method of countering the austerity program of the opposing party. The official narrative was as follows:

The Labour Party has launched a crowdsourcing new media campaign, asking its members and supporters to submit photos of examples of Labour investment since 1997. The “Change We See” campaign asks people to upload photos of the rebuilt hospitals, the local Sure Start centres, the schools that have been invested in and other examples of Labour’s investment.

From an adoption model perspective, the use of Flickr as an SNA for largely political messaging purposes is clearly problematic. As an SNA, Flickr allows anonymous posting of photographs and videos that are shareable within a potentially wide but self-directed audience. The following summarizes the model characteristics associated with this government SNA:

- Expansion-related
- Virality – High; virality with photo uploads cross-posted to Facebook, Twitter and other SNA’s
- Geospatiality – Low; confined to the UK with geotagging and mobile platform support by Flickr
- Temporality – Potentially high; without restrictions but currency of imagery not critical
- Value-related
- Media quality – Medium; photographs with descriptions (from the originator) and commentary from registered posters
- Stakeholder values – High; intended to support the implied values of the Labour Party
- Information value retention rate – Low; content consisted of static photographs of buildings with an accompanying description
- Risk-related
- Expansion control – High; expansion is not controlled by design
- Privacy and security assurance – Medium; handled by Flickr with basic security and privacy controls
- Message control – Medium; photo uploads and post monitoring available via Flickr administrative controls

The use of the Flickr SNA to “crowdsource” photos in support of a political party’s values contains the inherent risk of message corruption. Also, since Flickr can be linked to Facebook and Twitter the possibility exists for the rapid propagation of a corrupted message. This is precisely what occurred with “rogue” photo uploading of politically sensitive content and the embarrassment of the resulting censorship and ultimate lock of the site by the Labour Party (see “Labour: Change we see but you can’t photograph.”) (Day, 2010)
5. Discussion

Our proposed SNA adoption model is a first attempt to provide an SNA classification scheme that can be useful for decision-making. In particular, the model can be valuable in the custom construction of private social network applications where each system component can be tailored to fit a government application. Major players in the social networking application arena (e.g., Google, Facebook, Twitter, etc.) are creating development infrastructures that will allow for specific and focused functionality targeted for use in a wide range of types of organizations. In addition, custom social network environments, cloud-based services, and stand-alone components are increasingly available for the creation of private secure networks completely outside of the public domain. Such networks would allow for tight control over the adoption factors cited in this paper. For example, an organization may want to restrict virality and locationality for internal collaborative networks containing sensitive information. In addition, common network metrics such as node degree, centrality, closeness and betweenness measures can be used in both the design and analysis of government social networks to optimize their performance and predict their behavior.

Figure 2 is a visual schematic that illustrates how two different candidate social network applications can be compared for intended effectiveness relative to the characteristics highlighted in our model. The comparison is made using a scale of 0 to 10. A value of 10 indicates a high valuation for a particular characteristic and a 0 indicates that the characteristic does not exist for the application.

Using this schematic one can see that, based on its scores, the first candidate SNA, SNA 1, has a high expansion profile since it (1) is highly viral (very high growth potential) (2) is highly temporal (fast transfer or sharing of messages/content by network members) and (3) has high locationality (geographic dispersion) potential. SNA 1 has mixed numbers for its value profile with relatively low scores for media value and low Information value retention rate (information value declines rapidly) but it does contain information with high stakeholder value. Also, SNA 1 has a high risk mitigation profile given that network membership cannot easily be expanded beyond the intended border, has high privacy and security assurance (low breach potential), and high message control (low potential for message corruption). Consequently, SNA 1 is secure, private, and capable of rapid and deep expansion, and would likely be a good candidate for a social network application targeted at internal collaboration among government entities requiring immediate actionable data transfer between ad hoc teams, such as emergency response teams.

![Figure 2: Comparison of Two Hypothetical SNA's](image)

By contrast, the second SNA candidate, SNA 2, is characterized by relatively low risk mitigation attributes, high stakeholder value, and a high level of expansion capability. Therefore it would be suitable for a government application that is important to citizens, is able to go viral rather quickly, but does not pose a risk to national security or would not breach security if the message is corrupted. A government campaign tailored to create an interactive means for receiving input from citizens, such as a country-wide debate regarding a proposed
government policy or a simple means of reporting infrastructure problems in real-time would be appropriate candidates for a social networking application demonstrating these characteristics.

This process of categorization has the potential to guide the use of existing SNA’s or to offer a strategy for their customization within government. In addition, it can be used to trigger entirely new and unique SNA’s created from technology components likely to be available in the near future.

6. Conclusion

The proposed model described in this paper offers a preliminary framework for viewing and understanding the value of different types of social networking applications for government use. Current SNA’s are dominated by a few players such as Facebook, Google, Twitter, and a handful of others that consist of relatively closed structures. However, there is a clear industry trend to move the original applications toward the creation of social networking infrastructures consisting of discrete components that would allow for the detailed customization and enhanced application control required by many government agencies. The concepts of virality, temporality, locationality, risk mitigation, etc., will be fundamental to design efforts of the future.

Now that social networking is moving from an emerging technology to a powerful and viable means for governments to collaborate and communicate internally with government agencies as well as externally with its citizens, the challenge is to strike the right balance between managing risks and creating value. Our proposed model serves as an initial framework for doing so but is limited by the implicit assumption that the stated factors represent the most critical factors to consider, that the factors can be reliably measured, and that SNA’s of the future will be sufficiently customizable to justify the model. Several examples of recent SNA’s in Egypt (“Arab Spring” incident), India (Gang Rape in New Delhi), the UK (London gang riots), the U.S. (“Occupy Wall Street”) and elsewhere tend to underscore the importance of the factors we have identified as critical in the adoption of SNA’s. Ultimately, our proposed model framework will require external validation.

References


An User-Centric Check of the Available e-Government Services in Europe

Alessio Gugliotta, Francesco Niglia and Laura Schina
INNOVA spa, Rome, Italy
a.gugliotta@innova-eu.net
f.niglia@innova-eu.net
l.schina@innova-eu.net

Abstract: The success and sustainability of the e-Government Services seems to be strictly related to the adoption of the “user-centric approach” during the services development process, in which citizens/end users are considered the real source of knowledge and inspiration for building added value public services. On the basis of this assumption, this work describes the result of the analysis of the application of the user-centricity approaches in a list of running e-Government services. The main scope of the analysis is to have a global vision about the actual usability of these cases in other environments and propose to the Community at large insights and recommendations for enhancing the use of user-centricity in Europe. The analysis has been carried out within the activities of the NET-EUCEN network: the 40 cases discussed in this study belong to the repository of more than 70 experiences deeply analysed by the network, retained as actually interesting among more than 450 cases filtered in the ePractice portal, as they are characterized by (at least) two out three of the user-centricity criteria measuring the User Involvement: 1. Co-design; 2. Development and Implementation; 3. Deployment and Running. The overall analysis has been enriched by the comparison in the International Arena against the scouted best practices of Bahrain, Canada, Dubai, Singapore and the U.S., so to build a global positioning for European scenarios; it has been introduced a global competitiveness 4-level mask able to provide also a graphic positioning on the “competitiveness reference system”. This study brought us to have a more coherent vision highlighting the limits and potentialities of the cases, in terms of the application of the different services to the users and business perspectives. This approach brought an added value to the whole process of bringing the user-centricity in the European Countries since it provides, at a glance, good quality examples to be reused and a preliminary feasibility analysis. The most important result is represented by the alignment of Europe with the rest of user-centric offer worldwide. We would underline as the methodology developed for the cases study analysis can be easily adopted in other analysis focused on network studies and can be even standardised to identify the main bottlenecks, technical challenges, acceptance problematic and mass-user needs.

Keywords: user-centricity, service, evaluation, transferability, citizens, benchmark, business

1. Introduction

One of the most impacting and emerging trend in the Information and Communication Technologies (ICTs) is the increase of new communication tools enabling the participation of different stakeholders in the decision making processes referred to important issues. This new orientation promotes the usage of a bunch of innovative applications based on the Web 2.0 that probably are the most featured and simple technology enabling the user centricity and permeating different contexts (A. Bhargav-Spantzov et al. 2006), (M. Quasthoff and C. Meinel 2007). Websites as Wikipedia, Flicker, YouTube, and others similar show how the end user is now assuming the content creator role too, providing all kinds of multimedia content from expert knowledge and information to video and images (Caetano et a. 2007). Within this context, the NET-EUCEN network’ main scope is to enhance the (application of) user centricity in eGovernance and this document represents one of the main steps towards this target since it provides an analysis of good examples that can be used by European central and local administrations in the short term.

The aim of this work is to outline the analytical figures that represent the “best out of the best” within a set of examples of running services that are characterised by the application of some aspects of the user-centricity methodology. This step represents a check of examples of services that might be really of interest and effective for carrying out the “enhancement” of the user-centricity.

After, this introduction, the second section describes the purpose of the study in the double context of: 1) the NET-EUCEN network and 2) the user-centricity paradigm at large. The third section provides an outline of the sources and the sample used in the study, while the fourth part of the document describes the methodology followed for carrying out the analysis of case studies. Finally we conclude, in section 5, with the evidences about the level of user centricity approaches adopted in designing, developing and delivering e-Government
services, by providing some recommendations for an actual enhancement of the adoption in a wider European vision.

2. The scope of the study

The NET-EUCEN network has collected various examples of running services that are characterised by the application of some aspects of the user-centricity methodology and, following the main scope of the project “to enhance the (application of) user centricity in eGovernance”, it’s of utmost importance to provide the European central and local administrations with good examples that can be used in the short term.

The analysis described in this document represents the second step of best practice scouting, started at the beginning of the project and consolidated in a collective document (NET-EUCEN D2.0) that already provided a selection of existing services in Europe as well as in the extra-European (International) Countries.

Starting from a list of 74 different user-centric cases, 40 of them have been selected for the analysis that brought us to have a more coherent vision highlighting the limits and potentialities of the cases, in terms of the application of the different services to the users and business perspectives. The methodology followed a logical path since the analysis had been focused in three areas: socio-political, technology and user-centricity. Each mapped best practice has been analysed in its socio-economic environment through a light version of the P.E.S.T. to which we added a typical S.W.O.T. analysis carried out by the researchers and the experts in the field through an ad-hoc analysis’ mask.

3. The sample

The 40 cases selected belong to the repository (NET-EUCEN D2.0) of more than 70 experiences developed by the NET-EUCEN network, specifically:

- 25 cases gathered from the knowledge of partners that already entail the aspects of the user centricity. Some of them have been developed by the partners, and others have been scouted through an on-line survey.
- 49 cases selected in the www.ePractice.eu portal. These cases were retained as actually interesting for NET-EUCEN among more than 450 cases filtered in the portal, as they are characterised by – at least – two out three of the user-centricity criteria of user involvement: 1) Co-design stage: it means the engagement of users in the stages of development of new ideas and concepts, i.e. the definition of the service shall be made by starting from the users’ needs and requirements without any technological constraint. 2) Development and Implementation stages: it means the engagement of a sample/group of users in the first implementation of the services in order to evaluate its features and continuously discuss with developers to optimise the outcomes and suggest improvements and/or changes before the final running of the service; 3) Deployment and Running stages: it is referred to the possibility to validate the service through an, even wide, user-test campaign. This test shall imply a check of the flexibility of the service from the technological perspective and the interoperability of the applications, thus to give the possibility to customise it following the changes in the political, economic or social environment.

The overall analysis has been enriched by the comparison in the International Arena against the web scouted best practices of Bahrain, Canada, Dubai, Singapore and the U.S., to so to build a global positioning for European scenarios. The selection of cases was based on two mandatory steps:

- Availability of deep information about the cases. We knew all about the 25 cases in the partners’ knowledge, but a specific questionnaire was set-up for the owner of the cases gathered from the ePractice portal. Only 29 out 49 feedback to this questionnaire were received.
- Selection of the 40 best user-centric examples out of the remaining sample of fully described 54 cases. This selection related to those services targeted to wider users categories.

As result of selection, this is the list of 40 out of a total of 74 cases we have analysed in the document
## Table 1: The sample

<table>
<thead>
<tr>
<th>#ID</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A single application for the studies in universities</td>
</tr>
<tr>
<td>2</td>
<td>Access to e-Government Services Employing Semantic Technologies</td>
</tr>
<tr>
<td>3</td>
<td>Budapest Transport Privately Held Corporation</td>
</tr>
<tr>
<td>4</td>
<td>City of Katowice</td>
</tr>
<tr>
<td>5</td>
<td>Communities of Practice</td>
</tr>
<tr>
<td>6</td>
<td>Customer Care System</td>
</tr>
<tr>
<td>7</td>
<td>Digimarche.LAB</td>
</tr>
<tr>
<td>8</td>
<td>Digitalisér.dk</td>
</tr>
<tr>
<td>9</td>
<td>Education and occupation e-resources in Finland</td>
</tr>
<tr>
<td>10</td>
<td>e-Government Barcelona</td>
</tr>
<tr>
<td>11</td>
<td>e-Government Strategy</td>
</tr>
<tr>
<td>12</td>
<td>eHealth</td>
</tr>
<tr>
<td>13</td>
<td>eNotary and GOV registers</td>
</tr>
<tr>
<td>14</td>
<td>European Land Information Service</td>
</tr>
<tr>
<td>15</td>
<td>Fix My Street</td>
</tr>
<tr>
<td>16</td>
<td>Front Office Employment</td>
</tr>
<tr>
<td>17</td>
<td>Genviej</td>
</tr>
<tr>
<td>18</td>
<td>Idea Storm</td>
</tr>
<tr>
<td>19</td>
<td>iLive.at</td>
</tr>
<tr>
<td>20</td>
<td>Interactive Employment Services in Portugal</td>
</tr>
<tr>
<td>21</td>
<td>Learn more about ICT</td>
</tr>
<tr>
<td>22</td>
<td>Legal Aid interoperability through electronic filing</td>
</tr>
<tr>
<td>23</td>
<td>MiaPA</td>
</tr>
<tr>
<td>24</td>
<td>Mobile CA.gov</td>
</tr>
<tr>
<td>25</td>
<td>Mobile Parking Project</td>
</tr>
<tr>
<td>26</td>
<td>Mobile Services Dubai</td>
</tr>
<tr>
<td>27</td>
<td>New technologies applied to consumer protection</td>
</tr>
<tr>
<td>28</td>
<td>Online registration of rent and leasing contracts</td>
</tr>
<tr>
<td>29</td>
<td>P2P for Major Events</td>
</tr>
<tr>
<td>30</td>
<td>Park It DC</td>
</tr>
<tr>
<td>31</td>
<td>PlineGov: open source collaboration for the public sector</td>
</tr>
<tr>
<td>32</td>
<td>Point of Single Contact</td>
</tr>
<tr>
<td>33</td>
<td>Real Time Passenger Information - The Rural Dimension</td>
</tr>
<tr>
<td>34</td>
<td>Road Traffic Safety Directorate e-services</td>
</tr>
<tr>
<td>35</td>
<td>Samos Dialogos</td>
</tr>
<tr>
<td>36</td>
<td>SMS Information System</td>
</tr>
<tr>
<td>37</td>
<td>The Buzz</td>
</tr>
<tr>
<td>38</td>
<td>The Danish Travel Planner</td>
</tr>
<tr>
<td>39</td>
<td>Transport Direct - Better choices to travel in Britain</td>
</tr>
<tr>
<td>40</td>
<td>Virtual Cities 2009</td>
</tr>
</tbody>
</table>
4. The analysis of case: methodologies

The analysis had been focused in three areas: technology, user-centricity, socio-political; each mapped best practice has been preliminary evaluated using a light version of the PEST analysis to which we added a SWOT analysis of user-centric and technology aspects. These steps have been carried out by the researchers and the experts in the field through analysis masks that have been developed as ad-hoc instruments. Additionally, a four-levels global competitiveness mask has been introduced for the comparison with international cases, it is able to provide also a graphic positioning on the “competitiveness reference system”. This methodology can be easily adopted in other analysis for the network studies and can be even standardised to identify the main bottlenecks, technical challenges, acceptance problematic and mass-user needs.

4.1 The user-centric analysis

It relates to the analysis of the key-points that characterise the service as user-centric example, it is a light SWOT analysis, carried out to highlight methodologies and the effective results of the citizens-users’ involvement. Its scope is to understand how the users-citizens have been approached to set-up the service, from the beginning to the service run and, in a second stage, to define the methodologies of involvement that could be actually replicated and transferred to other services, cases and e-Government domains. The user target factor has been taken into account as well for defining the easiness of use, the satisfaction, the participation / inclusion of such categories in the whole process of service delivery. The analysis is carried out by giving an answer to the strength and the weak points of two different stages of the users’ involvement: 1. Involvement of user-citizen in the service definition and 2. Involvement of user-citizen in the improvement of the service.

4.2 The technological analysis

It relates to the analysis of the usability of the service, its long-term lasting and viability of the provision interfaces for the user target. As the user-centric one, this is a light version of a SWOT analysis that aims at pointing out and categorise the significant factors that can be actually used for describing the added value of the service in the e-Government domain. The analysis provides critical information, important to match the future providers’ capabilities with the constraints of the service and give an important contribution to the potential future strategic planning process. What we look for with this analysis:

- Understand if the technologies adopted are a boundary for the development of the service, including the use of Open Source rather than proprietary software
- Understand to which extent the new technologies are taken into account, including the interface trends that characterise the handled hardware (smart-phones and tablet)
- Understand the time and economic effort required to develop and/or customise the services
- Understand the limits of the applied technology, those that could easily led to a dismissal of the service from both provider and client side

The analysis has been carried out by giving an answer to the strength and the weak points of two different stages of the technological level of the service development: 1. Adaptability of the technology to the user target requirements and 2. Capability of the technology to be re-adapted for improving the service or transfer to other domain.

4.3 The PEST analysis including replicability

The PEST (Political, Economic, Social and Technological) analysis has been introduced in the process of cases evaluation for better understanding the market positioning, potential and direction for the business and application of selected services since it takes into account essentially external factors and it is helpful prior of completing a SWOT analysis. It is dedicated to address what are the variables that actually impact on the macro-environment especially under a strategic perspective so to evaluate also the transferability of the case. The replicability and transfer is one the most valuable attribute that a best practice can have and, especially for NET-EUCEN, the key-point for an actual enhancement of the adoption of user-centricity in large scale. According to this purpose, our PEST analysis addresses the following issues:

- Understand which are the variables that could impact on the future applicability of the service in the medium-long term;
Identify potential opportunities and threats in the service provision.

The analysis is completed by assigning a weight to the four different factors so to identify what is the factor with the main impact and which can be the main constraints at the transferring of the service in another context, i.e. if the political factor plays a critical role, its applicability in other country will be strictly related to the policy of the country.

4.4 The comparison and International positioning of cases

All the cases have been subject to a quantitative evaluation with the aim to provide a first classification through a score board and be an example for future analysis. Both PEST and SWOT have been referred to an “absolute measurement” of the potentialities of each case in its e-Government field; the results allow the cross-comparison among cases because of the assignment of comparable scores (see metrics below). The full detail of PEST and SWOT are visible in the free-web-retrievable document (NET-EUCEN D2.1). All the 40 cases have been scored and positioned in a 2-dimensional matrix [USER CENTRICITY: REPLICABILITY] for a better vision of which of them could be actually used for proposing them to Public Administrations and Policy makers.

As additional target, we provide a partial vision of the level of competitiveness of each selected service in terms of application of user centricity and replicability in the other countries. This analysis is going to be presented as a preliminary check of the actual value of the scouted services against the other international initiatives, thus to give an idea of the gap – if any – of the Europe with respect the U.S. and Asia Area. The quantitative evaluation followed a procedure that gave the results in a bi-dimensional, 3-degree environment that, as the following figure suggests, help us to actually differentiate the cases of interest in four different categories: [no, low, medium, high] interest.

4.5 The metrics used

The metric and rationale used for assigning the scores to the cases are described in the sub-paragraphs:

4.5.1 The user-centric metric

The user-centric paradigm has been defined in (NET-EUCEN D1.1) and its measuring exploited in (NET-EUCEN Working document on indicators), the metric we use in this analysis relates to the application of the methodology in each of the three steps.

Given the pre-selection of cases, we start with a list of services that are all characterised by the application of the user centricity in their overall deployment. We define 3 degrees of user-centricity in the cases, depending on the overall judgment or score of their indicators: Low, Medium and High.

For the BP document analysis, as well as for the respondent to the survey, we take into account four factors belonging to two different categories:

- **User centred approach**: P1 Share ideas and co-create content, P2 Provide information to improve the service
- **Best Practice Evaluation**: P3. user satisfaction, P4. Participation in decisions

Each of the four abovementioned factors has been analysed and assigned of a qualitative weight, then, each weight will be assigned to a score (table 2). For the analysis we summed all the four factors to arrive at a score in the window [0-4]. This metric is defined by 3 degrees of potentialities of user centricity of the cases basing it on the overall score achieved in either one or the other measuring.

4.5.2 The replicability / transferability metric

The replicability is meant as the actual potential of a service to be provided in other socio-economic environments, in terms of transfer of in another Country, for other user targets, for other e-Government domains. In this survey, this issue is evaluated through the P.E.S.T. analysis; the replicability, indeed, could be actually realised if one or more of the following issues are taken into account:

- **P5 Political**: check how much a service is specifically linked to a local constraint or need.
- **P6 Economic**: check how much a service is self-sustainable and if it could raise to a business for providers.
P7 Social: check if the service could be actually transferable to other user targets and under which conditions.

P8 Technological: check if the service is transferable to other domains and under which conditions.

Each of the four abovementioned factors has been analysed and assigned of a qualitative weight, then, each weight will be assigned to a score (table 2). This metric is defined by 3 degrees of potentialities of replicability of the cases basing it on the overall score achieved, i.e. the sum of all the scores for each of the four factors.

**Table 2: Weights and scores of the analysis**

<table>
<thead>
<tr>
<th>User Centred Approach</th>
<th>Best Practice Evaluation</th>
<th>Replicability</th>
<th>Evaluation</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1, P2</td>
<td>P3, P4</td>
<td>P5, P6, P7, P8</td>
<td>this is easily possible with no limitation</td>
<td>HIGH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>this is possible with limitation</td>
<td>MEDIUM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>this is clearly not possible or very difficult</td>
<td>LOW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No indication: the default option in case there is no information</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>

4.5.3 Assignment of score in the overall positioning matrix

An overall bi-dimensional matrix [USER CENTRICITY: REPLICABILITY] is used as a tool to describe, at a glance, the potential of services scouted in the campaign of enhancement of user centricity.

**Table 3: Overall degree of interest assigned to cases**

<table>
<thead>
<tr>
<th>User centricity</th>
<th>Transferability</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>low</td>
<td>No Interest</td>
</tr>
<tr>
<td>Medium</td>
<td>low</td>
<td>No Interest</td>
</tr>
<tr>
<td>High</td>
<td>low</td>
<td>Low Interest</td>
</tr>
<tr>
<td>Low</td>
<td>medium</td>
<td>No Interest</td>
</tr>
<tr>
<td>Medium</td>
<td>medium</td>
<td>Medium Interest</td>
</tr>
<tr>
<td>High</td>
<td>medium</td>
<td>High Interest</td>
</tr>
<tr>
<td>Low</td>
<td>high</td>
<td>Low Interest</td>
</tr>
<tr>
<td>Medium</td>
<td>high</td>
<td>High Interest</td>
</tr>
<tr>
<td>High</td>
<td>high</td>
<td>High Interest</td>
</tr>
</tbody>
</table>

5. Results: The cases’ analysis

In this section we provide the analysis of the cases scouted as best practice, giving a vision – at a glance – of the potentialities of each of them for a consequent international dissemination in the NET-EUCEN Validation Workshop campaign (VWC) [http://www.net-eucen.org/workshops.php](http://www.net-eucen.org/workshops.php).

5.1 Cases overall evaluation

This section will show the results of the measurement of the cases analysis, following the procedure described in the section 4. In first instance a disaggregated data will be released, thus to check the overall evaluation for each of the cases; in a second step an aggregated evaluation is provided, giving more weight to the comparison between European and International cases. All the evaluations have been carried out by the network members and external experts. The cases have been evaluated using the masks described table 2, we highlight that the “interest” of the overall result is exclusively referred to the possibility to bring the case during the VWC as practice to be transferred to the European Public Administrations. Table 4 provides a compendium of the result obtained by each analysed case.
Table 4: The synoptic-score table of evaluation of interest in the selected cases

<table>
<thead>
<tr>
<th>#ID</th>
<th>Transferability</th>
<th>User Centricity</th>
<th>Overall Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>2</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>3</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>High interest</td>
</tr>
<tr>
<td>4</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>5</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>High interest</td>
</tr>
<tr>
<td>6</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>7</td>
<td>LOW</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>8</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>9</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>No interest</td>
</tr>
<tr>
<td>10</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>11</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>12</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>13</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>14</td>
<td>LOW</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>15</td>
<td>HIGH</td>
<td>LOW</td>
<td>Low interest</td>
</tr>
<tr>
<td>16</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>17</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>High interest</td>
</tr>
<tr>
<td>18</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>19</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>20</td>
<td>HIGH</td>
<td>LOW</td>
<td>Low interest</td>
</tr>
<tr>
<td>21</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>22</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>23</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>High interest</td>
</tr>
<tr>
<td>24</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>25</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>26</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>High interest</td>
</tr>
<tr>
<td>27</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>28</td>
<td>LOW</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>29</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>30</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>High interest</td>
</tr>
<tr>
<td>31</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>32</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>33</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>34</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>35</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>36</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>37</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>Medium interest</td>
</tr>
<tr>
<td>38</td>
<td>MEDIUM</td>
<td>LOW</td>
<td>No interest</td>
</tr>
<tr>
<td>39</td>
<td>HIGH</td>
<td>MEDIUM</td>
<td>High interest</td>
</tr>
<tr>
<td>40</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>No interest</td>
</tr>
</tbody>
</table>
5.2 Preliminary statistics about analysed cases

This paragraph provides some projection that highlight how much the sample reflects the needs of the NET-EUCEN network. The main information we have to gather is related to the user-centric degree of our sample, i.e. understanding how much the analysis mask we adopted has a filtering impact in the evaluation.

The first output (figure 1) is the following:

- There is an equal distribution of low and medium application of user-centricity;
- The most statistical cases of user-centricity fall in the window [2-3]. Maybe we shall deepen that window with a more refined filter.
- The transferability scores a visibly higher level and this means that it has been paid more attention to the technology and informatisation rather than to the users.
- The most statistical cases of transferability fall in the window [2,5-3], this is clear since the technology of almost running services is mature.
- It’s worth to mentioning that no one case has been found as characterised by an high-level of application of the user-centricity paradigm as it has been defined by the NET-EUCEN network.

![Figure 1: Result of case analysis: distribution of scores. a) user-centric, b) transferability](image)

5.3 Overall positioning

This paragraph shows some aggregated projection of the case analysis, highlighting the comparison between the European and the International areas. The following results have only a partial validity since they refer only to a small percentage of the total services that are offered to citizens at a global level.

![Figure 2: Result of case analysis: a) distribution of degree of interest, division by area](image)

The positioning that we call I.C.A. “International Comparative Analysis” is meant to provide a preliminary check of the current status of the facts in the application of user-centricity. Going in detail, and taking into account
the scope of the analysis, we check also the degree of interest in disseminating to the Wide Community. We have discovered also some interesting information:

- We only have 7 cases of high interest;
- Other 12 cases can be considered of medium interest and will be – hence – discussed during the workshop.
- Also in this case there is an equal distribution between the not interesting (No, Low interest) and interesting (Medium, High interest) categories.

These last projections answers to our main question: is the Europe aligned with the rest of user-centric offers worldwide? We can easily say YES, even if the starting data represent a small part of the global offer of service to citizens and users. The various distributions between Europe and International area differ only for some percentage-points

From our technology analysis we’ve seen that several running services are still in the only-web information delivery that actually represents the trend of the mid 2000, while the emerging 2.0 tools are still in development phase for this specific sector.

Additionally, quite all the surveyed services are the result of the application of a policy (at whatever level, central – local) and co-funded by the public administrations; this is an important issue since it reveals that few running service can be actually used for a business in the short-medium period. The sustainability of these services lies in the reduction of the running costs and in the improvement of the welfare.

![Figure 3: Result of case analysis, % of cases in degrees of interest, division by area](image)

6. **Conclusion and recommendations**

The “key” used in this analysis is the “citizens engagement” that can be actualised through very different ways and using very different tools, often not only ICT-based. Public workshops and consultation are still a powerful instrument to engage citizens and create a debate. The use of Government 2.0 tools is limited by the low level of ICT education and literacy of some disadvantages categories that can be reached through a service in any case.

Starting from these two assumptions, the document reveals that there exist very few examples of running application of the user-centricity paradigm as defined by the NET-EUCEN network: 20 out an initial sample of more than 450 cases, to be actually used as examples to propose to the various P.A. in our Workshop Validation Campaign, notably 7 of high interest since they embed both user-centricity aspects and are easy to be transferred. This survey, indeed, represents the second step of the Best Practice scouting campaign (NET-EUCEN D2.0) that started by looking at a more that 1.500 cases in the [www.epactice.eu](http://www.epactice.eu) repository.
The analysis reveals that the Europe and the International area share the same level of implementation of user-centric services and a wider campaign of analysis would be need to point out the technological level and the actual implementation by central and local governments.

The transfer of these cases can be actualised through the support of local and central administrations and a cooperation framework with developers: this is a boundary for the replication and implementation of cases and shall be supported by governments until the business aspects will be improved. There are four main factors that shall be taken into account to enhance the application of user centricity in eGovernance sector: the engagement of citizens; the use of new technologies and the 2.0 tools; the use of open technologies; the business perspectives.

Following this preliminary analysis, we can list some initial recommendation targeted to the Community at large, the rationale follows the analysis of those cases that have scored the highest level in our evaluation, focused on understanding the aspects and reasons why a case is more interesting when compared to another:

- The key factor is the engagement of citizens in the various phases of the service definition, development and refining. It’s important to assess methodologies for users and citizens’ engagement, that are not only ICT-based, but imply the active participation of users especially in the phase of the service definition. Once the service is designed around the users’ needs it will be easier to engage the same user in the refining and improvement phases rather than when a service is “pushed” on a category of users.
- The use of new technologies and the 2.0 tools through mobile devices empowers the co-participation of users. This is the interface that almost all citizens and users are going to use for the management of all the information of his/her daily life. All the services shall be provided also through these kind of devices. All the campaigns of users engagement shall take into account also these devices in the polls campaigns and in the data gathering (requirements and/or refining) phase.
- The use of open technologies increases the possibility to replicate the service in other environments. The service developers shall envisage campaigns of support by free-lance programmers, thus increasing the low-cost / high-quality bug detection and service improvements, even through the implementation of new features. Furthermore, the open source technologies allow an easy re-adaption of the service modules in other domains.
- It’s important to have a business perspective for the service’ sustainability. This is not a boundary requirement, but it’s more and more important when thinking about the need of external funds in providing the service to a group of citizens. The business is bounded with the provision of added-value content information not referable to having any impact on welfare.

Acknowledgements

The authors gratefully acknowledge funding from the European Commission, Information Society and Media Directorate-General, under the ICT Policy Support Programme (ICT PSP). The results presented in this paper are based on the survey activities of the Thematic Network NET-EUCEN (Grant Agreement N° 250522). Usual disclaimers apply.

References

D2.0 "Analysis of cases in ePractice portal", 16th September 2011.
D4.1 "Draft scenarios for S4U", 30th April 2012.
Working document “NET-EUCEN: Building the indicators for measuring the user centricity”, February 2013
Shaping Information Infrastructure Evolution: Governmental Claims of Architectural Control Points

Stefan Henningsson¹, Jonas Hedman¹ and Bo Andersson²
¹Department of IT Management, Copenhagen Business School, Denmark
²Department of Informatics, Lund University, Sweden
sh.itm@cbs.dk
jh.itm@cbs.dk
bo.andersson@ics.lu.se

Abstract: Payments are central for society. Historically, it involved two parties exchanging goods and services for money. Today, payments, with increasing frequency, consist of digital representations of money that are transferred through globally intertwined network. Payments involve many parties such as payers, payment services providers, banks, central banks, telecom operators, mobile handset manufactures, and payees. The digitization of payments that occurs around the world, leads to the emergence of Digital Infrastructure (DI) that is characterized by the number and heterogeneity of included socio-technical components, relations, and their dynamic and unexpected interactions. DIs are IT solutions that frequently are the shared responsibility of an ecosystem, including private and governmental agencies. In consequence, development of DIs requires approaches that are different from the traditional systems development approaches. It is about modifying (changing and extending) a distributed installed base, shaping the evolution of DIs in desired directions. In this paper we inquiry into the possibilities for actors, such as governments, interested in the DI to influence its evolution towards specific ends. Specifically, through a case study of the payment infrastructure we identify and describe the role of legal and technical architectural control points. These control points are parts of an DI that have particular strategic importance, for example a monopolized gateway or a de jure mandatory standard for behavior or data interchange.

Keywords: information infrastructure, digital infrastructure, architectural control points

1. Introduction

Historically, payments involved two parties exchanging goods and services for money. Today, payments involve many parties, including payers, payment services providers, banks, central banks, telecom operators, mobile handset manufactures, and payees still exchanging goods and services for money. However, money has changed form and become digitalized. So today, payments, with increasing frequency, consist of digital representations of money that are transferred through globally intertwined network.

The digitization of payments that occurs around the world affects all states and governments. It leads to the emergence of a new type of information technology (IT) artifact with the generic label of Digital Infrastructure (DI) or Information Infrastructure (Hanseth and Lyytinen, 2010, Tilson et al., 2010, Star and Ruhleder, 1996, Henningsson and Zinner Henriksen, 2011). DI is a specific type of IT artifact that is characterized by the number and heterogeneity of included socio-technical components, relations, and their dynamic and unexpected interactions (Star and Ruhleder, 1996, Hanseth and Lyytinen, 2010). DIs are IT solutions that frequently are the shared responsibility of an organizational ecosystem including both private and governmental organizational entities (Northrop et al., 2006).

Design and development of effective DIs has proven difficult and incurs huge losses in foregone investments, opportunity costs, and political and social problems (Hanseth and Lyytinen, 2010). DI development is frequently the result of collective action and politics rather than clear-cut strategic rationales (Rukanova et al., 2010), exemplified by the difficulties with developing nationwide e-Health system in the UK (Sauer and Willcocks, 2007). The evolution of DIs has been compared to “drifting”, in many cases completely out of managerial control (Ciborra et al., 2000).

Developing DIs, such as the payment DI, requires approaches that are different from the traditional “design from scratch” system development methods (Hanseth and Lyytinen, 2010, Tilson et al., 2010). It requires somewhat different approaches – it is about modifying (changing and extending) what is to become as close as possible to what is desired – i.e., it is about making DIs evolve in the desired directions. Such an approach has been dubbed “installed base cultivation” (Hanseth and Lyytinen, 2010).
With this paper we inquiry into the possibilities for actors interested in the DI, such as the digital payment infrastructure, to govern and influence its evolution towards specific ends. The inquiry contributes to knowledge about an ongoing transition of e-Government innovation that moves beyond the scope of digitizing governmental services to challenges of governing and facilitating innovation of public-private IT infrastructures that are essential in today's society. Specifically, through a case study of payments, with particular interest in the Danish digital payment infrastructure we identify and describe the strategies of creating and claiming control over architectural control points. These control points are parts of an DI that have particular strategic importance, for example a monopolized gateway or a de jure mandatory standard for behavior or data interchange.

Although partially successful in the outset to maintain control over the payment DI evolution, the strategy creates substantive barriers for innovation and new actor entry. Ultimately, the lack of innovation leads to that the Danish payment DI and its associated ecosystem is challenged ('out innovated'), by a parallel DI supporting payment transactions carried out by a rival organizational ecosystem of which the Danish government has no influence over at all.

2. DIs and architectural control points

The paper builds on the theoretical perspective of DI (Hanseth & Lyytinen, 2010; Tilson et al., 2010; Henningsson & Zinner Henriksen, 2011) and the concept of Architectural Control Points (See, for example, Woodward, 2008). The combination of the two perspectives is an attempt to capture and bridge the interactions between the evolution of DIs and the strategies actors execute to affect their evolution.

In computer science and systems engineering, researchers have long recognized the concept of an architectural control point as a way to identify parts of systems that have particular strategic importance (Woodward, 2008). The concept was developed by the Value Chain Dynamics Working Group at MIT (Trossen and Fine, 2005) in order to understand how commercial benefit is gained from business models emerging in and around the telecommunications industry.

According to Woodard (2008) architectural control points can be defined as “system components whose decision rights confer architectural control over other components” (p. 361). Following Woodward (2008), actors with decision right own the designs that make up the system. More specifically, they hold decision rights that determine, the entities of a system and the relationships between those entities. Consequently, control points can more generally be defined as points at which management can be applied, and any encapsulated functional element of a system can be a control point (Trossen & Fine, 2005). The effect of architectural control points can be small but also powerful, influencing the whole architectural landscape (Elaluf-Calderwood et al., 2011).

In DI, the presence of architectural control points has been seen as problem. In DIs, the DIs ability to accommodate change in the infrastructure, catering for evolution is considered as key criteria for the DI’s long-term survival (Tilson et al., 2010). Rodon et al. (2012) and Hanseth et al. (2012) report on two cases where the issue of architectural control points was central in hampering DI evolution. According to Rodon et al. (2012), the Catalan Health Service (CHS) set the foundations for the development of an electronic prescription system in Catalonia by the mid-2004. In this development project, one of the actors managed through a series of strategic and political maneuvers make modification of the suggested architecture to introduce an additional gateway of which the actor controlled. This design where suboptimal from a technical perspective, and hampered future innovation, but meant that the actor still would keep control of the parts of the healthcare ecosystem. Hanseth et al. (2012) report on a similar story in the Norwegian health care system, which makes the authors suggest that architecture should not contain any architectural control points that allow individual actors to take control over the whole DI.

