Evaluating the progress of e-government development: A critical analysis

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Abstract. The development of e-government in most countries is still primarily aimed at developing electronic services that customers can access via the internet. This has been matched by the methods for monitoring e-government development, which fall far short of providing a true overall assessment. Such a narrow focus on e-government has led to a significant slowdown of development in most countries. Countries have used “quick fix, quick win” solutions, while continued development require above all the development of an integrated government portal and reengineering of back-office processes. The more developed countries are therefore increasingly tailoring their e-government strategies in the direction of customer-orientation and instead of persisting with rigid organisational structures are working on integrating services and processes across individual administrative bodies and institutions and even include private businesses. The development of e-government therefore demands a holistic strategic approach that encompasses the entire public administration and is not limited to individual bodies and institutions, or individual sectors and levels of administration. The methods of monitoring, evaluating and benchmarking e-government development will have to follow the same principles. Based on critical analyses of existing approaches, this paper attempts to define the areas and aspects that must be included within the integrated approach in order to facilitate the progress of e-government towards its strategic objectives, that is the development of services based on user’s needs and problems, i.e. integrated services or life-events.

Keywords: e-government, monitoring, benchmarking, integrated services, life-events

1. Introduction

Evaluating e-government has become an important or even essential element in the development and introduction of e-government [39,60]. Evaluation is vital to discovering the current state of e-government development, working out the extent to which objectives within various strategies and action plans have been reached, ascertaining strengths and weaknesses, shaping new guidelines, looking for examples of best practice and finally comparing different e-government organisations at the national and international levels. In addition, in its eEurope2005 programme [21], the European Commission explicitly stressed the importance of monitoring and benchmarking in the formation of new guidelines and policy.

However, several reports and researches [14,52,59] suggest that current approaches to monitoring evaluation and benchmarking e-government development don’t support a comprehensive e-government assessment and need to be further improved in order to give policy makers evaluation elements for their decisions. Therefore additional research is needed in the field.

On the other hand, different articles (see for example [40]) realized that most countries define the term e-government too narrowly only in terms of offering electronic services online. Yet e-government is
much more than this. It involves government use of modern information and communication technolo-
gies as applied to the full range of government functions [60] from policymaking, policy implementa-
tion (including service delivery and cooperating with citizens in democratic processes) to assessing and evalu-
ating their results, etc. Therefore it includes not only relations with customers (citizens and businesses),
but also internal operations of individual administrative bodies as well as relations between them.

In our opinion this problem is a symptom of pressure from politicians for rapid results encouraging
citizens and businesses to move over to using e-services. However, it is only recently, after numerous
warnings from experts [30,34,37,52] and when evaluations began to reveal the large gap between supply
and user take-up of services [70] and even the slowdown in their development [6,13] that individual
countries have started to make their strategies more comprehensive and give greater emphasis to the
user-centric approach, back-office reorganisation and process reengineering. This primarily involves
integrating the relevant services and processes to provide customers with high quality services designed
to meet their needs and expectations, i.e. integrated services or life-events. Approaches to monitoring,
evaluating and benchmarking e-government development must also change accordingly.

We suggest that existing methods of monitoring, evaluating and benchmarking e-government develop-
ment have been too narrowly defined for them to properly promote the development of solutions, i.e.
integrated services or life-events, that could fully utilise IT potential and offer real benefits to citizens
and businesses as well as the administration itself. Mostly they are just the reflection of too narrow focus
on e-government development.

The fundamental issue addressed by this paper concerns how existing approaches, particularly at the
EU level, should be changed and updated to facilitate the development of e-government in the way of
realizing long-term objectives i.e. integrated services development.

The research is based on critical analysis of existing approaches to monitoring and benchmarking e-
government development – with special emphasis on EU metrics – and the results of empirical research
that has been carried out by the Institute for Informatisation of Administration since 1999 [44–50]. The
results of these studies indicate that delays in the development and introduction of e-government are
primarily due to the fact that back-office processes have not really been reorganised, what should also be
considered in approaches to monitoring and evaluation of e-government development.

The paper addresses the following issues:

– which areas and aspects of e-government are supported by existing monitoring, evaluation and
benchmarking methods
– to what extent these approaches support the evaluation of services designed around customer’s needs
(integrated electronic services or life-events) and with their development related areas and aspects
of e-government
– defining key areas and aspects of e-government that must be included in the evaluation and bench-
marking system to obtain an overall picture and facilitate the development and introduction of
integrated e-services.