Tilson et al., (2010) refers to the above discussion as the paradox of control. “Opposing logics around centralized and distributed control (or individual autonomy) play an equally important role in the evolution of digital infrastructures. This paradox of control brings into consideration the strategic actions of heterogeneous actors and their preferences on modes of control related to change. These considerations shape the services deployed, ownership of data and their definitions, control of critical resources (e.g., APIs), and the appropriation of value.” (Tilson et al., 2010, p. 754)
Despite the negative conclusions made by Rhodon et al. (2012) and Hanseth et al. (2012) about the risk of constraining DI innovation by introducing control points, the issue remains that some actors may have a particular interest in shaping the evolution of the infrastructure. In the reported cases, the reasons for enforcing control points where primarily political, and ‘non-rational’. The case about the Danish digital payment infrastructure below complements this view with a case where control could be rationally justified. However, as the use of control points comes with the risk of constraining the innovative capacity of the DI, the use of control points becomes in the Danish digital payment infrastructure a paradoxical balancing act between control and innovation.

3. Method

To explore the role of architectural control points in payment infrastructure evolution, we apply an explorative case study approach. The aim is to present a case that illuminates and explicates the role of architectural control points with focus on legal and technical issues in the payment infrastructure evolutions. To this end we present a story that takes historical events into account as well multilevel interdependencies (international, regional, and national).

We use secondary sources, such books, articles, annual reports, and official websites, as data inputs in the development of the case story. For the analysis we return to the theoretical concepts to identify architectural control and identify how legal and technical control points influence the evolution of payment infrastructure.

4. Evolving payment infrastructure

Payments are central to society and everyday life. It is the process of transferring assets, such as money, from one party to another party in the exchange of goods and services (Kokkola, 2010). Over time, this process has evolved, for example from barter to coin, from coins to bills of exchange and legal tender (bank notes and cheques), from gratitude based (the gold foot) to trust based (central banks), and from exchange based to provision based payments (Evans and Schmalensee, 2005). Many of these inventions left footprints in the form of architectural control points that influence the current and future payment infrastructure (Woodard 2008).

The payment infrastructure is not one invention; rather it is based on an incremental evolutionary process, taking place around the globe. In this section we present the case of payment infrastructure evolution. The story starts in the barter economy followed by the introduction of coins and banknotes to today’s emerging global payment infrastructure with its national and organizational implications. We present and discuss two types of architectural control points that are influencing the evolution: legal and technical points.

4.1 From bartering to money

People have been exchanging goods and service, for example livestock for sacks of grain, labor for food and housing, pearls for land, and slaves for precious metals, for thousands of years (Ferguson, 2009). Early markets were based on barter between two parties, where goods or services were directly exchanged for other goods or services without using a medium of exchange. Barter markets never has been a primarily way of exchange. Instead, none-cash societies have relied on gift-economies, such as part of the Pacific Islands. But bartering still exists, but to limited extend, mainly between friends or in situation of crises, such as hyperinflation or deflation (Graeb, 2001). Recently, with advancements in information technology, we see new emerging barter markets (Giesler, 2006). For instance, the whole file sharing movement with Bit Torrents and a number barter exchanges in the North-America organized by National Association of Trade Exchanges (NATE). Bartering has some inherent limitations, including the presence of matching needs, the absence of common measure of value, and difficulty in storing wealth (Graeb, 2001). Historically, these limitations have been used as arguments for inventing money. However, Graeb (2001) disagree and proposes that money was invented when humans moved from the obligation "I owe you one" to "I owe you one unit of something". So according to Graeb, money emerged as credit and then later got the functions of a medium of exchange.

Initially, money was based on pearls, shells and pieces of precious metals (Ferguson, 2009). This type of money is labeled as commodity money and the most famous form is gold. The system of commodity money evolved into a system of representative money. In the process towards representative money, bills of exchange emerged (Ferguson, 2009). In the beginning, issued by gold and silver merchants or banks to their depositors. With time, these bills of exchange became accepted as a means of payment and were used as money. They emerged in Italy toward the end of the middle ages and the main purpose was to reduce the risk of robbery
when travelling, since a holder of a bill of exchange could use it to withdraw money in another town. The House of Medici, in Florence, Italy, popularized them and become the leading bank institution at its time (Ferguson, 2009). Prior to bills of exchange, the Song Dynasty in China introduced paper money, known as "jiaozi", but they were not the source of our current banknotes. Instead, this is credited to Stockholms Banco, which later became the central bank of Sweden. In 1661, the bank started to print bank notes. Behind, these banknotes there was a deposit in physical goods (e.g. gold) with the same value. Building upon this principle with deposits lead to the gold standard as monetary system, i.e. banknotes are the medium of exchange that can be changed into a fixed amount of gold. With this innovation, it was possible to replace gold coins. This system lasted until the Bretton Woods Conference in 1944, where most countries decided to adopt fiat currencies (Selgin, 2003). A fiat currency is an official legal tender, even though it has no intrinsic value, meaning that they are based solely on trust (George 2003). In addition, to fiat currencies most currencies were pegged, at that time to the US dollar, with a fixed exchange rate. The gold standard prevailed in the USA until 1971, when US government suspended the gold standard.

4.2 Global payment infrastructure

The innovations describe above are the foundation of our payment infrastructure. For instance, fiat money exists as digital representations in our bank accounts. Upon these building blocks a global infrastructure have emerged, consisting of financial institutions, central banks, payment transaction systems, payment methods, standards, and legal frameworks. We focus payments cards, standards and legal frameworks, and globally acting governmental agencies.

4.2.1 Payment cards

Payment cards have changed how we pay and spend money (Evans and Schmalensee 2005). They where introduced by Sears in the early 1900s, but not until the introduction of Diners card in the 1950s they reached a mass market. A few years later American Express followed. Diners and Amex are charge cards and exists in a 'closed-loop' system with users, merchants and issuers of cards.

In 1966, Bank of America launched the general-purpose credit card. Today known as VISA. The same year, the InterBank Card Association (later re-named as MasterCard) began to issue credit cards. MasterCard and VISA create and governs the rules for authorization, clearing and settlement, and develops and maintain the payment network system to process transactions. The Automatic Teller machine (ATM) can into the market the following year (Evans and Schmalensee, 2005).

4.2.2 Standards and legal frameworks

Payments, including authorization, clearing and settlement are governed by standards (Kokkola, 2010). ISO (International Organization for Standardization) is the world’s largest developer of International Standards and develop standards for the payment infrastructure. The ISO 4217 is the International Standard for currency codes, used for currency conversions. Banking institutions, businesses, and individuals worldwide for defining different currencies uses this code. Using these codes helps to eliminate any confusion regarding currency names and symbols that can occur during international exchange. The ISO 13491-2:2005 specifies checklists to be used to evaluate secure cryptopraphic devices in the financial services environment. ISO are also working on standards for mobile payments. For instance, the future standard ISO 12812 will address: security and data protection, Mobile person-to-person payments, Mobile person-to-business payments, and requirements for mobile banking applications.

International commercial law governs international sale transactions, including payments. A number of organizations participate in development of commercial law, United Nations Commission on International Trade Law and World Trade Organization. One of the tools is model laws that can be locally adjusted and adopted, for instance the United Nation Convention on International Bills of Exchange and International Promissory Notes from 1988

4.3 European outlook

Payment infrastructure in Europe has drastically changes over the last decade (Danmarks-Nationalbank, 2005, Garcia-Swartz et al., 2006). The introduction of the Eurozone and European Central Bank has harmonized the payment infrastructure (Kokkola, 2010). The Single Euro Payments Area (SEPA) legislation aims to make the
payment infrastructure more efficient and old banking collaboration, e.g. SWIFT, develop and maintain communication standards and communication network.

4.3.1 The EURO

Most countries in Europe are part of the Eurozone, with some of the exceptions like Denmark, England and Sweden. This is an economic and monetary union of 17 European Union (EU) member states that have adopted the euro (an ISO 4217 code) as their common currency and sole legal tender. Monetary policy of the zone is the responsibility of the European Central Bank (ECB). It is the central bank for the euro and administers the monetary policy of the 17 EU member state. The Treaty of Amsterdam established the bank in 1998 (Kokkola, 2010).

The primary objective of the European Central Bank is to maintain price stability within the Eurozone. In addition ECB implement the monetary policy of the Eurozone, conduct foreign exchange operations, promote smooth operation of the financial market infrastructure under the TARGET2 payments system. TARGET 2 is the core interbank transfer system in Europe. Furthermore, ECB has the exclusive right to authorize the issuance of euro banknotes.

4.3.2 SEPA

SEPA is a payment integration project initiated by the EU. The aim is to improve the efficiency of cross-border payments and turn the fragmented national markets for euro payments into a single domestic one. SEPA will enable customers to make cashless euro payments to anyone located anywhere in the area, using a single bank account and a single set of payment instruments. This includes the development of common financial instruments, standards, procedures, and infrastructure to enable economies of scale. For instance, in 2008 the pan-European payment instruments for credit transfers was in affect and by 2010 all present national payment infrastructures and payment processors were expected to be in full competition to increase efficiency through consolidation and economies of scale.

4.3.3 SWIFT

The Society for Worldwide Interbank Financial Telecommunication (SWIFT) was founded in Brussels in 1973. SWIFT provides a network that enables financial institutions worldwide to send and receive information about financial transactions in a secure, standardized and reliable environment. The first message was sent in 1977. SWIFT's first United States data center started in 1979. SWIFT also markets software and services to financial institutions, much of it for use on the SWIFT network, and ISO 9362 bank identifier codes (BICs). The SWIFT network link more than 9,000 financial institutions in 209 countries are exchanging an average of over 15 million messages per day. SWIFT does not facilitate funds transfer; rather, it sends payment orders, which must be settled by correspondent accounts that the institutions have with each other. SWIFT has become the industry standard for syntax in financial messages. Messages formatted to SWIFT standards can be read by, and processed by, many well-known financial processing systems, whether or not the message traveled over the SWIFT network.

The SWIFT secure messaging network was run from two redundant data centers, one in the United States and one in the Netherlands. SWIFT opened a third data center in Switzerland, which started operating in 2009, since then data from European SWIFT members will no longer be mirrored to the US data center. The American intrusion of the SWIFT network forced SWIFT to change its architecture to satisfy member privacy concerns by implementing the new distributed architecture with a two-zone model for storing messages. Concurrent to this process, the European Union negotiated an agreement with the United States Government to permit the transfer of intra-EU SWIFT transaction information to the United States under certain circumstances.

4.4 Danish payment infrastructure

Money has a long history in Denmark and “Knud den Store” (Canute the Great) started coinage in the 1020s. The Danish “Krone” has been the official currency of Denmark, since 1875. The krone was a result of the Scandinavian Monetary Union (Denmark, Norway and Sweden), which came into effect in 1873 and lasted until World War I (Jensen, 2001).
The krone is part of ISO as well as and has the ISO 4217 Code of DDK. Furthermore the krone is pegged, since 1999, to the euro via the European Union’s exchange rate mechanism (ERM II) after having negotiated an opt-out from participation under the Edinburgh Agreement in 1992. Its exchange rate is tied to within 2.25% of the euro. This will enable Denmark to join adopt the single currency at a later stage on the same terms as those applying to the initial euro area member states.

### 4.4.1 National Bank

The national bank issue Danish banknotes and coins. In addition, Danmarks Nationalbank acts as settlement bank for a number of financial institutions via the payment system, Kronos. This system is linked to Target 2 for funds transfers between nations. The national bank of Denmark ensures that the exchange rate to the Euro is keep, by buying or selling Krones.

### 4.4.2 NETS

The Danish banks were among the first in the world to develop and invest in electronic payment services in the 1960s. The banks established PBS in 1968 to develop and deploy payment solutions and associated services on the Danish market. In 1974 a direct debit was introduced and in 1983, PBS introduced the national debit card, the Dankort.

Nets is the leading payment service provider in Scandinavia providing payment & information services. Nets was formed in 2009 as merger between Danish PBS Holding A/S and Norwegian Nordito A/S. The company processes almost all payment cards in Denmark. In addition, Nets provide Betalingsservice, AvtaleGiro, eFaktura, secured front-end and back-end solutions, and e-security of electronic document signing.

In 2010 and 2011, Nets invested a lot of resources in the planning and development of new common Nordic IT platforms to replace the previous Norwegian and Danish platforms. The new common systems will be implemented on a rolling basis in 2012. Innovative new platforms will be added, the first example of which is the mobile payment solution Mobilpenge, which was launched in January 2012 and which forms a link between the mobile phone and the user’s bank account.

### 4.5 Summary and analysis

In this section we will show the role of legal and technical architectural control points, see table 1 for a summary. Two key historical control points affects today’s payment infrastructure. First is that they are fiat money, i.e. they are not worth anything by themselves. Second is that money are representational, i.e. they represent some thins, e.g. Euro or Krone. These two, control points underlie the entire payment infrastructure and affects the legal system, including its standards, and all the information technology that supports payments.

On an international level powerful actors, such as WTO and UN, aims to draw and maintain the basic foundations of the payment infrastructure, by developing model laws and international agreements that becomes architectural control points. Many of these agreements become standards such as ISO standards, e.g. ISO 9362 bank identifier codes (BICs). This standard is implemented by thousands of banks around the world and is used in the SWIFTNetwork. Visa and Mastercard provide global payment infrastructures, including the card and access to payment terminals, which are becoming standard for card payments.

Europe’s payment infrastructure consists of an overall infrastructure that links the independent member infrastructures. The ECB is the central node. Target 2 system controls interbank fund transfers and utilizes the existing payment transfer standards under the rules of the Eurozone. SEPA is the new directive that is under implementation across Europe. It forces every member state to adopt (harmonize) its payment infrastructure, such information technology and legal framework

The national level, in our case Denmark, involve actors, such as the national bank, banks, and Nets, that both tries to maintain the current infrastructure but at the same time to develop new payment solutions that meets global requirements. Nets collaborate with Mastercard and Visa regarding the international card transactions in Denmark, whereas Danish banks co-brand the Dankort with Mastercard and Visa.
5. Discussion and conclusion

Increasingly, e-Government innovation moves beyond the scope of digitizing governmental services to challenges of governing and facilitating innovation of public-private IT infrastructures that are essential in today’s society. Not at least because of the turbulence in the financial industry and the emergence of mobile payments, the shaping of the payment infrastructure is a topical subject in the e-Government discourse.

The history of payments portrays an evolutionary process where the claiming of architectural control points has played a significant role in the shaping of the payments. Recently, payments have become increasingly digitalized. As a consequence, strategies of claiming control points have taken the form of digital means. Internationally, the SWIFT network has been established as one control point. In Europe, the TARGET2 system forms one control point. In Denmark, the Kronos system constitutes a national control point.

Taken together, the control points means that actors can exercise some control of the otherwise ‘drifting’ evolution of the digital payment infrastructure. For example, the Danish Government is able to control the actor’s who gets access to the Kronos system, thereby influencing the constituent of the payment ecosystem.

However, the extensive use of control points also come with consequences. Outside the established digital payment infrastructure, rival ecosystems and rival DI’s are emerging. Internet-based payments, mediated by actors such as PayPal, Google Wallet, Apple Passbook, and iZettle are surpassing the existing control points to introduce faster and more radical innovation. Similarly, Telecom providers are looking into ways of utilizing the mobile phone networks for digital payments.

So, while the actors of the ecosystem surrounding the digital payment infrastructure are at least partly successful in shaping the evolution of the government controlled digital payment infrastructure, the challenge lies in balancing control and flexibility of innovation. As noted by Hanseth et al. (2012), architectural control points may hamper infrastructure innovation. If so, the government controlled digital payment infrastructure runs the risk of being ‘out innovated’ by rival infrastructures for digital payments. Different legal and technical control points leads to that the different emerging infrastructures are following different rules of innovation, which favors one infrastructure in front of the other in the innovation game.

Acknowledgements

This work was carried with the support of Copenhagen Finance IT Region (www.cfir.dk) and was funded by the Danish Enterprise and Construction Authority grant number ERDFH- 09-0026.

References


Stefan Henningsson, Jonas Hedman and Bo Andersson


Understanding Service Transaction Costs: Developing a Framework for e-Government Change

Paul Jackson
Department of Accounting, Finance and Economics, Oxford Brookes University, UK
pjackson@brookes.ac.uk

Abstract: This paper discusses the development of the UK’s ‘Cost Architecture Framework’ and its use by local authorities to support decision-making about e-Government channel migration and process redesign. It starts by describing the need among UK local authorities for a more robust and consistent approach to identifying the cost of service transactions and the potential benefits of moving to online channels. The paper then discusses how ideas from Activity-Based Costing (ABC) were incorporated into an approach, the Cost Architecture Framework, to help meet this need. This is followed by a discussion of how these ideas have since evolved into an online tool used by members of the local government community. The paper shows how, through the involvement of a range of stakeholders, the techniques of ABC have become part of an ‘improvement ecosystem’ bound up with process redesign and e-Government related change. This has enabled process analysts and improvement practitioners to build the business case for change, as well as to benchmark the cost and quality of services transactions across different local authorities. The paper also shows how frameworks to support e-Government-related change can evolve through the interaction of management techniques, user needs and stakeholder participants.

Keywords: transaction cost, channel migration, activity-based costing, process change

1. Introduction

The migration of customers to online channels is a key part of the e-Government agenda. In building the case for change, an understanding of the relative costs of channels (web, face-to-face, telephone, etc.) is clearly important. Doing this robustly and transparently can be problematical, however. For instance, the fulfilment of a service may involve more than just what goes on at the web ‘front-end’.

The full cost of a service will also reflect not just resources that are directly used (such as labour and technology), but also an apportionment of indirect costs (namely, overheads). Making cost comparisons across organisations – for example, to support analysis for shared service provision – adds additional weight to the need for clear and consistent principles.

This paper looks at how one approach to this challenge – the “Cost Architecture Framework” – was developed within the UK local government community. It examines how ideas from Activity-Based Costing (ABC) were adapted and employed for use by local authorities to support collaborative working and service benchmarking in relation to the costs of government channels.

The paper begins by reviewing the background to ABC. It then looks at the evolution of Cost Architecture Framework. This is examined over three key phases, leading to the production of Department of Communities (CLG) guidance (CLG 2008) and the development of an online tool to support the collation and sharing of cost data.

Having described this work, the paper then discusses ABC as part of an improvement ecosystem, arguing that its application in the instances described need to be understood as part of an evolving and integrated set of improvement methods, particularly bound up with processed-based analysis and change. Because these methods have often been construed as ‘lean’ (see, for example, Womack and Jones 1996; Radnor and Walley 2008; Bagley and Lewis 2008), a critique is then supplied that draws on ideas from the lean accounting literature. Implications for public sector practitioners are then provided.

2. Activity-based costing (and management)

Activity-Based Costing (ABC) was first developed to overcome shortcomings in traditional approaches to allocating costs to products and services (Friedman and Lyne 1995). As Cooper and Kaplan (1988) observed, the use of labour hours as the proxy for apportioning indirect costs was becoming increasingly irrelevant where direct labour was consuming an ever smaller proportion of product and service costs. The distortions created meant that managers were poorly served when making decisions about product prices and strategies,
Paul Jackson

as well as in identifying the most efficient processes to use and the best channels with which to reach customers.

An activity-based approach, by contrast, focuses not on the ultimate cost object (such as the product or service), but on the activities that produce the product or service (for example, Arnaboldi and Lapsley 2003, p. 348). As such, it is the activities that are seen to consume resources - such as labour, materials, machinery, space, and other corporate overheads. Having identified activities and allocated resources to them, costs can then be traced to the products and services that consume these activities (Cooper and Kaplan 1998). In ABC this is done via the use of ‘cost drivers’ - the factors that create demand for particular activities (see also Shanahan 2008: 39-40). As Cooper and Kaplan (1988) note, traditional cost accounting techniques often use drivers that bear little or no relationship to the activities that create work - for example, allocating the costs of Accounts Receivable based on sales revenue rather than the number of invoices. With cost information so derived, it is argued, managers are better placed to evaluate the options before them, optimise corporate performance and maximise profitability (Stratton et al. 2009; Maelah and Ibrahim 2007). It is for reasons such as these that activity-based techniques have grown in popularity since the 1990s (Friedman and Lyne 1995).

In research conducted in the UK, Friedman and Lyne (1995) found a variety of uses being made of activity-based techniques. This included support for costing and pricing (such as in bidding for work, or deciding on product ranges), resource allocation (for example, in departmental re-charging and justifying capital expenditure) and in cost management (for managing overhead reduction or identifying non-value-adding activities).

ABC has now been adopted by a range of organisations in the UK public sector, including universities (Goddard and Ooi 1998; Cropper and Cook 2000; McChlery et al. 2007), local government (Ardaboldi and Lapsley 2003), central government (CIPFA 2001) and health care (Lawson 2005; Arnaboldi and Lapsley 2005). Internationally, too, ABC has been employed by a range of public sector bodies (for example, see Mullins and Zorn 1999; Fortin et al. 2007; Carmo and Padovani 2012).

A range of techniques and frameworks, derived from ABC, emerged during the 1990s, which sought to broaden the appeal of ABC from a cost accounting technique to a tool for performance management and Activity-Based Management (ABM) more generally (for example, see Brimson and Antos 1994; Forrest 1996; Turney 1996). The use of activity-based methods as an adjunct to other managerial practices is something for which Cooper and Kaplan originally laid claim. ABC is, they posited, ‘as much a tool of corporate strategy as it is a formal accounting system’ (1988, p. 97). And as Ness and Cucuzza (1995) argue:

‘...ABC can be much more than a superior accounting technique that shows how much money individual products are really making or losing. When ABC is woven into critical management systems, it can serve as a powerful tool for continuously rethinking and dramatically improving not only products and services but also processes and markets strategies.’ (p. 130)

3. ABC and value-adding analysis

The focus in activity analysis on processes and continuous improvement is emphasised by Johnson (1991), an early advocate of ABC, and is something observed by Friedman and Lyne (1995) in their UK research in the mid 1990s. Many of the companies the latter authors studied gained most of their benefits directly from activity analysis itself - often in determining whether or not such activities were value-added (p. 14).

As CIPFA’s (2001) guidance on ABC notes, having identified areas of analytical interest, an ABC exercise can then put those relevant activities into a series of categories (pp 5-6):

- **Customer value-adding** – activity that cannot be removed without reducing the quality of service to the customer
- **Business value-adding** – activity that adds value to the business and which, in due course, may add value to the customer
- **Non-value-adding** – activity that adds no value to either the business or customer, removal of which could improve the service
- **Sustaining** – activity that adds no value but is required to support operations.
Value-adding analysis can therefore be important in removing waste, focusing on aspects that really matter to customers and minimising those activities which, while essential, do not benefit either the organisation or the users of its services. When combined with accurate cost information, such analysis can be a powerful input into decisions about redesigning services.

This returns us to the specific concern of the current paper and the use of ABC in supporting business process improvements and decisions about delivery channels. This should be of particular relevance to public bodies, such as local authorities. Unlike profit-making companies, such organisations have little choice as to which services they provide; hence product costing and customer profitability analysis are of little interest to them. Public bodies are therefore less concerned with finding the optimum product mix than identifying the most efficient way of delivering value to customers while meeting statutory responsibilities.

4. The practical application of ABC to support service improvement

Against this theoretical background we will now look at the practical application of ABC within a community of UK local authorities. This will cover the three phases of work, the organisations involved and the outputs produced. At the centre of this work was the creation, enhancement and roll out of what became known as the ‘Cost Architecture Framework’. The three phases are summarised in Table 1.

Table 1: The three phases of work

<table>
<thead>
<tr>
<th>Phase</th>
<th>Context of work</th>
<th>Outputs</th>
<th>Key Actors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Validated service delivery costs project</td>
<td>Validated costs; 2006 report, Validated Service Delivery Costs</td>
<td>NWeGG, † CIPFA, councils</td>
</tr>
<tr>
<td>2</td>
<td>Cost Architecture project</td>
<td>2008 CLG guidance: Delivering Efficiency</td>
<td>NWeGG, CIPFA, councils</td>
</tr>
<tr>
<td>3</td>
<td>Roll out of Cost Architecture and development of cost calculator</td>
<td>Spreadsheet and online cost calculator, training workshops</td>
<td>ESD Toolkit, † councils</td>
</tr>
</tbody>
</table>

The author, as a member of the CIPFA team, was heavily involved in the first two phases of this work, attending project meetings, supporting analysis and helping to draft the related reports. Data on Phase 3 has been collected in discussion with ESD Toolkit consultants, reviews of guidance reports and inspection of relevant tools.

4.1 The cost architecture guidance in context

In 2008 the Department of Communities and Local Government produced the guidance report Delivering Efficiency: understanding the cost of local government services (CLG 2008). The document was jointly authored by IPF (the then name for the business services arm of CIPFA) and the North West e-Government Group (NWeGG). The primary audience for the report, it says, are process analysts and improvement managers, but also anyone tasked with improving services and/or seeking to evidence efficiency gains (p. 7).

The report provides a cost allocation framework based on ABC and draws on the Best Value Accounting Code of Practice3 (a code managed by CIPFA under legislative authority). As the report says, it was written in response to practitioner demand for guidance and tools to help in identifying the cost of services delivered to customers. Its genesis lies in earlier work by CIPFA and NWeGG, the Validated Service Delivery Costs Project.

4.1.1 Phase 1: Understanding service delivery costs

In 2006, as part of a broader effort in promoting online services, NWeGG commissioned CIPFA to support its work on channel migration strategies. The challenge here was to understand the cost of different local authority delivery channels: face-to-face, telephone/contact centres and websites. Although cost data existed, different costing and reporting structures were evident across councils, with no agreed methodology for measurement. This was compounded by differences in the unit being measured. For example, taking an application over the web is certainly a service transaction, but it is only part of a broader set of transactions through which a service (such as a benefit claim or planning application) is delivered - much of it happening behind the electronic interface.

---

1 The North West e-Government Group, now reformed as iNetwork.
2 Electronic Services Delivery Toolkit, later renamed Effective Services Delivery Toolkit.
3 Later renamed the Service Reporting Code of Practice (SeRCOP).
To make like-for-like comparisons between services and authorities, a common approach to cost allocation was therefore required. This needed to be one that more accurately tracked service and process costs (which might cut across functional areas) than was available by simply allocating costs in a 'top down' manner via budget headings. This was particularly important in building a body of evidence on the efficiency of different channels, as well as supporting business cases for channel migration (particularly in partnership projects).

These findings were set out in the report, ‘Validated Service Delivery Costs’ (IPF/NWeGG 1996). While the report supported the case for moving to online channels, it also noted that channel migration might also demand accompanying process redesign and technology integration, all of which would affect the business case for change. The key recommendation, though, was for a consistent approach to cost measurement, based on agreed principles and guidance (p. 3). It was also recommended that the project partners should liaise with the Electronic Services Delivery Toolkit community to evolve an approach to transaction analysis that was consistent with ESD ‘controlled service lists’.

Later to become ‘Effective’ Services Delivery, ESD Toolkit is a body funded jointly by the Local Government Association and member councils. Among other things, it supports a consistent approach to defining local authority services (through its service lists), as well as being a repository for tools, ideas and case studies on innovation and improvement. In due course, ESD Toolkit did indeed take over responsibility for the outputs from the Delivering Efficiency report (i.e., CLG 2008) and what became known as the Cost Architecture Framework.

4.1.2 Phase 2: The cost architecture approach to service costing

As the above indicates, the work that the 2006 report set out to produce two key deliverables: (1) a common cost allocation framework and (2) a standard definition of what constitutes a local government transaction. This was intended to address a gap in the sector in terms of the ability to produce consistent data on the costs of public services, thus increasing the ability of authorities to benchmark with one another.

The work was also seen to be an explicit complement to projects funded by the Department of Communities under the National Process Improvement Programme (NPIP) – a set of initiatives to improve skills and practices in local government around the design and management of business processes. In particular, though, it was focused on understanding the cost of serving customers, especially how these varied between different delivery channels.

The Cost Architecture Framework takes the view that the starting point for a common costing approach needs to be the ‘functions’ carried out by a local authority. These will either be ‘duties’, which an authority may have to perform (such as the provision of school meals), or ‘powers’ (for example, promoting tourism), which confer councils with the right to take certain actions. In order to produce a standard vocabulary for such functions, the cost architecture approach draws on two key reference points: the ‘business process architecture’ work carried out by NWeGG in the North West of England, and the ‘controlled services lists’ maintained by ESD toolkit. Both are described below.

Local authority business process architecture: The business process architecture for a local authority is the set of things it has to do in order to execute its duties and powers as a local authority. These are essentially a generic set of business processes, which are themselves comprised of different activities. The process architecture (what work is performed) is therefore common across local authorities. That said, there are ‘design’ choices as to how these are carried out - how the organisation is structured and which channels it uses, for instance.

The NWeGG work in this area originated in Blackburn with Darwen Council, continued at Chorley Borough Council and culminated in work with councils in Cumbria. Its aim was to derive the fundamental building blocks of what local authorities do. Such blocks – or generic processes - provide a starting point (within and between organisations) from which to identify areas of commonality, challenging existing ways of doing things and identifying approaches to delivering services.

The work identified some 64 generic processes – or ‘units of work’ – that constituted the business architecture of a local authority (in Chorley’s case, a district council). This included, for instance, ‘take a payment’ and
‘perform an inspection’. In the later work by NWeGG, this list was whittled down to around 50 generic processes (see ESD 2011), covering district, country and unitary authorities. Having identified a business process (or ‘unit of work’), it can then be assigned to a point on the transaction life-cycle. For a local authority, six such points have been identified (ESD 2011: 5-6):

- **Pre-transaction**: work that is needed prior to service requests or delivery, such as providing information on a service, or registering a service user’s details
- **Service request**: receiving a service, or making a request for one
- **Fulfilment**: delivering a service, such as repairing an asset or inspecting a property
- **Post fulfilment**: dealing with follow-on work, such as annotating a customer’s file or dealing with a complaint
- **Support**: work that enables all other transactions take place, such as to train staff or manage a budget
- **Democracy**: work, such as developing policy or engaging with citizens, which is bound up with a local authority’s governance and direction setting.

Taken together, a set of processes across the transaction life-cycle enable services to be delivered to customers. Using the Cost Architecture Framework, these can then be aligned to the Local Government Services List.

**Local Government Services List**: Whilst the functions of a local authority are prescribed by statute, *how* those functions are resourced, managed and delivered as ‘services’ is dependent on the way those services are designed. As we have seen, each service is comprised of a number of processes (and transaction points). In order to measure and compare how – and how well – such services are delivered, there is therefore an issue in describing services in a standard way. To do this, the Cost Architecture Framework makes reference to the Local Government Services List (LGSL) managed by the ESD Toolkit community (see CLG 2008, p. 33).

The LGSL provides a standard way of referring to council services (over 800 of them), thus allowing for like-for-like comparisons across organisations. For example, LGSL No. 710 (Trading Standards: Food Production Hygiene) is the service that ensures ‘standards are maintained in all aspect of food production and distribution, animal health and agriculture’.

Figure 1 shows the relationship between activities, processes, the LGSL and the functions of local authorities.

![Diagram showing Local Government Functions, Local Government Services, Processes and Activities](image)

**Figure 1**: Illustrated cost architecture, adapted from CLG (2008)

### 4.1.3 Phase 3: Calculating activity, service and channel costs

The approach described above charts the background and development of the Cost Architecture Framework. Following production of the 2008 guidance, and in collaboration with volunteer authorities, an Excel
spreadsheet-based calculator and supporting manual were developed to allow councils to calculate their costs using these principles and methods. This was released in April 2009, following testing by five councils, including a district, country and unitary authority, and was superseded in 2010 by a Web-based version, the ‘online service costs calculator’ (known as the ‘calculator’). It now has more than 40 local authority users.

The calculator provides an electronic means by which councils can enter data in order to compute the costs of their processes, transactions and end-to-end services. It also allows for ‘before’ and ‘after’ calculations (for example, by comparing ‘as is’ and ‘to be’ process designs) as well as identifying the cost of using alternative delivery channels. In addition, it allows authorities to benchmark the costs of their services with one another – something of particular interest to those contemplating partnership working for shared delivery, where an understanding of one another’s baseline positions is critical.

Using the Cost Architecture Framework and calculator involves the following steps:

- **Deciding on the service (or transaction) to be measured.** Users can select from the LGSL (to identify the service), as well as from the 50 ‘generic processes’, to characterise the work that supports the process.
- **Identifying activities undertaken in performing a process.** This involves looking at what people do in order to execute a business process. This could include (continuing the inspection example): planning a site visit, travelling, visiting a site and updating records after a visit.
- **Entering staff time and related costs on each activity.** At this stage in the process, annual total costs for each activity are identified. (For consistency across the sector, costs headings are consistent with the Service Reporting Code of Practice.)
- **Calculating service volumes (transaction numbers).** Before unit costs can be calculated volume figures need to be arrived at.
- **Identifying unit and channel costs.** Having identified the total cost of activities (and the generic processes they support), these are divided by volume figures in order to arrive at unit costs.
- **Conducting value-adding analysis.** As well as calculating the cost of activities, the calculator also allows activities to be categorised as ‘value-adding’, ‘sustaining’ or ‘non-value adding’.
- **Deciding on desirable change.** Armed with this information, managers and partners are better placed to understand how resources are being used, the level of productive of given resources, and which activities, processes and services are delivering the best value for money.

5. **Discussion and conclusions**

This paper has sought to follow the application of one management accounting technique, Activity-Based Costing (ABC), as it was applied and tailored across a number of local government initiatives. The developments discussed originated in a desire among local authorities for a more consistent approach to measuring the cost of delivery channels, and the transactions and processes that underpinned them. This led on to the guidance that became known as the Cost Architecture Framework. This linked costing techniques, based on ABC, to work on local authority process architecture, resulting in a standardised framework for describing and costing processes, transactions and services.

An infrastructure (in the form of an online calculator) now exists to support this framework, including the collation and sharing of cost information that populates the Framework. Not only is this being used to help local authorities benchmark their processes, services and delivery channels more accurately, it is also being employed to help eliminate waste and inefficiency, and so design better services for the public. As such, ABC is being employed not primarily as a tool for accountants. Rather, it is being used by staff involved in supporting process improvement and channel migration. Indeed, it could be argued that this limited – or perhaps ‘targeted’ – application is one key reason it has gained traction in this case.

The fact that activity-based thinking found a home in broader process improvement initiatives should come as no surprise. As Friedman and Lyne (1995) observe, a consequence of using activities as the basic building blocks of a costing system is the compatibility with a general process approach to organisations, as found in initiatives such as business process re-engineering (p. 15). In an activity-based system, they go on to say, it is possible to cost cross-functional processes – which themselves are comprised of activities – something not possible with traditional functional systems (p. 16).
The approach adopted by the Cost Architecture Framework also finds sympathies in the ‘lean accounting’ literature. McNair (2007), for example, makes the point that lean management is defined within a process structure (or ‘value streams’). Activities, he notes, have to be knitted together to create a horizontal flow of value creation. For this reason lean practitioners have emphasised the importance of ‘value stream accounting’, in contrast to traditional ‘top down’ costing methods (for example, Cooper and Maskell 2007).

In this sense, the approach adopted by the Cost Architecture Framework has more in common with lean practitioners than early advocates of ABC, whose main interest was achieving a better allocation of indirect costs to final cost objects. As mentioned above, users of the Cost Architecture have tended to focus on staff-related costs (using time as the key cost driver). In a local authority this reflects the fact that certain attributes of ABC are of little use anyway. For example, because of the service nature of the work, there is little ‘batching’ (whose set-ups might drive costs). And while some services are charged for, pricing and product mix are not major concerns. Furthermore - and as the later work by Cooper and Kaplan (1991) noted when introducing their hierarchy of costs - you can do little about certain overheads, especially in the short term.

What is particularly noteworthy about the Cost Architecture Framework, however, is the desire to achieve some kind of standardisation. For a start, the Service Reporting Code of Practice is used to categorise costs. Services are described using the Local Government Services List (LGSL), with the ‘business process architecture’ employed to achieve consistency and comparability when measuring processes. Even an activity dictionary is emerging. Moreover, a shared infrastructure – in the form of the online calculator – is available for collating and sharing measurements.

Of course, practitioners cannot afford to lose sight of why these techniques have been used in the first place. As the ‘theory of enacted systems’ posits, accounting and performance measurement should be seen as subsystems that support an integrated approach to product and service delivery (Stenzel 2007, p. xvii). Fortunately, the very evolution of the Cost Architecture Framework and supporting tools has explicitly been seen as part of an improvement ecosystem, bound up with process-based techniques. The challenge remains, therefore, to see the techniques and tools involved, not as ends in themselves, but as the means of generating information that will support e-Government through better process designs, more efficient ways of working and more effective customer services.

References

E-Government Evolution: A Supply Perspective of e-Government in Malaysia

Kamalia Azma Kamaruddin, Ariza Nordin and Nor Laila Md Noor
Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia
kamalia@tmsk.uitm.edu.my
ariza@tmsk.uitm.edu.my
norlaila@tmsk.uitm.edu.my

Abstract: E-Government has evolved from its initial presence on the Internet to more transactional and integrated applications. A model to reflect growth is an integral part for a successful e-Government implementation thus it need to be present in order to benchmark its development. Although there have been many initiatives deployed to promote e-Government developments all over the world, it is lacking of a model to categorize initiatives based on investment made in the organization. This study attempts to classify e-Government initiatives by focusing on the investment in the supply-side perspective. The research use literature analysis method to study existing information system models and adapting it to suit the needs of our context. We propose an e-Government evolution model in supply perspective which consists of five evolutionary phases: (1) Infrastructure, (2) Infrastructure, (3) Transactional, (4) Informational and (5) Strategic. Through a case study, we adopted the model to see the classification of different e-Government initiatives in Malaysia. Each initiative is evaluated using supply lens to understand its position in the overall e-Government development. We recommend that governmental agencies follow this evolutionary path as they progress from providing infrastructure services to positioning the organization as a pioneer in the field that give innovative services to the citizens and business alike.

Keywords: e-government evolution model, e-government investment, it demand and supply, it investment

1. Introduction

Governments in developed and developing countries have implemented electronic government in their effort to promote efficient governance (Weerakkody and Dhillon 2008) to the citizens and business communities alike. Broadly, e-Government can be defined as “government’s use of ICT, particularly, web-based applications, to enhance the access to and delivery of government information and services to citizens, businesses, employees and other agencies and entities” (Wang and Liao 2008). In the era of information technology especially when the Internet and World Wide Web continues to expand, it is not surprising to see all levels of governmental bodies leveraging on these approach to deliver their services. Evolution model is an important tool to measure the growth of e-Government initiatives.

There have been many e-Government evolution models established in the recent years as cited by Ifinedo and Singh (2011). These stage models developed since the year 2000 until recently, tried to characterize the state of an e-Government level in a continuous process to determine its maturity level: from developing a static website to integrating government systems behind the web interface (Schelin 2003). However, to the best of our knowledge, none of the models in the context of e-Government is suitable to classify e-Government initiatives based on IT investment made in the organization.

IT management consists of two dimensions. The first dimension is the demand side, which is the business customer’s perspective. A business unit’s interest in IT is primarily as a support function in the achievement of their goals (Damoulakis 2008). Second is the supply side, which focused on areas like software applications, hardware, infrastructures, tools and staff. These elements ensure that services are delivered and it’s the IT manager’s primary areas of focus.

In managing e-Government developments, challenges exists to the supply-side because of the size and complexity of governmental structures and the huge amount of information that the organization needs to deal with (Koh et al. 2005). A suitable evolution model that categorizes each e-Government initiatives based on investment made in the organization is needed so that future developments and enhancement can be planned. By looking at supply perspective, we can strategize IT growth in governmental agencies and improve organization wide return on investment (ROI).
While most of IT and e-commerce models focused on private sector, none attempted to explain the investment evolution in an e-Government context. Questions such as, ‘what kind of e-Government initiatives have public sector agencies implemented?’ and ‘how do we move from deploying transactional to strategic applications?’ are difficult to answer as there is no consolidation of data and lack of model to represent e-Government growth holistically. In this research, we proposed a model for e-Government investment using supply-side view to understand the classification of different e-Government initiatives which consists of five evolutionary phases: (1) Infrastructure, (2) Infrastructure, (3) Transactional, (4) Informational and (5) Strategic. We believe the proposed model will fill in the gap for e-Government research, thus promotes integration and consolidation of initiatives especially for Malaysian context.

2. Literature review

While the topics of information technology management and e-Government are widely discussed in their own domains there is a paucity of studies that address these constructs in a joint context. In this section, we discuss information technology management and e-Government and their relationship as a foundation for the development of proposed model.

2.1 IT demand and supply perspectives

As e-Government is a prominent concept of how IT diffusion into the government services, the definition of supply-side and demand-side perspective of e-Government is very much influenced by the information technology management domain, which can be broken down into IT demand and supply. Basically, the demand unit is the party requesting IT service and the supply unit is the party providing it. IT demand organization mirror the business structure and drive process improvement and project design while IT supply organization focus on delivery and are organized by capability, not business line (Mark and Rau 2006). Figure 1 lists typical responsibilities of a demand unit and supply unit.

![Figure 1: Typical responsibilities of IT demand and supply organizations (Adapted from Mark and Rau 2006)]

To achieve agility and efficiency in application development, companies are splitting the supply units from the demand units (Mark and Rau 2006). This approach is suitable to view the public services where its demand unit resides within IT department of the organization and liaise with the operational teams to coordinate requests from them, and the supply unit, which can be an internal application-development team or outsourced to third-party vendors, develops and maintains applications for the organization.

In 2009, Hackett Group’s research showed demand for IT services will surpass its supply throughout the year 2011, which means business transformation will be growing strongly while organic growth will be declining (All 2009). Thus, there is an obvious need for more IT efficiency in the supply sector. A Malaysian Public Sector ICT Study conducted in 2010 shows findings from the perspectives of IT supply and demand, which include aspects of IT management, organization and infrastructure (MAMPU, 2011). It is concluded that agencies are aware that comprehensive IT planning is essential in achieving sound management practices. In this research,
we will use the IT demand and supply lens to evaluate some of the IT and IS models to understand its suitability in tracing e-Government investment evolution.

2.2 E-Government evolution dimensions

Evolution is a process that involves gradual change and development. Since the year 2000, there have been many e-Government evolution models proposed by individual researchers or practitioners of institutions, in order to determine and forecast e-Government maturity state. Various kinds of models ranging from four to six stages have been developed to characterize the state of e-Government maturity, which start from static information-based websites at the lowest level to personalization of government services in the highest level (Layne and Lee 2001; Baum and Di Maio 2000; Hiller and Belanger 2001; United Nations 2003; Deloitte and Touche 2001). However, these models are viewing e-Government evolution from adoption perspective and in a demand-side setting. They are not suitable to classify e-Government investment in the organization, which is in a supply-side dimension. To the best of our knowledge, evolution model that reflects growth of e-Government based on IT investment has not been advanced in the literature. Thus, in order to formulate a model that is suitable to categorize all e-Government initiatives, we have looked into some well-known models in the field of IT management and e-commerce as they are more focused on IT investment in organizations. Three of interests are those proposed by Lutchen (2004), Weill and Broadbent (1998) and Koh and Balthazard (1998). These models are summarized in Table 1.

Table 1: Review of IT and e-commerce models

<table>
<thead>
<tr>
<th>Model</th>
<th>General description</th>
<th>Categorization of Initiatives</th>
<th>IT view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lutchen (2004)</td>
<td>IT Investment Model to classify IT investment in an organization.</td>
<td>A pyramid of four layers IT investment: i) Infrastructure ii) Transactional iii) Informational iv) Strategic</td>
<td>Supply</td>
</tr>
<tr>
<td>Weill and Broadbent (1998)</td>
<td>Information Technology Portfolio Management (ITPM) model that provides a means to monitor and manage all IT investments in an organization.</td>
<td>Four dimensions of IT portfolio: i) Infrastructure ii) Transactional iii) Informational iv) Strategic</td>
<td>Supply</td>
</tr>
<tr>
<td>Koh and Balthazard (1998)</td>
<td>Three-Ring Model to organize array of features of e-commerce.</td>
<td>Three primary uses of Internet: i) Informational ii) Transactional iii) Operational</td>
<td>Demand</td>
</tr>
</tbody>
</table>

Lutchen (2004) described infrastructure as technology investment to construct foundation IT capability and transactional as investment to process basic repetitive transactions of the company. The next layer, which is informational, is defined as investment to manage and control the organization at the business unit level. Lastly, the strategic level is depicted as technology investment to gain competitive advantage. This model is viewing applications from the supply perspective of information technology, which translates the business’s needs and opportunities into categorizations of layers focused on delivering the services.

In Information Technology Portfolio Management (ITPM) model (Weill and Broadbent 1998), IT investments are presented as an IT portfolio with four dimensions. IT infrastructure is the foundation of the portfolio since it is the basis that provides IT services to the layers above it. The second layer is transactional IT which processes and automates the repetitive and basic transactions of enterprises (Dolci and Macada 2011). On the topmost level is the informational IT, which is sharing the layer with strategic IT dimension. Informational IT provides information for management and control of the company while strategic IT refers to investments that are made to position the company in the market. These two dimensions are supported by IT infrastructure and transactional process below it (Dolci and Macada 2011). Similarly to Lutchen’s, this model also view information technology using the supply lens.

The Three-Ring Model proposed by Koh and Balthazard (1998) captures all Internet applications in three primary categories of usage: (1) Informational uses, (2) Transactional uses, and (3) Operational uses. In informational use, Internet is used to distribute information to educate, entertain, influence or reach the consumer while transactional refers to the use of Internet to support a coordinated sequence of user and
system activities that will result in transfer of values (Koh and Prybutok 2003). Finally, organization that uses Internet to conduct business operations falls in the category of operational uses. As the applications of Internet are viewed from users’ perspective, the Three-Ring Model is using the IT demand lens in categorizing its constructs.

In doing comparison analysis, when we try to map Lutchen’s model to the local context, it does not have sufficient layers to represent e-Government initiatives completely thus it will need to be extended in order to suit our needs. For the other models, although Weill’s shares some similarities with Lutchen’s in terms of the representation of levels and perspective used, it differs in the arrangement of layers. Most e-Government applications under scrutiny are segregated explicitly where different types of application are designed for different types of user, which also means each layer has different accessibility privileges. Thus, if we were to adapt Weill’s model to trace e-Government growth, it will not be suitable because this model has two dimensions sharing a common layer. We also found that Koh and Balthazard’s model do not have the right view for us to extend to a supply-side model. It is also not comprehensive to trace all e-Government initiatives since it is lacking the foundation of IT capabilities construct. Due to that reasons, we have chosen Lutchen’s model as the basis of our representation and adapted it to address the mentioned limitations and to suit the local context.

3. E-Government evolution model in supply perspective

Figure 2 shows our E-Government Evolution Model in Supply Perspective which has been adapted from Lutchen’s IT Investment Model. It consists of five evolutionary phases, which are Infrastructure, Infostructure, Transactional, Informational and Strategic. As with other multi-layer pyramid models that transcends from bottom up, our model propose that a lower layer must be implemented first before advancing to the next upper layer. This is to ensure a strong foundation of generic capabilities before expanding to other specialized initiatives.

![E-Government evolution model in supply perspective](Adapted from Lutchen 2004)

3.1 Infrastructure

Our interpretation of investment evolution in e-Government starts with ‘Infrastructure’ layer, which is the lowest level in the pyramid. Based from Information Technology Infrastructure Library, definition of infrastructure refers to all the hardware, software, networks and facilities that are required to develop, test, deliver, monitor, control and support IT services. In other words, it is the foundation of IT capability used in common across an organization. In supply-side dimension, infrastructure is focused on areas like technology, tools and staff to ensure the IT services are delivered (Damoulakis 2008). E-Government implementation framework needs to be supported by strong infrastructure, which includes specific standards for networking, information security, e-payment, e-signature as well as public key infrastructure system (Darwish 2008). Infrastructure initiatives create standardization, integration and flexibility of the organization. It also reduced IT cost over time.
3.2 Infrastructure

Moving upwards from Infrastructure is the second layer called ‘Infrastructure’ or information infrastructure. It is the base for all information incorporating and information related service that acts as enabling function for turning information into a managed assets. It also enables information sharing and allows interoperability (Mohd Zahri 2010). Earlier, Fielding (1994) has defined it as an information resource database with a specifically design structure. However, over the years, infrastructure has evolved to cover more than just database but a platform that provide integrated support mechanism in the form of regulatory, documentational, metadata and data for information related activities. As an example, Egypt has link several of its national databases to provide the creation of family database, the linkage of National ID to the education database to track school dropouts, the real-estate registration and the unified commercial registry (Darwish 2008). Infrastructure provide a clear and consistent navigation structure of information with consistent meaning and availability where and when it is needed.

3.3 Transactional

Thirdly is the ‘Transactional’ layer, where applications that ‘process basic repetitive transactions’ (Lutchen 2004) in the organization, fall within this classification. The objectives of applications in this layer are to reduce cost and increase throughput of the transactions thus improve organizational wide return on investment (ROI). E-Government applications that enable public to transact more easily with the government and enable supplier to sell goods to the government through the Internet such as online payment and online procurement (Koh and Prybutok 2003) are categorized here. Transactional layer also allow citizens and businesses to perform self-services transaction such as licenses applications, tax filing and information updates.

3.4 Informational

On top of transactional is the ‘Informational’ layer. In this level, all applications for managing and controlling the organization at the departmental level (Lutchen 2004) are grouped together. The purpose of these applications is to give better information to the middle-level decision makers, better integration of data, increased control of the department, thus give improved quality of services. The types of applications in this category are Management Information Systems, Decision Support Systems and Executive Information Systems. Most of e-Government informational systems in Malaysia, are government-to-government (G2G) applications which intended to improve the operations of government agencies with better analytical, management and decision support tools (MAMPU 2009).

3.5 Strategic

The top most level is the ‘Strategic’ layer where applications categorized here gives advantages to position the organization as a pioneer in the field, added competitive necessity and provide innovative services (Well and Broadbent 1998) to the citizens. For example, by implementing initiatives such as interactive participation in the decision process, it puts the organization as having good e-governance for its e-Government implementation. ‘Best practices’ in public sector can be the result of services implemented in this layer.

According to Ambali (2011), there are three levels of initiative forces that call for application of e-Government to G2G dimension. First, is the growing emphasis on paperwork reduction as well as to make information management activities easier (Ambali 2011), this activity can be associated to the function of transactional layer of the above pyramid. Second, is the interest to oversight an improved efficiency, cost savings and improving consistency of outputs (Trattner 2000). These intentions can be correlated to the purpose of informational layer of e-Government investment model mentioned above. Third, is an attempt to apply ‘best practices’ in public sector (Sprehe 2001), which is the result of the strategic layer in the above model. These motives justify that the upper layers of this model is suitable to be adopted in e-Government context.

4. Case study – Malaysia’s e-Government

In keeping with worldwide trends, Malaysia has leap into the Information Age by announcing its e-Government initiative as one of the flagships for the Multimedia Super Corridor project. With a vision “to transform administrative process and service delivery through the use of IT and multimedia”, e-Government projects were rolled out to 28 Federal Ministries, 219 Federal Departments, 346 State Statutory Bodies and 142 Local Government Authorities phase by phase (Mohd Zahri 2009). After 16 years since the launching of
the flagship, much has been achieved in the Malaysian public sector scenario. The advancement of information and communication technology has evolved from the use of computers at government service counters in the 70’s to the use of web portals at the turn of the century. E-Government has become an integral part of the public service delivery system with over 1200 public services offered over the Internet (Xavier and Sambasivan 2011).

In Waseda University World e-Government Ranking for the year 2011, Malaysia has been positioned at the 24th place out of 50 countries surveyed (MAMPU 2011). The 2012’s United Nation e-Government survey listed Malaysia in the category of twenty-five emerging leaders of e-Government development. With a score of 0.6703 over 1.0, Malaysia is positioned at the 8th spot in Asia’s e-Government leaders category (United Nations, 2012). The noteworthy findings on Malaysia’s e-Government development effort has offered an insight of its competitiveness in terms of e-Government implementation in relation to other countries around the world.

In the 10th Malaysia Plan, the Malaysian government laid a framework that identifies key components in an integrated environment, which will support the short and longer-term development and growth of public sector information and communications technology (ICT) capability. The framework called Malaysian Public Sector ICT Framework lays out ICT strategic plan for all public sector agencies in Malaysia in enterprise-wide approach. However, this framework addresses the components and environment for implementation of ICT strategic initiatives as ‘shared resources’ model, which consists of enterprise, community and specific applications. It is viewed in demand-side and does not represent growth from IT investment perspective. Although there have been many initiatives deployed to promote e-Government developments in Malaysia but a holistic view is inconceivable.

5. Data collection and analysis

The data collection activity was conducted by choosing thirty-five e-Government initiatives or websites from various agencies in Malaysia based on its currentness and the high impact projects from e-Government flagship applications. The list of high impact projects was collected from publications by MAMPU, an agency that is overseeing all e-Government development in Malaysia. Then, a user profile was created for each website for logging into the e-Government application embedded in it. Each application was studied closely to identify its functionalities and features. Apart from that, we have also studied the documentation of e-Government projects published by MAMPU and other government agencies. From there, each initiative’s characteristics were observed and recorded.

After data was collected, we have analysed it by tabulating and structuring it into a table format and at the same time mapping it against our proposed model. E-Government applications or initiatives that have same characteristics were grouped together according to its relationship and supply-side layer. Table 2 shows the categorization of e-Government initiatives based on supply-side view in Malaysia. In the table, we have included information on type of e-Government relationships, supply-side layer for each e-Government initiatives, and brief description of its function.

**Table 2: E-Government initiatives in Malaysia in supply-side view**

<table>
<thead>
<tr>
<th>E-Government Relationships</th>
<th>Supply Side Layer</th>
<th>E-Government Initiatives</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>G2C</td>
<td>Informational</td>
<td>ePBT (Local Authority System)</td>
<td>A system comprises of four main modules developed to increase the effectiveness and efficiency of administration at the local authorities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISPAA (Public Agency Complaints Management System)</td>
<td>A centralized system for all government agencies to manage public complaints</td>
</tr>
<tr>
<td></td>
<td>Transactional</td>
<td>e-Services (Electronic Service Delivery)</td>
<td>Enable the public to transact more easily with government agencies and utility companies via multiple electronic delivery channels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E-Syariah</td>
<td>Enable the Syariah Courts to conduct its management and administration through electronic means</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JobsMalaysia</td>
<td>An automated online job matching service</td>
</tr>
<tr>
<td>E-Government Relationships</td>
<td>Supply Side Layer</td>
<td>E-Government Initiatives</td>
<td>Descriptions</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------------</td>
<td>--------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>that matches job seekers with potential employers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CRS (Citizen Registry System)</td>
<td>A centralized repository of citizens’ basic data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MyID</td>
<td>Restructural initiative where Identity Card number is used as the sole reference number for Malaysian citizens when dealing with government agencies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Digital District</td>
<td>Creation of digital districts by setting up broadband ecosystems in districts and sub-districts using building block approach.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2G</td>
<td></td>
<td>HRMIS (Human Resource Management Information System)</td>
<td>An application system that covers all aspects of human resource management from the appointment of civil servants until they retire.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPP II (Project Monitoring System II)</td>
<td>An online system that monitors the entire lifecycle of national development programs, including planning, implementation and evaluation, implemented in all government agencies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HIS (Hospital Information System)</td>
<td>Web based information system that allows sharing of clinical and other patients related information between healthcare providers and other entities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SMS (School Management System)</td>
<td>A system to record and manage student information beginning from registration of student for pre-school until the student completes secondary education.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PSDD (Public Sector Digital Dashboard)</td>
<td>An application that measures and evaluates the performance of government owned projects.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SKALA</td>
<td>A web based project monitoring system for Public Works Departments.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GOE-EGDMS (Electronic Government Management System)</td>
<td>A web-base application system that can assist users to manage documents more effectively and efficiently.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e-Land</td>
<td>An integrated system to handle the management and administration of Land Offices for all land transactions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>eSPKB (Electronic Budget Planning &amp; Control System)</td>
<td>A financial system that enables processing of payment vouchers for local orders.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAGA (Standard Accounting System for Government Agencies)</td>
<td>A computerized accounting package designed to fulfil the financial needs of Statutory Bodies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>myMeeting</td>
<td>A web-based, paperless meeting management and decision monitoring application.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>POWER (Pension Online Workflow Environment System)</td>
<td>An integrated pension information system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ORS (Open Registration System)</td>
<td>A system that register applications, make selections and lists distribution of housing to the lower income group.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>eCourts</td>
<td>A project aimed at improving the efficiency and effectiveness of courts management and operations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ERMS (Electronic Record Management System)</td>
<td>A system that is designed to manage the maintenance and disposition of records for government agencies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EG*Net (Government Digital Nation)</td>
<td>Nationwide wide area network (WAN).</td>
</tr>
<tr>
<td>E-Government Relationships</td>
<td>Supply Side Layer</td>
<td>E-Government Initiatives</td>
<td>Descriptions</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------</td>
<td>-------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td>Integrated</td>
<td>connecting government agencies specifically for the implementation of e-Government applications.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Telecommunications</td>
<td>Network Service)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PCN (Putrajaya</td>
<td>Integrated and managed network infrastructure for government agencies within federal government administrative centre in Putrajaya.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Campus Network)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>eProcurement</td>
<td>Enable suppliers to sell goods and services to the government through the internet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>eLodgement</td>
<td>Enables the lodgement or filing of company and business statutory documents electronically</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AgriBazaar</td>
<td>Trading hub for buyers and sellers of agriculture products to do business online</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPIP</td>
<td>License applications for tourism industry including hotels (classification of the star), travel agencies, tourist guides, tourism training institutes and tourism buses and vehicles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MyCoID (Malaysia</td>
<td>Restructural initiative to use Company Registration number as the single reference number for all transactions with the government agencies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corporate Identity Number)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Discussion of findings

In Table 2, we have converted e-Government initiatives in Malaysia, which previously is in shared-resources, demand-side model to a growth model in supply-side perspective. From the analysis of current scenario, we found that Malaysian government paid more emphasize on the G2G initiatives particularly for informational and transactional systems. This is perhaps in line with MAMPU’s plan written in its 2009’s publication, which is “to improve the operations of government agencies with better analytical, management and decision support tools to solve the increasingly complex problems and decision processes” (MAMPU 2009).

Interestingly, we also found that Malaysia has made the right move by embarking on high impact projects to improve its infrastructure and infostucture services. This involves putting in place an array of communication infrastructure, delivering content services, integrating databases and engagement with the people on the use of technologies to deliver local solutions. It is essential as infrastructure and infostructure are the foundation of other IT capabilities for e-Government implementation. In this research, we have discovered that our data collection methods could not detect applications in the strategic layer. This is because strategic layer is more abstract in nature, and therefore, will be difficult, if not impossible to gauge from merely information on websites and documentations. Furthermore, strategic layer applications for G2G and G2B may not be readily available for public access. Thus, to evaluate this layer in the future, we would need to enhance our data collection activity to include in-depth interviews with the management and respective project managers of each government agencies in order to obtain such kind of information.

7. Conclusions

A model to reflect growth is an integral part for a successful e-Government implementation thus it needs to be present in order to benchmark its development. In this research, a model for e-Government investment evolution is proposed and implemented initiatives in Malaysian e-Government are being scrutinized. Each initiative has been evaluated using supply lens to understand its position in the overall e-Government development. It is suggested that governmental agencies go through this evolutionary path in planning and strategizing future developments and enhancements of e-Government projects. This in turn will improve organizational wide return of investment of e-Government implementation. Using the model proposed in this research, question of, ‘what kind of e-Government initiatives have the public sector agencies implemented?’ can now be answered as data can be consolidated to represent e-Government growth holistically. The next step of this research is to evaluate the suitability of the model and explore what are the mechanisms of moving from one layer to another. This is turn would answer the following question of ‘how do we move from
deploying transactional to strategic applications?”. We also need to further study how would the mechanisms work and under what conditions will it perform effectively. In another aspect, IT demand and supply is the current trend in IT management research, thus perhaps e-Government in Malaysia should be managed according to this approach. As written in The Malaysian Public Sector ICT Strategic Plan, the ultimate aim is to achieve a citizen-centric and ‘whole of government’ public service, which means the public sector must meet and exceed the expectations, preference and needs of citizens and businesses.

References


Driving Connected Government Implementation with Marketing Strategies and Context-Aware Service Design

Asanee Kawtrakul\textsuperscript{1, 6}, Anan Pusittigul\textsuperscript{2}, Suchada Ujjin\textsuperscript{3}, Udomsak Lertsuchatavanich\textsuperscript{4} and Frederic Andres\textsuperscript{5}

\textsuperscript{1}Department of Computer Engineering, Faculty of Engineering, Kasetsart University, Bangkok, Thailand, \textsuperscript{2}Ministry of Agriculture and Cooperatives, 12 Krung Kasem Road, Wat Sam Phraya, Sub-District, Phra Nakhon District, Bangkok, Thailand, \textsuperscript{3}Kasetsart Agricultural and Agro-Industrial, Product Improvement Institute, Kasetsart University, Bangkok, Thailand, \textsuperscript{4}Department of Plant Pathology, Faculty of Agriculture, Kasetsart University, Bangkok, Thailand, \textsuperscript{5}National Institute of Informatics, Japan, \textsuperscript{6}National Electronics and Computer Centre, National Science and Technology Development Agency, Thailand

asaneenaist@yahoo.com, asanee.kawtrakul@nectec.or.th
anan@moac.go.th
suujin@hotmail.com
agrusl@ku.ac.th
andres@nii.ac.jp

Abstract: In Thailand, several e-Government services have not as yet been active or sustainable as they have been developed without taking customer experiences or the value chain into consideration. However, recent progress in the field of services design and innovation has resulted in deployment of e-Government implementation. Moreover, in order to achieve better e-services, shared services with seamless connections across enterprises are also needed, i.e. connected government. In this paper, we target these shortcomings by reviewing the lessons learned in previous e-Service implementation. Four of these lessons focus on: understanding the core business and the service context, building stakeholder capacity, especially service design for their own businesses, engaging multi-sectors for service co-creation with customer experiences, and setting up an investment scheme with marketing strategies for providing sustainable services. Based on these learned lessons, we propose a method of driving connected government in designing context-aware services, and managing and stimulating widespread adoption of e-services by using benefits realization as a marketing strategy. A project initiative called Coop-Cyber-Brain, a platform of community knowledge sharing and services in the agriculture domain, has been implemented for evaluating the model and harvesting best-practices in connected Government transformation.

Keywords: quality of services, connected Government, community-based knowledge service, value proposition, marketing strategy, customer experiences, context-aware services

1. Introduction

It is expected that the number of available e-Government services for citizens and businesses will continuously grow in the future due to the increasing number of Internet users and mobile devices. However, several e-services are not active or sustainable as they have been developed without taking customer experiences or the value chain into consideration. In order to increase customer satisfaction with e-Government services successfully, realization of the benefits of implementation requires cooperation among stakeholders and co-creation among service consumers.

To achieve higher-levels of e-Government in shared services and seamless data interoperability across enterprises, \textit{connectivity} is needed. \textit{Connectivity} in this context specifically refers to connecting government to citizens, connecting information to government workers, and connecting government agencies to each other. With a connected ecosystem, e-services will shift away from e-Government toward connected Government, hereinafter referred to as c-Government, which focuses on transforming the entire relationship between the public sector and public service users. It is also a new layer of virtual business, built around citizen needs, and operates horizontally across government to achieve better services while reducing the cost of government service delivery. Regarding the increasing number of mobile devices, the combination of the transactional government data and social networking data has led to not only improved service delivery, but also citizen engagement. Accordingly, a government that transforms e-Government into c-Government can create a real impact for better government, where citizens are both users and co-producers of public services.
Thailand, through its Ministry of Information and Communication Technology, has established a Strategic Roadmap for 2013-2017 to implement e-Government, aimed at enhancing e-Government services to its citizens (Kawtrakul et al., 2011). Aligning with Country Strategy 2014, there are three goals of country development that need to be focussed on: economic growth, inclusive growth and green environment. A key factor in implementing these three goals is connected government with good internal management (see Fig. 1).

Figure1 shows the alignment of Country Strategy 2014 with the ASEAN Community Roadmap 2009-2015, which is composed of three pillars: ASEAN Economic Community (AEC), ASEAN Political-Security Community (APC) and ASEAN Socio-Cultural (ASC) Community. Each triangle in Figure 1 has its own characteristics and service activities. And each activity needs connectivity, i.e., data connectivity and workflow, on both the national level and ASEAN level. It is expected that recent progress in the field of services design and innovation will increase the value density of e-services and will create value for both citizens and businesses. Such value may be quantitative, e.g. raising income for the poor, lower costs with higher productivity, and speed of services, or it may be qualitative, e.g. quality of life, customer experiences, risk reduction, safety, security and equality.

![Figure 1: Driving connected Government through national and ASEAN strategic alignment](image)

In order for the service activities to work and operate successfully, they require connectivity; i.e., government connected with the entire structure for sustainable development, created as a result of the relationships between the public sector and public service users. In order to develop proactive e-Government strategic plans, both technical and non-technical aspects of interoperability should be taken into consideration with equal significance, especially the non-technical aspects such as leadership, legal, political and socio-cultural. In this paper, we target these challenges by focusing on non-technical interoperability in value networks and value creation as follows:

- Establishing Communities of Interest with marketing strategies and effective communication strategies for continuous and sustainable implementation.
- Increasing the degree of participation through active partnerships between government, citizens and the private sector for co-created value based on community knowledge sharing and ensuring that projects work.
- Making sure that stakeholders understand the core business and service context. Treating e-Government as a reform process, not merely the computerization of government operations, will contribute to building
an “information society” in which the lives of citizens are empowered and enriched by access to information, and the social, economic and political opportunities that this offers.

- Building the capacity of both service consumers and service providers, especially in understanding their own business processes. In order to maintain and extend existing services, government personnel need to be trained and learn by working on the project initiatives instead of only using consultants or outsourcing.
- Availability of deep information about the cases. We knew all about the 25 cases in the partners’ knowledge, but a specific questionnaire was set-up for the owner of the cases gathered from the ePractice portal. Only 29 out 49 feedback to this questionnaire were received.

Moreover, in order to reduce awkward interactions between users and the system, to automate workflows, and to adapt these workflows as well as the service’s behaviour and appearance toward the users according to current circumstances, it becomes increasingly obvious that e-services must be able to handle context-aware services. According to initiatives of the ASEAN Community, Country Strategy and Strategic c-Government Roadmap Integration work plan 2013-2015, one of the target achievements in shared services with seamless connectivity across enterprises is economic integration with poverty reduction and the promotion of equitable and inclusive development.

Since the world population will increase from 7 to 9 billion by 2050, more food will be needed to meet demand. In Thailand, rice is the national food staple and represents the main income sustaining farmers (66% of 5.7 million agricultural households are rice farmers). A project initiative called Coop-Cyber-Brain, a platform of community knowledge sharing and delivering services in the agricultural domain through the mechanism of agricultural cooperatives, has been implemented for evaluating the model of non-technical interoperability and harvesting the best-practices in c-Government transformation.

Section 2 will outline the processes required for starting and selecting a project aimed at harvesting the best practices in c-Government implementation. Section 3 will explain the service design and marketing strategies for multi-sector engagement. Section 4 describes the platform of Coop-Cyber-Brain that shows how to co-create value based on community knowledge sharing and ensuring that projects work through a network of service providers and service consumers. Section 5 proposes a measurement and evaluation method for benefits realization.

2. The challenges of c-Government transformation and project initiative implementation

In order to shift toward connected government transformation proactively, while ensuring that investment in such implementation is spent wisely and is worthwhile, the essence of marketing strategies and recent progress in the field of services design and innovation have resulted in deployment of c-Government implementation. Experience from the lessons learned during 2006-2012 shows that a business model carefully designed around a strong understanding of specific customer needs, strong working networks, citizen-empowerment with IT alignment for self-services, and an efficient cost structure, especially a value-driven cost structure, will help increase the value chain through customer experiences and reduce agencies’ operating budgets while increasing public satisfaction.

2.1 Lessons learned and challenges

The success factors for c-Government transformation lie in the connectivity of shared services, seamless connectivity across enterprises, and information exchange among government agencies. These factors are identified firstly from the lessons learned and weaknesses of e-Government implementation. This paper examines four of the ten lessons learned (Kawtrakul et al., 2012) for implementation of the project initiative presented in this paper. The other six lessons will be implemented at a later date since they are related to the ecosystem of c-Government, i.e. law enforcement, data governance, data ownership, engagement of a broad variety participants, promoting knowledge sharing within government, and the needs of stakeholders across enterprises.

Understanding the core business and service context. Focusing only on computers will not make officials more service-oriented toward government’s “customers” and partners. Accordingly, treating e-Government as a reform process, and not merely the computerization of government operations, will contribute to building an “information society” in which the lives of citizens are empowered and enriched by access to information and the social, economic and political opportunities that it offers. Since citizens and business partners are the heart
of any business model, a business model of e-services should be carefully designed around a strong understanding of specific customer needs. Current theoretical debates recognize service innovation with benefits realization as the engine for growth of e-services and as offering substantial potential of achieving c-Government implementation.

**Engage multi-sectors and co-create with customer experiences for making projects work and continuous improvement.** The evidence indicates that realizing benefits of interoperability projects requires marketing strategies for cooperation and coordination among a wide variety of participants across the organization, and for building strong working networks with engagement. From experience, the need for multi-sectors connecting and exchanging information across organizational boundaries is growing and has various contexts. Since service innovation is the outcome of complex interactions among a wide variety of actors and individuals, the co-creation of firms and organizations through customer experiences becomes necessary for sustainability of c-Government development. It is also important to have a framework and platform to provide a suitable basis for multi-sectors and their communities to create a value chain of services and continuous improvement.

**Build in-house capacity, especially in understanding one’s own business processes, and empower citizens with IT alignment.** In order to maintain and extend existing services, government personnel and stakeholders need to be trained and learn by working on project initiatives instead of only using consultants. Learning by doing and with practice is the basis of a creative service design for providing a service value proposition. Each value proposition consists of a selected bundle of services that caters to the requirements of a specific customer segment. In this sense, c-Government could be implemented actively and sustainably. Moreover, citizen empowerment with IT alignment for self-services and for accessing information, social, economic and political opportunities could ensure that investment in implementation would be spent wisely and is worthwhile, and would also maintain good customer relationships.

**Need to set up an investment scheme for information exchange or services, operating under a particular business model, and harvest the benefits from the outputs and outcomes of both technical and non-technical aspects of interoperability implementation; for example political, legal, and socio-cultural.** The potential success of a promising project relies on aligning investment schemes among the defined communities and showing them how to harvest the benefits of interoperability and information integration, such as providing faster, smarter and cheaper services to the public or reduce costs while increasing productivity. Creating and delivering service value and maintaining customer relationships incur costs. Therefore, it can be useful to define cost structure for obtaining economies of scale and economies of scope.

The above-mentioned lessons learned brought out several challenges that needed to be addressed. The participants in the forum on “SWOT analysis and c-Government Roadmap 2013-2015 establishment” that took place in September 2012 (Kawtrakul et al, 2012) pointed out the success factors that are conducive to creating sustainable and scalable e-services for Roadmap implementation. Table 1 addresses the challenges, success factors and proposed solutions to these challenges:

- The value proposition is one of the key success factors in maintaining services offered to consumers and in customer relationships. The value proposition is an aggregation of benefits that c-Government offers to consumers. It leads to two challenges of customer value creation: 1) Benefits realization: i.e., the value we deliver to the customer, and 2) Quality of services: i.e., the customer needs we are actually satisfying, such as localization (tailored services), and better performance with cost reduction. In recent years, since the concepts of mass customization and customer co-creation have gained importance, applying IT enabling services and social networks will take advantage of economies of scale.

- Human capital is one of the most important assets required to make a project work and allow an enterprise to create value and offer a value proposition. Human capital development is related to: How to create awareness, change behaviour “made to order” and change attitudes, particularly among government agencies toward accepting new ideas and sharing data or information for public service improvement and participation. Making c-Government knowledge and skills available through internal expertise will build in-house capacity to maintain and extend existing services. Empowering people to participate and increase accountability and transparency is a new mindset to be embedded in existing institutions and organizations, and will need time and effort in pursuit of such goals.
Customer empowerment and strong working networks: Customer empowerment becomes the necessary means for customers to help themselves, to co-create value and to assist with the design of new, innovative and relevant services. Since c-Government is a participatory process, strong working networks or active partnerships between government, citizens and the private sector are required in order to achieve c-Government success.

Cost Structure and measurement: Costs should be minimized accordingly; aligning investment schemes among the defined communities could ensure that investment in c-Government implementation would be spent wisely. Additionally, adopting national policies and legislation in priority areas, reviewing sectors policies for comprehensiveness, and aligning financing with priorities are all factors of success in investment. Based on various experiences, an accurate measurement in terms of income or well-being might be a good marketing strategy for multi-sector engagement.

**Table 1: Challenges and proposed solutions to address based on the lessons learned**

<table>
<thead>
<tr>
<th>Success Factors</th>
<th>Challenges</th>
<th>Proposed solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value proposition</td>
<td>Benefits realization</td>
<td>E-services that solve customer problems or satisfy customer needs with heterogeneity, localization, personalization and coherence.</td>
</tr>
<tr>
<td></td>
<td>Quality of services</td>
<td>E-services with customer experiences that make customer interactions with government less cumbersome. Great impact with end-to-end services, such as a 90 percent reduction in processing time, 50 percent reduction in data entry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Services that would be valued by customers.</td>
</tr>
<tr>
<td>Human capital</td>
<td>Government agency workforce needs to broaden multi-disciplinary skills and change to a different mindset for collaboration and co-created cultures. Transmission and absorption are an important part of capacity building. Strong leaderships.</td>
<td>Continuous training and education for operations, management and leadership. Innovating by adapting new practices, learning by doing or using and as a result of the mobility of people’s knowledge and skills. Bringing concepts of learning and capabilities closer to the reality of development.</td>
</tr>
<tr>
<td>Cost structure and measurements</td>
<td>Investment schema</td>
<td>Capitalize on an agency’s existing investments in their business. Country’s strategic alignment.</td>
</tr>
<tr>
<td></td>
<td>Accurate measurement of both quantitative and qualitative factors in c-Government transformation.</td>
<td>Measure in terms of income or well-being.</td>
</tr>
</tbody>
</table>

The success of c-Government transformation is also based on: Improving data gathering for their core business functions, performing continuous input, receiving feedback from their “customers” who use c-Government services, stimulating widespread adoption of e-services, especially information-intensive service systems with effective communication strategies, successful commercial and government deployments, and capitalizing on an agency’s existing investments in their business.

2.2 The selected principles for c-Government project initiatives

In order to harvest the best-practices in connected government transformation which can create a real impact for better government, where citizens are both users and co-producers of public services, pilot projects should be carefully selected for implementation. There are reason why we selected the agricultural domain for a c-Government project initiative and farmers as the customers of e-services. Since the world population will increase from 7 to 9 billion by 2050, a larger food supply will be needed. Multiple challenges, such as food-feed-fuel policies, water resource management, disaster management, climate change, etc., constantly besiege the agricultural sector in the Asia-Pacific region, where more than 60 percent of the world’s population and about 65 percent of the world’s poor live. To cope, lessons and good practices in agriculture
information services, such as zoning, precision farming, meteorological information, market information, etc., have to be captured. To empower people in rural areas, farmers need useful and reliable information at the right time. Such information assists them in making complex decisions, which then impact the livelihoods of their families and the broader society. Partnership with multi-sectors, including the private sectors related to the use of ICT, has proven to be an essential mechanism in developing information service systems sustainably.

In Thailand, rice is the national staple food and represents the main income sustaining farmers (since 66% of the 5.7 million agricultural households are rice farmers). A project initiative called Coop-Cyber-Brain has been implemented for evaluating the model of non-technical interoperability and harvesting the best-practices in c-Government transformation; this is a platform of community knowledge sharing delivering agricultural information through an agricultural cooperative mechanism. Coop-Cyber-Brain has been selected for driving connected government on the basis of the following considerations:

- Readiness of organizational core processes and their supporting processes for sustainability.
- Operating within an existing government strategy that aims at inclusive development, economic competitiveness and alignment with the activities of the ASEAN community.
- Gaining the support of stakeholders by early demonstration of positive impacts of ICT application on their well-being.
- Doing business in an equitable manner that seeks to empower and benefit its members and the community.

Figure 2 illustrates an overview of the Coop-Cyber-Brain project. Agricultural cooperatives have played an important role in strengthening market access and competitive returns for independent farmers. They adapted their operations to agricultural technological innovations, such as the use of fertilizers, plants and livestock breeding, agricultural mechanization, financial management for the members, and to new information systems.