2. Paving the way towards integrated electronic services

Customer orientation is one of the most important long-term objectives of public administration and
a key element in the effective and efficient supply of quality services. This objective will be realised
within e-government by developing integrated services that not only bring together services dispersed
and fragmented among individual administrative bodies, but also integrate them into more complex units
that match citizens’ needs and problems [48]. Integrated services offer users the opportunity to resolve issues or life-events (moving house, building a house, starting a company) on the whole in one place (‘one-stop-shop’ principle). The basic characteristic of these services is that they are created on the basis of users’ needs and not of internal requirements and structure of the administration.

The literature offers a number of models presenting the development of e-government (from the customer perspective) via individual levels of development [5,10,38,55,74]. In order to present the development way towards integrated electronic services, the model [56] will be used. It describes the development of e-government, particularly on the World Wide Web, in four characteristic stages:

1. **Web Presence** – publishing basic information;
2. **Interaction** – more information, search engines, saving and printing of forms, communicating with employees via e-mail, links to other websites;
3. **Transaction** – offering transactions ranging from the triggering of processes (which correspond to particular service) using electronic forms to full electronic implementation of services and corresponding processes, including the case handling, receipt of the final product, and electronic signatures and payment if required;
4. **Transformation** – the long-term objective of e-government, allowing integrated services to be offered on the ‘one-stop-shop’ principle, many processes occurring without customers having to be involved, making administrative operations more transparent and improving customer satisfaction.

Research [6,13,17,49,74], indicates that most countries reach the second level of development. This level is relatively easy to achieve, as supplying information, application forms and e-mail addresses online involves no great effort or any change in existing operations. The development of the real transaction services, however, enabling all phases of back-office process to function electronically requires intervention also in back-office systems. At this level development starts to significantly slow down [6,13]. West [17] found that only 10 per cent of websites surveyed in the EU countries had at least one level-3 service.

The situation is entirely in line with narrowly defined strategies, according to which most countries launch e-services along the ‘quick fix, quick wins’ principle and rapidly construct the electronic equivalent of a traditional, bureaucratic administration. Research [20] warned that most of the potential for e-government would be squandered if we were to continue developing web applications that function merely as a façade to cover over internal chaos. The back-office requires just as much attention as the front-office in the development of e-government [64], and the two areas should be developed in tandem.

Research [70] also indicates that there is a significant gap between the supply and take-up of services. In addition to the still inadequate level of internet penetration, the digital divide and the low level of trust in e-government, the cause lies in the poor quality of services. Research [61] has found that e-service users (the research included users of 20 basic online public services, as defined by the European Commission) most frequently cite timesaving (available 24 hours a day) and flexibility (no need to visit the office) as the greatest benefit of e-services. These are benefits that internet use itself provides and are not the consequence of better quality services. Service users also say that it is difficult to find the information or services they require. E-government services are therefore still in their infancy and far from being services designed to meet customer needs. The research concludes that to attain significant benefits the services and accompanying processes have to be updated and include a higher level of coordination between agencies, particularly in the sense of sharing information and software. Similarly [29] determines that providing a suitable level of services will require demanding quality standards in communication and data sharing in the back-office environment, both within individual bodies and between them.
No country has yet achieved the fourth or transformation level of development, denoted by full realization of customer orientation objective and introduction of integrated services. Many countries have dedicated considerable efforts to developing a national government portal based on the life-event principle [32,43,74], yet the path to this objective will be long and arduous. In the development of integrated services all existing services and corresponding back-office processes, whether or not different competences and authority are spread between different institutions, have to be considered. A fundamental reengineering and integration of services and processes, as well as the reorganisation of bureaucratic organizational structures, data sharing, the introduction of shared technology solutions, training of servants, legislative changes and new management models are required. The quality of integrated services depends on the extent to which the services, and the processes they are based on, are actually integrated [28] and considered with regard to the real value they brings to the customers. An empirical study [35] has demonstrated that there is a clear and strong link between reorganising government back-offices and the electronic public services experienced by users. Cooperation between administrative bodies at different levels of government plays the key role in this process [51].

3. Overview of existing approaches to evaluating e-government development

A large amount of research has already been carried out into monitoring, evaluation and benchmarking e-government. An overview of approaches shows that they cover different areas and aspects of e-government (Table 1). They include various indicators that can be categorized in the following groups:

- e-readiness
- back-office
- front-office
  * supply
  * demand
- effects and impacts.