**Figure 2:** A model of c-Government transformation with marketing strategies and context-aware services through an agriculture cooperative mechanism

A method in designing, managing and stimulating widespread adoption of e-services is proposed through farmer empowerment. Context-aware services and tools, such as tailor-made fertilizing, disease monitoring, market information and precision farming, are provided for facilitating community-based collaboration and problem-solving across agency, partners, as well as public boundaries.
3. Value proposition with new service offering: Context-aware services

In this section, we propose a method of driving connected government in designing context-aware services, and stimulating widespread adoption of e-services by using benefits realization as a marketing strategy.

3.1 Multi-sector engagement with marketing strategies

In order to drive connected government, realizing benefits of implementation requires cooperation and coordination among a wide variety of participants across an organization. This paper focuses on two benefit realizations: one for service providers who must ensure that their investment in e-services implementation should be spent wisely and is worthwhile, the other for service consumers where quality of e-services is needed. Citizen-empowerment for self-services will help reduce agencies’ operating budgets while increasing public satisfaction.

Since marketing is the process of communicating the value of a product or service to customers, Figure 3 shows the key partners involved in optimizing our business model, reducing risk and acquiring resources. Mr. Cyber-Brain, a farmer, is an important person who needs to be well-trained for stimulating widespread adoption of e-services, and also for data gathering. With effective communication and promotion strategies, multi-sectors consisting of local government, experts who provide knowledge, farmers, and officers of agricultural cooperatives could co-create business services with a value chain as shown in Figure 2.

![Figure 3](image)

**Figure 3:** Multi-sector engagement is one of the key success factors of co-created service innovation

3.2 Service design and context-aware services

A context-aware service is a type of smart service that can be automatically processed according to various situations and information. For example, in agricultural environments, factors may be a plant’s rate of growth, the amount of sunshine, the weather, relative humidity or the indoor temperature of greenhouses, and so on. These contextual factors represent important service execution information for disease control, smart cultivation or fertilizing in an agriculture environment. Therefore, context-aware services for agriculture can consider such factors within the agricultural environment using any work automation model.

Figure 4 illustrates the conceptual idea of how context-aware services could realize benefits for farmers:

- **Context:** For example, the stage of rice growth analyzed from satellite data and verified by Mr. Cyber-Brain, water resources, weather, humidity, etc. (Nagai et al., 2009).
Platform: Technical aspects, such as data storage, data exchange and interoperability, analytic model, expert system, knowledge processing, services, etc. Non-technical aspects such as leadership, legal, political and socio-cultural.

Context-Aware Services: Each farmer would have access to personalized services, such as fertilizing information (Srisawasdi et al., 2008), disease control suggestions, etc., depending on their environment, i.e., soil nutrients, rice varieties, stage of rice growth, location, etc.

Figure 4: Three layers of context, platform and personalized services

4. Framework for context-aware knowledge services with a co-created value chain

Since service-systems are “information-intensive”, the information required to perform such services should be co-created between service provider and service consumer, so that the framework that facilitates community-based collaboration and problem-solving across agencies yields new services and more added value.

4.1 Cyber-Brain: Community based knowledge services platform

With the development of the Internet and the World Wide Web, the enormous amount of knowledge resources prevents knowledge consumers from effectively and efficiently accessing the information needed. To overcome such a problem, knowledge fusion is one of the solutions. Cyber-Brain (Kawtrakul et al., 2008, Kawtrakul et al., 2009) is a community-based platform of services and tools that facilitates IT infrastructure consolidation, information sharing, and collaboration across agencies, partners, and public boundaries. This platform operates in such a way as to avoid IT duplication between agencies and facilitates integration of IT resources within the federal government and among federal, state and local governments. With Cyber-Brain, appropriate, personalized knowledge services will be provided to support problem-solving, decision making and early warning.

4.2 Coop-Cyber-Brain: A business owned and controlled by those who use it

Cooperative Principles is a business owned and controlled by those who use it. Cooperatives, therefore, are user-driven businesses that have contributed greatly to the development of agricultural systems directed toward meeting member needs, rural communities and the changing characteristics of markets.
Coop-Cyber-Brain is a project initiative of c-Government implementation that includes a reference architecture, a project planning roadmap, services from the UKNOW Centre and its partners, and several workshops for developing and executing the project. This project is based on successful commercial and governmental deployments and capitalizes on an agency’s existing investments in networks, servers, applications, storage, and skills to enable a more connected government.

Farmers and cooperatives also need to be motivated to use e-Government services through the provision of compiling relevant and accessible digital content. In particular, the following must be implemented to increase demand and support e-Government services:

- Developing a multi-channel single window common service delivery, including 'physical' citizen service centres and other public access points such as tele-centres, call-centres, web portals and mobile portals.
- Implementing measures that will enhance public trust in ICT enabled transactions and all other interactions in the digital environment.
- Encouraging the development of relevant, compelling, user friendly, online and mobile content, including so-called 'Killer applications'.
- Developing a system aimed at improved accessibility and affordability of online and mobile content, and ICT.

4.3 Social media enhanced knowledge management

Social media takes knowledge and makes it highly iterative within the community of farmers and cooperatives. It creates collective intelligence content as a social object (Sasaki et al., 2012). That is, content is no longer a point in time, but content sharing that is part of a social interaction within a farmer’s community, such as discussion. It easily disassembles the knowledge sharing pillars of structure as it evolves. As examples, problem-solving in a micro-blogging service can shift meaning as a discussion unfolds; conversations in community social networks that link farmers and cooperative data can defy categorization; and internal blogs and their comments don’t lend themselves to obvious taxonomy. This can include new issues in natural language processing, data engineering and management (Kannan et al., 2012), especially in terms of context-aware knowledge extraction.

Social media in the community of farmers and cooperatives will be a boon to knowledge management in agriculture. Many of the benefits we experience in the internet web space-- effective searching, collective intelligence from associated unstructured data sources, and ranking of problem-solving relevance -- will become basic features of the Coop-Cyber-Brain. There will an increasing overlap between farmer’s public and private data to enhance the value of the private data along a Communication Agriculture Engineering approach under the NoE Communigram-net.

4.4 Scenario of a context-aware service for Thai Farmers: Rice watch

Based on using contextual information, the returned services are better tailored to the needs of the user and the quality of service is enhanced. Figure 5 shows how to develop awareness and recognition of the need for the data collection process with the farmers, and thus to provide a platform for them to continue collecting relevant data and their activities for the system. Three layers are needed for rice growth based on disease monitoring, diagnosis and treatment, i.e., data integration connectivity or interoperability, and services.

5. Building measurement and evaluation methods

Usually, measurements for the success of e-Government project implementation are online government services, a paperless government, a knowledge based government, and a transparent government. However, this project aims to provide citizen service innovations with a single point of access by integrating different government departments and agency websites.

It is commonly recognized that indicators are an essential basis for capacity building, investment, and degree of engagement; this process needs a tool to measure the success of a project and also innovation activities. Similarly, there is a strong need to identify good practices in cross-agency co-operation between government

---

1 www.communigram.net
and other public sectors. Through the measurement of such operations, the farmer will gain maximum income while maximizing yields and minimizing costs through disease control and tailor-made fertilizing.

6. Conclusions

This paper focuses on innovation for driving connected government implementation. It presents the current initiatives dealing with enhancing quality of services and examines innovative activities in capacity building. The goal of this paper is also to identify new challenges in market strategies for developing awareness and recognizing the need for a co-created value chain among farmers, and thus to provide a platform for them to continue collecting relevant data on their activities for the system. We also found that market strategies, effective communication strategies, quality of e-services, and e-service content are needed for the creation of a sustainable architecture for connecting service implementation. The four representatives of agricultural cooperatives from four provinces have been implementing such strategies to formulate the framework and guidelines for best practices in e-agricultural information services. 26 Mr. Cyber-Brains have been trained for each agricultural cooperative member to be the future trainers of the other members, and around 250 Mr. Cyber-Brains will be trained in the second phase. Thanks to those 26 Mr. Cyber-Brain farms, it was ascertained through interviews that 30% of costs could be saved related to disease control and tailor-made fertilizing. The success factors strongly depend on cohesive working networks and multi-sector engagement, including the government agencies that own the data.

References

Asanee Kawtrakul et al.


Abstract: In this paper we use the case study of a successful innovative e-Government project, iSAC6+, to examine some of the key factors in the project's success with the aim of contributing to the general understanding of the challenges associated with managing e-Government projects. We make observations, identify areas for deeper consideration and draw conclusions as to how lessons learned might be applied to other e-Government projects. There has been considerable analysis into the success and failure of e-Government projects. We analyse some of the literature to identify the unique features which might add additional challenge and risk to e-Government projects and then focus on the case study, specifically on individual participants and stakeholders rather than on the project as a whole. The discussion looks at the vulnerability of e-gov projects resulting from one of their defining characteristics, their collaborative and multi-organisational nature. A collaborative project which meets its objectives will rightly be seen as a success, though this may not be the viewpoint of all participants, some of whom may have found that the hoped for benefits have not been realised. For these participants the project is at best a limited success, but for many, a failure. The high failure rate for e-Government projects is researched, analysed and documented. One feature which is a consequence of the complex and unpredictable environment within which e-Government initiatives take place is that they are inherently innovative in that their purpose is invariably aimed at establishing new IT enabled solutions to embedded and complex problems. Innovative projects operating in complex, unpredictable environments are at high risk of failure for some if not all participants. The aim of iSAC6+, was to implement of a semantic web based Citizens Advice Service (CAS) application in five pilots. Success was judged by the achievement of cost and quality benefits for all stakeholders, citizens and administrators (cost burden reduction), and by the impact on the pilot organisation and operation (service modification). The analysis will demonstrate how the development of a management and measurement framework based upon the strategic aims and objectives for each partner supported success. It will also show how absence or lack of clarity about aims and objectives adversely affected some partners. Finally the paper will make comments and suggestions based upon the lessons learned.

Keywords: e-government, project management, collaboration, project success

1. Introduction

In this paper we use the case study of a successful innovative e-Government project to identify some of the key factors contributing to the success of this particular project with the overall aim of contributing to the general understanding of the challenges associated with managing e-Government projects. We make observations, identify areas for deeper consideration and draw conclusions as to how lessons learned might be applied to other e-Government projects. The focus of the analysis is on individual participants and stakeholders rather than on the project as a whole. The analysis will start with a view of the performance and success of the whole project, but will then move on to look at the objectives, expectations and intentions of individual partners or stakeholders and how well these were met.

1.1 Rationale

There is a considerable amount of analysis and discussion relating to the success and failure of e-Government projects, and some of it will be referred to below. Much of the discussion could be applied to IT Projects in general, but here the discussion looks at the vulnerability of e-gov projects resulting from one of their defining characteristics, their collaborative and multi-organisational nature. The basis of this paper is that in addition to the risks inherent in IT projects generally, e-Government projects present a set of unique project management challenges which need to be properly understood if the aim of innovation in government through Information Technology is to be achieved. In particular the collaborative nature of such projects, will be examined through the use of a case study to identify the nature of the challenge, and to suggest approaches to meeting this challenge. While the impact on individual partners or stakeholders is sometimes identified as an indicator of failure, it does not appear to have been investigated as an issue in its own right, with its own problems to
address and lessons to be learned. While a collaborative project which has many participants, like iSAC6, may be viewed as an success, as will be described later, this may not be the viewpoint of all participants, some of whom may have left the project before its conclusion, or found that the hoped for benefits have not been realised. For these participants the project is at best a limited success, but for many it is a failure with an investment of funds, people and commitment failing to deliver any return. (EUROPEAN COURT OF AUDITORS, 2011) It is a scenario which is common in EU funded research projects, but which has also been the subject of comment in studies of projects elsewhere in both developed and developing economies. (Grant Thornton, 2011)

The analysis will first look at the characteristics peculiar to e-Government projects and discuss how these pose risks and present challenges not usually faced in other IT projects. We will then focus in particular on the individual participant perspective during the initial phases of the project and look for any relationship between this starting point and eventual success or failure.

2. Features of e-Government projects

Government organisations at all levels seek change: operationally in terms of the effectiveness, efficiency, scope, quality and cost of the services they provide; and strategically in terms of working practices, organisational culture and relationship with stakeholders. For approximately the last 10-15 years the focus of change has been on research into, and implementation of, e-Government initiatives. E-Government itself has come to include a wide range of initiatives and functions. It emerged alongside the Dot Com boom of the 1990s, growing rapidly from early use of the internet to disseminate public information and undertake public consultations developing in concept to include almost any IT supported public sector business process (Heeks, 2006). A thorough and highly informative analysis of the whole realm of e-Government, including a selection of speeding definitions, can be found in the report of the eGovRTD2020 project (Codagnone & Wimmer, 2007). The range and size of e-Government is important for this discussion as it indicates a level of scope and complexity not generally evident in the private sector and thus perhaps indicates the need for different attitudes towards management and judgement of success or failure. In their case study comparison Melin and Axelsson ably demonstrate the challenges of e-Government project management in a complex inter-organisational environment (Melin & Axelsson, 2009), while the Grant and Jordan consultancy report discussing strategy in the complexity of the Public Sector highlight three key features of relevance to this paper: multiple and potentially conflicting goals; the range of stakeholders; and unpredictability (Grant & Jordan, 2012). We will see all three of these features having an impact on some of the iSAC6 participants.

Perhaps the best known and most widely publicised feature of e-Government projects is their propensity for failure.

In Special Report 9/2011 the European Court of Auditors observed that:

“The needs of citizens, businesses and administration were not determined in advance and strategic objectives were too general and lacked specific targets. There was insufficient analysis of what was actually required.” (EUROPEAN COURT OF AUDITORS, 2011)

The Auditors concluded that the absence of clear, quantifiable objectives was a significant contributor to the failure of ERDF e-Government projects to meet needs and deliver value. Many other studies have highlighted the problems faced by e-Government projects and the frequency with which they fail to deliver the desired benefits. In her analysis of e-Government project failure, Carolyne Stainforth quotes recent studies which “suggest between 60 to 80% of e-Government projects fail in some way” (Stainforth, 2010). The UK National Audit Office, the statutory authority that reports to Parliament on the efficiency and effectiveness of resource deployment by government departments, estimate that 34 government IT projects “have a delivery confidence rating of ‘red’ or ‘amber/red’, that is they are not expected to deliver the benefits expected of them. Most of these projects fall within the broad description of e-Government. In North America, according to a report from Grant Thornton, “USA (ranked 2nd in the United Nations Global E-Government Survey 2010), has spent about 600 bn USD in the previous 10 years, only to realize that the returns / benefits are far below the intended / expected benefits from large scale e-Government programmes.” (Grant Thornton, 2011). The problem is a global one, not just limited to the mature democracies and developed economies of Europe and North America. There are papers discussing the problems of e-Government project failure in the Middle East (Al-Rashid, 2010), China (Janowski, et al., 2007), Egypt (Abdelsalam, et al., n.d.), US and Canada (Longford, 2002).
Terry Keefe et al.

An echo of the view that e-Government projects, by their nature, face a unique set of challenges can be found in “Foundations of Strategy” by Grant and Jordan. In their book the authors describe how the process of strategy formulation in the public sector is made difficult by a set of unique characteristics not found in the market-led sectors (Grant & Jordan, 2012). Three of the seven distinguishing features are:

Multiple, potentially conflicting goals where organisations have many aims and drivers, not necessarily closely related and at times in conflict with each other. In effect, strategic activities require collaborations between different stakeholders within public sector organisations. As Cadognone and Wimmer point out, e-Government projects frequently involve collaboration between organisations, thus increasing the level of risk.

Distinctive constraints and levers. The rules, constraints and procedures applying in the public sector are significantly different from those in the market sectors, and as a consequence the challenges for management are greater.

Less predictability. Government takes place in a complex political, social and economic environment where the factors influencing and driving change are many and varied. When the risks inherent in IT and innovation projects are added to this mix it is hardly surprising e-Government projects find success so difficult to achieve.

Similarly Ward and Daniel in discussing the application of Benefits Management to management of IT projects identify two distinctive and potentially disruptive characteristics of public sector projects: imposed drivers and many stakeholders. The authors go on to discuss the value using Benefits Realisation techniques to manage the range of drivers and stakeholder expectations (Ward & Daniel, 2006), an approach which was used successfully in iSAC6 (Keefe, et al., 2012).

A consequence of the complex and unpredictable environment within which e-Government initiatives take place is that they are inherently innovative insofar as that their purpose is invariably aimed at establishing new IT enabled solutions to complex problems. As Melin and Axelsson, quoting Heeks, put it “New e-government projects are typically initiated based on: “a problem that needs to be solved” or “identification of an opportunity which could be seized” (Melin & Axelsson, 2009). The problem in project management terms is that this makes e-Government projects inherently high risk. The challenge for the project manager is to find ways which enhance chances of success. To this end the paper will now focus on a success story, iSAC6.

3. The case study - iSAC6+

3.1 Background

iSAC6+ is an EU funded initiative aimed at utilising semantic web technology to enhance the provision of advice to Citizens by government Citizen Advice Service (CAS) offices. iSAC6 is the culmination of a series of developmental projects which created an innovative semantic web based application, refined it within a single pilot location and then moved on to a wider implementation.

The value added by iSAC6+ is in helping local government offices carry out their responsibilities for supporting the needs of citizens most at risk of social exclusion or marginalisation. Desired project outcomes were to:

- Reduce long term costs, a critical issue in the current “do more with less” economic climate;
- Apply innovation strategically and organisationally to improve competitiveness and enhance client-orientation as part of the drive towards professionalization of the public sector;
- Improve the quality of citizen information services in terms of availability, accessibility, and usability, as well as enriching the information content and ensuring consistency of use.

3.2 Summary of success from final report

Overall the project has been a marked success. The final report to the European Commission describes the key objectives (report wording in brackets). A synopsis of the project result, in italics, follows each objective.

To achieve change in delivery of the public service within the pilot (Did ISAC catalyse change in the pilots?)

The pilots experimented several shades of change in the service, in procedures, in policies of measuring quality of services, and impact in the organisation. The examples range from deep implication with strong leaders in
the organisation to lighter implementations aside key players in the organisation. The common change is the adoption of a new approach to attending citizen information needs, to think of reducing ABR through better information provision with online and natural language interfaces, and to measure the impact on that adoption.

- To achieve a real reduction in the cost for citizens and administration (Did the change contribute to any administrative burden reduction? Did it contribute to reduce the administrative costs as well?)

A strong affirmative answer comes up from the pilots with significant service change/modification enabled by iSAC. Administrative burden reduction was achieved by both citizens and public administration through iSAC. It is estimated that the associated burdens to businesses are also relieved as they are part of the measures regarding the citizens in the piloting. The quantitative ABR is -0.78 Euro per capita. The quantitative and the qualitative burdens reduction are higher in those pilots with higher service modification.

- To create a sustainable and transferable online public information application (Is there any endorsement or next adopters for its further deployment and sustainability?)

There are now 8 new partners, referred to as “next adopters” about to start using iSAC6. The group of next adopters are all local municipalities from France, Italy, Spain and Belgium, with a balanced composition of small (three) and large (four). There is in addition a Belgian social enterprise.

They have adopted iSAC in the last track of the iSAC6-project in the period of March - September 2012. They have taken advantage from the lessons learned of other pilots in the project, which where assisting them in all the subjects related to change management, service modification, and technical assistance.

The six iSAC6+ pilots have had close contact with the next adopters, especially the three municipalities who have had a key leading role in the early adoption, transferring their enthusiasm and know-how to the next adopters of their country in France, Italy, and Catalonia-Spain. The two pilots not experiencing as much benefit as the municipalities were not successful in attracting next adopters. So the project as a whole has met its objectives and has been deservedly declared a success by its EU sponsors. However, as the final report points out, the success has been concentrated on the municipal function of providing a Citizens Advice Service, a valuable and very necessary service. In the case of iSAC6 the areas of failure, or reduced success, have not significantly affected the overall project performance, but in other projects the negative impact may have been more significant.

3.3 Partners and participants

It is worth now looking in detail at the main participants, to see if we can identify the factors which made some highly successful and others much less so.

In iSAC6+ the primary operational objective was to achieve cost and quality benefits for all stakeholders: administrators; service users; and the wider citizenship. In a paper for ECEG 12 we described how we worked with public Administration partners to develop a cost and benefit model and how we identified operational objectives. For some partners we were able to additionally identify a range of organisational change objectives which had underpinned the initial decisions to participate in the project. Organisational and strategic change objectives are typically difficult to quantify and measure as they are often qualitative in nature and described in non-specific terms. The paper went on to describe how strategic objectives were elaborated to develop success factors and progress indicators, together with examples and explanations of how these strategic objectives were expected to be achieved (Keefe, et al., 2012). It was noticeable that three of the partners from what might be termed traditional city administrations were able to articulate their aims and objectives. The three others found this more difficult, having entered the project motivated more by a desire to explore possibilities offered by the technology rather than for reasons of process innovation and improvement.

Table 1 provides information about each partner and their project outcome. For the purpose of this paper we have included partners who withdrew at any stage including initial proposal.

The use of monitoring and measurement frameworks was highly successful in two areas:

- Measuring the value and cost of the service innovation to both citizens and administrative offices. The project team placed a high priority on developing a robust framework for monitoring progress and measuring benefits, using the Standard Cost Model (SCM) and Balanced Scorecard as described in the
earlier ECEG12 paper (Keefe, et al., 2012). The task of identifying objectives, indicators and measures was difficult and protracted but it is arguable that the main benefit was in making project participants aware of the measurement process and its benefits (Bikfalvi, 2012). The benefits realisation approach in particular helped partners to identify and elaborate their individual aims and objectives.

- Creating a quantifiable measure for improvements in the organisation and administration of service delivery, referred to as “Service Modification”. This helped pilot partners specify where improvement had occurred, and also allowed the project management team to identify a relationship between this area and the achievement of cost reduction benefits (Bikfalvi, 2012).

**Table 1**: Information about each partner and their project outcome

<table>
<thead>
<tr>
<th>Description</th>
<th>Strategic aims</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| Pilot 1 A municipal authority, Spain. | Reduce the costs
Improve administrative efficiency
Improve service quality
Digitise service delivery | Success
The authority had been part of the original development projects and felt the project was a big success. |
| Pilot 2 A municipal authority, France. | Reduce the costs
Improve administrative efficiency
Improve service quality
Encourage new ways of working | Success
Embraced the project with enthusiasm and has consequently generated a high level of success in terms of service improvement, working practices and cost burden reduction. |
| Pilot 3 A municipal authority, Italy | Reduce the costs
Improve administrative efficiency
Improve service quality | Success
The municipality already had a well-developed approach to monitoring service delivery and a productive IT support function. Worked closely with their own IT department and other pilots to implement an effective CAS. |
| Pilot 4 A technical support unit within a municipal authority, Germany | Demonstrate potential to reduce costs
Encourage more e-working within the municipality | Success – none identified in terms of service modification or burden reduction. Within the project context, the pilot, in the framework of the iSAC6+ Project, provided a different organizational model compared to the other sites. It is responsible for the IT service of the city. Its main responsibility is for Information Technologies and has no specific citizen attention or information provision functions. |
| Pilot 5 A women’s health information and awareness provider, Eire | Explore the potential of the system to improve information dissemination | Success – limited
Provides a different operational model to other partner sites. It is an NGO and not publicly funded or governmental sponsored organisation. The iSAC project caused the management team to completely rethink their online service model together with the office and services back ends to help generate an integrated environment for management, staff, external supports and their information consumers. Measures were difficult to apply. |
| Pilot 6 A regional police force, UK | Explore the potential of the system to improve information dissemination within a larger programme | Failure
The force came into the project after the failure of their outsource partner to deliver an associated programme. They struggled to clarify objectives and were unable to justify continuation when funding cuts were imposed |
| Pilot 7 A large city authority, UK | Not stated | Withdrew before committing resource
Represented in the proposal bidding stages by an outsource supplier but pulled out before start-up because of lack of clarity over what the service would provide |
| Project Coordinators | University of Girona, Spain, supported by Sheffield Hallam University, UK | |

It appears that those organisations which entered the project on an open-ended research basis struggled more to get benefit from it. One, for example, could not clearly define what they wanted to achieve. As a result they could not create a strong enough case to defend their involvement when they were faced with funding cuts. Those who could define their organisational strategic objectives are seeing very positive results.
4. Observations, recommendations and concluding remarks

Project success and failure are topics of a huge amount of discussion, especially in relation to e-Government. Among IT Project Management experts there is a general agreement on the criticality of having a set of clear, defined and agreed aims and objectives before commencing any detailed form of project planning, let alone going ahead with the project e.g. (Cadle & Yeats, 2008) (Highsmith, 2010) (Marchewka, 2013).

4.1 Observations

As discussed earlier, e-Government projects are high risk in that they focus on innovation, have a high degree of complexity, and often have multiple objectives. Many particularly in the EU, are started as research activities with participants who are not clear what they want to achieve. As a result many do not deliver success, at least for some of their participants (EUROPEAN COURT OF AUDITORS, 2011). This is of course the case for other research areas but it is particularly relevant to e-Government where the funding pressures are very restrictive and the types of partner organisations very diverse. When we look at iSAC6 case study we find all three aspects are present. Clearly iSAC6 cannot be held up in comparison to the huge range of diverse and immensely larger e-Government projects. However there are lessons which would be of value to many project managers and sponsors, particularly within the EU.

iSAC6 has been highly successful in meeting its core objectives, and as a consequence is set to expand and build upon that success. The factors forming the keys to this success are:

- The project has had a clear and consistent focus upon improving a standard but very important government process, providing information to citizens. In this instance the focus was made more precise by piloting it among municipal authorities with a relatively high degree of commonality.
- The implementation project built upon an innovative but proven technology which had been refined within a pilot location.
- The strategic aim was clearly defined and elaborated by setting a number of strategic objectives supported by a monitoring and measurement mechanism. This ensured that success was defined as quantifiable outcomes, not just good intentions.
- The inclusion of expert partners able to take on the research, technical development and creation of management frameworks meant that the pilots were able to concentrate on developing and managing the CAS business process.

While it would be inaccurate to say iSAC6 generated any failures, it is clear from the comments in the Project reports and an examination of the history of the project that the project was for a few participants not as productive as they hoped for. The factors which are worth noting are:

- Some partners engaged in the project in a way which implied they saw it as a research or feasibility activity rather than implementation. Consequently these partners found it difficult to frame objectives and measures aimed at specifying value and benefit achievement. For two of the partners this reduced the value they received from participation but was not entirely neutral. For Pilot 6, the regional Police force it was a fatal problem in that in the absence of clear objectives and expected benefits they were unable to justify continued commitment of resources and were forced to pull out.
- The process of establishing a collaborative project which could successfully bid for EU or other public funding invariably contains a political dimension whereby it is necessary to ensure the consortium is appropriately balanced. There are good reasons for this requirement but the outcome is that it decreases the likelihood of having a single shared set of project objectives. For iSAC6 this was only a real problem at the formation stage of the project and was recognised as a risk by the large UK city authority which pulled out as a result. Other projects, as discussed elsewhere, have not been so fortunate and found themselves in serious difficulties as a result.

4.2 Considerations for further research and action

One case study, no matter how successful, is clearly not a sufficient basis for recommending changes in the practice of IT Project Management of e-Government projects. We do make some recommendations below with regard to good practice, and raise some questions about the way in which projects are initiated. We believe the iSAC6 case study does provide sufficient support to our observations to suggest that more
comprehensive investigation of e-Government projects to establish the degree to which there may be unique challenges and risks for which project managers and teams, and from there to identify whether changes in practice and management might improve levels of success. Development and implementation of a robust and comprehensive Benefits Realisation mechanism was difficult but ultimately highly successful in maintaining focus on objectives and quantifying success. We suggest other public sector projects consider a similar approach and incorporate a benefits realisation framework into their project proposal. While the Standard Cost model may not be appropriate to all projects, it is likely to be so for all those involving public service delivery and we recommend it be adopted in these projects. Funding bodies such as the EU should consider whether the project proposal process is appropriate to the challenges of developing e-Government services. The typical process of bringing together a varied consortium of interests may be counterproductive as it adds to the risk of over complexity and conflict. It would be wise to consider consortia which share a single business or service process and to require a set of aims and objectives for each participant as well as for the whole project.

4.3 Concluding remark

Experience and research point to collaborative E-Government projects in particular having a high failure rate. By looking at the experience of a successful collaborative e-Government project, and examining areas of failure as well as success we have shown that many fundamental problems are generated at the beginning. Clear, well defined and measurable objectives based upon specific strategic aims are essential to the success of any project. This analysis demonstrates that this also applies to individual participants if the project is to avoid the challenges of dealing with multiple and possibly conflicting sets of objectives.

References

Bikfalvi, A., 2012. D2.2 Analysis of administrative burdens reduction and service improvements after project activities, Girona: s.n.
Bikfalvi, A., 2012. D2.2 Analysis of administrative burdens reduction and service improvements after project activities, Girona: UdG.
Grant Thornton, 2011. Project Management in e-Governance, s.l.: NISG, PMI.
Rosa, J. L. d. l., 2012. A unique European citizens’ attention service, Girona: UDG.
Providing Government e-Services: An Extension of Applicability Check for Practitioners

Luc Lagrandeur1 and Denise Fortier2
1Faculty of Management, Laurentian University, Sudbury, Canada
2Williams School of Business, Bishop’s University, Sherbrooke, Canada
llagrandeur@laurentian.ca
dfortier@ubishops.ca

Abstract: Since the 1980’s, researchers have raised concerns about the importance, the relevance, and the rigor of information systems research for both the academic realm and for real-world practitioners. Indeed, research should either challenge assumptions or extend knowledge based on these assumptions, as part of a formal theory or as represented in the way practitioners behave in the real world. Accordingly, a strategy to enhance relevance is to involve practitioners in the research process. By doing so, we can generate research that is deemed interesting, applicable, and useful for practitioners. In other words, interaction with practitioners can help researchers fill gaps between phenomena as they exist in practice and in the current state of academic knowledge. Adopting this research perspective, this article proposes an extension to Rosemann and Vessey’s (2008) applicability check approach by offering an example of research focused on problems faced by practitioners who provide e-government services. Given that communities are grappling with unanswered questions regarding how to best manage and deliver e-services both within City Hall and with their citizen-clients, this study seeks to understand the external and internal concerns that result from municipal governments offering online services. In this respect, we crafted a participatory research process involving relevant practitioners at the outset. We worked with the Intelligent Community Forum (ICF), a non-profit think tank based in New York City (USA), and conducted semi-structured interviews with a purposeful sample of elected officials and city administrators from 13 communities from North America, Europe, and Australia. The goal of the interviews was to ask subject-matter experts (SME) to discuss the problems and challenges they face regarding the internal and external forces associated with providing e-services. In order to do so, questions ranged from identifying 1) reasons for cities to undertake e-service initiatives, 2) reasons for using the information highway, 3) the resulting internal impacts within their communities, 4) the resulting external impacts on their communities. Data that resulted from interviews were recorded, coded and analyzed based on the guidelines of content analysis, a qualitative data reduction and sense-making effort that takes a volume of data and attempts to identify core consistencies and meaning (Patton, 2002). Results show a wide scope of concerns that range from a focus on the citizen-client along with changes with the strategic positioning of IT department as a business unit. Moreover, external concerns include citizens having improved access to information and to convenient e-services. In sum, knowledge that results from this study is twofold. First, results offer a wide view of the managerial problems faced by municipal governments offering online services. Second, it shows that the scope of the Rosemann and Vessey’s (2008) research lifecycle can be shortened by moving applicability check upstream simultaneously as part of the research problem identification. In so doing, this paper paves the way for academic research in an area that is relevant to practice.

Keywords: practical relevance, rigor, academic research, research process, applicability check, government e-services

1. Introduction

Since the 1980’s, academic researchers have been grappling with the importance of generating research that is both relevant and interesting for practitioners. This paper highlights the concerns raised by select academic researchers on the issues of relevance and rigor of information systems (IS) research for both the academic realm and real-world practitioners. As pointed out by several researchers in this field, a strategy to obtain relevance is to involve practitioners in the research process (Benbasat and Zmud 1999, Lee 1999, Thomas and Tymon 1982, Baldrige, Floyd & Markocz 2004, Tushman and O’Reilly 2007, Rosemann and Vessey 2008). By doing so, research results could be more applicable and current for practitioners and would have a greater potential for usefulness. An interesting research paper either challenges assumptions or extends knowledge that is based on these assumptions; these assumptions are either expressed as part of a formal theory or they are represented in the way practitioners behave in the real world (Benbasat and Zmud 1999, Thomas and Tymon 1982). Therefore, interaction with practitioners can help academic researchers fill gaps between phenomena as they exist in practice and the current state of academic knowledge.

This article proposes an extension to Rosemann and Vessey’s (2008) applicability check approach by offering an example of research focused on problems faced by practitioners who provide online government services. By adopting this research perspective, this research paper aims to focus on the interests of key stakeholders. In turn, findings can then identify core issues for academic researchers, thus improving relevance for the
academic community as well as for practitioners. Indeed, managerial problems as defined by real-world practitioners provide relevance for the ensuing research life cycle, namely from problem identification to theoretical development, all the way to data analysis and communication of the findings. As purported by Benbasat and Zmud (1999), academics can define the “fundamental issues” of our discipline with the insights from practitioners. By exploring the real-world managerial problems faced by practitioners, we as academic researchers can then engage in research that has not been discussed in the academic literature. This provides relevance for the academic realm by identifying knowledge deficiencies, and for practitioners by providing useful prescriptions.

### 1.1 Research relevance for information system research

Thomas and Tymon (1982) first began to articulate the general properties or requirements of research relevance. Essentially, they point out that two-way interaction is necessary between researchers and practitioners: the researchers acting as knowledge producers and practitioners acting as knowledge users. Thus, relevant knowledge flows in both directions, between researcher and practitioner for the contents of information as well from practitioner to researcher to guide relevance. Accordingly, research can meet the necessary conditions for theory to be useful to practitioners, namely descriptive relevance, goal relevance, operational validity, nonobviousness, and timeliness (Thomas & Tymon 1982).

> “Descriptive relevance refers to the accuracy of research findings in capturing phenomena encountered by the practitioner in his or her organizational setting. [...] Goal relevance refers to the correspondence of outcome (or dependent) variables in a theory to the things the practitioner wishes to influence. [...] Operational validity concerns the ability of the practitioner to implement action implications of the theory by manipulating its causal (or independent) variables. [...] Nonobviousness refers to the degree to which a theory meets or exceeds the complexity of common sense theory already used by a practitioner. [...] Timeliness concerns the requirement that a theory be available to practitioners in time to use it to deal with problems.” (Ibid, pp 346-349).

Benbasat and Zmud (1999) present dimensions of relevance and propose guidelines as to how to achieve these. Basically, “an article describing research that is interesting, applicable, and current has the potential to be useful for practitioners” (Ibid, pp 12). Accordingly, the foremost important criterion to attain relevance is to implicate the practitioner as the key stakeholder in topic selection. This results in a research topic that is more attuned to the needs and interests of practitioners and enables the academic community to take a more proactive role in “discussing the key research areas of the discipline by taking into account the benefits that will accrue to practitioners from research in these areas” (Ibid, pp 8). For research programs to be fruitful in producing useful theory, researchers should follow as many of Benbasat and Zmud’s recommendations (Lee, 1999). Thus, it is suggested that the production of more high-quality, highly relevant management research is achievable when researchers 1) study questions that challenge both existing scientific theory and conventional management practice early in the research process, and 2) understand the practitioners’ perspective and let methodological choices be guided by the parameters of practitioner experience (Baldridge, Floyd & Markoczy 2004).

### 1.2 An extension to Rosemann and Vessey’s research life cycle

As previously indicated, we propose an extension to Rosemann and Vessey’s (2008) applicability check approach. They argue that a first step in aiding researchers to improve the relevance of their research is to conduct applicability checks on research objects with practitioners, either prior to- or following- engagement in the research process. Thus, the purpose of applicability check is to ensure relevance of the research topic for the practitioner. Accordingly, research will be important for practitioners, solutions will be suitable for them, and the resulting article or communication of the research results will prove accessible to practitioners.

In order to develop a way to determine the importance of research to practice, Rosemann and Vessey show that applicability check should occur between two instantiations of the research life cycle; see figure 1 for the extended research life cycle as presented by Rosemann and Vessey (2004) from a timeline perspective.
Figure 1: The extended research life cycle by Rosemann & Vessey (2008)

More specifically, applicability check could be conducted as (1) the final step in the research life cycle; (2) the first step in the life cycle; or (3) at the end of the first instantiation of the life cycle, leading into the second instantiation. In their paper, they conducted an applicability check on DeLone and McLean's IS success model (in Rosemann and Vessey 2008:14) at the end of the first instantiation of the life cycle, leading into the second instantiation. We believe that using the third method leads to a research life cycle that is too long and does not provide results that are timely or beneficial for practitioners who work in the face-paced arena of information technology. By targeting an earlier phase of the research life cycle, we provide an example that uses applicability check in a different way. In this paper, we propose an extension to this model by integrating applicability check as the first step in the research life cycle, see figure 2.

Figure 2: An extension of applicability check in the research life cycle

As indicated by Bembasat & Zmud, we do not imply that research needs to be carried out in a less rigorous fashion, we simply wish to meet the condition of timeliness as proposed by Thomas and Tymon (1982):

“One of the most serious criticisms of the organizational sciences is that the phenomena under study change faster than science can come to grip with them.” (Ibid, pp 349)
Information technology, more specifically, the use of online services is growing at an increasingly rapid pace. This reality proves highly challenging for practitioners who are trying to understand how best to implement new technological advancements. As our data will demonstrate, practitioners are trying to cope with the internal and external impacts of providing such services. Research is usually a slow and long process. If we as researchers can shorten the timeframe of the research life cycle when studying rapidly changing phenomena, we should therefore be able to better describe, understand and provide timely solutions to practitioners. Indeed, we aim to do so before the phenomena vanishes and is supplanted by a new one (Thomas and Tymon 1982). Thus, Rosemann and Vessey’s (2008) research lifecycle can be shortened by moving applicability check upstream simultaneously as part of the research problem identification so as to minimize the risk of contributing out-dated research outcomes.

Since the publication of Rosemann and Vessey’s work, very few IS studies have adopted this approach. We suspect that the procedures length does much to explain this paucity. Therefore, our work aims to show how to shorten the research lifecycle by an example of using applicability check at the beginning of the research life cycle for the identification of relevant managerial problems as identified by practitioners. Our experience with this approach, using the interview method and sense-making analysis, leads us to identify research topics that should prove relevant and important for practitioners. These research topics can then be used as a basis for the remaining research life cycle.