The existence and maturity of the right environment for launching and using e-government solutions in individual areas are two key elements in the successful development of e-government and, by measuring enabling factors for IT, indicate the readiness of individual players (government, citizens and businesses) to participate in the electronic world, i.e. e-readiness. On the government’s side this is mainly an issue relating to strategies, policies and action plans for the introduction and development of e-government, IT use policies, the adoption and use of information infrastructure, IT training, awareness of the advantages and problems of e-government and issues relating to financing, motivation and obstacles for the development of e-government. External (citizens and businesses) aspects include primarily ownership, interests and the level of use of information infrastructure, reasons for their under-use and opinions on the development of e-government in general. These indicators partially overlap with the evaluation of the information society as a whole.

The front-office area is studied from two complementary points of view: supply and demand.

Supply-side approaches entails evaluating online supply, and only in individual cases does it also involve supply via other channels of communication such as digital television, mobile technologies, call centres, dedicated kiosks and so on. These approaches generally investigate availability, level of development, quality and other characteristics of individual websites, and portals as well as particular e-services and information content.
On the other side demand-side approaches study the field from the point of view of the users (citizens and businesses). This kind of research primarily involves investigating actual use of websites, portals, e-services, information content and other elements of supply, the level of interest in use and reasons for not using services as well as evaluations of the quality of services as perceived by the users and evaluation of their perceptions, requirements and needs.

The research that has dealt with evaluating the back-offices has assessed the adoption and use of different information systems including data sharing and exchanging technologies (databases, document management, process and workflow management, data sharing and exchange between organisations,
etc.).

Approaches to effects and impact evaluation include assessments of the impact of e-government on economic, social and democratic processes, such as cost and benefit analyses, impact on organisation, work methods, etc.

A detailed review of these approaches reveals that they are focused mostly on individual area or aspect of e-government, first of all on dealing with customers (front-office), evaluating the supply-side of e-government and something less demand-side, while largely neglecting the back-office and the impact and effects of e-government (Table 1). This proves the opening supposition that current approaches do not support a comprehensive e-government assessment, but only partial evaluations that cannot give policy makers evaluation elements for their decisions, especially not in the direction of transformative government, characterized by integrated services development, where quality highly depends on back-office systems.

4. Critical analysis of EU approaches and possibilities for improvement

In the EU, the eEurope2002 [23] and eEurope2005 [21] programmes offer a basis for evaluation the progress towards information society, including e-government as a separate field of interest. In addition to an action plan they also include a list of indicators for monitoring progress in the area [22,42]. The EU does not have a standard methodology for measuring and evaluating these indicators, so the evaluation of individual areas and aspects has occurred separately.

The approaches currently used by the EU to present official data on e-government development are the CapGemini Ernst & Young approach [13], which measures the supply-side of e-government by availability and level of online development of 20 basic public services and the EuroBarometer [25,33] which, in addition to general information society indicators that cover some aspects of citizen’s and businesses’ e-readiness, measures demand-side of e-government, i.e. the use of government web pages by citizens and businesses for finding information, obtaining forms and sending completed forms.

The existing approaches do not therefore cover all areas and aspects of e-government and those that are covered are evaluated with a limited selection of indicators that are focused mainly on detecting technological progress. This enables relatively cheap, fast and clear results, but does not provide a comprehensive picture of the state and impact of e-government. This was also stated in the eEurope2002 report [24], which promoted additional research in the field.

The gap was filled in part in 2003 by four research projects. The ‘Top of the Web’ study by PLS Ramboll and Eworx [61] measured the quality of 20 basic public services as perceived by their users and the benefits they offer, thus supplementing the CapGemini Ernst & Young’s approach. The SIBIS project (Statistical Indicators Benchmarking the Information Society) [70] expanded the EuroBarometer indicators with more comprehensive measurements of the citizen’s and businesses’ e-readiness (adoption and use of IT – especially internet, knowledge, security, trust, digital divide issues), and partially also CapGemini Ernst & Young’s measurements (interest in use, actual use, and reasons for not using the 20 basic public e-services). Now underway are the BISER project (Benchmarking the Information Society: e-Europe Indicators for European Regions) [8] and REGIONAL-IST (Regional Indicators of e-Government and e-Business in Information Society) [65], which relate to the development of similar indicators to the SIBIS, EuroBarometer and CapGemini Ernst & Young approach, with more emphasis on the regional development. The latter include also indicators on IT usage in municipalities and regional departments. However, the question is whether or not the EU will include these indicators in its official monitoring framework.
<table>
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<tr>
<th>Approach</th>
<th>Euro-Barometer</th>
<th>CapGemini Ernst &amp; Young</th>
<th>PLS Ramboll and Eworx</th>
<th>TietoEnator Trigon</th>
<th>SIBIS</th>
<th>BISER</th>
<th>REGIONAL-IST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators</td>
<td>IT ownership and usage, security, government websites usage – information, forms, e-mail</td>
<td>availability and sophistication of e-services</td>
<td>e-services quality, satisfaction with e-services, benefits using e-services</td>
<td>e-services maturity (accessibility, usability, supply)</td>
<td>IT ownership and usage, dig. literacy, e-commerce dissemination, telework, e-health, security, dig. Divide and preference, awareness, safety and use of government e-services</td>
<td>IT usage, e-services usage and satisfaction, barriers to use of e-services</td>
<td>IT ownership and usage, security, telework, government websites usage (information, forms, payment, e-mail, forum), barriers and impacts of e-commerce, availability and sophistication of government e-services, impact on work methods, municipalities back-office</td>
</tr>
<tr>
<td>Evaluation aspect</td>
<td>technological</td>
<td>user</td>
<td>user</td>
<td>technological, user</td>
<td>technological, user</td>
<td>technological, user</td>
<td>technological, user</td>
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<tr>
<td>Data gathering method</td>
<td>citizens opinion poll</td>
<td>websites</td>
<td>online opinion poll of users</td>
<td>websites</td>
<td>citizens opinion poll</td>
<td>citizens opinion poll and businesses interviews</td>
<td>citizens opinion poll; businesses, municipalities and regional departments interviews</td>
</tr>
<tr>
<td>Advantages</td>
<td>reliable statistical approach</td>
<td>objectivity, plainness</td>
<td>actual usefulness assessment</td>
<td>usability measurement</td>
<td>comprehensiveness of information society indicators, correlations with the results of other studies</td>
<td>regional level analysis</td>
<td>comprehensiveness of information society indicators, correlations with the results of other studies, regional level analysis</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>focused merely on the internet</td>
<td>not consider back-office processes, not even the quality of services</td>
<td>subjectivity, too narrow defined website result</td>
<td>subjectivity, too narrow defined website result</td>
<td>not consider back-office and e-services quality, benefits are measured only superficially</td>
<td>not consider back-office and e-services quality</td>
<td>cursory measurement of back-office and effects/impacts, not consider e-services quality</td>
</tr>
</tbody>
</table>
Table 3

<table>
<thead>
<tr>
<th>Stage</th>
<th>% (max = 4)</th>
<th>% (max = 3)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0–24%</td>
<td>0–32%</td>
<td>Total absence, of any publicly accessible website managed by the service provider.</td>
</tr>
<tr>
<td>1</td>
<td>25–49%</td>
<td>33–66%</td>
<td>Information – the information necessary to start the procedure to obtain this service is available online.</td>
</tr>
<tr>
<td>2</td>
<td>50–74%</td>
<td>67–99%</td>
<td>One-way interaction – the publicly accessible website offers the possibility to obtain (by downloading forms) the paper form to start the procedure to obtain this service; an electronic form to order an non-electronic form is also considered as stage 2.</td>
</tr>
<tr>
<td>3</td>
<td>75–99%</td>
<td>100%</td>
<td>Two-way interaction – the publicly accessible website offers the possibility of an electronic intake with an official electronic form to start the procedure to obtain this service; this implies that there must be a form of authentication of the person (physical or juridical) requesting the service in order to reach stage 3.</td>
</tr>
<tr>
<td>4</td>
<td>100%</td>
<td></td>
<td>Transaction – the publicly accessible website offers the possibility to completely treat the public service via the website including decision, delivery and payment if necessary. No other formal procedure is necessary for the applicant via paperwork.</td>
</tr>
</tbody>
</table>

Table 2 presents and compares the main characteristics of individual approaches to evaluating e-government in the EU. In order to discover to what extent these approaches support the evaluation of integrated services, the models that are directly related to the evaluation of e-services are presented and analysed in more detail below. They are also supplemented with approaches developed outside the EU framework, which could be used to update and improve them.

4.1. The approach by CapGemini Ernst & Young

The approach focuses on evaluating the development level of e-services using a four-stage model (Table 3), drafted by European Commission. The e-service development level indicates how far an individual service has developed towards full electronic operation online [13]. The European Commission has also issued a list of 20 basic public services for measuring, 12 for citizens and 8 for businesses. For some services (due to their characteristics) the maximum possible stage of development was limited to stage 3 (personal documents, declaration to the police, birth and marriage certificates, changes of address and submission of statistical data).

This approach not only offers no way of evaluating integrated services and back-office processes, it indirectly also hampers their development, since it does not take into account services that are fully electronically developed but that are inaccessible via a publicly accessible website. Additionally the list of services includes some that brings no value to the customers (e.g. birth and marriage certificates) and should be removed or vastly improved, since they promote the automation of existing solutions instead of their full reorganisation and reengineering toward the development of integrated services.