2. An example of applicability check

The literature confirms that many communities are grappling with unanswered questions regarding how to best manage the development and offering of e-services either 1) internally, within the organization of City Hall, and 2) externally, regarding how to best manage the relationship with the citizen-client (Lagrandeur 2008). Consequently, a review of the literature establishes both the timeliness and the relevance of the impact of e-services by municipal governments (Löfstedt 2005). Thus this study focuses on the external and internal forces of the development of online services in municipalities: forces that affect the organisation and the relationship with its citizens.

2.1 The inception phase of the study

In identifying managerial problems, we purposefully began by using our personal industry and research experience to better understand the phenomena and increase our insights into topics that we consider important. As purported by Tushman and O’Reilly (2007), “the source of research questions should be the phenomena, not the traditions or constraints of a given disciplinary point of view” (Ibid, pp 772). Furthermore, these authors argue that researchers should test their ideas by interacting with engaged practitioners whereby such interaction can illustrate gaps between phenomena as they exist in practice and the current state of academic knowledge (Tushman and O’Reilly 2007).

2.1.1 Research methodology

Given our quest to understand how to best manage and deliver e-services both within City Hall and with its citizen-clients, we designed a participatory research process involving relevant practitioners. We worked with the Intelligent Community Forum (ICF), a non-profit think tank based in New York City (USA) that focuses on the use of broadband and information technology for economic development in communities around the world. Their contribution was highly valuable both in terms of elaborating research questions and to validate results.

2.1.2 Sampling and data collection

We conducted semi-structured telephone interviews with a purposeful sample of elected officials and city administrators from 13 communities from North America, Europe, and Australia. A purposeful sampling strategy was used with no notion of random sampling to achieve statistical generalizability. Accordingly, the sample was built up to enable the researchers in order to satisfy the needs of this study. By using professional contacts, the researchers sought to recruit potential participants who fit the study requirements. See Appendix 1 for a complete list of participating communities along with a profile of research participants.

The goal of the interviews was to ask subject-matter experts (SME), namely elected officials and city administrators, to discuss their motivation for introducing e-services and joining the information highway as
Luc Lagrandeur and Denise Fortier

well as the problems and challenges they face regarding the internal and external forces associated with providing e-services. In order to do so, questions ranged from identifying 1) Reasons for cities to undertake e-service initiatives, 2) Reasons for using the information highway, 3) The resulting internal impacts within their communities, and 4) The resulting external impacts on their communities.

2.1.3 Data analysis

Data that resulted from interviews were recorded, transcribed, coded and analyzed based on the guidelines of content analysis, a qualitative data reduction and sense-making effort that takes a volume of data and attempts to identify core consistencies and meaning (Patton, 2002).

We thus proceeded by first analyzing each transcript, identifying relevant responses. We then looked for commonalities between participants’ responses. All the similar responses were grouped together. Given that we started with a blank slate, we needed to perform several such iterations in order to create categories. More specifically, data coding focused on descriptive codes that entail little interpretation, where a class of phenomena is attributed to a segment of text (Miles & Huberman 1994). In other words, “In our IS department, we have set up an e-services unit to provide support” is an example of this type of code. Once the list was completed, we then assigned labels to identify each category (e.g. cost reduction).

2.1.4 Results

For the participating communities, we found a wide variety of reasons for undertaking e-service initiatives and using the information highway. Moreover, these initiatives result in several key internal and external forces.

Reasons for cities to undertake e-service initiatives

Research participants explained that their reasons for offering e-services to citizens cover many angles. Indeed, these range from improving customer service, to providing information, improving citizen engagement, promoting the city, improving communications with citizens, and improving transparency and accountability. Here are some of the reasons that were provided by SMEs:

“To improve services to citizens by providing ‘at home service’ instead of having them drive down to City Hall.” – Windsor

“To create partnerships; social media platforms allows the government to form active partnerships with business and the community in planning, priority setting and policy development.” – Ipswich

“To provide information about the community for residents or businesses looking to relocate to the area.” – Hinton

“To help address community expectations for government to be more transparent, accountable and to engage more frequently on key issues.” – Ipswich

Reasons for using the information highway

When asked about their reasons for joining the information highway, participants claimed that they do so to reduce costs, to improve the productivity or efficiency of the organization, to improve the quality of service to citizens, and to improve branding by managing and controlling their web presence. Here is a sample of answers:

“E-services reduce the high cost of service provisions to customers via manual methods.” – Ipswich

“To increase efficiency; integration between the front and back office.” – Helmond

“To be able to control the look and feel of their department and control access to the backend of the database”. Stratford

The resulting internal forces within their communities

According to participants, the resulting internal impacts cover a variety of contexts. These range from a focus on the citizen-client, a reallocation of human resources, changes in procedures and processes, in human
resources and financial savings. There has also been a shift in participation in e-initiatives, in the decision-making process, in roles and responsibilities within the city and the IT department, and in access to technical expertise. These have sometimes transformed the IT department’s strategic positioning as a business unit. Research participants claimed that internal forces have had the following consequences:

“I increased ability to provide personalized and flexible customer service.” – Ipswich

“To manage content, we have set up a procedure where we have review dates on everything that is on the Web with a signoff form.” – Geelong

“In 2008, Helmond partnered with 25 other cities (for a total of 1.2 million citizens) to create a joint corporation, Dimapct, to develop standard product/e-services on one platform. All participating cities have the same "look and feel" but their content is different.” - Helmond

“No hiring or firing of resources happened; responsibilities have been changed or resources reallocated.” – Golden

“Change from the ‘glass house’ mentality of the IT department to a ‘business entity’; The IT department is not just a support function, it must plan funding, prepare strategies, leverage all the business units of the City together to come to a common goal.” – Chattanooga

The resulting external forces on their communities

Finally, for participating communities the following external changes were observed: citizens have improved access to information and e-services are more convenient for them. Citizens therefore have increased knowledge of city’s e-services and there are more communications or e-interactions between citizens and the city with an increased use of social media. Some participants even observed a change in the relationship with the citizen-client, noting improvements in their citizen engagement level and their satisfaction level. In many cases, it was explained that the city’s web presence improved transparency in the operations of the city and changes in the fiscal burden of citizens.

“We don’t have long lines at City Hall any longer; so there’s been efficiency there because they [citizens] can do most of their business over the Internet.” – Riverside

“One impact is the increase in the type and the amount of services that are requested, especially from citizens who interface with departments like the treasury, the parks department, the library and the permit office. You do one thing for them, they want more.” – Arlington

“Convinced of the impact of Technologies on our everyday life, the city introduced tools to reinforce citizen participation in local democratic life. Since 1997, the Interactive City Council has allowed inhabitants to take part in live sessions, thanks to cable and the Internet, and to ask their representatives questions.” – Issy-Les-Moulineaux

“I think it provided much better customer service. The volume of contacts made to our 311 call center has gone up 4 times over the last 5 years. It shows our ability to solve their issues as quickly as possible.” – Riverside

2.2 The identification of managerial problems

Throughout the course of the interviews, respondents freely expressed challenges or problems, either internally or externally, with regards to offering e-services. Respondents from eight communities presented different managerial problems that can be categorized as external and internal challenges or issues. A list of the type of challenges or managerial problems faced by the communities is presented in table 1.

Table 1: List of managerial problems

<table>
<thead>
<tr>
<th>External challenges</th>
<th>Internal challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve engagement level</td>
<td>Adoption of e-services</td>
</tr>
<tr>
<td>Branding of the city</td>
<td>Access to expertise</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Systems integration (back-office)</td>
</tr>
<tr>
<td>Increased demand by citizens</td>
<td>Transparency</td>
</tr>
<tr>
<td>Improve customer experience</td>
<td></td>
</tr>
</tbody>
</table>
To derive the managerial problems, a case was prepared for each of the eight (8) communities whenever respondents expressed them during the interview. Based on the cases, the categorized challenges have been turned into managerial problem questions:

The external managerial problems / challenges faced by the communities are:
- How can a community improve the engagement level of its citizens in the affairs of the city and the likes?
- How can a community promote a single brand when “internal” organizations develop their own web presence?
- How can a community increase accessibility for its citizens?
- How should a city cope with the increased demands from its citizens in e-services and new technology such as social media and mobile applications?
- How can a city improve the citizen-client (customer) experience?

The internal managerial problems / challenges faced by the communities are:
- How can adoption of e-services by city departments be improved?
- How can a city develop e-services when access to expertise is unavailable within the community?
- How best to integrate e-services with back-office systems?
- How best to provide transparency on city’s operations with the use of e-services?

The purpose of this study was to identify the managerial problems and “real-world” issues that are relevant to elected officials and city administrators. Indeed, we know that municipalities that have a web presence are faced with complex challenges. Interviews results not only confirmed this reality, but participants also provided detailed lists of issues related to the following: 1) Reasons for cities to undertake e-service initiatives, 2) Reasons for using the information highway, 3) The resulting internal impacts within their communities, and 4) The resulting external impacts on their communities.

We then asked the Intelligent Community Forum to further identify which of the nine (9) managerial problems should be further studied for research purposes. The three (3) challenges that they thought are of greatest importance and relevance is the following:
- How can a community improve the engagement level of its citizens in the affairs of the city and the likes?
- How can adoption of e-services by city departments be improved?
- How can a city develop e-services when access to expertise is unavailable within the community?

As pragmatic IS researchers, this knowledge enables us to pursue the next steps of the research life cycle, beginning with problem identification, in order to bridge a gap not only in the academic literature but also provide relevant solutions for practitioners.

### 2.3 The identification of research problems

In his evaluation of current e-government research, Löfstedt (2005) finds deficiencies and some directions for future research. His findings show that research at the local government level is in its infancy; more research is required. He proceeds to suggest an empirical study to investigate the state of development, e-services provided and e-strategies of local government to identify good and bad practices. Moreover, Lenk and Traunmüller (2000) propose that e-government be studied under four angles: the point of view of the citizen, the process (or reorganization) angle, the cooperation perspective, and the knowledge angle.

“The direction for future research is proposed to be from the citizen perspective. By placing the individual user, i.e., the citizen, in focus the general perspective will be more of ‘Citizen Systems’ and less of ‘Governmental Systems’.” (Löfstedt, 2005, pp 48)

There is a lack of information of the impact of municipal online services on the municipality (the organization) and the relationship with citizens. To provide research directions, Löfstedt (2005) suggests these research questions:
Luc Lagrandeur and Denise Fortier

“How should e-Services be developed from a citizen perspective? What contribution can the citizens make in this development process? Is there any common strategy for the development of local e-Government and e-Services? How should such a strategy be developed and what should it comprise? What are the current perspectives and in what way do they take citizens into consideration?” (Ibid, pp 49).

Thus, managerial problems are not only relevant to practitioners but also to academics; where there is a knowledge deficit there is an opportunity to fill a gap and explore questions in greater depth by identifying research problems and questions. As supported by Benbasat & Zmud (1999), “IS researchers should look to practice to identify research topics and look to the IS literature only after a commitment has been made to a specific topic” (Ibid, pp 8).

3. Conclusion

As demonstrated above, we argue for new ways to address the first two research phases with applicability check. In other words, once practitioners identify relevant and important issues, it becomes the researchers’ responsibility to engage in the research life cycle. Their role then becomes one of tackling problems that have not been discussed in the academic literature. Ultimately, the researcher’s role is to identify knowledge deficiencies that then become relevant research problems. If we deem the first and second research phases as being the most relevant for practitioners, researchers can then validate these issues as the ones to be investigated in the next phases of the research life cycle. As with traditional research, a review of the scientific literature can validate the relevance of an issue identified by practitioners. Once validated, it is imperative to determine if those “real-world” managerial problems can become research questions. Indeed, in his evaluation of current e-government research, Löffstedt (2005) identified deficiencies along with directions for future research, indicating that research at the local government level is in its infancy. In sum, knowledge that results from this study is twofold. First, results offer a wide view of the managerial problems faced by municipal governments offering online services. Second, it shows that the scope of the Rosemann and Vessey’s (2008) research lifecycle can be shortened by moving applicability check upstream simultaneously as part of the research problem identification. In so doing, this paper paves the way for academic research in an area that is relevant to practice.

Acknowledgements

The authors wish to thank Robert Bell from ICF for his support throughout this research project. Furthermore, we wish to thank the elected officials and city administrators who participated in the interviews to ensure relevancy for future research. Finally, sincere thanks go out to our “guardian angel” Dr. Joachim Jean-Jules for his acumens and suggestions.

Appendix 1

List of participating communities with population level

<table>
<thead>
<tr>
<th>Community</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden (Canada)</td>
<td>4,200</td>
</tr>
<tr>
<td>Hinton (Canada)</td>
<td>9,738</td>
</tr>
<tr>
<td>Stratford (Canada)</td>
<td>30,461</td>
</tr>
<tr>
<td>Lakeshore (Canada)</td>
<td>34,000</td>
</tr>
<tr>
<td>Issy-les-Moulineaux (France)</td>
<td>64,448</td>
</tr>
<tr>
<td>Helmond (Netherlands)</td>
<td>88,766</td>
</tr>
<tr>
<td>Chattanooga (USA)</td>
<td>167,674</td>
</tr>
<tr>
<td>Ipswich (Australia)</td>
<td>168,131</td>
</tr>
<tr>
<td>Windsor (Canada)</td>
<td>210,891</td>
</tr>
<tr>
<td>Geelong (Australia)</td>
<td>223,047</td>
</tr>
<tr>
<td>Riverside (USA)</td>
<td>311,575</td>
</tr>
<tr>
<td>Arlington (USA)</td>
<td>365,438</td>
</tr>
<tr>
<td>Vienna (Austria)</td>
<td>1,730,000</td>
</tr>
</tbody>
</table>
Profiles of participants

- (1) Mayor
- (4) Chief Information Officer / Executive Director of IT / Manager of IT
- (1) Electronic Government Services Manager
- (1) Manager of Special Projects – IT
- (1) Economic Development Manager
- (1) Regional Digital Economy Coordinator, Office of Economic Development
- (1) Manager of Recreation & Marketing
- (1) Managing Director of Media
- (1) General Manager of Corporate Services
- (1) Director of Customer Services
- (1) Official – Chief Executive Office
- (1) Manager of Strategic Initiatives

References


Maturity and Usability of e-Government in Informational World Cities

Agnes Mainka, Kaja Fietkiewicz, Adriana Kosior, Sandra Pyka and Wolfgang Stock
Department of Information Science, Heinrich-Heine-University Düsseldorf, Germany
Agnes.Mainka@hhu.de
Kaja.Fietkiewicz@hhu.de
Adriana.Kosior@hhu.de
Sandra.Pyka@hhu.de
Stock@phil.hhu.de

Abstract: In view of the increased popularity of e-Government in the development of Informational World Cities, i.e. prototypical cities of the knowledge society (such as Singapore, Seoul or Hong Kong), we present two research questions: What is the state of maturity of e-Government in Informational World Cities? How high (or low) is their degree of usability? In order to deal with these issues, we formulate an extended criterion model for the quantification of e-Government maturity, and analyse the average quality of the navigation systems of 31 identified Informational World Cities' official websites.

Keywords: e-government, knowledge society, informational world city, maturity, usability

1. Introduction

With the advent of the knowledge society begins a new era for cities. Developed societies in many regions throughout the world depend upon the growing importance of knowledge. Just as there have been typical cities of industrial society (e.g., Manchester in the 19th and early 20th century) or the service society (e.g., Manhattan in the late 20th century), there exist typical cities of the knowledge society. According to Manuel Castells (1989), we will call them “Informational Cities” (Yigitcanlar, 2010; Stock, 2011; Mainka, Khvoshchanka, & Stock, 2011). These cities are metropolises of the 21st century and they make their mark in the global economy. Urban development and economic growth are based on infrastructures of information and communication technology (ICT) and on cognitive infrastructures. In an Informational City, there exist two spaces: the space of places and the space of flows (Castells, 1994). The space of places (e.g., buildings, streets) is dominated by the space of flows (flows of money, power and information).

In the early phases of Informational City research, it was necessary to identify potential Informational World Cities. An Informational City combines different aspects of modern cities in the knowledge society. In the present project phase, we will investigate world cities. Above all, an Informational World City must be a world city based on the groundwork laid out by Friedmann (1995), Taylor (2004), or Sassen (2001), who define such a place by its degree of “cityness”. The number of residents by itself does not make a world city. There also has to be important infrastructure, as given in a digital city (Yigitcanlar & Han, 2010), which some authors call a “ubiquitous city” (Hwang, 2009), a smart city (Shapiro, 2006; Hollands, 2008), a knowledge city (Ergazakis, Metaxiotis, & Psarras, 2004), or a creative city (Landry, 2000; Florida, 2005). The economic success of a world city correlates with emerging human capital (Gläser, Scheinkman, & Shleifer, 1995). Hence it is necessary for such a city to meet the needs of the knowledge society and to contain important infrastructures in order to be able to compete with other world cities.

How should a real Informational World City be defined? Two conditions must be met. First of all, a city must be referred to as a world city in the literature, and secondly, the city should be referred to also as a digital, smart, knowledge, or creative city (at least one precondition must be fulfilled). All in all, we analysed 126 references. We found information that identified 31 cities in the literature that can be recognised as Informational World Cities (Figure 1). These cities reflect global centres distributed all over the world.

In an Informational World City, eGovernance is the basis of innovation (Yigitcanlar, 2010). Here we looked beyond the aspects of e-Government and eCommerce, taking into account other important characteristics of a city, such as the improvement of living standards for citizens and the increase of economic growth via better cooperation between authorities and citizens and businesses. Thus, the term eGovernance should be understood as a generic term for planning, innovation and funding at city level (Sharma & Palvia, 2010, 3).
Increased use of ICT and knowledge management between authorities and citizens or businesses optimises services in e-Government and imposes an obligation to actively engage in political debate and decision-making processes on citizens and companies (Gisler, 2001; Kettl, 2002; Sriramesh & Rivera-Sanchez, 2006; Sharma & Palvia, 2010, 2). In this paper, we analyse this phenomenon and take a closer look at e-Government as the fundamental pillar of eGovernance. According to Moon (2002), e-Government sees an interaction between the levels of information, communication, transaction, integration and participation. We thus conducted an empirical survey of the government websites of 31 Informational World Cities, adapting Moon’s five-stage model (2002) in order to find quantitative indicators for these phases of e-Government.

Our research questions are: (1) What is the state of maturity of e-Government in Informational World Cities? (2) How high (or how low) is the usability of navigation systems on Informational World Cities’ government websites?

Our study is one of the first quantitative empirical analyses of maturity at a city level. Our comparative usability analysis is consequently based upon task-based user tests of the governmental websites’ navigation systems. Both studies are globally oriented and focussed on cities of the knowledge society.
2. E-Government according to Moon’s five-stage model

The fundamental research we based our own work on refers to a definition of e-Government and to theoretical models trying to describe its development. Hiller and Bélanger (2001) address privacy strategies for e-Government. They provide a detailed definition, background and a framework of e-Government. Contrary to the proposed four-stage model by Layne & Lee (2001), they present an extended five-stage model. The additional stage is participation (i.e. voting, registration or posting comments online). This could be seen as a sub-set of the previous stage named “two-way communication,” but the authors see these features as so significant as to warrant naming a separate category for them. In terms of privacy concerns, too, their unique sensitivity makes it useful to see these functions as distinct. Great care for authentication and security is needed for this stage. Moon (2002) adopted the e-Government stage model by Hiller and Bélanger (2001) in order to map the e-Government framework and examine the rhetoric and reality of e-Government at a municipal level. In his model he lists practices, effectiveness data and barriers for the stages. The study shows that many municipal governments are still at either stage 1 or 2 of their development and merely post and disseminate information or provide channels for two-way communication (public service request). Moon examines the state of municipal e-Government implementation and assesses its effectiveness. He explores two institutional factors that contribute to the adoption of e-Government, namely the size and type of government.

Many (theoretical) models or stage models have been introduced in order to determine the development of e-Government. Coursey and Norris (2008) investigate some of these normative models with reference to control; to see whether they are accurate or useful in understanding the actual development of e-Government. Criticism is based on empirical evidence from 3 surveys of local e-Government in the United States. These outcomes show that the local governments were mainly informational, with few transactional functions, but no high-level functions were predicted in the models. Therefore, the authors point out that the models investigated, by Layne and Lee (2001) and Hiller and Bélanger (2001), do not describe the development process accurately, at least not among American local governments. According to Coursey and Norris, these models are purely speculative and have been developed without any link to the literature about government. The examined e-Government offerings are limited, primarily involving information and non-transactional services. Only few governments provided non-financial transactions, and even fewer provided financial transactions. Referring to these results, the authors question the models because their predictions that governments will move stepwise towards the adoption of more sophisticated e-Government offerings approaching integration and transaction was not seen to be confirmed. This purported movement is either not happening, or proceeding at a glacial pace. The models have serious limitations because they miss or ignore the possibility of existing barriers to e-Government adoption. Finally, there are no recognizable steps or stages in e-Government. Rather, governments adopt e-Government slowly and incrementally after an initial e-Government presence, so that organisational and political factors are likely to significantly affect the development, performance and adoption of e-Government application.

In a nutshell, these are Moon's five stages (2002):

Stage 1: *Information dissemination*. At this point not only the content of the information is important, but also such aspects as usability and accessibility (Al-Khalifa, 2010; Chen, Chen & Shao, 2006; Hyun, Choi & Kim, 2007; Shi, 2007; U.K. Cabinet Office, 2005).

Stage 2: *Communication*. The next stage is that of (two-way) communication, which nowadays oscillates more and more around social media. In matters of so-called Government 2.0, there is an increased interest in social media and its correlation to e-Government (Bonsón et al., 2012; Nam, 2011).

Stage 3: *Transaction*. This stage consists of financial and non-financial transactional e-Government services such as renewing a driver’s licence, voter registration, state park information and reservation, paying taxes and penalties etc. (Cook, 2000). A critical success factor for all transactional services is the users’ trust (Kumar et al., 2007; OECD, 2009).

Stage 4: *Interoperability (Integration)*. Pardo, Nam & Burke (2011) claim that the key component of these initiatives is the ability of multiple governmental and non-governmental organizations to share and integrate information across their organisational boundaries.
Stage 5: Participation. eParticipation enhances democracy and includes services like political surveys, political discussion forums or voting (Medaglia, 2012; Saebø, Rose, & Molka-Danielsen; 2009; Susha & Grönlund, 2012). Our instrument for evaluating informational World Cities’ government websites has two components: (1) Maturity and (2) Usability. For both of these components, two different methods are considered, which are explained in the following paragraphs.

3. Maturity of e-Government

3.1 Method

To quantify the maturity of e-Government based on Moon’s (2002) five-stage model, we formulate an extended criterion model. The goal is to define a descending ranking order of e-Government with regard to maturity.

Each stage is divided into several sections based on Moon’s model, and on several surveys which analyse the users’ information needs of e-Government (Friedrichs, Hart, & Schmid,. 2002; Cook, 2000; gfs.bern, 2011; Institut für Informationswissenschaft Bremen GmbH, 2003; Stadt Münster, 2009). Each stage is valued with 100 points. Maturity was evaluated from the official websites of each of these 31 Informational World Cities, either in their native language or in English, courtesy of Google Translate. The websites were evaluated between December 2012 and January 2013.

The first stage (information dissemination) refers to the one-way communication in which information is transmitted only from e-Government to its users. This stage is divided into information types and user types. For the first (information) type, the government websites should offer basic data (8.3 points, which is the sum of such sub-aspects as contact information, current affairs, emergency number, and city map). Other aspects include transportation, health care, politics, mGovernment, push services and other services. Additionally, the website should be available in English as well as three further languages for the main immigrant groups. For the second (user) type, their informativeness for such groups of users as residents, tourists, students and businessmen was monitored (8.3 points for each aspect).

The second stage is two-way communication. This stage is divided into five parts: (1) social media services, like Facebook and Twitter, (2) fixing appointments online, (3) email response, (4) official email instead of snail letter mail, (5) option of giving feedback (20 points for each aspect).

The third stage (transaction) includes financial and non-financial transactions via the government website. This stage is divided into six parts: (1) online forms for filling in, (2,3,4) taxes, penalties and online payment for other fees, (5) library services (extending books or requesting loan cards), (6) a personalised portal for the residents (16.7 points for each aspect).

The next stage includes horizontal and vertical integration. Firstly, vertical integration is obtained when it is possible to reach information and services from other agencies, departments or offices from just one website, as in the integration of libraries or museums. Secondly, horizontal integration is obtained when there is one database or intranet for all departments and when all departments use standardised software. Information about integration is not available online. We were thus unable to analyse this stage without the help of personal information and will study this aspect in further research.

The last stage (participation) offers citizens the opportunity to leave feedback, make a complaint or participate in an opinion survey. This stage is divided into four parts: (1) online surveys, (2) forums and electronic voting platform, (3) participating in local government meetings online, and (4) online elections (25 points for each aspect).

3.2 Results

Our results indicate that New York (USA), Singapore and Milan (Italy) are the top-ranked Informational World Cities in terms of e-Government maturity. New York took first place with 277 out of 400 potential points. Singapore follows in second with 273 points. Milan is ranked third with 272 points. Boston (USA, 143), Dubai (United Arab Emirates, 141) and Kuala Lumpur (Malaysia, 94) occupy the bottom three positions. Figure 2 summarises the maturity results for all specified Informational World Cities.
Figure 2: Maturity scores of informational world cities’ government websites divided into four stages

Figure 2 shows the maturity scores of Informational Word Cities’ e-Governments divided into the four stages: information, communication, transaction and participation. As seen in Figure 2, all Informational Word Cities’ e-Governments, except London, reached a score of about 50 points in the first stage. This shows that most e-
Governments provide their residents with basic data about the city, such as contact information, current affairs, emergency numbers, city maps or transportation. In the second stage, defined in terms of two-way communication, where the e-Government communicates in order to negotiate with the public, scores are very different. Amsterdam’s, Frankfurt’s and Vienna’s e-Governments topped the rankings with about 60 points, whereas Dubai and Kuala Lumpur acquired less than 20 points. For the third-stage transaction, where financial and non-financial transactions were analysed, the allocation is similar to that for the second stage. Barcelona’s and Milan’s e-Governments exceeded 90 points, London and Kuala Lumpur less than 20 points. For the participation stage, which provides opportunity for citizens to leave feedback, make a complaint or participate in an opinion survey, the distribution is greater than in the other stages. Some e-Governments (Kuala Lumpur, Boston and Dubai) scored zero points compared to Beijing’s, Paris’ and Melbourne’s 50 points.

These results show that the e-Governments of our specified Informational World Cities met different requirements in different stages. Most e-Governments perform well in providing their residents with basic data, while others could provide more data for aspects like transaction and participation.

4. Usability of e-Government

4.1 Method

To evaluate the usability of the 31 governmental websites in Informational World Cities, we performed a usability test. In the literature, many methods can be found for testing the usability of a website. Nielsen (2012) claims that the most basic and effective method is a user test containing three components: representative users, representative tasks and an examiner who observes users while they perform a task.

For our evaluation, we chose the method introduced by Röttger & Stock (2003), where the average quality of navigation systems serves as the indicator for a comparative analysis of websites. The quality measure is based upon click rates and break-off rates in task-based user tests. The goal of this usability test was to gather a quantitative measurement of the difference between the usability of Informational World Cities’ government websites, as well as to define a ranking of the results in descending order. We thus formulated 10 tasks to check whether users could easily access core information or services on the websites. We designed 10 typical tasks, e.g. “Who is the head of government?” or “Find information about the Public Library”, and presented them to our test users. All in all, 44 test users took part in this study. Each website was evaluated by ten to 16 users, except for the Chinese websites, which were evaluated by four native speakers. Additionally a pre-test with five test users was conducted. These test users were students in the first or third term of their Information Science and Language Technology studies at Heinrich-Heine-University in Düsseldorf. Starting from the home page, the test users had to record the required number of clicks in order to arrive at the target page. For each task, the target page was specified by the examiner. A maximum time of three minutes was set for solving one task. After exceeding the maximum time, a “break-off” had to be recorded. The websites were either tested in their native language or translated into English by Google Translate. The usability tests were performed between November 2012 and December 2012. Via users’ click numbers, the average quality of navigation systems could be calculated for each government website, with the highest possible value being 1000 points (Röttger & Stock, 2003). The obtained value, the average quality of navigation systems, can be easily applied to a comparison of different websites.

4.2 Results

The results indicate that Vienna (Austria), Seoul (South Korea) and Shanghai (China) are the top-ranked Informational World Cities in terms of the usability of their government websites. Vienna took first place with 927 out of 1,000 potential points. Seoul follows in second with 876 points. Shanghai is ranked third with 860 points. Singapore with 587 points, Tokyo (Japan) with 580 points and Kuala Lumpur (Malaysia) with 504 points are at the bottom of the ranking. Table 1 summarises the results of the usability test for the analysed Informational World Cities.

The ranking shows distinct differences between the websites. Levels of usability differ significantly between top-ranked websites and those at the bottom of the ranking. The e-Governments occupying the last places should rework their usability concept to make their websites more user-friendly.
Table 1: Usability scores of informational world cities’ government websites

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Informational World City</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vienna</td>
<td>927</td>
</tr>
<tr>
<td>2.</td>
<td>Seoul</td>
<td>876</td>
</tr>
<tr>
<td>3.</td>
<td>Shanghai</td>
<td>860</td>
</tr>
<tr>
<td>4.</td>
<td>Stockholm</td>
<td>822</td>
</tr>
<tr>
<td>5.</td>
<td>Munich</td>
<td>811</td>
</tr>
<tr>
<td>6.</td>
<td>Berlin</td>
<td>809</td>
</tr>
<tr>
<td>7.</td>
<td>Boston</td>
<td>783</td>
</tr>
<tr>
<td>8.</td>
<td>Helsinki</td>
<td>781</td>
</tr>
<tr>
<td>9.</td>
<td>Frankfurt</td>
<td>779</td>
</tr>
<tr>
<td>10.</td>
<td>San Francisco</td>
<td>775</td>
</tr>
<tr>
<td>11.</td>
<td>Vancouver</td>
<td>762</td>
</tr>
<tr>
<td>12.</td>
<td>Los Angeles</td>
<td>759</td>
</tr>
<tr>
<td>13.</td>
<td>Toronto</td>
<td>745</td>
</tr>
<tr>
<td>14.</td>
<td>Chicago</td>
<td>726</td>
</tr>
<tr>
<td>15.</td>
<td>Montreal</td>
<td>723</td>
</tr>
<tr>
<td>16.</td>
<td>New York</td>
<td>715</td>
</tr>
<tr>
<td>17.</td>
<td>Melbourne</td>
<td>706</td>
</tr>
<tr>
<td>18.</td>
<td>Amsterdam</td>
<td>700</td>
</tr>
<tr>
<td>19.</td>
<td>Paris</td>
<td>696</td>
</tr>
<tr>
<td>20.</td>
<td>Shenzhen</td>
<td>687,5</td>
</tr>
<tr>
<td>21.</td>
<td>Barcelona</td>
<td>687</td>
</tr>
<tr>
<td>22.</td>
<td>Beijing</td>
<td>680</td>
</tr>
<tr>
<td>23.</td>
<td>Milan</td>
<td>669</td>
</tr>
<tr>
<td>24.</td>
<td>Sydney</td>
<td>668</td>
</tr>
<tr>
<td>25.</td>
<td>Hong Kong</td>
<td>662,5</td>
</tr>
<tr>
<td>26.</td>
<td>Dubai</td>
<td>631</td>
</tr>
<tr>
<td>27.</td>
<td>London</td>
<td>629</td>
</tr>
<tr>
<td>28.</td>
<td>Sao Paulo</td>
<td>600</td>
</tr>
<tr>
<td>29.</td>
<td>Singapore</td>
<td>587</td>
</tr>
<tr>
<td>30.</td>
<td>Tokyo (English Version)</td>
<td>580</td>
</tr>
<tr>
<td>31.</td>
<td>Kuala Lumpur</td>
<td>504</td>
</tr>
</tbody>
</table>

Vienna’s e-Government is very user-friendly because all important aspects are accessible on the homepage (Figure 3). The good mixture of text and images gives the website a simple but comprehensible design. Basic tasks can be easily accomplished even when visiting the website for the first time. At any given moment, the elaborate and reasonable navigation system and the breadcrumb trail show the users where they are, where they have been and where they can go from there.

Figure 3: Vienna’s e-Government website (Retrieved January 05, 2012 from http://www.wien.gov.at)
Seoul’s e-Government has been ranked #2 in this usability test. The site is clearly arranged and important information is easily accessible on the homepage. The navigation system is worded in a clear and understandable manner. A lot of information can be found on the website, and yet the site is not overloaded. In addition, it is very attractively designed.

Shanghai’s government website took third place in this usability ranking. Test users indicated that information on the website is easily accessible and the navigation system is well-structured.

5. Discussion

In conclusion, the maturity of the 31 analysed e-Governments is more or less sub-optimal. Even the top-ranked website, New York’s, only scored 70% for all scrutinised aspects. The arithmetic mean of all maturity values is 210 points (out of 400). This means that about half of the described aspects are missing. There is a huge potential for optimising the maturity of e-Governments.

Similarly, there is a grave fluctuation in the usability of e-Governments' navigation systems. The mean average of all usability values is 720 points (out of 1,000), which is quite a good result. The top-ranked Informational World City, Vienna, has scored 927 out of 1,000 potential points, meaning that all information could be retrieved almost immediately.

The correlation (Pearson) between the values for maturity and usability is +0.30, which indicates a weak (positive) link between both values.

Acknowledgements

We would like to thank Dr. Chang Kaiser for her support in analysing the Chinese websites. Furthermore, we are grateful to our test users for spending a working day on our experiment.

References


Open Data: Barriers, Risks and Opportunities

Sébastien Martin¹, Muriel Foulonneau², Slim Turki² and Madjid Ihadjadene³
¹Université Paris 8, Vincennes-Saint-Denis, France
²PRC Henri Tudor, Luxembourg, Luxembourg
slim.turki@tudor.lu

Abstract: Despite the development of Open Data platforms, the wider deployment of Open Data still faces significant barriers. It requires identifying the obstacles that have prevented e-Government bodies either from implementing an Open Data strategy or from ensuring its sustainability. This paper presents the results of a study carried out between June and November 2012, in which we analyzed three cases of Open Data development through their platforms, in a medium size city (Rennes, France), a large city (Berlin, Germany), and at national level (UK). It aims to draw a clear typology of challenges, risks, limitations and barriers related to Open Data. Indeed the issues and constraints faced by re-users of public data differ from the ones encountered by the public data providers. Through the analysis of the experiences in opening data, we attempt to identify how barriers were overcome and how risks were managed. Beyond passionate debates in favor or against Open Data, we propose to consider the development of an Open Data initiative in terms of risks, contingency actions, and expected opportunities. We therefore present in this paper the risks to Open Data organized in 7 categories: (1) governance, (2) economic issues, (3) licenses and legal frameworks, (4) data characteristics, (5) metadata, (6) access, and (7) skills.

Keywords: open data, open government, e-government, risk, contingency actions

1. Introduction

Open Data has gained a lot of interest in the e-Government communities over the last years, leading to the implementation of many initiatives and platforms to publish open datasets in such areas as mobility (e.g., bus timetables), security (e.g., crime rates), or economy (e.g., statistics on business creations). Open Data is an essential tool for the dissemination of the Open Government principles. However its wider deployment requires identifying the obstacles that prevent e-Government bodies either from implementing an Open Data strategy or from ensuring its sustainability. We have therefore carried out a study between June and November 2012, in which we analyzed three cases of Open Data development through their platforms, in a medium size city (Rennes, France¹), a large city (Berlin, Germany²), and at national level (UK³). In addition, we have studied the context in which the Open Data movement has been developed across Europe, in particular the type of data that have been opened, and the services that were developed by Open Data re-users.

In this study, we aim to draw a clear typology of challenges, risks, limitations, barriers, all terms used by the different stakeholders with diverse meanings and based on different motivations. Indeed the challenges and constraints faced by re-users of public data differ from the ones encountered by the public data providers. Through the analysis of the experiences in opening data in the UK and in the cities of Rennes in France and Berlin in Germany, we attempt to identify how barriers were overcome and how risks were managed.

Beyond passionate debates in favor or against Open Data, we propose to consider the development of an Open Data initiative in terms of risks, contingency actions, and expected opportunities. We therefore present in the next sections the risks related to Open Data organized in 7 categories:

- governance,
- economic issues,
- licenses and legal frameworks,
- data characteristics,
- metadata,
- access, and
- skills.

¹ http://www.data.rennes-metropole.fr/ accessed May 18, 2012
² http://daten.berlin.de/ accessed May 18, 2012
2. Analyzed experiences

We took into consideration data catalogues from Rennes in France and Berlin in Germany. We used the conclusions drawn by Fraunhofer (Both, 2012) which supported the creation of the Berlin platform. Analyses of services were only carried out for Rennes and the United Kingdom, since the Berlin initiative was recent.

Berlin is a good example of Open Data at the local level, with the advantage of showing the relationship between different administrative scales, the level of the city itself and the region (land). Berlin platform has served as a model and prototype for the whole Germany and even beyond since it is integrated in a European research project. It was also prepared with a prospective study by the Fraunhofer Institute to understand the data opening process since its early stages. The first datasets are progressively added to the portal, launched in September 2011.

Rennes, the administrative centre of the French region Bretagne, also provides an example of local Open Data. The city led the opening of its data in a broader approach to innovation based on digital technologies. Among the first initiatives in France, this is the first community to open a portal in 2010. It has set up an effective support for reuse with a reuse competition and has a rather dense network of re-users.

The UK portal is open since January 2010 and centralizes data nationally. The British approach has resulted in the publication of reports and scientific articles. The British government has asked each department to publish its Open Data strategy of opening, each one being inserted into the overall strategy outlined in a White Paper. Data from the United Kingdom have also enabled the creation of a large number of services that can be analysed to understand how the data were reused.

These case studies were chosen because they are exemplary Open Data initiatives at different geographical levels and suggest paths to improve the data opening process and the creation of new services.

---

**Figure 1:** Ishikawa diagram summarising risks and barriers related to data opening

4 http://data.gov.uk/library/open-data-white-paper
3. Risks related to governance issues

Opening data is the result of a political commitment. It raises risks related to the objectives and the sustainability of the initiative.