Since the model only allows an evaluation of the visible parts of the process (front-office), the gap between the third and fourth development stages is very large, if one takes into account that a whole range of different levels of back-office development exist between the two levels. A further weakness of the model is the fact that it focuses on technological development of services without acknowledging other qualitative aspects such as access to services, quality of information, and how useful the services are.

A further problem lies in the fact that higher stages of the model do not necessarily include the lower levels: a service can be given a stage 2, 3 or 4 without any information about the service being available. Similarly, a service can reach stage 3 or 4 without downloadable form being available online. This means...
the service is only of use to those who use digital certificates, and it is therefore useless to people who
cannot or who do not want to use such authentication technologies. In this way the model fails to
encourage multi-channel services and does not contribute to reducing the digital divide. This means it
would be better to measure the presence or absence of individual service properties and functions and
aggregate scores in some manner to produce an overall score for the service.

All these points indicate that the model is limited to easily measurable indicators that do anything but
reveal true progress.

4.2. The approach by NOIE

The Australian National Office for Information Economy (NOIE) uses a five-stage model to evaluate
e-services [57]:

1. information on online services;
2. downloadable forms available online;
3. transaction services;
4. integrated information services;
5. integrated transaction services.

While the first three levels cover the same ground as the model by CapGemini Ernst & Youn, the
fourth and fifth levels permit the evaluation of integrated services. However, the differences between
levels are even greater. A further inconsistency of the model is seen in the fact that integrated information
services are placed at level 4. In one sense it is true that integrated information services are worth more
than unusable transaction services, yet the mere availability of information should not be seen as more
valuable than the technological development level of transaction services. This problem is demonstrated
in the fact that technological development and service integration should be monitored separately.

4.3. The approach by Vintar et al.

The above mentioned problem is solved with the approach by Vintar et al. [48]. The criteria for
evaluation of integrated services are grouped in two dimensions of service maturity: sophistication and
integration. Whereas the sophistication level is defined according to the CapGemini Ernst & Young’s
model, the integration level refers to the degree of integration of ‘elementary’ services and corresponding
processes required for a particular life-event:

1. dispersion: services needed to solve particular life-event are dispersed or fragmented over different
   websites of different institutions;
2. coordination: services in the life-event are accessible through a single entry point on the internet,
   but essentially services and corresponding back-office processes remain more or less unchanged
   (perhaps only automated); coordination may take place in two ways: (1) step-by-step coordination,
   where the user initiates each process separately and concludes them before moving to the next,
   or (2) one-step coordination, where the user only needs to initiate the first process and others are
   initiated automatically;
3. integration: services and corresponding back-office processes are reengineered and integrated into
   one single process to solve the particular life-event as a whole.

The maturity score for a life-event indicates how far in development of each dimension the particular
life-event has been developed. It comprises an aggregated score of the development of the services
comprising the life-event and a score for the level of integration of these services, including accompanying back-office processes. The model therefore takes into account the organisational aspect (integration) as well as the technological aspect; however the evaluation of the back-office informatisation remains weakly supported, nor is the user aspect taken into account in evaluating factors that affect quality. Some of these shortcomings are corrected by the TietoEnator Trigon’s [73] and PLS Ramboll and Ewox’s [61] approaches, which evaluate the user aspect of services, the first from the supply side and the second from the demand side.

4.4. The approach by TietoEnator Trigon

The TietoEnator Trigon’s model [73], developed under the European Commission’s IDA programme, incorporated a more pragmatic approach that permits the evaluation of the maturity level of e-services, based on the following assessments:

– accessibility: ease of use for locals and ease of use for other EU users to locate/access the service and actual possibility of usage from abroad;
– usability: service covers real user needs, easy to learn, easy to use, ensure few user errors, pleasant to use, presentation in foreign languages;
– supply: supply completeness and supply quality.

The model is of interest in that it adopted the evaluation of services from the user point of view; however the criteria make it difficult to produce an objective evaluation. Furthermore, the scores are heavily dependent on the knowledge and understanding of the evaluator. Another weakness is that the model emphasises criteria that are significant to services with cross-border components. Services that are not relevant to foreigners are immediately poorly assessed. This may be the reason that the model was only used for a test measurement and not then applied. Nevertheless, with evaluation of accessibility (ease to locate service), usability and comprehensiveness of e-services supply (supply scope and depth) the need for integrated service development may be indicated.