3.1 Open data vs. open government: A misunderstanding

Yu and Robinson (Yu, 2012) highlight a misunderstanding caused by the confusion between Open Government and Open Data, which are motivated by different objectives. This leads to consider Open Data as a technical issue, whereas it is not sufficient to engage in a process of Open Government. An Open Government process should seek transparency and a profound change in the way in which public bodies operate. They grounded mostly their analysis on the first project of the Obama administration in 2009. This risk concerns European initiatives to various extents. In Rennes, the concept of Open Government is not even mentioned; the initiative aims to create innovative services for citizens and to generate economic value from data, while strengthening the attractiveness of the city and the region. In Berlin however, Open Government is one of the stated objectives, of the Open Data initiative\(^5\).

3.2 Reluctance of civil servants

In some cases, Open Data is perceived as a threat by civil servants. The increased control of citizens may lead to protests against public actions, based on an adequate or inadequate interpretation of data which is often de-contextualized. This fear can generate hostile attitudes and finally a reluctance of civil servants to take an active part in the data opening process. In order to overcome this risk, certain actors have engaged in the early mobilization of internal and external stakeholders (e.g., Kéolis in Rennes) and of civil society organizations in order to prevent potential conflicts.

3.3 Inconsistency of public policies

A lack of perseverance in political behaviors can also put the initiative at risk: re-users need to be confident that the Open Data policy will be sustainable and that data sources have a certain level of stability and are maintained over time. If Open Data remains the project of a specific team, then it can be questioned as soon as the political configuration changes. However re-users can react heavily to any signal from the authorities. When it was discussed to include Etalab (in charge of the French Open Data platform\(^6\)) in a wider agency, many stakeholders expressed concerns about the willingness of the authorities to continue the Open Data policy. If Open Data is rooted enough in the administrative culture and operations, if it is supported by a cultural shift in public administrations (Davies, 2010), then it is possible to decrease the risks.

3.4 The relevant administrative level

Each local authority makes diverse choices regarding reuse conditions and formats for instance and opens datasets which are best suited to its context. They raise a risk of fragmentation of the initiative at the expense of the potential reuse of data released beyond the local territory.

A major challenge is to find a balance between state intervention that should ensure the consistency of the released datasets and local responsibilities. However, the coordination of efforts at European level (e.g., the European Thematic Network on Legal Aspects of Public Sector Information\(^7\)) and interoperability initiatives (e.g., SEMIC/JoinUp project) can help overcome the fragmentation of projects in Europe.

3.5 The lack of dialogue between data providers and re-users

Another set of risks relates to the relationships between providers and end or intermediate users, including the lack of dialogue with the users, the lack of information about the updates of already opened datasets, and the lack of information about the future datasets to be opened.

\(^5\) « Open Data ist ein wichtiger Baustein des Open Government für eine transparente und bürgernahe Verwaltung. »
http://daten.berlin.de

\(^6\) http://www.etalab.gouv.fr/ accessed January 20 2012

\(^7\) The European Thematic Network on Legal Aspects of Public Sector Information
Sébastien Martin et al.

In Berlin and Rennes, a dialogue has been formalized with groups of re-users (e.g., La Cantine numérique). It can always be strengthened through events dedicated to Open Data (e.g., Berlin Open Data day 2012). However, for both Rennes and Berlin, there is no focus on the data update and the new datasets to be released.

Table 1: Summary of risks related to governance

<table>
<thead>
<tr>
<th>Identified risk</th>
<th>Contingency actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reluctance of civil servants</td>
<td>Engage in the early mobilization of internal and external stakeholders, and of civil society organizations; ask officials to identify specific issues that explain their reluctance.</td>
</tr>
<tr>
<td>Inconsistency of public policies</td>
<td>Favour a cultural shift in the administrations</td>
</tr>
<tr>
<td>The relevant administrative level</td>
<td>Find a balance in the intervention of different political levels</td>
</tr>
<tr>
<td>Lack of dialogue between data providers and re-users</td>
<td>Encourage regular meetings between providers and re-users. Dedicate a specific page for the announcement of updates and future openings, and allow re-users to give their opinions.</td>
</tr>
</tbody>
</table>

4. Risks related to economic issues: costs and return on investment

Despite the proliferation of studies on the benefits that can bring Open Data, few assess the costs and benefits of each type of data, as it was attempted by the study led by the University of Victoria (Australia) for the various impacts of spatial data and hydrological data (Houghton, 2012). The lack of common standards to assess both the cost and benefits of opening data puts the sustainability of Open Data initiatives at risk.

4.1 The cost of opening data

Implementation costs include hardware, software and human resources. To overcome the costs of opening data, small communities can mutualize their expenses or rely on national infrastructures. The UK has increased its expenses in December 2012 with the provision of a potential credit of £8 million for the public bodies that have not yet met their objectives. Table 2 shows an estimate of the costs incurred for several platforms.

Table 2: Cost comparison of Open Data platforms

<table>
<thead>
<tr>
<th>Platform</th>
<th>Country</th>
<th>Scope</th>
<th>Scale</th>
<th>Cost assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>data.gov</td>
<td>USA</td>
<td>General</td>
<td>National</td>
<td>Around $10 million/year</td>
</tr>
<tr>
<td>data.gov.uk</td>
<td>UK</td>
<td>General</td>
<td>National</td>
<td>2010-2011: £1.2 million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2011-2012: £2 million per year¹¹</td>
</tr>
<tr>
<td>Etalab</td>
<td>France</td>
<td>General</td>
<td>National</td>
<td>£5 million/year¹²</td>
</tr>
<tr>
<td>Nantes Métropole</td>
<td>France</td>
<td>General</td>
<td>Local</td>
<td>€100 000 (cost of the Portal)</td>
</tr>
<tr>
<td>PortalU</td>
<td>Germany</td>
<td>Environment</td>
<td>National</td>
<td>€750 000 / year</td>
</tr>
</tbody>
</table>

4.2 Benefits and return on investment

The way in which it is possible to demonstrate a return on investment is debated. The uncertainty on the extent and nature of the return on investment represents a clear risk for the sustainability of Open Data initiatives. Optimistic calculations advanced by the organizers of the Apps for democracy contest only take into consideration a limited number of parameters: the contest itself deemed the value drawn by the applications worth $2,000,000. The return on investment should take into consideration such heterogeneous benefits as an increased service quality, transparency and trust by citizens, active citizenship through a higher participation in political and public debates, as well as actual cost savings, and the generation of economic activities.

---

8 http://www.lacantine-rennes.net/ accessed June 10 2012
9 http://berlin.opendataday.de/ueber/ accessed December 18 2012
Application contests help data providers identify new ideas to reuse the data. However, as Janssen (2012) noted « little is known about the conversion of public data into services of public value ». The way in which sustainable services can be created from these initiatives would require further studies.

4.3 Sustainable business models for the production of data

Data creators are indirectly funded through taxation, sometimes by the sale of data or services created from these data. This has led to much debate in the UK about the opening of geographic data from the Ordnance Survey. Releasing data for free on the Internet entails a risk to weaken the data production process and jeopardize the data quality (Uhlir, 2009). Moreover, this might create a distortion in the competition between companies, since certain companies have already established business models based on data they have paid for. Opening data in this case entails a risk for the business model of companies that already use public data.

Table 3: Summary of risks related to the economic issues

<table>
<thead>
<tr>
<th>Identified risk</th>
<th>Contingency actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cost of opening data</td>
<td>Assessing the costs of not opening; Share part of the costs with other Open Data platforms</td>
</tr>
<tr>
<td>Benefits and return on investment</td>
<td>Adopt a realistic approach to costs and benefits; Encourage stakeholders who use Open Data to indicate that use</td>
</tr>
<tr>
<td>Sustainable business models for the production of data</td>
<td>Promote networking between stakeholders; participate in clusters that sustain incubation of companies grounding their business model on Open Data</td>
</tr>
</tbody>
</table>

5. Risks related to licenses and legal frameworks

5.1 Heterogeneous licenses across datasets

Legal constraints raise mainly the risk of fragmentation of Open Data, if the licenses and conditions for reuse are mutually incompatible. Indeed, a number of services are based on multiple datasets (e.g., mashups) for which managing heterogeneous conditions of reuse is very challenging.

This risk is linked to an incomplete openness of data if re-use or commercial use of the data is limited by the licenses. It has been taken into account by the British authorities: in 2011 they changed their license. The former, Click-Use Licence did not allow modifying data. The new Open Government License overcomes this limitation by explicitly allowing changes in the data. This shows the potential value of defining an Open Data initiative at the national level with a partially top-down approach where the national catalogue not only aggregates data, but also defines a real editorial policy, the UK catalog opens over 9000 datasets released with a single license. Rennes has followed the same trend to a greater openness. Coherent conditions of reuse are expected to facilitate the reuse of data.

In Rennes, the whole datasets recorded were covered by the license Rennes Métropole V2. In Berlin, the datasets follow a slightly less homogeneous licensing model. In both cases, licenses applied to datasets in Berlin are open, except for 4 datasets (Table 4).

Table 4: Licenses in Berlin

<table>
<thead>
<tr>
<th>License</th>
<th>Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Commons Namensnennung – Creative commons attribution</td>
<td>54</td>
</tr>
<tr>
<td>Creative Commons Namensnennung - nicht – kommerziell – Creative commons attribution- NonCommercial</td>
<td>1</td>
</tr>
<tr>
<td>Creative Commons Weitergabe unter gleichen Bedingungen - Share Alike</td>
<td>1</td>
</tr>
<tr>
<td>GNU - Lizenz für freie Dokumentation - GNU Free Documentation License</td>
<td>1</td>
</tr>
<tr>
<td>Keine Freie Lizenz – No free license</td>
<td>4</td>
</tr>
</tbody>
</table>

5.2 The stacking of rights over individual datasets

The stacking of rights on a dataset happens when several organizations claim ownership or control over a dataset and the conditions of its opening. Some may contest the opening and delay it. In Rennes, this has been prevented by the early involvement of the local transporter, Keolis14, in the data opening process.

---

While most efforts currently focus on public data, Deloitte in its analysis (Deloitte, 2012) suggests that the main value of Open Data will result from the combination of public data, business data, and personal data. This will likely lead to even more complex situations, regarding rights and licenses over datasets.

Table 5: Summary of legal risks

<table>
<thead>
<tr>
<th>Identified risk</th>
<th>Contingency actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence is not open enough</td>
<td>Release data complying with the definition of openness; Collect the concerns of re-users and modify licenses if the barriers are too constraining</td>
</tr>
<tr>
<td>Heterogeneous licences across datasets</td>
<td>Sensitization of stakeholders; Strengthen the role of the agency that organizes Open Data</td>
</tr>
<tr>
<td>Stacking of rights</td>
<td>Governance choices</td>
</tr>
<tr>
<td>Privacy</td>
<td>Data anonymisation</td>
</tr>
</tbody>
</table>

6. Risks related to data

The data also represent risks related in particular to their reliability, their quality, and their format.

6.1 Data accuracy and bias

The dependence of data producers on public funding can raise suspicions on the accuracy of the data. Some data can be sensitive to political pressure (e.g., unemployment figures) and the context in which they were created may raise concerns regarding potential manipulations by the State.

6.2 Data quality as a result of a high quality production process

The discontinued funding of certain activities represents significant risks for the quality of the data. The case of the Netherlands cadaster shows the sensitivity of the datasets to financial aspects. Entirely dependent on funds provided by the State, these were cut repeatedly over 1990’s, which has led to a sharp deterioration in its quality (Uhlir, 2009).

Open Data advocates discard the risks by showing the opportunities of involving users in the process of data improvement. By identifying errors and warning the data curators, re-users as well as any citizen can contribute to maintain high quality datasets through crowdsourcing mechanisms.

6.3 Data available in heterogeneous formats

In order to efficiently access datasets, users must identify the appropriate software to read the data and work with them, then to choose the best format according to their needs. Some formats are proprietary and the combination of Open Data in proprietary formats incompatible with each other already raises conversion difficulties. This represents an entry barrier for re-users who wish to access the data but could not acquire the required software.

Data are made available in a variety of formats. The Klessmann report (2012) indicates that approximately 90% of the datasets in Germany are in PDF format, which presents the greatest problems for reuse, but a large part (up to 56% depending on the organization) contains structured information that could be made reusable by converting it for instance to the CSV format.

Access and reuse can therefore be facilitated if they are produced by software whose code is open (open source software) and published in an open well documented format. In order to ensure that the format in which data are made available is not an obstacle, Rennes and Berlin make many datasets available in multiple formats (Table 6).

Table 6: Formats by dataset in Rennes and Berlin

<table>
<thead>
<tr>
<th></th>
<th>Datasets</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rennes</td>
<td>137</td>
<td>1</td>
<td>8</td>
<td>5.4</td>
</tr>
<tr>
<td>Berlin</td>
<td>61</td>
<td>1</td>
<td>9</td>
<td>2.3</td>
</tr>
</tbody>
</table>
This policy is however not systematic and depends on data creators. Tim Berners-Lee\(^{15}\) proposes to evaluate Open Data according to criteria that give each dataset a rank based on its openness and its reuse abilities. One limitation of the current Open Data is that most of the data obtained at most three out of five stars, which in the frame of Tim Berners Lee limits the success of the releases and restrains the value of the data.

**Table 7: Summary of data issues**

<table>
<thead>
<tr>
<th>Identified risk</th>
<th>Contingency actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data accuracy and bias</td>
<td>Clarify the context of the data creation process</td>
</tr>
<tr>
<td>Data quality as a result of a high quality production process</td>
<td>Stabilize funding for the creation of data and promote crowdsourcing</td>
</tr>
<tr>
<td>Data available in heterogeneous formats</td>
<td>Publish datasets in various formats</td>
</tr>
</tbody>
</table>

### 7. Risks related to metadata

Metadata are assigned to describe datasets. They are very important for the retrieval and reuse of datasets.

#### 7.1 Lack of single standard to describe datasets

For the description of datasets, metadata are most often formatted according to the Dublin Core\(^{16}\) and DCAT vocabularies\(^{17}\). However, there is no single standard to describe Open Datasets. Re-users have to deal with multiple vocabularies. Coordination efforts are then necessary to overcome the difficulties raised by the heterogeneity of metadata models used to describe Open datasets. In France an initiative has been launched to harmonize metadata from practices identified at the local level\(^{18}\).

#### 7.2 Incomplete metadata

The lack of metadata, the lack of mechanisms to ensure the quality of metadata, and the lack of information on the objectives and means that have led to their creation or their aggregation also represent risks for the efficient reuse of Open Datasets. For example there is often no information on how data were used in the first instance. Generally, the documentation of data provenance\(^{19}\) and context which would allow interpreting the data is critical. In Berlin, Both (2012) demonstrates the key role of metadata for the future of Open Data and even suggests tracing reuses through metadata.

**Table 8: Summary of metadata related risks**

<table>
<thead>
<tr>
<th>Identified risk</th>
<th>Contingency actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of single standard to describe datasets</td>
<td>Participate in the harmonization of metadata between Open Data catalogues</td>
</tr>
<tr>
<td>Incomplete metadata</td>
<td>Gather metadata needs from re-users; implement mechanisms to trace the provenance and use of datasets.</td>
</tr>
</tbody>
</table>

### 8. Risks related to access

Open Data should be accessed by both humans (end-users) and machines (through re-users). When setting up an access interface, some platforms request users to register and log in to access the data. This can discourage potential re-users by establishing tedious procedures. On the opposite if the platform does not impose any identification, it becomes very difficult to know who is accessing what data and reusing it.

More and more, platforms enable access through APIs (e.g., data.gov in the United States) for re-users who can then automatically access and update the datasets. They relieve service creators of the task of updating data. By ensuring that data used by service creators is up-to-date, the data providers increase the quality of services. Nevertheless, the proportion of data accessible through APIs is still low, only five in Rennes. These datasets are also among the most used by applications created from public data. Although it is unclear that this is due to the presence of an API (as they also happen to belong to the domain of mobility, highly popular among data re-users), it suggests that APIs can indeed support the reusability of data.

---

\(^{15}\) [http://sidata.info](http://sidata.info)

\(^{16}\) [http://dublincore.org/documents/dces/](http://dublincore.org/documents/dces/)

\(^{17}\) [http://www.w3.org/TR/vocab-dcat/](http://www.w3.org/TR/vocab-dcat/)


\(^{19}\) [http://www.w3.org/2011/prov/wiki/Main_Page](http://www.w3.org/2011/prov/wiki/Main_Page)
Table 9: Summary of access related risks

<table>
<thead>
<tr>
<th>Identified risk</th>
<th>Contingency actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance between free access and the need to know the use of data</td>
<td>Provide all the data through an API capable of reporting access and use</td>
</tr>
</tbody>
</table>

9. Risks related to skills

The risks entailed by the implementation of an Open Data initiative also relate to the potential users and re-users identified for the data. In particular, analysing the skills of re-users can help understand how to facilitate the reuse and the type of services that can be developed on top of the datasets.

9.1 The language barrier

The creation of services at European level requires that the data published from different countries to be understood sufficiently by re-users to be retrieved and used without any risk of misinterpretation. In Luxembourg, the vast majority of the datasets held by public administrations are in French. While there are only few cases where data published in German are not also available in a French version, the creation of transnational services requires implementing mechanisms to guarantee the linguistic interoperability of datasets.

9.2 Skills related to information literacy and domain knowledge

Concerns have been raised regarding the ability of Open Data to equally benefit all social categories. Benjamin, Bhuvaneswari and Rajan (2007) suggest that in some cases opening data can lead to a deterioration of living conditions for a part of the population, while benefiting to a minority who had the necessary skills to make use of the newly released information. However this is inherent to any innovation and only reflects the extent of the digital divide.

The issue of skills is also related to the ability of stakeholders to generate profits from open datasets. It is also represented in the concerns about the privatization of public data, with a few people grabbing what should be a common wealth. In this regard, Chignard mentions genealogical data, which represent a very important market (Chignard, 2012).

These risks are to a large extent beyond the scope of Open Data, in particular risks related to the level of education and information literacy. However, they can be addressed through the development of data visualisations, which can ease the understanding and interpretation of the phenomena described in datasets. In addition, education can help improve the skills of users and re-users through initiatives led by re-user groups which organize training sessions to present available data and the tools and methods to work with them20.

Table 10: Summary of skills related risks

<table>
<thead>
<tr>
<th>Identified risk</th>
<th>Contingency actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The language barrier</td>
<td>Publish data in multiple languages and / or fix the issue through metadata</td>
</tr>
<tr>
<td>Skills related to information literacy and domain knowledge</td>
<td>Mention the data provenance and their first use through metadata; provide training to re-users during the events around Open Data</td>
</tr>
<tr>
<td>Re-users are unfamiliar with metadata</td>
<td>Assessing metadata formats known by users</td>
</tr>
</tbody>
</table>

10. Conclusion

Many studies have analysed the benefits of Open Data and report on Open Data initiatives. Janssen, Charalabidis and Zuiderwijk (2012) insist on the myths that have accompanied the development of Open Data. From a strategic perspective, Yu and Robinson explore the particular risks related to Open Government (Yu, 2012), while Lessig has early expressed reservations on the benefits that one can expect from transparency21. This calls for a more pragmatic approach grounded in demonstrated benefits and a clear assessment of the risks associated with the implementation of an Open Data strategy. By analyzing the barriers and potential

---

20 Retrieved from http://lemag.lacantine-rennes.net/2012/10/atelier-infolab-a-la-chasse-aux-donnees-rennaises-de-mobilite-1752

benefits of Open Data, without the ambition of being exhaustive, we propose prevention measures and contingency actions which can be taken.

However, while Open Data is often considered at the level of general public policies, we note that not all types of data raise the same risks and opportunities. The sale of certain types of datasets is potentially very profitable, whereas others do not have existing markets. Rennes has to a large extent focused on geographic data, while Berlin has opened many economic datasets. The services developed based on the datasets can therefore be of very different nature, making all analyses on costs and benefits very difficult to apply across cases.

The analysis in terms of return on investment is very different according to the type of data. However, specific actions, such as the definition of complete and standardized metadata can enhance the potential for reuse of datasets and therefore increase the return on investment, whichever the type of data that is considered.

All the same, different types of actors may perceive risks in a different way, due in particular to their local context. Engaging in a risk management framework tailored to the specific context of data providers can help considering Open Data beyond the traditional barriers highlighted by opponents. Most importantly, it demonstrates the need to consider the deployment of an Open Data initiative as a long term process whose sustainability can be improved through the evolution of all stakeholders: users and re-users through the enhancement of skills and the creation of efficient associations; data creators through the prediction and selection of formats necessary to enhance the reuse of data and the release of multiple data formats; finally intermediary platforms such as national aggregators which can help overcome risks related to the fragmentation of datasets, in technical, semantic, as well as legal terms.

Future work will be dedicated to the study of the different types of datasets and services developed and the way in which it is possible to optimize the return on investment of Open Data initiatives by selecting relevant datasets and understanding the process by which successful services can be built on top of those datasets.

References


Remote Signatures for e-Government: The Case of Municipal Certification in Italy

Michele Martoni and Monica Palmirani
University of Bologna, CIRSFID, Bologna, Italy
monica.palmirani@unibo.it
michele.martoni@unibo.it

Abstract: Italian e-Government projects since 2000 have been functional to implementing at the national level the objectives set out in the Lisbon Agenda, eEurope 2002, eEurope 2004, i2010, and the European Digital Agenda. The European context has to be gauged to the peculiarities of the Italian administrative system. The latter suffers from structural weaknesses, scattered and fragmented interventions, poor rationalization of public spending, working conditions often undermined by external factors, and difficult social situations. So innovation in the Italian public sector is not merely the sum of all smart technological factors but is rather achieved by integrating organizational processes and traditional best practices, which often need to be redesigned in light of the possibilities afforded by new tools, and it must also be supported by a strong regulatory framework. Several municipalities (such as Ravenna) are pursuing the objective of computerizing and automating their services with a view to implementing e-Government services, and in a scenario where not all the administrative government agencies are at the same level of innovation, traditional and paper services need to be managed in combination with paperless e-services. This work focuses on how online registry office certificatess [??], can be issued and delivered, how these documents should be presented to other administrative government agencies that rely on paper, and how they can be made to have legal validity using a digital seal. We will key in on five critical questions that came up in the course of implementation.

Keywords: electronic signature, digital signature, legal XML document, digital seal, e-government

1. Introduction

Normative provisions on innovation and simplification in administrative activity have prompted several government bodies to computerize the services they provide for citizens. One notable example is the City of Ravenna, which is computerizing and moving online its structures and services so as to implement an e-Government platform. Add to that the aforementioned Digital Agenda for Europe (COM/2010/0245), recently implemented by the Italian government, too. The city, following the passage of Decree Law No. 5/2012, thus devoted itself to the work of the Italian Digital Agenda Steering Committee. With these premises in the background, the City of Ravenna has resolved to carry out a project aimed at issuing online registry office certificates that can be printed as legally binding hardcopy documents. The challenge was to deliver online registry office certificates, all the while enabling paper circulation among those public administrative offices in the territory that were not ready for digitalization workflow and interoperability.

2. Critical highlights

Several critical issues came up in reaching the dual goal of innovating while preserving the paper tradition. The first issue that came up, the focus of the present contribution, was that of the way in which to have the mayor or the registry officer digitally sign registry office certificates. Specifically, the need emerged to implement a remote-signature system on a mass scale, that is, through an automated process. Indeed, as anyone will appreciate, it wouldn’t have been feasible to set up a service where the mayor or the registry officer would sign registry office certificates in real time (on request), for that would require him or her to be on hand around the clock, just as it would have been anachronistic and out of the question to build into the system time or space constraints even more stringent than those which currently frame conventional services. In light of that need, it proved necessary to study the relevant rules and regulations, whose analysis is laid out in what follows.

The second question was that of an electronic document’s lifecycle and legal standing if it should move to a different support and rendering (XML transformation, PDF, etc.), as from an electronic or a digitally signed document to a paper one, so this is an issue carrying implications for the possible use of digital-seal technologies [Palmirani (2011)]. The third issue was how to preserve the original format of the digital document (as signed by the competent person) even when the document is transformed by the rendering process.
These three aspects are separately treated in this contribution under its three main headings: Section 3 presents the legal framework for the electronic signature; Section 4 the digital document’s legal validity and effectiveness; and Section 5, the critical issues raised by the legal and technical analysis of the pilot-case.

3. Electronic signatures and the digital signature

Before the EU Directive 1999/93/EC, Italian law only recognized the concept of a digital signature (DPR 513/1997). As a legal term, electronic signature thus originates in the European Union and designates the general class inclusive of all electronic signatures. Its foundation lies in the so-called principle of technological neutrality embedded in the EU’s regulatory policy. As a general class, electronic signatures comprise four subtypes: (1) basic electronic signatures; (2) advanced electronic signatures; (3) qualified electronic signatures; and (4) digital signatures. Digital signatures, then, are a particular type of electronic signature based on a specific technology, namely, asymmetric (or public key) cryptography. Article 1(1)(a) CAD (the Italian Code on Digital Administration, Legislative Decree 82/2005) defines an electronic signature as “the complex of electronic data—either attached to other data or connected to them by logical linking—used as a method of electronic identification.” The basic electronic signature is the “weakest” of all such signatures. It essentially consists of systems of electronic authentication embodying requisites less stringent than those built into qualified electronic signatures and digital signatures [Birch (1997); Brennan (2001)].

3.1 Electronic signatures

The function of an electronic signature is to make electronic identification possible [Verde (1990); Muenchinger (2002)]. By electronic identification is meant the ability of an electronic signature to validate the data it refers to. The aforementioned CAD defines it as the “validation of the complex of data uniquely and exclusively assigned to someone, making it possible to identify that person in an information system, and carried out through appropriate technologies, its purpose (among others) being that of making access secure.”

3.2 The advanced electronic signature

An advanced electronic signature is defined in the aforementioned DPR 513/1997 as “the complex of electronic data or the complex of data attached to a digital document, (i) making it possible to identify the document’s signatory, (ii) ensuring that they uniquely link to the signatory, (iii) created using means under the signatory’s exclusive control, and (iv) linked to the data the signature is affixed to in such a way that any subsequent change in the data can be detected.”

3.3 The qualified electronic signature

A qualified electronic signature is defined in the CAD as “a specific type of advanced electronic signature based on a qualified certificate and carried out using a secure device for creating signatures.” A qualified signature, then, is a system that provides two guarantees, ensuring that a document’s signatory can be identified, and that any change which may have been made to the document after its signing can be detected. To this end, the law requires that the signature be affixed using a secure device under the signatory’s exclusive control.

The electronic signature and the qualified electronic signature are defined in such a way as not to call for any specific technology. Indeed, the law does not mention any specific technique but only confines itself to setting out the governing principles.

3.4 The digital signature

The digital signature, by contrast, does come about as the result of a specific technological choice [Cachin et al. (2009); Diffie et al. (1976); Elgamal (1985)]. Indeed, it is defined under Article 1(1)(s) CAD as “a particular type of advanced electronic signature coupled with a qualified certificate and based on a system of mutually linked cryptographic keys—one private, the other public—making it possible for the signatory using the private key and for the recipient using the public key to respectively disclose and verify the source and integrity of a digital document or a set of such documents.”

The cryptography used for digital signatures is thus called asymmetric or public-key cryptography [Rivest et al. (1978)]. As mentioned, this technique uses a pair of keys: one of them private, which must remain secret and at the signer/holder’s sole disposal, the other one public, which by contrast can be disclosed to anyone. What
is peculiar about these two keys is that because they dovetail, they enable the holder using the private key and the recipient using the public one to respectively disclose and verify the source and integrity of a digital document or set of such documents (see Article 1 CAD).

If this validation procedure turns out positive, the recipient will have proof that the document was in fact signed by the holder of the private key (that is, by the person identified in the certificate) and that the same document has not been altered after it was signed.

Under Article 4 of DPCM of 30 March 2009 (hereinafter referred to as the “technical rules”), a key pair for creating a digital signature must be assigned to a “single holder.” This, clearly, is a rule designed to guarantee a matching relation between signatory and signature. Then, too, different key pairs can be distinguished by the function they are meant for. Thus far we have looked at so-called signature keys. But we also have two other types of keys, namely, certification keys and timestamp keys. Certification keys can be used exclusively by the certifier and their use is for signing a qualified certificate, which in this way enables one to be certain that it cannot be modified and that its source is authenticated.

3.5 The timestamp key

A timestamp key, for its part, is designed to digitally timestamp a (digital) document so as to make it possible to fix with certainty (and to assert against third parties) the moment when that document was created. These keys, too, belong exclusively to the certifier, the only person authorized to use them.

A key pair can be used only for the purpose for which it has been implemented and issued.

Finally, the information authorizing the use of a private key (such as the PIN necessary to unlock the key) must be kept by the key’s owner in such a way that it remains separate from the key-generating device, and the signature-generating data must not be shared with anyone.

4. A digital document’s legal validity and effectiveness

As can be appreciated from the foregoing, digital records can come in any of five varieties: (1) devoid of any electronic signature; or signed with (2) a basic electronic signature; (3) an advanced electronic signature; (4) a qualified electronic signature; or (5) a digital signature [Martoni (2008); Martoni (2010)A].

Under Article 20(1) CAD, a basic digital document can bear no electronic signature of any type and still be legally valid and effective. Or, stated otherwise, a document cannot be found legally ineffective simply by reason of its being digital. Specifically, under the subsequent subsection 1-bis, a digital document may be recognized as having the legal status of a written instrument. However, the law also cautions that such recognition must not come too lightly, but must on the contrary be carefully weighed, taking into account the document’s objective characteristics as to its quality, security, integrity, and inalterability. This is a determination entrusted to the judge, who in deciding whether a digital document can serve as a written instrument must do so on the basis of the criteria set forth in the law. Article 21(2-bis) CAD stipulates that, “except as herein provided under Article 25, if a private instrument as per Article 1350(1)–(12) of the Italian Civil Code is executed through a digital document, it must be signed using a qualified electronic signature or a digital signature, for otherwise it will be null and void.”

As concerns a digital document’s probative force, the CAD distinguishes three classes in its currently applicable formulation. The first of these classes is that of digital documents devoid of any electronic signature, a case in point being a simple digital file. Under Article 20(1-bis) CAD, a digital file’s probative force is to be established in court, taking into account the document’s objective characteristics as to its quality, security, integrity, and inalterability, without prejudice to the provisions stated in Article 21 [Martoni (2010)B; Martoni (2010)C; Stallone (1990)]. The second class is that comprising digital documents bearing an electronic signature (and so neither an advanced one, nor a qualified one, nor a digital one). Here, too, Article 21(1) CAD provides that the probative force of an electronically signed digital document is a matter for the judge to decide (pursuant to Article 116 of the Italian Code of Civil Procedure) by taking into account the document’s objective characteristics as to its quality, security, integrity, and inalterability.
The third class, framed by Article 21(2) CAD, is the one comprising digital documents bearing an advanced, qualified, or digital electronic signature, and created in compliance with the technical rules referred to in Article 20(3) CAD, and whose purpose is to ensure that the author can be identified and that the document preserves its integrity and inalterability. Any digital document that satisfies these conditions is recognized in the law as having full probative force pursuant to Article 2702 of the Italian Civil Code. With this class of documents, the use of a signature-creating device is assumed to be ascribable to the owner of the device unless that person can prove otherwise.

### 4.1 Automated signatures

In certain contexts, a signing procedure can involve a large number of documents, making it impractical to sign documents in piecemeal fashion on a “document by document” basis. Indeed, as is known, every signature makes it necessary to unlock the private key contained in the signature-creating device by entering a PIN.

In these cases, therefore, the law provides for and legitimizes “automated” signing procedures. These procedures, however, are themselves subject to stringent legal criteria.

By an automated signing procedure, then, is meant any procedure making it possible to sign multiple digital documents in bulk by entering a single PIN just once. It bears mentioning that each digital document in such a bundle will still be individually signed. This is also referred to as mass digital signing.

The technical rules, in their current draft, define an automated signature as that “particular computerized procedure for affixing an electronic or qualified signature once authorization is given by the signor, who maintains exclusive control of the signature keys, but who need not be continuously keeping watch.” Immediately as we read this definition we will notice that it defines not only an automated signature but also a remote one, considering that in describing what automated means, it thereby also introduces the idea of the signatory not having to keep oversight or be always on hand.

A final comment is that because an automated signature is a qualified or digital electronic signature, it is linked to a signature certificate. Owing to the kind of use made of automated signatures, this certificate can be housed in the signature-creating device (e.g., a smart card or USB token) rather than on other devices, such as a hardware security module (HSM). An HSM is a kind of secure crypto-processor designed to manage signature keys. It is a physical device traditionally connected directly to the server used by the signatory. This is a topic we will be taking up later on in this discussion [Smith (2010)].

### 4.2 Remote signatures

A remote signature is defined in the current draft of the technical rules as that “specific kind of procedure for affixing a qualified electronic signature or a digital signature which is generated through an HSM and guarantees that a private key is in its owner’s sole control.”

And by an HSM is meant, in this circumstance, the combined “hardware and software that outputs secure devices for generating signatures in such a way as to securely manage one or more pairs of cryptographic keys.”

A remote signature, in other words, is a signature a signatory can affix to a document without having a signing device within physical reach. Which is precisely why the signing device needs to be protected against third-party use.

### 4.3 Relevant legal provisions

Article 4(2) of the DPCM of 30 March 2009, stipulates what follows: “A signature affixed through an automated procedure pursuant to Article 35(3) CAD must be affixed using a key pair different from any of the other pairs in the signatory’s possession.” The subsequent Article 4(3) reads: “If an automated procedure uses more than one device for generating the same signatory’s signatures, each such device must use a different key pair.” Under Article 35(2) CAD, “secure devices and the procedures herein referred to in the previous subsection (1) must guarantee the integrity of the digital documents a signature is affixed to.”
Michele Martoni and Monica Palmirani

The next sentence reads: “Before a digital document is signed, it must be shown to its prospective signatory in a clear and unambiguous fashion, and signatories must have confirmed that they intend their signatures to be generated, this in keeping with the technical rules herein set forth in Article 71.”

The following Article 35(3) CAD stipulates that the foregoing requirement “does not apply to signatures affixed through an automated procedure.”

Even so, in an earlier version, the CAD proceeded to qualify that provision by stipulating immediately thereafter that “signatures affixed through an automated procedure are valid if the procedure itself was activated in a manner ascribable to the signatory, and so long as this person makes it manifest that he or she intended the procedure to be activated for the specific document so signed.”

The language of the provision just quoted has changed, and the rationale behind that change will be illustrated later on.

Finally, we should mention the Guide to the Digital Signature put out by CNIPA (Italy’s National Centre for Information Technology in Administrative Government). Section 13(2), pp. 25–26, of this guide reads as follows (in version 1.3 of the guide, dating to April 2009): “It is perfectly legal to rely on automated signing procedures, so long as this is done taking certain precautions which certifiers are very familiar with, and which are also described in the law currently in force. Specifically, a signatory affixing a signature through an automated procedure must do so using a key pair different from any other such pairs in his or her possession. This makes it possible to immediately determine, when running a check, that an automated procedure was used. For similar reasons, every signing device used for automated procedures must avail itself of its own key pair, a different one for each device, even if the signatory is the same. The use of a hardware security module (HSM) offers better performance than a smart card (or USB token). One can even use applications that make it possible to enter the PIN just once to sign multiple documents, while still being clear what kind of signature is being automatically affixed and how many documents are being so signed.”

5. Points of controversy

5.1 Queries submitted to the agency for digital Italy (formerly CNIPA and then DigitPA)

The most salient point of controversy is how to correctly interpret the combined effect of the provisions in Article 35(1)–(3) CAD. Article 35(2) CAD, concerning non-automated signing procedures, requires that a digital document be submitted to its signatory before a signature is affixed. Article 35(3) CAD, concerning automated signatures, expressly sets out an exception to Article 35(2) by providing that automated signatures are not subject to the rule requiring that a digital document be shown “to the signatory in a clear and unambiguous fashion before the signature is affixed.”

This would seem to amount to an explicit exception to the rule requiring that the document be submitted to the signatory. On the other hand, Article 35(3)—in its previous version, no longer current but in force at the time this contribution was being researched—proceeded to say that “signatures affixed through an automated procedure are valid if the procedure itself was activated in a manner ascribable to the signatory, and so long as this person makes it manifest that he or she intended the procedure to be activated for the specific document so signed.” This last provision posed an interpretive problem. More to the point, it seemed to support a strict interpretation on which signatories had to expressly consent to the procedure with each document they intended to automatically sign. It followed that even if a digital document did not have to be submitted to its signatory, it was still necessary to give this person an opportunity to expressly adopt the signing procedure for each document he or she intended to sign.

The implication here, as anyone can appreciate, was that any express consent to the signing of specific documents would necessarily have to be stated by the signatory only after they had been signed. And, as we will see, this posed an insurmountable roadblock to the development of certain types of online services.

The guidelines put out by CNIPA (now called Agency for Digital Italy) stated in this regard that an automated signing procedure must give a signatory a clear picture of the nature of the documents and the number of documents he or she is about to automatically sign.
Hence the need to determine how these provisions ought to be interpreted and what their scope and evolution ought to be, especially in light of the way the relevant technologies have advanced since the provision was written.

Because the import of the provisions at issue needed to be clarified, a formal query was submitted to CNIPA (now called Agency for Digital Italy), so as to have an authoritative interpretation of the same provisions and of the agency’s own guidelines, for in this way it would have been possible to correctly bring them to bear in framing specific e-Government services.¹

Specifically, four issues were raised as follows.

5.2 Object of the signature

Question (1): How to set up the procedure enabling a signatory to activate automated digital signing (typically done by entering a PIN) in compliance with the rule requiring that such activation be ascribable to the signatory’s own intention and that the signatory be clearly notified of the kinds and the number of documents he or she is about to automatically sign? Specifically, in which of the following ways should the procedure be framed?

(a) Compliance is achieved by enabling signatories to view and access the exact list of documents they will be digitally signing. To this end the documents will have to be uniquely identified and be made accessible in some viewing format (e.g., .doc, .pdf, .xml) before they are signed, the minimum requisite satisfying which the signatory can be said to have acted willingly. Signatories would in this case be asked to sign a bundle of digital documents whose contents they can individually view, but without being required to do so. This is achieved by clearly identifying and making fully viewable all the documents in the bundle (a solution we will call “fully identified and represented document bundle”).

(b) Compliance is achieved by submitting to the signatory a list of future documents whose content cannot be fully accessible in its definitive form but is nonetheless represented in outline through a set of predetermined summary data, as through record layouts, arrays, and lists (this solution we will call “identified but not fully represented document bundle”).