4.5. The approach by Accenture

The approach by international consultancy firm Accenture [6] assesses the maturity of services on the following basis:

– service maturity measures the level to which online services are developed. It is an aggregate indicator, calculated as the product of the number of online services and the development level of each of the online service. Services are separated into three categories depending on the maximum development level they can attain: publish, interact, transact, which development was evaluated using a three level ranking;
– customer relationship management – CRM measures the extent to which government agencies manage interactions with their customers and deliver services in an integrated way. This includes understanding how customers want to interact, what services they need and how they are delivered.

The strength of the model lies in the method of evaluating the maturity of online services, as it takes into account the number of such services, their technological development and the quality of access to them. Though, it does not permit evaluations of the integrated services as a whole or take back-office processes into account, it enables, however, the evaluation of integrated services to some extent by evaluation of how effectively a service is offered: is it designed on the basis of user needs, or must users be familiar with the internal organisation of the administration to find the services they need, and to what extent is the service integrated with services that other organisations have responsibility for.
4.6. The model by PLS Ramboll and Eworx

The latest European Commission research, performed by PLS Ramboll and Eworx [61], closed the knowledge gap in the EU in the field of services evaluation, as 20 basic public services were evaluated from the demand side. This supplemented the CapGemini Ernst & Young’s model and enabled direct comparisons between supply and demand. Service quality as perceived by theirs users is assessed in relation to:

- **overall service evaluation** (a six-stage scale);
- **service usability**: positive or negative answers on questions about website accessibility, service accessibility, ease of use, language comprehensibility and website response speed;
- **benefits of service use**: users choose among benefits in the list (save time, save money, gain flexibility, get faster service, receive more and better information, receive better help, better control over the process).

A weakness of the research, as with all the others that attempt to evaluate quality on the basis of user’s surveys, is that those surveyed generally (though not always) do not have enough knowledge of the possibilities of modern IT to objectively assess the advantages offered by the new solutions; their scores are therefore often too high. However, by assessing the benefits and disadvantages of e-services the need for integrated services development may be recognized.

4.7. The approach by Leben et al.

The strength of this model [2] is that it directly improves upon the existing EU metrics (CapGemini Ernst & Young approach) and the approach by Vintar et al. [48]. It eliminates some of the shortcomings of the previous models and also adds criteria for evaluating the method of accessing services, the organisation (integration) of services into the life events and properties of the portals that offers particular services. However it does not evaluate back-office processes, which is its main weakness. Evaluation takes place at three levels that correspond to the three basic components of the portal:

- **e-service**: particular stages and characteristics from CapGemini Ernst & Young’s model are analysed separately and then aggregated into the overall assessment of the e-service. In addition, the clarity of e-service and quality of information provided are assessed and included in the overall score;
- **life-events** are assessed according to:
  * **maturity**, which is assessed according to the average of the e-services (which comprises particular life-event) overall assessments, the scope of life-event (how well a particular life-event is covered with e-services) and life-event coordination (the way in which e-services are combined into particular life-event, as perceived by the user: dispersion, one-entry point, step-by-step coordination, one-step coordination);
  * **usability**, which combines two elements: access to services within life-event (different instruments helping to access e-services) and the standardization of e-service design and structure;
  * **clarity** to the user (which services constitute life-event, which are vital and which additional, their structure within life-event);
- **life-event portals** are assessed by the discreteness of the average assessment of life-events and evaluated against the scope and accessibility of life-events, standardization of life-events design and structure, and personalization.
4.8. The approach by Nordic Council of Ministers

This model [58] is the result of cooperation between the statistical offices of the Nordic countries aimed at developing a comprehensive international methodology for measuring IT use in the public sector (the measurements have not yet been carried out). The indicators primarily refer to the use and impact of IT on work methods in government bodies. The model is of interest because it evaluates the back-office (the use of information systems in an organisation’s back-office: intranet, GIS system, level of cooperation with other administrative organisations and businesses, record keeping system, e-document handling system, workflow system) and the impact of IT on the back-office (adjustment and simplifications of work routines, new distribution of roles and competences and release of resources), yet it does not take into account demand-side and evaluation of any kind of e-services, which is its main shortcoming.

4.9. The approach by Birch

The Birch’s approach [16] is of interest because it evaluates the back-office as well as the effects that implementing e-government has on the back-office. The significant indicators from this aspect are:

– whether and in what manner a body cooperates (partnership) with other organisations within and outside the public administration on the development of e-government: joint supply of services, strategic partnerships between several organisations in planning and implementing joint services, etc.;
– barriers to partnerships;
– impact of e-government on the back-office processes and working methods (size of working space, operating costs, work flexibility, time and costs used to send customers information, time and costs implementing processes for customers).