(c) Compliance is achieved simply by notifying the signatory that the signing procedure will apply to an abstract class of documents which cannot not yet be specifically identified because they will be created on demand, and which are therefore identified either by their kind or nature (e.g., “all payment orders coming in next month”) or by their number (e.g., “no more than 100 documents a day”). Under this solution, signatories would no more than activate a signing procedure (whose object can only be identified through abstract predicates, as no concrete description would be available). Whenever a document meeting the specified class criteria enters the system, the procedure previously activated by the signatory will affix a digital signature to it, also taking into account any maximum number of documents allowed. This will go on regardless of whether the signatory will express a new intention (this solution we will call “abstractly identified documents”).

CNIPA responded by unequivocally by saying: “Signatories must explicitly accept to sign documents if the procedure is automated” and “must be fully aware of what they are signing,” and can expect the guarantees afforded by compliance with the procedure, of which they must be adequately informed (see Question 3 below).

To this CNIPA added that “it will be up to each signatory to decide on a case-by-case basis whether the abstract framing of the class, as defined by the type and number of the documents that qualify for signing, is accurate enough to afford a clear picture of what he or she is consenting to, or whether a more accurate framing will be necessary.”

¹ The query in question was submitted to CNIPA on 6 July 2009 and was anwered in Protocol No. 0006272 of 15 October 2009.
This means that signatories will be held liable for any consequences that may flow from their accepting to activate a nontransparent procedure. The opinion, then, appears to be grounded in the full-awareness principle framing the very idea of consent as a cognizant and informed decision.

It also bears pointing out that the opinion does not strike down the idea of identifying documents by class (Solution C above), so long as certain constraints are satisfied which will be illustrated below.

5.3 The signature over time

Question (2): If Solution C above is adopted, will it be possible for someone other than the signatory to block an automated signing procedure, even remotely, if the need should arise. A case in point would be the paradoxical scenario where a signatory has died and yet keeps signing documents because the procedure is still active.

CNIPA replied by commenting that a signature-creating device must always be activated by the signatory and that it deactivates only once a “specific stream of documents” has been completely signed. It is clear from this comment that CNIPA treats an entire procedure as a single action delimited by a “document stream.” We take the view, then, that each document stream is understood to be indivisible: if the procedure were to be interrupted in midstream, it would not be possible to restart it without a new intentional act on the signatory’s part. In practice, then, it will be possible to stream documents into bundles.

And if we wanted to implement a system for issuing certificates on demand, then each request for one or more documents could make a bundled stream requiring its own acceptance on the signatory’s part. Or, on the contrary, a bundled stream might be defined by the signatory on the basis of two or three predicates describing the documents to be submitted for signing: documents would make it into this class as a bundled stream on the basis of their (1) type, (2) date range, or (3) number.

5.4 Control on the signature

Question (3): Under Solution C, should signatories be informed in advance of what happens once they unlock a signature-creating device and what characteristics the device has (especially in view of the fact that the procedure these devices set in motion will run to completion and won’t stop on its own without any input from the signatories themselves). CNIPA replied to this question by referring us to its comment under the previous Question 2. I take this to mean that CNIPA recognizes automated procedures as legitimate only when applied to document bundles, this in part in order to ensure that the signatory does not lose control of the signing procedure.

5.5 The nature of the signature

Question (4): The last question was whether the final recipient of a document digitally signed through an automated procedure should be notified of the nature of the signature, namely, its being affixed in a different way than is the case with a single digital signature (a question asked in light of the previously quoted CNIPA guideline (p. 26) under which it ought to be “possible to immediately determine, when running a check, that an automated procedure was used”). If so, what should such a notice say? CNIPA replied here that “it does not seem […] necessary to notify final recipients if the document they received was signed through an automated procedure.” We take the view that this is because an automated signature is at bottom a digital signature, so much so that it carries the same legal effect. Indeed, the way a signature is affixed does not change its legal effect from the recipient’s standpoint, and so there is no reason to require a notice. Still, CNIPA went beyond the strict framing of the query and noted, too, that “the signatory must expressly accept to use the procedure and must be adequately informed of its characteristics.” It was further noted by CNIPA that “the signatory needs to be informed about the way the PIN is used, about the use restrictions stated in the digital certificate relative to the key pair used for the signature, and especially about the documents to be signed.”

This last comment—on the need to inform signatories “about the documents to be signed”—does not seem entirely clear. Here I would refer the reader to the discussion of CNIPA’s replies to the previous questions.
6. Conclusions

As previously mentioned, the CAD has been amended, and the changes affect Articles 35(3)–(4), 35(5), and 35(6), respectively through Articles 24(1)(a), 24(1)(b), and 24(1)(c) of Legislative Decree 235/2010.

Article 35(1)–(3) CAD now reads as follows:

“(1) Signature-generating secure devices and procedures must be secure so as to guarantee that the private key (a) is confidential; (b) cannot be derived, and that the relative signature is counterfeit-proof; and (c) is adequately protected by the signatory from third-party use.

“(2) The secure devices and procedures referred to in the foregoing Article 35(1) must guarantee the integrity of the digital documents so signed. These documents must be shown in a clear and unambiguous manner to the signatory before they are signed, and there must be confirmation that the signatory actually intends to generate the signature, this in keeping with the technical rules herein referred to in Article 71.

“(3) The provision last mentioned, in the second sentence of Article 35(2), does not apply to automated signatures, which are valid if the signatory consents to the signing procedure before the signature is affixed.”

The most relevant provision, where we are concerned, is the one last quoted. Recall that under the previous version, the signing procedure was deemed valid if it “was activated in a manner ascribable to the signatory, and so long as this person makes it manifest that he or she intended the procedure to be activated for the specific document so signed.”

As the reader will appreciate, the qualms previously expressed are allayed now that reference to the specific document has been struck out, and what appeared to be insurmountable obstacles have now been cleared away.

In light of this fact, the City of Ravenna has found it possible to launch its service for issuing registry certificates online. Each certificate is signed by the mayor, who figures as the signatory of an automated digital signature affixed ad hoc for the purpose at hand. The signing device in these cases is contained in an HSM. The mayor activates the signing procedure remotely by entering a PIN and at any time can halt the procedure, which otherwise will terminate once a preset number of documents has been signed. The procedure frames document streams by class, too, so that only certain predetermined types of documents move through the HSM. These constraints are expressly stated in the signature certificate, so that the entire procedure is transparent to third parties.

In this new evolution, this technical solution was used to export the registry certificates online to a large number of municipalities across Emilia-Romagna Region and beyond (e.g., Rome), and it was also adopted by the ANCI (the National Association of Italian Municipalities). The experience developed in this context was held up as a best practice in the digital-seal guidelines at the government level in Italy (under DigitPA). Moreover, a new paradigm emerged for managing remote signatures jointly with the digital seal affixed to digital documents. Finally, the appropriate technical and legal requirements were set for these documents to have legal validity once they are printed as hardcopies again, all the while making it possible to use the digital seal to keep the digital workflow chain moving. In this way the hardcopy paper became the medium for the digital document embedded in the digital seal, bridging the gap to which is owed the digital device. This legal-informatics approach makes it possible to digitize a key administrative service, in such a way as to smoothly transition from the paper era to the digital paperless era.

Acknowledgements

This work is part of the institutional cooperation between Municipality of Ravenna and CIRSFID about eGovernment’s research topics, in order to favour the local Digital Agenda implementation.

References

Michele Martoni and Monica Palmirani


ICT Investment Effectiveness in the South African Post Office

Seabelo Mathswenyego¹, Rembrandt Klopper² and Sam Lubbe³
¹Jhb Metropole, South Africa
²UKZN, South Africa
³NWU, South Africa
rklopper@gmail.com
sam.lubbe@nwu.ac.za

Abstract: Considerable resources have been, and continue to be invested in Information and Communication Technology (ICT) in South Africa, as well as globally. Much of this investment is made on the basis of guarantee that an expected return will occur. This paper presents the results of an empirical study of the impact of ICT investment on IT efficiency at the South African Post Office (the SAPO). Six years of historic data for the period 2005 to 2010, including appropriate IT data and financial data from the organisation’s financial statements and balance sheets, were collected from the Chief Information Officer (CIO). ICT investments were tested against financial performance indicators such as return on ICT investment, operating leverage, turnover growth, net profit, organisational risk, IT cost efficiency ratio and IT efficiency ratio. Within the study period, it was observed that ICT investments at the SAPO were negatively correlated with most of the financial indicators such as return on ICT investment, operating leverage, turnover growth, net profit, organisational risk and IT efficiency ratio. ICT investment correlated positively with IT cost efficiency ratio and operating expense ratio. This study therefore suggests that ICT investment at the SAPO for the mentioned period did not have the desirable impact on financial performance of the organisation. In order to realise tangible financial benefits of the ICT investments at the SAPO, the authors suggest that a longer period needs to be considered. Non-technological determinants such as competence and experience levels of IT personnel, alignment of IT strategy with the business strategy and business process re-engineering to suit new systems needs to be considered too prior to making any investments in ICT.

Keywords: e-government, ICT, ICT investment, ROI, CIO

1. Orientation

For most organisations, ICT expenditure continues to be a major, if not the single largest, component of capital investment. Tangible benefits have, however, remained elusive for many organisations. A number of pertinent issues and questions have been raised as to why organisations have failed to reap the benefits of huge ICT investments (Hamidi et al., 2011). This study conducted an empirical investigation into ICT investment effectiveness in the South African Post Office (SAPO). Business leaders and ICT practitioners may also benefit from this study.

1.1 Problem statement

SAPO has invested financial resources in ICT technologies. However, no tangible returns had been realised yet from these investments during the period from 2005 to 2010. According to Shu and Strassmann (2006), there is no evidence of a relationship between ICT expenditure and the financial performance of an organisation. Kim and Lim (2011) indicated that a lagged effect exists between ICT investment and the financial performance of an organisation. The reasons for the mixed results were contributed to data reliability, methods of analysis and the lack of appropriate ways to measure the effects of ICT investment.

The SAPO, as with other organisations, also considers the return on its investments. With its 2010 mission (SAPO, 2010), which seeks to enable the nation to connect effectively with the world by distributing information, goods, financial and government services, leveraging its broad reach and embracing change, technology and innovation, SAPO is faced with the need to measure the value of its ICT expenditure.

1.2 Brief history of the organisation

The Postal Services Act (Act 124 of 1998) designates the SAPO as the universal postal services operator in the Republic of South Africa. The Act obliges SAPO to provide a defined range of postal services, namely delivering a basic letter of less than 1kg throughout the country and providing addresses to all citizens at an affordable price (SAPO, 2010). A license agreement governs the performance required from SAPO in discharging its universal services obligations. The license agreement sets rules for a user-orientated, high-quality, country-
wide universal postal service at an affordable cost. To this end, it establishes rules for access to universal postal services and the quality of these services (SAPO, 2010).

2. Literature review

2.1 Impact of ICT on an organisation

ICT strategies, according to Huang et al. (2008), include the technology scope, system competencies and ICT governance. The technology scope focuses on important ICT technologies and applications, while system competencies deal with those capabilities that distinguish ICT services and are important to the achievement of a company’s strategies. ICT governance, among other things, involves the areas of responsibility in a partnership between ICT and business.

Measures of performance guide the creation of ICT strategic plans, which are then converted into operational plans. It is critical that a framework be established for ICT management reporting, and ICT performance in key business areas should be communicated and motivated. Hu and Quan (2005) state that ICT has provided competitive advantages to firms by adding value across all aspects of the value chain, improving operational performance, reducing costs, increasing decision quality and enhancing service innovation and differentiation. The introduction of ICT in organisations has had mixed results in terms of productivity output.

2.2 The history of the effectiveness of ICT in terms of organisational performance

Various approaches were used by researchers such as Kwong and Mohammed (1985) and Ward (1987) to measure the benefits of ICT for an organisation. Ward (1987) claims that contrary to common policy, expenses such as research should be included as part of the total ICT investment cost. Kwong and Mohammed (1985) suggest the use of a computerisation index (CI) in their empirical study on the quantitative evaluation of the impact of computerisation on profitability. CI, they claim, measures the extent and sophistication of computerisation.

Kwong and Mohammed (1985) compare the methods of Product Portfolio and Profit Impact of Marketing Strategy (PIMS) and the Boston Consulting Group Method as measurements of financial performance. In contrast to Harris and Katz (1991), the conclusion is that the ROI is a suitable measure of financial performance, in spite of its deficiencies in dealing with the timing, duration and risk differences among returns.

Weill and Olson (1989) indicate that the link between ICT and corporate strategy varies a lot. Claims which emerge from their study include the suggestion that managers need to adopt a broad definition of ICT so that they know what that investment is, and that ICT expenditure should be measured and tracked over time against a convenient base. This suggests that the amount of every ICT investment could be treated as a portfolio investment, with different aims and associated levels of risk.

2.3 Business performance

Relationships between investment in ICT and business performance, as well as productivity, have reported the positive effects of such investment. Lin (2009) questions these results on the grounds that the studies involved an examination of primarily cross-sectional data. This criticism stems at least in part from the premise that the benefits of ICT investment can only be realised over longer periods of time. Research reflecting relationships between ICT investment and business performance and productivity might be convincing if it were based on ICT investment in both current and previous periods.

On the one hand, there is a shortage of relevant metrics. On the other hand, there is an absence of a proper methodology to evaluate the payoffs of ICT investments (Meyer and Degoulet, 2010). They report that in a survey published in 2004 (McKinsey on IT), more than two thirds of CIO’s reported they had no process in place for auditing the performance of their ICT projects.

Epstein and Rej (2005) developed a model for evaluating performance in information technology, in order for management to better justify and evaluate ICT initiatives. The ICT contribution model for evaluating performance in ICT is a general model of key factors that help organisations identify and measure the costs.
and benefits of ICT, and properly assess the payoffs of investments in ICT. The ICT contribution model can be applied with equal effect to both for-profit and non-profit organisations. The following model illustrates the inputs, processes, outputs and outcomes of ICT contributions within an organisation.

The balanced scorecard concept, developed in the early 1990s, recognises the incompleteness of many business measurement processes (Atzeni and Carboni, 2008). They are thus unbalanced measures taking a particular view of a situation. They suggest where things are going wrong, but often fail to highlight where things are going well. In order to analyse causes, managers may be required to sift through significant amounts of data. This inevitably means that some critical issues will not be identified, and this may also mean that by the time causes are identified, it is too late to make changes before the next measurement and reporting cycle.

An organisation's ICT success is dependent on various ICT learning and growth-related elements, such as appropriate resources (capital and people), suitable corporate systems (training, information, performance measurement and incentive systems, organisational culture and climate), and behavioural effects. ICT learning and growth affect ICT internal processes, such as standardisation, integration and consolidation, security, and overall quality of ICT processes, and services (Epstein and Rejc, 2005).

2.4 Models for ICT investment decision-making

In order to test the validity of statements made by authors such as Weill and Olson (1989) and Harris and Katz (1991) in the literature, as well as to justify decision making with regard to ICT investments, suitable models were required for this study. Eleven such models for ICT investment decision-making were found in the literature. These models are: computerisation index (CI), operating leverage (OPEL), return on ICT assets (R), organisational factor, revenue stability, stochastic process simulation (SPS), IT expense ratio (ITEX), operating cost efficiency ratio (OPEX), IT cost efficiency ratio (ITCE), the probability of making an ICT investment when organisational risk is affected positively/negatively when making an ICT investment, and cost-benefit analysis ratio (CBA). A brief description of each of these models is provided below.

The aim of Kwong and Mohamed's (1985) study was to quantitatively measure the impact of computerisation on profitability and, in the process, develop an indicator of the extent and sophistication of computerisation. They proposed a Computerisation Index (CI) for this purpose, which is constructed according to the following formula:

\[ CI = V_1(W_1) + V_2(W_2) + V_3(W_3) \]

2.5 Presentation of formulae used to do the calculations for CI

Kwong and Mohamed’s (1985) CI was constructed as follows:

\[ CI = V_1(W_1) + V_2(W_2) + V_3(W_3) \]

where:  
- \( CI \) = Computerisation  
- \( V_1 \) = Variable affecting the degree of computerisation  
- \( W_1 \) = Weight applied to Variable \( V_1 \)

Ten variables (\( V_1 \) up to \( V_{10} \)) were selected by Kwong and Mohamed (1985) to collectively represent the computerisation index.

2.6 Preparation of the formulae used to do calculations for organisations

The leverage models that were used in this study are the following: operating leverage (which affects EBIT), the expected return on IT assets, and the percentage risk factor. The following equations were used to calculate operating leverage (Brealey and Meyers, 1988):

\[ \text{Operating leverage} = \% \text{ change in EBIT} + \% \text{ change in turnover} \]
The expected return on assets model that was selected to measure investment was the following:

\[ r_a = \text{Expected operating income} + \text{the market value of all securities}. \]

Harris and Katz (1991) note that technology is altering the way in which companies compete. Therefore, there is, they maintain, increased incentive to closely examine the link between the business and IT strategies of the organisation. Systems technology sophistication is assessed using a table of the type of data processing installations. These complications, used by Harris and Katz (1991), were formulated by an industry panel of senior information system executives.

**Table 1:** Levels of systems technology sophistications (Harris and Katz, 1991)

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Multiple processors/</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Multiple locations directly connected or via switched networks</td>
</tr>
<tr>
<td>Operational</td>
<td>Database management system, TSO, CICS, remote and local batch</td>
</tr>
<tr>
<td>Systems Software</td>
<td>Multiple CPU’s/multiple program execution, multiple operational environments</td>
</tr>
<tr>
<td>Application Software</td>
<td>Modular programs/structured techniques, high-level language</td>
</tr>
<tr>
<td>Management</td>
<td>Multiple locations/dissimilar operations, remote control</td>
</tr>
</tbody>
</table>

The organisation with the largest CI was assumed to be the most computerised. According to Harris and Katz (1991), this enables the comparison of a business with similar lines of business. The conclusion they drew is that any organisation with expenses per monetary income that are higher than the competition is at a competitive disadvantage. Another ratio, known as the IT expense ratio (ITEX), is the ratio of IT expenses to non-interest operating expenses. The last ratio is the IT cost efficiency ratio (ITCE), which is the ratio of the cost of information processing to sales revenue. They note that every situation should be evaluated on its own merits.

### 2.7 IT Efficiency ratio (ITEX)

This is the ratio of IT expense to total operating expense as one measure of the degree of operational dependence on information technology

(Harris and Katz, 1991). It can be expressed as follows:

\[
\text{IT Efficiency Ratio} = \frac{\text{Information Technology Expenses}}{\text{Total Operating Expenses}}
\]

### 2.8 IT Cost efficiency ratio (ITCE)

The IT cost efficiency ratio is a single-factor expense measure of the cost of IT. In this study, three sources of information technology-based cost economies are relevant. These are scale economies, scope economies and economies due to learning effects (Harris and Katz, 1991). This can be expressed as follows:

\[
\text{IT Cost Efficiency Ratio} = \frac{\text{Information Technology Expense}}{\text{Total Turnover}}
\]

### 2.9 Operating cost efficiency ratio (OPEX)

This is the ratio of non-interest operating expense to income (Harris and Katz, 1991). It can be expressed as follows:

\[
\text{Operating Cost Expense Ratio} = \frac{\text{Non-interest Operating Expenses}}{\text{Income}}
\]

### 2.10 Research questions

The following research questions were explored in this study:

- What is the impact of ICT investment on IT cost-efficiency and IT efficiency ratios?
- Will the initial ICT investment target be changed if managers can identify changes in the organisational risk?
What is the impact of ICT investment on organisational risk, cost-benefit analysis, operating leverage, and return on IT assets?

What is the impact of ICT investment on the financial performance of SAPO, as measured by ROI, operational costs, profitability levels (operating income, operating leverage, net profit, and turnover growth) and operating expenses?

3. Research methodology

This study was predominantly quantitative in nature, and was conducted by means of a survey that made use of a semi-structured questionnaire, which was completed by knowledgeable individuals within the SAPO. Information for the study was only gathered from SAPO’s CIO. These people were presumed to be knowledgeable, objective and experienced with regard to the subject matter being explored.

The financial data for this study was obtained from the SAPO 2005 – 2010 financial statements, which was the period under investigation. The questionnaire was sub-divided into sections covering details of the organisation, type of ICT investment, financing of the investment, monitoring of the ICT investment and financial figures that were needed to complete and calculate the necessary models.

3.1 Questionnaire validation and finalisation

The questionnaire was tested by sending it to three friends and one academic employee, who were requested to read it and indicate whether or not their understanding was the same as that of the researcher. Firstly, the initial questionnaire draft was piloted among nine people, consisting of six colleagues and three friends. The researcher did not recommend any changes to the questionnaire. After receiving the responses and feedback from the pilot group, the questionnaire was revised. It was sent via e-mail to the CIO at the SAPO after the necessary approvals from the supervisor had been obtained.

4. Research results and analysis

The operational data needed for this study was gathered by means of a questionnaire that was completed by the CIO of the SAPO. Most of the financial information was sourced from the SAPO’s financial statements for the period 2005 to 2010. Indicators such as the computerisation index, risk and risk-related measure, IT-related ratios and cost-benefit analysis ratio/profitability index were computed for the period 2005 to 2010.

The SAPO’s computerisation index, calculated as the weighted average of variables such as management activity level, years of computer usage, number of computers, application software, size of CPU, hardware costs, staff, number of shifts, organisational location and project investment analysis. This index is a measure of ICT resources that have been invested in an organisation over a given period of time.

The data gathered showed that the SAPO increased its computerisation level by 25.9% to 7208 between 2005 and 2010. This means that the SAPO has increasingly in ICT resources in order to improve the general level of computerisation sophistication. This could have been driven by dynamic and advanced market expectations, as well as the intense competition faced by the SAPO during the period under review (Kwong and Mohamed, 1985).

4.1 Relationship between the computerisation index and return on IT assets (ROI)

Figure 1 below illustrates the relationship between ICT investment (CI) and return on IT assets. It shows that for the first two years, return on IT assets was increasing, with a corresponding increase in ICT investment. However, the remainder of the 5 year period indicates a different trend, whereby an increase in ICT investment was followed by a decrease in return on IT assets. This might indicate that SAPO has an inefficient operational environment that does not improve company returns when the computerisation levels are increased (Hu and Quan, 2005).

Investing in more ICT resources at the SAPO during the period 2005 to 2010 did not have any significant impact on returns on ICT assets. The results obtained in this study contradict Hu and Quan’s (2005) theory, which states that ICT provides competitive advantages to firms by adding value across all aspects of the value chain, including improving operational performance, reducing costs and improving returns. Nevertheless, it must be
Seabelo Mathwenyego, Rembrandt Klopper and Sam Lubbe

noted that the return on ICT assets recorded by the SAPO during the period under review was relatively high, with an average of 35.3%.

Figure 1: Relationship between the computerisation index and return on IT assets (ROI)

4.2 Relationship between ICT investment and business performance indicators

Figure 2 below compares CI, operating expense ratio and % turnover growth. It shows that as the level of computerisation for the SAPO during the period 2005-2010 increased, the operating expense ratio also increased. These two indicators (level of computerisation and operating expense ratio) exhibited a high positive correlation, with a correlation coefficient of 0.81.

Figure 2: Relationship between ICT investment and business performance indicators

However, this contradicts Hu and Quan’s (2005) theory, which states that ICT provides competitive advantages to firms by improving operational performance, thereby reducing costs. At the SAPO, the increase in operational cost after investing in ICT could be attributed to an inefficient operational environment and cost control management techniques. The SAPO's turnover growth rate showed an increase in the first two years and then decreased up to the end of the five-year period. Consequently, the level of ICT investment and turnover growth rate were negatively correlated, with a correlation coefficient of minus 0.7.

5. Relationship between CI and profitability performance indicators

Figure 3 below illustrates the relationship between the computerisation Index (CI) and profitability indicators such as operating income, operating expenses and net profit. It can be observed from this figure that operating income increased during the 5 year period under review. Nevertheless, the computerisation index was
positively correlated with operating income, with a correlation coefficient of +0.88. Kwong and Mohammed (1985) observe that the organisation’s performance showed an improvement here, with an increase in the level of computerisation.

**Table 2: Correlation analysis among profitability indicators**

<table>
<thead>
<tr>
<th>CI</th>
<th>Cl</th>
<th>Return on IT assets</th>
<th>Operating leverage</th>
<th>Operating expense ratio</th>
<th>% Turnover growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on IT assets</td>
<td>-0.31</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating leverage</td>
<td>-0.13</td>
<td>0.30</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating expense ratio</td>
<td>0.81</td>
<td>-0.41</td>
<td>-0.35</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>% Turnover growth</td>
<td>-0.70</td>
<td>0.66</td>
<td>0.36</td>
<td>-0.68</td>
<td>1</td>
</tr>
<tr>
<td>Operating leverage</td>
<td>-0.13</td>
<td>0.30</td>
<td>1</td>
<td>-0.35</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Operating expenses showed a similar increase during the 5 year period under review. Consequently, the computerisation index was also positively correlated with operating expenses, with a correlation coefficient of +0.93, and costs also increased in tandem. On the contrary, the SAPO’s net profit decreased significantly during the 5 year review period, and was negatively correlated with the computerisation index, with a correlation coefficient of minus 0.67.

![Figure 3: Relationship between CI and profitability performance indicators](image)

The results obtained in this study also contradict Hu and Quan’s (2005) theory, which states that ICT provides competitive advantages to firms by adding value across all aspects of the value chain, including improving operational performance, reducing costs and improving returns. As expected, the computerisation index was negatively correlated with organisational risk, with a correlation of minus 0.94.

Despite all the profitability negatives observed above, the profitability index, calculated as the sum of the present value of cash flow after tax divided by the initial investment, was +4.2. This indicates that SAPO’s investment in ICT assets over the 5 year period has been a worthwhile venture (Hu and Quan, 2005).

### 5.1 Relationship between ICT investment and IT-related ratios

Figure 4 below illustrates the performance of IT-related ratios over the 5 year period under review. The operating expense ratio showed an increase, together with the CI, but decreased slightly in the final year. As a result, the CI correlated positively with the operating expense ratio, with a correlation coefficient of +0.81. This means that by increasing ICT investment assets between 2005 and 2010, the SAPO did not produce the desired positive result of reducing its total operational costs. Harris and Katz (1991) report that the most profitable organisations or top performers are more likely to spend a significantly higher proportion of their operating expense on IT.
In this regard, the operating expense ratio averaged 1.4 for the 5 year period. This means that the total operational costs for SAPO between 2005 and 2010 were outstripping its operational income. This is not good for business, as the organisation might then have to rely on other sources of income to close the gap and remain viable. In the first two years, IT cost-efficiency and IT efficiency ratios dropped slightly before showing an increase for the remaining period. Despite being positively correlated (IT cost efficiency and IT efficiency), with a high positive correlation of +0.84, the IT efficiency ratio correlated negatively with CI, while the IT cost efficiency ratio was positively correlated with CI. This is supported by Harris and Katz (1993), who report that top performers are more likely to spend a significantly higher proportion of their operating expense on IT, thereby resulting in a positive relationship between CI and operational expenses.

Table 3 below indicates the profitability performance indicators and IT-related performance ratios for the 5 year period under review.

Table 3: Profitability performance indicators and IT-related performance ratio trend for the 5 year period under review

<table>
<thead>
<tr>
<th></th>
<th>Year 2005</th>
<th>Year 2006</th>
<th>Year 2007</th>
<th>Year 2008</th>
<th>Year 2009</th>
<th>Year 2010</th>
<th>AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computerisation Index (CI)</td>
<td>5,724</td>
<td>5,764</td>
<td>6,207</td>
<td>6,646</td>
<td>6,898</td>
<td>7,206</td>
<td>6,408</td>
</tr>
<tr>
<td>Operating leverage</td>
<td>0.902</td>
<td>0.934</td>
<td>0.669</td>
<td>-0.674</td>
<td>3.308</td>
<td>-0.172</td>
<td></td>
</tr>
<tr>
<td>Return on IT assets</td>
<td>0.338</td>
<td>0.337</td>
<td>0.510</td>
<td>0.319</td>
<td>0.295</td>
<td>0.321</td>
<td>0.353</td>
</tr>
<tr>
<td>Organisational risk factor</td>
<td>80.06%</td>
<td>79.24%</td>
<td>78.38%</td>
<td>77.53%</td>
<td>74.82%</td>
<td>75.66%</td>
<td>0.776</td>
</tr>
<tr>
<td>IT efficiency ratio (ITEX)</td>
<td>0.21</td>
<td>0.25</td>
<td>0.15</td>
<td>0.21</td>
<td>0.22</td>
<td>0.21</td>
<td>0.210</td>
</tr>
<tr>
<td>IT cost efficiency ratio (ITCE)</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
<td>0.25</td>
<td>0.24</td>
<td>0.22</td>
<td>0.226</td>
</tr>
<tr>
<td>Operating expense ratio</td>
<td>1.39</td>
<td>1.17</td>
<td>1.32</td>
<td>1.47</td>
<td>1.53</td>
<td>1.50</td>
<td>1.396</td>
</tr>
<tr>
<td>Profitability index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.192</td>
</tr>
</tbody>
</table>

6. Responses to the research questions

6.1 What is the impact of ICT investment on IT cost-efficiency and IT efficiency ratios?

Kwong and Mohammed (1985) suggest the use of a CI in their empirical study on the quantitative evaluation of ICT investment in an organisation. They state that the CI measures the extent and sophistication of computerisation. In their evaluation model, CI incorporates factors such as the number of computers, application software, staff, number of shifts and years of computer usage.

6.2 Will the initial ICT investment target be changed if managers can identify changes in the organisational risk?

Kwong and Mohammed (1985) conclude that increased computerisation is positively associated with improved organisational performance, in both the short- and long-term. However, the results obtained in this study contradict Kwong and Mohammed’s theory. Improved computerisation at the SAPO did not translate into...
improved organisational performance in terms of return on investments, turnover growth and net profit. In order to achieve positive results with improved ICT investment, the SAPO management might need to consider investing in technologies or ICT systems that fit their business environment and hence support the broad strategic objectives of the organisation. This will presumably assist in driving the organisation’s growth.

6.3 What is the impact of ICT investment on organisational risk, cost-benefit analysis, operating leverage, and return on IT assets?

Loukis et al. (2009) argue that the relationship between ICT and business should lead to ICT investments adding strategic value to the business. ICT effectiveness is thus measured in terms of the value that it adds to the business value proposition.

6.4 What is the impact of ICT investment on the financial performance of the SAPO, as measured by ROI, operational costs, profitability levels (operating income, operating leverage, net profit, and turnover growth) and operating expenses?

Lee and Lee (2010) note that business executives must no longer use financial benefits alone to measure the value added by ICT investments. Instead, they now consider non-financial benefits such as the IT cost-efficiency ratio, IT efficiency ratio, improved customer satisfaction, better information availability and shorter production cycle times.

7. Managerial guidelines

From the results of this study, the following guidelines are recommended for the SAPO management:

- Consider the re-engineering of the organisation’s processes, in order to align them with the operation of new ICT technologies and achieve a return on investments.
- Contemplate the alignment of the IT strategy with the overall SAPO business strategy.
- Consider procuring ICT technologies that support the organisation’s strategic objectives, in order to drive the organisation’s growth.
- Ensure that available technologies are fully utilised, in order to realise their value and grow the business.
- Consider employing competent ICT personnel with experience.
- The SAPO might be in need of competent managers who can convert original ideas into effective applications, so that ICT investment can have meaningful results that benefit the organisation.
- The SAPO also needs to do a value chain analysis to assist in ensuring that ICT initiatives are tightly coupled with the business activities, thereby resulting in good business performance.

8. Conclusion

Based on the quantitative data obtained from the SAPO for the period 2005 to 2010, it can be concluded that ICT investment during this period was negatively correlated with most of the financial indicators, such as return on ICT investment, operating leverage, turnover growth, net profit, organisational risk and IT efficiency ratio. However, ICT investment correlated positively with the IT cost-efficiency ratio and operating expense ratio.

References


Seabelo Mathswenyego, Rembrandt Klopper and Sam Lubbe


Postal Services Act (No 124 of 1998)


Bridging the Contradictions of Open Data

Ronald Meijer¹, Sunil Choenni¹,², Roexsana Sheikh Alibaks¹ and Peter Conradie²
¹Research and Documentation Centre – Ministry of Security and Justice, Den Haag, The Netherlands
²Rotterdam University of Applied Sciences – Creating 010, Rotterdam, The Netherlands

Abstract: For a successful public value strategy, the elements “public values/strategic goals”, authorizing environment” and “operational capability” should be coherently aligned. In this paper, we discuss how we have aligned these elements in the context of Open Data. We focus on the relationships between Open Data and public values, in particular, trust, transparency, privacy and security. Several contradictions exist between these values. To succeed, Open Data policy has to reconcile these values. For reconciliation purposes, we introduce the notion of precommitment, which is a restriction of one’s choices. Precommitment is conceptualized as a policy-instrument whereby an organization imposes some restraint on its policy in order to restrict the extent to which values may conflict and stakeholders have to worry about the trustworthiness of that policy. We demonstrate how precommitment - implemented as a data request procedure – combined with a proper data infrastructure for Open Data may reconcile potentially conflicting values.

Keywords: open data, trust, privacy, precommitment, data infrastructure

1. Introduction

Open data (OD) is gaining importance in recent years. This increase of importance is taking place in the context of a growing demand for openness. Governments and governmental organizations plead for more openness, e.g. the Obama Administration and the European Union (Zuiderwijk et al. 2012) (Kulk et al. 2012) (ROB 2012). But also the scientific community is calling for more openness with its own research data. Openness is viewed as a means to contribute to transparency and via transparency, it is assumed to contribute to trust of civilians and other stakeholders amongst the government and in science (Zuiderwijk et al. 2012) (Kulk et al. 2012) (ROB 2012) (Schuyt 2012) (Rajamäki 2012). On the other hand, openness may lead to privacy breaches and security violations (Braak, et al. 2012) (Gutmann et al. 2008) (Kalidien et al. 2010) (Kulk et al. 2012).

In line with the increase of the importance of OD, several OD initiatives are going on at the moment (Conradie and Choenni 2012). These OD initiatives all have in common that they are to a certain extent operating with more or less defined goals and objectives, some of which can be categorized as “public value” (PV). The “open” side of OD provides access for the public eye. This clearly underlines the idea that OD is about creating “public” value. OD, as shall be demonstrated in this paper, is not only about creating PV, but also to an important extent, about conserving and maintaining “public values”. In fact, an OD policy has to reconcile multiple seemingly conflicting values.

The concept of PV is increasingly popular within both academic and practice settings (Williams and Shearer 2011). Some believe that this concept will be the next “Big Thing” in public management (Talbot 2009). For a successful PV strategy the three elements of Moore’s famous “strategic triangle”, i.e. “public values/strategic goals”, “authorizing environment” and “operational capability” must be brought into coherent alignment (Moore 1995) (Williams and Shearer 2011).

In this paper, we discuss how we have aligned the before-mentioned PV elements for an OD policy in the context of judicial research and registration data at a government research institute. We focus on the relationships between OD and public values, in particular trust, transparency, privacy, and security. Several contradictions exist between these values as will be demonstrated below. In our case, these values form the first of the three strategic triangle elements. The “authorizing environment” in our case is mainly formed by general policy instructions, and privacy laws and regulations. The “operational capability” in our case consists of data infrastructure and staff.
We argue that to be successful, OD policy has to reconcile conflicting values. For this purpose, we exploit the concept of precommitment, which is in essence a restriction of one’s choices (Elster 2000; Kurth-Nelson and Redish 2012). We conceptualize precommitment in this paper as a policy-instrument whereby an organization imposes some restraint on its policy in order to restrict the extent to which values may conflict and stakeholders have to worry about the trustworthiness of that policy. Our case demonstrates how by means of a precommitment instrument - implemented as a data request procedure – combined with a proper data infrastructure, OD policy may reconcile potentially conflicting values.

The reminder of this paper is organized as follows. In the next section we start with a condensed description of PV. In section 3 the central “public values” which are encountered by OD policy is described and analyzed. And the concept of precommitment is conceptualized. In section 4 the case of OD policy for judicial research and registration data in a government research institute is presented. In this case solutions for reconciling conflicting public values are presented. Finally, section 5 concludes the paper.

2. Public value approach

The PV framework was originally formulated by Moore (Moore 1995) (Williams and Shearer 2011). PV can best be understood and achieved within the notion of the “public sphere”, a democratic space which includes, but is not coterminous with, the state in which citizens address their collective concerns and where individual liberties have to be protected (Benington and Moore 2011). The government is seen as a creator of PV and a pro-active shaper of the public sphere: politically, economically, socially and culturally (Benington and Moore 2011). There is consensus in the literature that PV can be interpreted as combining (and reconciling), safeguarding and enrichment of the public sphere with the delivery of the values that are desired by the public (Williams and Shearer 2011).

Moore’s central proposition was “...that public resources should be used to increase value in a way which is analogous to value creation within private enterprise. However, this PV would necessarily extend beyond narrow monetary outcomes to include that which benefits and is valued by the citizenry more generally.” (Williams and Shearer 2011). PV is also described as including the value attached to relatively concrete outcomes, and the more intangible (Grimsley and Meehan 2007). The value “trust”, which is central to OD, as we shall demonstrate below, repeatedly appears in several definitions (O’Flynn 2007) (Grimsley and Meehan 2007) (Williams and Shearer 2011; p7).

A strategic triangle is central in Moore’s PV framework (Williams and Shearer 2011; p5) (O’Flynn 2007). It contains three elements “public values / strategic goals”, “authorizing environment” and “operational capability” (Williams and Shearer 2011). For a successful organizational PV strategy, these elements should be coherently aligned. This is attained by complying the strategy to three corresponding broad tests, namely it must be “substantially valuable”, “legitimate and politically sustainable” and “operationally and administratively feasible” (Moore; 1995).

For information systems (IS) we find a clear parallel between the PV literature and the literature about the approach of embedding human values in IS. For instance, (Choenni et al. 2011a) stresses on the importance of embedding human values, such as privacy and trust, in the development of information systems. They plead for an explicit agreement with regard to the values that should be included in a design. Thus extending the view about the IS beyond the original more narrowly defined requirements. We argue that “human values” embraced by government become “public values”, as they are from then on part of the conditions, goals and objectives of organization strategies. Thus, public managers, adopting a PV approach who aim to create value in IS for e-Government can profit from IS “human value” -design approaches. We also argue that the interpreting of the OD initiatives in the PV paradigm may help to clarify the policy problems which OD may encounter and in doing so may help to raise and increase PV.