The weakness of the approach, however, is that none of its indicators evaluate service supply.

5. Evaluating these approaches

The existing EU metrics and approaches outside its sphere are all characterised by a high level of partiality (Table 1). Each approach includes indicators that meet narrowly defined objectives for the individual research and hence cover just a small area of e-government development. Despite the fact that evaluating the supply of information and services is covered best (Table 1), most research only indicates the availability of transaction services without evaluating their development and quality level. However, there are several approaches, which were analysed in the previous paragraphs that are more or less focused on the evaluation of ‘elementary’ and integrated e-services. Table 4 summarizes the extent to which those approaches enable evaluation of integrated services and areas that affect their quality and development.

We can see that the existing EU metrics are well developed in the methods of single services evaluation, but do not include a single case of the evaluation of integrated services. Only the approaches by TietoEnator Trigon and PLS Ramboll and Eworx (not part of the official metrics) indirectly enable the need for their development to be identified. However, even none of the other presented approaches cover all the areas that affect development and the quality of integrated services. It seems that the most useful approach in terms of evaluating the development level of online supply is the approach by Leben et al., which is directly built on EU metrics, but which does not permit back-office evaluation, which has a key impact on the possibility of developing and consequently the quality of integrated services.
Table 4

Inclusion of (integrated) e-services evaluations within individual approaches

<table>
<thead>
<tr>
<th>Approach by:</th>
<th>Back-office ‘elementary’ services</th>
<th>Sophistication of integrated services</th>
<th>Services accessibility</th>
<th>Life event navigability</th>
<th>Characteristics of portals</th>
<th>Effects/impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>CapGemini Ernst &amp; Young [13]</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>PLS Ramboll and Eworx [61]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TietoEnator Trigon [73]</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOIE [57]</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Accenture [6]</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vintar et al. [48]</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leben et al. [2]</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Nordic Council of Ministers [58]</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Birch [16]</td>
<td>✓</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

6. Towards a more holistic approach focusing on evaluating integrated services

The main objective set in planning the model was to develop a model that would enable a comprehensive evaluation of e-government development and facilitate the design of guidelines and actions needed to encourage development towards the long-term objectives of e-government, particularly the development of integrated services designed around user needs rather than the existing, frequently fragmented structure of the administration.

The development of the model was based primarily on research we have carried out in the past [44–50], studies carried out within the EU and the other studies mentioned in the paper. In the draft model, presented in Table 5, we tried to cover all the areas and aspects of e-government that in our opinion has the impact on e-government development and the quality of its results. We classified the indicators into four main groups: environment maturity, back-office, front-office and impact. First, general indicators are given for each area and then specific indicators that relate to evaluating integrated services.

The comprehensive evaluation of integrated services must take into account all the ‘elementary’ services and processes they are comprised of. In Fig. 1 is a draft conceptual model for evaluating integrated services. The left hand side is a model for assessing the level of development of individual services as well as the level of integration of individual services within particular life-event. On the right is a model for assessment of the development of individual processes and level of their integration. However, the enormous diversity of administrative services means that designing a general assessment model is very complicated and it is almost impossible to include all possible variants. Furthermore, it is possible that some options do not apply to some services or processes. This means the options and possibilities that apply to an individual service and process within integrated service must be defined in advance.

Each service within particular integrated service is assessed according to:

- level of development according to how much value the service brings to the citizen: (0) service has no form of electronic support whatsoever; (1–5) levels are defined according to the model by CapGemini Ernst & Young [13] with an additional level enabling online process monitoring; (6) service is designed so that administration automatically informs customer about specific activity; (7) service executed automatically without customer’s intervention; (8) service eliminated since it does bring no value to the customer (for example providing data or certificates on information already known by the government) – the service and the corresponding process are usually settled in totally different way;
- level of integration within integrated service (levels 0–3 derives from Vintar et al. approach [48]) with the difference that here only the service integration (front-office aspect) is taken into account.
Table 5
A draft model of a holistic approach for monitoring the development of e-government focusing on evaluating integrated e-services