3. Public values in open data

OD consists of data that is not identifiable to a person with the aim to be reused and redistributed by everyone, without restrictions from copyright, patents or other mechanisms of control (Zuiderwijk et al. 2012) (LinkedGov 2011) (Open_Knowledge_Foundation 2011) (Sweeney 2009). The idea behind opening public data is to make information that is generated or collected by organizations in the public sector re-usable. This idea is founded on the acknowledgement that citizens are taxpayers and therefore have access rights to this data.
They have this right wherever financially feasible and, when releasing, it won’t violate any laws or rights relating to privacy either for citizens or government staff (LinkedGov 2011) (Open_Knowledge_Foundation 2011) (Sweeney 2009).

3.1 Values

Transparency and trust are central values that drive OD. Openness is viewed as a necessary condition for a well-functioning democratic state of law. It serves the legitimacy of Public Administration and the trust of civilians in the government (ROB 2012). The scientific community is also calling for more openness with its own research data. We have observed that in the Netherlands, trust in scientific research is an object of discussion. Regularly, messages that mention cases of questionable research practices appear in the media. A growing distrust against science seems to appear, a distrust which is fed by a series of incidents fully described in the media (Schuyt 2012). Several cases of fraud have been discovered in recent years (Heilbron 2005). The proposed measures point to more openness and transparency. Besides good data management, peer pressure, archiving and sharing is advocated. These elements support the replication of research. As a consequence the chances of fraud decrease, while the chances of discovering fraud increase (Schuyt 2012). Therefore we argue that openness contributes to transparency and via transparency, it contributes to trust of civilians and other stakeholders, amongst the government and in science (Zuiderwijk et al. 2012) (Kulk et al. 2012) (ROB 2012) (Schuyt 2012) (Rajamäki et al. 2012).

The IS evaluation framework based on PV of Grimsley and Meehan (2007) focuses upon citizens’ and clients’ experiences of service provision and service outcomes as contributors to the formation of public trust. They show that trust is related to the extent to which people feel that an e-Government service enhances their sense of being well informed, gives them greater personal control and provides them with a sense of influence or contingency (Grimsley and Meehan 2007). In the context of law enforcement Rajamäki et al. note that people feel they have lost control over their own data and they do not know who handles personal data, when and for what purpose. This concern can be answered by increasing transparency of these operations (Rajamäki et al. 2012). The principle of transparency is that information should be shared while data is collected. Possibilities for control must be created and people assured that there is no abuse (Rajamäki et al. 2012). As will be argued in section 3c, constraints imposed on the access to data therefore are important for trust: in deciding how far one party needs to trust the other and vice versa. Transparency is also important for trust as by transparency the unilateral restraints imposed can be verified by the stakeholders.

As described above, OD refers to data that does not reveal personal identity. We argue that privacy is thus another central PV in OD. By means of the Data Protection Directive the European Union requires that if personal data is processed, this should be done fairly, lawfully and for specified, explicit and legitimate purposes (Article 6 of the Data Protection Directive). The purposes for which the data is processed must be explicit and legitimate and must be determined at the time of collection of the data (Recital 28 of the Data Protection Directive) (Kulk et al. 2012). In the Netherlands important principles of justice are anchored in the Dutch Privacy Protection Act (DPPA), such as finality, legitimacy, proportionality and subsidiarity, transparency and data subject’s rights. Finality refers to the purpose for which personal data is collected. This purpose should be explicit and the processing of collected data must be compatible with the purpose for which they were collected. Legitimacy refers to the process of data collection and also to the context of the data: data must be processed in a proper, careful, and legal manner. Moreover data must be relevant, sufficient, not excessive, and correct (Versmissen 2001). Proportionality demands that the means used are proportional to the intended purpose. Subsidiarity demands the use of the alternative which minimizes the use of privacy sensitive data. Transparency refers to the right that the data subject is entitled to know if someone is processing data about him. The data processing party has the obligation to identify itself to the data subject and has to inform him about what data it processes and the purposes of processing (Versmissen 2001).

The fourth and final OD value we discern in this paper is security. Security is a comprehensive notion. However, we derive this value from the privacy value. To prevent accidental or malicious disclosure, modification, or destruction of records and data sets, data security is indispensable (Denning and Denning 1979). Research and registration databases may contain privacy sensitive data. The opening of this data therefore should be done in strict compliance with the privacy value to prevent privacy breaches. In other words the security of the data has to be protected. In section b below, we will go into more detail on this value.
3.2 Analyzing values

Having identified the values playing a crucial role in OD, here we analyze how they are related to each other. Figure 1 resumes the OD values as described above. It depicts the public OD values transparency, trust, privacy and security and the way they assumedly relate to each other and to three selected intermediary elements, replicability, information overload and reliability. The way public values and intermediary elements relate to each other is depicted by arrows. These elements may reinforce each other, indicated by a “+” sign, or contradict, “-” sign. The intention of this chart is not to be complete. Its intention is to show the apparent contradictions between the public values on which we focus in this paper. The intermediary elements will only be briefly described in relation to the values. An elaborate discussion of these elements is beyond the scope of this paper.

Figure 1: Open data values

OD - making data accessible for (re-)use to the public – is assumed to contribute to transparency. By giving access to research and (semi)government data, civilians, policy makers, journalist, audits and scientists get opportunities to control, verify the data, replicate research findings or create new findings. It is assumed that this results in maintaining or increasing trust. However there is a “dark side” to opening data without constraints or restrictions imposed on the access to data. This “dark side” may lead to several contradictions in the OD policy values.

In the first place OD may conflict with privacy. The opening of data is seriously impeded when privacy sensitive data are at stake. OD may not seem to be personal data at first glance, especially when it is anonymized or aggregated. However, it may become personal data by combining it with other publicly available data or when it is deanonymized (Kulk et al. 2012) (Denning and Denning 1979). Anonymizing data cannot be “100% privacy proof”. Even when data with a high aggregation level is shared, the risk that one is able to deduce or abduce privacy-sensitive information remains (Braak et al. 2012) (Ohm 2009). Opening up data without taking into account the privacy risks attached, may lead to privacy breaches with possibly very negative consequences for the trust of respondents who participated in research and civilians in research or government. We may have found a possible negative relation between the privacy value and trust. To prevent privacy breaches, it is necessary to eliminate privacy sensitive attributes. However this may have a negative impact on the possibility of using the OD for replicability as some of the attributes needed to ensure the replication cannot be used any longer. Thus as privacy is protected, not all results may be replicated as a consequence. This may have negative impact on trust.
Next, OD may conflict with security, the principal goal in which the government research institute of our case is operating. Identity disclosure from survey or administrative data might be used by private or public groups to target or harm individuals, population subgroups, or business enterprises (Gutmann et al. 2008). Privacy of civilians thus needs to be thoroughly protected. Civilians expect that public organizations follow rules and procedures carefully in order to protect them and their privacy. Civilians that are harmed due to incorrectly followed rules and procedures may cause social unrest. Therefore, measures to enforce that rules and procedures are followed correctly should be taken into account while developing infrastructures for data sharing in the public domain (Braak et al. 2012).

Thirdly, OD may conflict with transparency, via the intermediary element information overload. In the literature we find that information overload occurs when information received becomes a hindrance rather than becoming potentially useful (Bawden 1999). Information overload is related to the quantity and diversity of information available (Bawden 2009). We therefore argue that as governmental organizations possess large volumes of data about many subjects the opening up of this data may cause information overload.

Finally, OD may have negative effects on trust via the intermediary element validity and reliability of the results in cases where the data is re-used. This may concern re-use on the basis of the data provided but also on the basis of extension of data with other (open) data sources. We argue that as data are opened the governmental control on reliability and validity decreases due to a possible lack of a proper interpretation. Third parties may use the opened data in ways that weaken these elements. Data from administrative databases might for instance be misinterpreted and misused with the stigmatization of groups as a consequence (Kalidien et al. 2010).

3.3 Precommitment

We have found several contradictions between the OD values. Consequently, to succeed, OD policy has to reconcile these values. We argue that constraint imposed on the access to data is important for trust: in deciding how far one party needs to trust the other and vice versa. We argue that precommitment is necessary to bridge the contradictions in OD.

Precommitment is a restriction of one’s choices (Elster 2000) (Kurth-Nelson and Redish 2012). It is implying constraint. Individuals might benefit from having specific options unavailable, available only with a delay, or at greater cost. Precommitment may be aimed at overcoming impulsivity (e.g. in gambling machines require the gambler to pre-set a limit on his or her expenditure, after which the machine deactivates (Kurth-Nelson and Redish 2012). Precommitment is also theorized as a device whereby we can impose some restraint on ourselves and thus restrict the extent to which others have to worry about our trustworthiness (Gambetta et al. 2000).

We conceptualize precommitment as a policy-instrument whereby an organization – in case responsible for OD - imposes some restraint on its policy in order to restrict the extent to which values may conflict and stakeholders have to worry about the trustworthiness of that policy. To limit possible conflicts between OD values several restraining options for opening data are possible. In the first place privacy sensitive data might be irrevocably deleted. Datasets may be completely anonymized before they are archived, thus limiting the future possibilities to replicate research or to link the datasets to other data to create new datasets. Secondly, data including privacy sensitive attributes might be opened for specific goals or target groups only. Some data (e.g. registry databases of police and prosecution) might only be distributed for specific scientific purposes and to scientific institutes only – in compliance with privacy laws and regulations in vigor. Thirdly, before the opening of data from research to public, all privacy sensitive data needs to be thoroughly removed. As a result the opened datasets will contain only limited information and can be analyzed only in a (very) restricted way. Finally, data can be made accessible in an indirect way by the provision of exclusively highly aggregated data only. These data is generated by data experts.

The following case illustrates how precommitment is implemented in the open data policy of a government research institute operating in the field of security and justice.
4. A case: Open data policy of a Government research institute

At the Research and Documentation Centre of the Ministry of Security and Justice - in Dutch “Wetenschappelijk Onderzoek- en Documentatiecentrum” (WODC) - data is gathered to advise about and to define the current and future research agenda of the Dutch Ministry of Security and Justice, to answer policy-related questions and to indicate the possible implications of research findings for standing policy. For this purpose WODC systematically collects, stores, enhances and provides criminal justice information produced by themselves or external organizations commissioned by WODC (Zuiderwijk et al. 2012).

WODC strives towards transparency, thus investing in trust, while giving priority to protecting privacy. WODC aims to facilitate the reuse of research data, as this may provide the organization with benefits, such as the possibility to scrutinize and validate the data and to decrease the workload of the WODC. WODC works with confidential judicial research and registration data, so that issues as confidentiality and privacy-sensitivity should be thoroughly taken into account (Zuiderwijk et al. 2012) (Kalidien et al. 2010). WODC therefore has developed a procedure to share data from the collected data as much as possible with other parties, while protecting privacy and in compliance with the restrictions of the privacy protection principles and laws. This procedure is combined with a data infrastructure to manage the contradictions of different values. In two consecutive sections we discuss data infrastructure and -procedure.

4.1 Data infrastructure

Data from concluded research projects is collected. Data from those projects that is qualifying for public opening is centrally stored in compliance with the Dutch Privacy Protection Act (DPPA). Privacy sensitive data is deleted unless explicitly needed for further research (longitudinal research, monitoring projects). Public safety registration data is stored in a data warehouse (DW), containing police and justice data, for policy research purposes. A DW ensures a uniform approach to data for interpretation purposes and ensures maximum accessibility. Privacy is protected as the DW is anonymized, i.e. has been stripped of directly identifying attributes, like names, addresses etc. In the DW problems around inconsistencies, reliability, and validity are tackled (Choenni and Meijer 2011b). The archived research data and DW data form the basis of the WODC data request policy.

WODC may decide to the public opening of research data. The research data of WODC is open for everyone once - contented to the high criteria of DPPA and confidentiality matters – it is uploaded on the server of the Dutch Archiving and Networked Services (DANS). Before opening the data from research to public, all privacy sensitive data – which may lead to disclosure directly as well as indirectly - is removed. WODC may permit restricted access to scientific organizations for scientific purposes to privacy sensitive research data. The DPPA allows the (re-) use of personal or privacy sensitive judicial data, under certain conditions, for scientific purposes. Public safety registration data might be released only for scientific research to scientific organizations. WODC regularly receives individual data requests from scientists for permission to re-use research data or for an extract of public safety data from the DW. Extracts from the DW may – in principle – be opened, but for scientific research only. WODC gives access to the data by providing highly aggregated data on demand. This data is generated by data experts and concern DW data requests mostly. Each and any request is thoroughly audited by the WODC data request procedure.

4.2 Procedure

The data request procedure is a rigorous procedure which is aimed at sharing data with other parties as much as possible, while thoroughly protecting privacy. With the aid of this procedure we manage to protect privacy sensitive attributes in datasets, in compliance with the security policies.

WODC discerns two subtypes of data requests to contribute to OD and give access to citizens, namely requests for Statistical Information and requests for Data Supply. Statistical Information is aggregated data on which people do not aim to edit the data information. This information can be based on registration as well as research data of WODC. The output provides a minimal opportunity to be edited. Data supply can be subdivided in requests for re-use of research data from published research or requests for an extract of registration data from the data warehouse (DW).
Ronald Meijer et al.

WODC distinguishes three steps towards the opening of data while protecting privacy. At first an experienced data manager carefully studies a data request to see which variables are necessary for an applicant, whether the required variables could be delivered from the centrally archived research data or the DW. The data manager prepares a preliminary decision to a request by making a report with considerations such as legal requirements, policy sensitivity and quantity of work for WODC. This document is sent to the workgroup of DPPA asking them to exam the legal conditions of the request. The data request is tested on the criteria of the DPPA by the workgroup. In this phase every kind of convertible (personal) facts not in agreement with privacy laws and rules are removed. When necessary a Trusted Third Party is included in the data request project, in order to prevent the unnecessary transfer of privacy sensitive data (Braak et al. 2012). The subsequent and final stage is the judgment of the board of directors. Board members discuss the request looking at the advice written by the data manager (based on their experience and comments of the DPPA workgroup) and decide whether or not the data should be delivered to the requested party and on which conditions. An appraisal of the board of directors leads to delivering data after signing a standard agreement and specific conditions of reuse by the applicant.

5. Conclusion

We have observed a relationship between OD and public values. This relationship is described by the values trust, transparency, privacy, and security. As we have argued, several contradictions between these values exist. To solve these contradictions we have introduced the notion of precommitment: a policy-instrument whereby an organization imposes some restraint on its policy in order to restrict the extent to which values may conflict and stakeholders have to worry about the trustworthiness of that policy. We have elaborated this notion in a rigorous data request procedure. To manage the contradictions between values we combine this procedure with a data infrastructure. By means of the WODC case, we have illustrated how contradictions are handled.

The case illustrates how the priority to protect privacy on the one hand leads to the limitation of the opening of data to the public, but on the other hand gives the opportunity to OD in a restricted mode for scientific goals. A DW assures reliability of answers to statistical information requests. Hereby privacy is protected by presenting only very highly aggregated data to the general public. Requests for data supply mostly concern data on the level of unique identifying records in research datasets or registration data. Therefore in these type of requests most of the time, privacy sensitive data is involved. In these cases data is supplied only for scientific goals in compliance with the privacy laws and regulations. Moreover, by verifying the data on legal and policy confidentiality points of views on several moments in different phases, the chance of failure is reduced to a minimum, thus maintaining trust. Opening data to scientists creates possibilities to re-use and (partly) replicate existing research findings, thereby contributing to trust.

Acknowledgements

The authors wish to thank Rochelle Choenni for her valuable contribution to this paper, in particular for verifying the final version on correct and fluent English.

References


Barriers to Electronic Government and Digital Inclusion

Adela Mesa¹ and Pedro Martínez-Monje²

¹ Department of Political Science and Administration, Faculty of Social Sciences and Communication, University of the Basque Country, Bilbao, Spain
² Department of Sociology, Faculty of Social Sciences and Communication, University of the Basque Country, Bilbao, Spain
adela.mesa@ehu.es
pedromanuel.martinez@ehu.es

Abstract: New channels have been created from the idea of electronic governance which allow access to and use of the electronic administration, the electronic services and also electronic participation so that the population can take part in the issues of public policy which have up to now been within the exclusive scope of the governmental institutions. The possibilities offered by this form of governance cannot be dissociated from the development of a digital citizenship which can unfold through participation in the mechanisms and structures of electronic governance and e-administration, although there are barriers which prevent the digital access or digital inclusion of some sectors of the population. The barriers to the development of E-Government are due to the real or perceived legal, social, technological or institutional characteristics which act against the development of the electronic administration; either due to the fact that they prevent the demand, hinder the users of the electronic Administration, or prevent the offer from the organizations in the public sector when it comes to providing electronic Administration services. Specifically, we are going to deal with both the barriers which are related to Internet skills and use by the population and also the e-government policies which have been developed, and all within the field of health. As regards the first group of barriers mentioned, we refer to issues like e-learning, the different uses of Internet, the use of the electronic Administration, etc. As regards the e-government policies, one must take into account that various actors have an influence on them (politicians, technicians, users, etc.), as well as specific actors in the area of health (doctors, health personnel in general and services personnel). In the latter, one must take into consideration that health one of the pillars of the Welfare State is in the firing line in these times economic crisis and budget reductions. As such, the e-health policies have - even more so if possible a central role in dealing with a twofold challenge: on the one hand, to contribute to the effectiveness and efficiency of the service through the introduction of the ICTs, without this leading to social segregation or exclusion; and on the other hand acting with criteria of economy and streamlining of resources. Along these lines, in the area of health in Spain there are various programmes (digital clinical history, preliminary medical appointment in the Internet, electronic prescription, etc.) which are in different phases of implementation. These plans are modernizing instruments but they can also have exactly the opposite effect by generating new social inequalities by leading to situations of social vulnerability and digital exclusion. This work seeks to provide a reflection on this process in order to explore inclusive strategies in the e-health initiatives in Spain and which could help other countries to find a new public governance process.

Keywords: e-government barriers, e-governance, digital inclusion, e-health, e-policies

1. Introduction

In the last two decades before the financial crisis the different public Administrations – influenced by the leadership exercised by different European or global bodies – saw great potential in adopting and developing the ICTs to improve their own structures, operation and even their image.

This led to extensive literature being published dealing with different matters but which could be summarised as the concept of electronic government and the three dimensions covered in its definition, in other words, and according to the definition of the Gartner Group, we consider “electronic government” to be the use of the ICT to improve and optimise the provision of public services, citizen participation in consultation processes and the formulation of public policies. In recent years a lot of resources (financial, personnel, etc.) have been dedicated to the development of electronic public services (e-services in general), there have been various cases of democratic participation via the ICT (e-democracy) and, in a more incipient manner, the complex societies are increasingly using the ICT for governance processes (e-governance) (Mesa, 2007).

¹ This study has been prepared within the framework of the “Barreras al Gobierno Electrónico. El empleo de las TIC en la Política Sanitaria Autonómica. Un enfoque desde las Relaciones Interinstitucionales” (CSO2009-09169) research project, financed by the Spanish Ministry of Economy and Competitiveness. Part of the article also refers to the “Ciudadanía digital y e-inclusión en el desarrollo de la gobernanza electrónica” research financed by the University of the Basque Country (Universidad del País Vasco /EHU) (EHU11/45).
Focusing on the first dimension mentioned above (e-Administration), during said years the use of the ICT in the public administrations reached quite high average levels, and very significant in some cases. At the beginning of the new millennium, the idea which started with the modernising the administration has gone hand in hand with the introduction and development of the ICT in the public Administrations (mainly through the new possibilities offered by the use of Internet, the online communication of information, etc.).

Spain joined this process – followed by most western countries – since 1997 when telecommunications were liberalised in the country (with the exponential expansion of the call centre companies). The European Union in turn adopted a leading role to encourage all of the member countries setting out a series of guidelines aimed at Europe becoming the worldwide leader in the information society.

Since them, and in the specific case of Spain, abundant regulations have been produced to regulate this area (mainly at the end of the nineties and since the approval of the electronic access Act in 2007). These regulations have also been commonly boosted by different scope (regional, state, international) information society and electronic government plans all from the perspective that the development of electronic government provides modernisation and progress for the current public administrations. And although the current financial crisis is going to force some projects to be halted and others to be reconsidered, it is a good time to ask which elements influence (and how) said development of electronic governance. We shall focus our study on this point.

It is noticeable how the development of the electronic Administration (e-Administración) is not following a continuous rhythm but in some cases is actually slowing down and even halted. This paper is therefore aimed at finding out about the main barriers to the progress of e-Administration and electronic government in general, above all in the healthcare sector which is one of the main pillars of the welfare state. One must also take into account that Spain’s Autonomous Regions - Comunidades Autónomas – (17 in total) have been taken as reference entities.

Along the lines mentioned above, the European institutions – particularly the Commission – and the different Member States have been working for over fifteen years to try to promote electronic government. The 1994 Bangemann Report “Europe and the Global Information Society. Action Plan”, which indicated the main issues at the end of the century and in the new millennium, marked the start of a new era. Since then there have been a series of plans both European (eEurope 2002, 2005, i2010), and their respective reflection in the Spanish arena -Plan InfoXXI, administración.es, España.es, Plan Avanza 2006-2010 and its continuation with the Plan Avanza 2 (2011-2015); which have shown said evolution within the state framework and in that of the Autonomous Regions. There has been some progress as far as e-Government is concerned: although this does not mean that there has been linear progress. Through the widespread regulation in this area over the last decade we can see many points of disagreement and debate between the actors involved, with different results in each case.

The electronic administration processes are in general considered to be related to modernisation, or (as it is more commonly called) innovation in the public administration. The approaches which seek to apply innovation to the public entities are increasingly present both in the academic debate and in the real practices. However, we must consider the amount and scope of the problems which arise as a result, precisely due to the public nature of the governmental organisations (clash between policy and management, the resistance of the administrative culture, the application of effective evaluation mechanisms, etc.) (Mulgan, 2007). In this way the electronic government strategies can be seen as an opportunity to introduce innovative initiatives into public management and in the provision of public services.

Within this context, and focusing precisely on the issue of the evolution of the implementation of the electronic administration and the online public services, our study is focused on defining what we understand by barriers to electronic government and, once this term has been defined, analysing some of the groups of barriers referring to the framework of the Spanish regional politics and particularly applied to the area of health.

For such purpose, and taking some previous work as a reference (Oxford Internet Institute, 2007), we have developed a methodology which allows us to consult 45 (out of 51 base sample) technicians and administrative modernization directors in the 17 Autonomus Regions and all members of the Inter-Regional
NHS Subcommittee from the Spanish Central Government, about the weight and relevance of certain groups of barriers to the development of electronic healthcare governance in Spain.

This paper is therefore going to be structured as follows: (I) setting out the issue; (II) a second section in which we will show some of the issues relating to various groups of barriers to electronic government which we have emphasised here to be relevant in terms of digital inclusion (technical and design barriers, barriers regarding access, skills and uses of the ICT, and barriers relating to e-Government); (III) We shall also stress the concrete characteristics of these barriers in the specific case of healthcare based on the partial results from the research and the main problems which it faces; (IV) finally we shall provide some conclusions and evaluation about the progress thus far; (V) we also cite some bibliographical references on the issue.

2. The barriers to the electronic government: The approach to the issue

The studies by the Oxford Internet Institute on barriers to electronic government have been a reference for many other studies on this subject (Schwester, 2009). In our case, we have taken its definition of barriers to electronic government as: "those legal, social, technological or institutional characteristics – real or perceived – which act against the development of the electronic administration: whether because they impede the demand, act to prevent or hinder the users of the electronic Administration, or prevent the offer or act to stop or hinder the public sector organisations when it comes to providing electronic administration services" (ibid.). Through this definition we can differentiate the two main areas where the electronic Administration is used: that corresponding to the public instances (supply), and that corresponding to the users (demand); although it must be understood in a broader manner given the fact that within the administrative organisations themselves there are relations between those supplying and those demanding electronic administration (the internal market of the Administration itself). The extension of the information culture and the exponential potential of Internet are finding very little resistance in their introduction into the public arena, however the different consequences deriving from them must be taken into account as well as their impact.

The study within which this article is situated is focused on the different types of barriers facing the implementation and development of electronic government. The classification into groups of barriers (legal, social, technological, institutional), which are also interrelated, help us to identify their nature and therefore to try to discover the factors which slow down and even prevent said development and as a result to try to find ways to overcome them. Here we shall only present some groups of barriers, i.e. those which are more related to digital inclusion (another issue we are interested in) as a group of barriers which specifically refer to that aspect.

This research is therefore aimed at establishing an assessment of the development of electronic government in Spain, particularly in the area of health and for such purpose we have concentrated in the obstacles to said development. We seek to shed light on this matter based on prior studies and methodologies (Oxford Internet Institute, 2007; Schwester, 2009) which we have used to prepare a specific questionnaire for the case in question (the intergovernmental relations between the Autonomous Regions on the matter of health through the development of electronic government).

As regards the methodology which we have followed, at the beginning we select the groups of barriers which we could face and afterwards, and taking into account the different issues deriving from each of them, we draft the different questions on the questionnaire placing special emphasis on carefully specifying the terms used.

These groups of barriers are as follows: 1) technical and design barriers, 2) administrative and organizational barriers, 3) barriers to interoperability, 4) barriers regarding access, the skills and uses of the ICT, 5) barriers relating to security and privacy, 6) barriers relating to the e-Government policies, 7) barriers relating to the regulatory elements, 8) economic elements, 9) specific barriers in the healthcare sector. As already mentioned, from these we have selected some groups of barriers for this article.

The questionnaire was set out according to these nine groups or blocks with a total of 52 propositions on which it was necessary to assess the degree to which it could constitute a barrier to the development of e-Government. The response level consisted of 5 categories: 1) it is not a barrier, 2) it is a very small barrier, 3) it is a small barrier, 4) it is a big barrier, 5) it is a very big barrier.
Using an online questionnaire and subsequent monitoring of the unanswered questionnaires by a specialist company, in the end a sample was obtained of 45 senior technicians (out of a theoretical sample of 51) responsible for modernisation and technical innovation departments, on the one hand; and on the other hand all of the persons participating in the Inter-Territorial Sub-Committee of the Spanish National Health Service. The initial analysis of the responses allowed us to make some preliminary evaluations which we present below on the selected groups of barriers.

2.1 Technical and design barriers

The possible technical and design barriers which affect e-Government refer to the defective technical design of the solutions adopted in the different applications. Often the systems and services related to e-Government fail or perform less well than expected due to inadequate design. In fact, the difficulties caused by unsuitable user interfaces in the e-Government systems can slow down the relations between the public administrations, citizens and companies. Such operating problems can limit potentially successful services and discourage the reuse of this digital dimension of e-Government for those who experiment with it. The incompatibilities in the hardware, software or the communication infrastructure and networks both inside and outside of the public institutions can also cause significant problems.

One of the issues which has been most discussed is the presence of the public administration on the Internet portals. On this matter, the usability of the e-Government applications is usually configured according to the requirements of the public administrations themselves, instead of looking at the requirements of the citizens. For instance, it was noticed in a recent survey (AEVAL, 2011) that when the Spanish Internet users access information on the Internet portals of the public administrations, they do so mainly via search engines. This is clear evidence of the fact that the information from the public administrations’ websites is still not capable of organising the contents according to the users’ logics.

On the other hand, accessibility has been another issue which has traditionally been taken into account when it comes to establishing proper technical design. In general, and as an introduction to the next barrier, it can be stated that initially few public Internet portals used technical elements aimed at groups with accessibility problems (deaf and blind people or those with cognitive problems). At the same time, regulations have been adopted from the Web Accessibility Initiative and the World Wide Web Consortium, whose guidelines are commonly accepted in all of the areas of Internet, like the reference specifications when trying to make the Internet pages accessible to disabled persons. In Spain these guidelines have been incorporated through Standard UNE 139803:2004.

Amongst this block of barriers, and referring the results from the questionnaire, the questions were focused on 3 items dealing with: the opinion of the technicians on the citizens’ level of use and level of preparation for e-services, as well as their perception about the need to use them.

The opinion from our sample of technicians is that the citizens’ level of knowledge in the use of the e-services constitutes a big barrier (60%), just like the level of use of the e-services (44.4%), although the opinion on this issue is ambivalently divided in terms, on the one hand, of small and very small barrier and, on the other hand, big and very big barrier. The citizens’ participation on the need to use the e-services is not seen as a barrier for two thirds of the interviewed technical personnel.

Afterwards (through detailed interviews) we have investigated about the reasons for this opinion and the causes which have led the citizens to not be sufficiently prepared to use e-services. The questions which arise from these results are: What degree of responsibility do the technicians have for the fact that the citizen’s level of use of these services is not optimum? It is possible that much emphasis has been placed on creating e-services applications and trying to be pioneers in the development of e-Government without considering to whom those applications are ultimately targeted. Finally, is the poor level of use and preparation no more than the logical consequence of a still low level of Internet use if compared to the other countries in the European Union?

2.2 ICT access, skills and uses

The ICT are becoming increasing widespread throughout human life, which has also been accompanied by a phenomenon called the digital divide. The digital divide refers to the access barriers to people’s use of Internet
and the ICT. There has been much progress in identifying groups who are vulnerable to the digital divide, who are now called the digitally excluded (Martínez-Monje y Mesa, 2010), who are: disabled people, the elderly, low-income people, those living in rural areas and women (Plan Avanza 2011-2015). However, as Internet penetration is reaching high levels (mainly in developed western countries) other forms of digital exclusion are being studied which are related to the knowledge and skills to use the ICT in daily life. In this case, it is not exactly an access barrier, but rather a barrier related to use, for example of certain advanced services in the Internet, like those which may be offered by the public administrations.

This dimension, analysed in the questionnaire, has been identified as one of the main barriers to the development of e-Government. The level of preparation/training of citizens is the issue indicated as an important or very important barrier by over 60% of those interviews. This makes it the most substantial aspect out of all of those indicated within this dimension regarding access, skills and uses of the ICT by the citizens in relation to the public administrations on the Internet.

In fact, the managers who responded to the questionnaire do not consider a barrier for the development of e-Government either the use or the perception of having to use the electronic services. In other words, what is really considered a challenge is the idea that the citizens still do not have the skills required to use the full potential of e-Government. This is despite of the fact that they may be considered more or less necessary or that a greater or lesser use is made of the electronic services.

The analysis in this section is orientated towards an aspect which has already been mentioned above about the digital divide. In the case of Spain, the available data shows that there is quite wide access to Internet (64% of the households and 62% by broadband) although it does not reach the European (EU27) average which is 73% and 68% respectively, according to the data from Eurostat (2011). In fact, the availability of electronic public services is also very high in comparison to the offer in other neighbouring European countries. As such, what could perhaps explain this limitation in the demand refers to the fact that the citizens still do not have enough technical ability or the opportunities from the market and the State itself to make use of the electronic services which have a high level of difficulty. On this matter it would also be interesting to know to what extent the above may also be a consequence of a design which is not very orientated to facilitating their use by the citizens.

2.3 E-Government policies

The first issue faced by the different e-Government plans in Spain (Plan Avanza and Plan Conecta, to cite the most recent) is the clash produced by any change to the civil servants’ traditional form of administration and which could lead to reactions of distrust and even rejection (Criado, 2009: 203-232). We are referring to the different types of actors who take part in the e-Government policies. The existence of different groups of actors (politicians, managers, ICT specialist, etc.) who come together with different interests and needs in the e-Government policies complicates the possibility of finding a coherent and even a correct solution.

First of all, it should stressed -though constantly repeated- that the political leadership strategies are essential in order for these changes to come into fruition. At the beginning of this process, this type of policies were dependant on the interest – more personal than political – which arose in each case as it depended to a large extent on the person responsible (politician or civil servant). But a proper development of e-Government requests a greater degree of commitment and greater formalisation. As well as this, there are also sometimes problems when it comes to implementing certain electronic services in those areas where the traditional processes comply with objective quality criteria.

On the other hand, the increased regulations in Spain, both on the level of the General State Administration and in the Autonomous Regions (Cerrillo, 2007) is complicating the handling of the electronic Administration. The systems necessary to ensure compliance with the different regulations can also act as obstacles to electronic government due to the difficulties in the development, processing or both. Recently on the other hand, e-government development processes in the area of health are being linked to budget cuts in the sector

---

2 A study carried out by the Capgemini consultancy firm for the Orange Foundation indicated that out of 26 selected online services, the availability percentage in the Autonomous Regions was 76% in 2011. Available in http://www.informeespana.es/docs/Estudio_Comparativo_2011_Servicios_on_line.pdf
(for example the electronic prescription, etc.) which could have detrimental effects in the long term on said process.

The decentralisation process in the area Healthcare culminated in Spain in 2002 (at different rhythms in each Autonomous Region), with the Autonomous Regions becoming competent over health planning, public health and management of healthcare services (Chao, 2012).

In this block we asked about the traditional manner of managing the public employees, in case it could be considered a barrier. The need to have public support, to achieve results in the short term, the convergence of different types of actors in the e-government policies each with different interests, needs, etc.

Curiously, in this block the perception of big barrier is found in the question regarding the convergence of different groups of actors (politicians, managers, ICT specialists, etc.) with different interests and needs in the e-Government policies. Other issues like the traditional form of management and doing things and the needs to achieve short-term results are perceived as barriers, but the need to obtain the constant support from the maximum political level for the e-Government policies is seen as a bigger hurdle.

In general, it is considered that the problem is not in the proceedings and in their adaptation introducing the new technologies, but rather that the biggest challenge lies in the relationship between the different actors and the interest and needs which each of them may have. In other words, it is the political aspects which is most likely to generate barriers to the development of e-Government.

3. E-Governance in health

The general study on the barriers to electronic government is applied in this part of the research to the specific area of healthcare. Healthcare and education are essential pillars of the welfare state and therefore one of the most sensitive for the population as a whole which is very much against reducing the expenditure on this public service (94.6% of the Spanish population according to a study from the Sociological Research Centre - Centro de Investigaciones Sociológicas- in 2011).

We could briefly state that the territorial decentralisation of the power over healthcare was completed in Spain on the culmination of the transfers process in 2001 and one of the key problems which arises as a result is how to ensure the cohesion of the system. As a result, Spanish healthcare policy is entering into a decisive phase in the relations between the central Government and the autonomous administration, and as such the ICT also become part of that inter-governmental dynamics.

On the organisation level, the entity which formulates the relations between the Ministry of Health and the autonomous departments in charge of health care is the Inter-Territorial Council of the National Health System (CISNS). This intergovernmental body, which facilitates the relations between the administrative levels, was set up in 1987 and as representatives from the General State Administration (person responsible for the Ministry) and from the autonomous regions (person responsible for the autonomous departments and autonomous cities). The agreements of the CiCNS are formulated through recommendations which are approved if appropriate by consensus, so that the cooperation agreements to carry out joint healthcare actions are formalised through agreements.

In the questionnaire mentioned in this study, the difficulties for e-governance in the healthcare sector refer to the need for specific ICT applications, the population’s attitude to health and their level of demand of electronic healthcare services, the need to train the healthcare personnel in e-services, the need to safeguard the privacy of the population when using the electronic healthcare services, the different types of identification cards and the adaption of the healthcare system to the situations which affect public health.

Based on the results obtained, the main problem for the development of e-Governance in healthcare lies, from the point of view of the technical personnel who were interviewed, in the diversity of the electronic identification cards as well as in the need to safeguard privacy and confidentiality in the use of the electronic healthcare services. Half of those interviewed think that both barriers are big or very big. These results lead to another series of questions: What degree of knowledge and what skills in the use are necessary so that the population can effectively use the electronic healthcare services?; How are the electronic healthcare services
interrelated with the use of social networks on the Internet in relation to health?; Why is the population’s attitude to health a small barrier for the development of healthcare e-governance, as indicated in the response from the technicians?; What is understood as “e-Government in healthcare”?

4. Conclusions

After the analysis of the results obtained from the questionnaire on barriers to electronic government, in general and within the area of healthcare particularly in the Spanish Autonomous Regions, we can extract some of the most significant valuations on the matter.

As regards the technical and design barriers, the perception of the technicians regarding the citizens’ lack of use and knowledge for the e-services seems to be quite important. This appears to be related to the perception on the lack of preparation/information of the citizens in the handling of the ICT. These deficits in technological skills among the population must be addressed by public authorities promoting literacy programs tailored to different profiles of digital divides. And political authorities should not relegate it only to the proactive initiative of NGOs. In addition, technicians have observed that different levels of government administration (state, regional, and local) hinder the development of eGovernment, and, from our point of view this can be an important fact of the lack of a coordinated solution to the problem of the digital divide.

Another important issue is that in addition to the citizenship’s limited access to the Internet, we must add that the use of such access becomes a digital divide factor in many cases.

In the block on e-Government policies, the greatest perception of barriers is found in the question relating to the convergence of different groups of actors (politicians, managers, ICT specialists, etc.). In fact, it is considered the biggest barrier in the block. It is well known that the willingness of political authorities to implement e-government programs has successfully been the mainstay in these programs for years. This is a structural barrier as politicians change periodically. Only rules and specific plans about it can ensure that the guidelines set have a relative continuity.

Talking about policies, the recent initiatives in e-healthcare may be rejected by the citizens if they are exclusively associated to welfare budgets cuts. Both Health sector staff and the population have to notice the benefits of ICT to improve the welfare of the citizenry. It is quite significant that 35 per cent of the Internet user population in Spain have ever requested a medical appointment through the Internet (ONTSI, 2012) meanwhile only 62 per cent of the population use regularly the Internet. Other programs as the clinical digital history have other kind of problems, that is, interoperability.

The specific features of the healthcare sector require specific considerations as regards e-healthcare, some which are shared with other sectors may here have greater weight or relevance as it is a particularly sensitive sector for the population. In later stages of the research we will focus our analysis in this direction.

References

AEVAL (2011) La Administración Pública a Juicio de los Ciudadanos. Satisfacción con los Servicios, Valoración del Gasto, Confianza en los Empleados Públicos y Actitudes hacia la e-Administración, Public Services Quality Observatory (Observatorio de la Calidad de los Servicios Públicos), Madrid: Spanish Ministry for Territorial Policy and Public Administration.


ECEG 2014
Brasov, Romania

14th European Conference on e-Government
Spiru Haret University, Brasov, Romania
12-13 June 2014