<table>
<thead>
<tr>
<th>ENVIRONMENT MATURITY</th>
<th>GOVERNMENT</th>
<th>CUSTOMERS (CITIZENS &amp; BUSINESSES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>general</td>
<td>• adoption and use of information infrastructure</td>
<td>• adoption and use of information infrastructure</td>
</tr>
<tr>
<td></td>
<td>• adoption and content of strategic documents</td>
<td>• opinions on strategic documents</td>
</tr>
<tr>
<td></td>
<td>• trust and security issues</td>
<td>• trust and security issues</td>
</tr>
<tr>
<td></td>
<td>• knowledge and skills issues</td>
<td>• knowledge and skills issues</td>
</tr>
<tr>
<td></td>
<td>• motivation and barriers to implementing e-government</td>
<td>• motivation and barriers to using e-government</td>
</tr>
<tr>
<td></td>
<td>• financing the development of e-government</td>
<td>• digital divide issues</td>
</tr>
<tr>
<td>specific</td>
<td>• motivation and barriers to the development of integrated services</td>
<td>• motivation and barriers to the development of integrated services</td>
</tr>
</tbody>
</table>

| BACK-OFFICE          | |
|----------------------| |
| general              | • availability and use of information systems and databases |
|                      | • methods of cooperating within and between individual administrative bodies |
|                      | • level to which a processes is carried out electronically |
|                      | • level of integration of processes within life-events |
|                      | • level of process standardisation |
|                      | • the number of different employees and institutions involved in the execution of the processes and life-events |
|                      | • the number of processes within particular life-events |

| FRONT-OFFICE         | |
|----------------------| |
| SUPPLY               | DEMAND |
| general              | • public administration's online presence | • use and quality of websites |
|                      | • website characteristics and functionality | • use and quality of information content |
|                      | • information content of websites | • needs, wants, demands, opinions |
| specific             | • amount and development level of e-services | • use and quality of e-services |
|                      | • amount and development level of integrated services | • demand for integrated services |
|                      | • level of integration of services within life-events | • use and quality of integrated services |
|                      | • level of services standardisation | |
|                      | • the number of services within particular life-event | |

| IMPACT               | |
|----------------------| |
| GOVERNMENT           | CUSTOMERS |
| general              | • cost, time, complexity performing processes and services | • time, convenience, simplicity, accuracy |

Each assessed service is represented with a point on the left graph on Fig. 1. In the best possible scenario all the points are in the upper right hand corner, representing the highest possible development of integrated services. This means that customers can carry out all activities linked to a life-event electronically, completing just one form and receiving just one result. In some cases also automation and elimination of particular services within life-event are possible.

Furthermore, each process is assessed according to:

- level of development according to how much of the process can be carried out electronically: manually, partially electronically (applications for individual activities: document management system, workflow system, database access and use, decision-making support systems, expert systems, etc.),
Fig. 1. A draft model to assess the level of integrated service development.

fully electronic, automatic (without human intervention – this is only possible in some processes);
– level of integration used to assess how communications (data exchange) takes place with the main
process and to what extent this process is integrated into the main process. This is only possible
after the full process reengineering.

In this case each assessed process is also represented by a point on the right graph on the Fig. 1. In the
best possible scenario all the points are in the upper right hand corner, representing the highest possible
development of an individual process within integrated service. This means that all processes within
integrated service are integrated into one single process and executed fully electronic or even automatic,
i.e. without human intervention.

The model therefore enables the evaluation of integrated services in terms of the level of their electronic
support and integration. A higher level of development means a lower number of services and processes,
lower level of duplication, and a lower number of administrative bodies involved in implementing an
integrated service, with as high as possible level of technological support. By this the model enables the
design of genuinely applicable guidelines for the development of integrated services.

7. Conclusion

Monitoring metrics is one of approaches that can significantly influence the direction in which e-
government development is taking place. The analysis of current approaches shows that mainly they are
just the reflection of a too narrow focus on e-government development. Also, they are too partial to
provide an overall picture and enable a formation of new development guidelines that could promote the
further development of e-government towards the realization of its long term objectives.

The current metrics should be extended and supplemented firstly with indicators that will measure the
progress towards transformative government i.e. customer oriented high quality services designed around
user needs and problems (integrated services). Since their development requires not only changes in front-
office operation but also and firstly the radical reengineering of back-office processes and organisation
structures, the new indicators should refer not only to the level of development and quality of the front-office part of integrated services but also to the level of development and quality of back-office processes and systems irrespective of existing organisational boundaries. In addition, special attention should be focused on the level of integration of the current individual services and processes, from which the single integrated service will be developed.

Therefore, decisions on what should be measured must be based on the holistic definition of e-government, its long-term objectives, characteristics and the issues that remain to be solved. It is important to remember that metrics are not complete once first defined. Analyses indicate that statistical methods and practical approaches to measuring gradually improve and action must be taken to improve them, in line with the latest events and developmental trends. Measuring is a learning process [35] that never ends.

Yet given the present state of e-government development, which must now address the development of customer oriented services, the present set of metrics are lacking, particularly in terms of the comprehensive evaluation of integrated services and the indicators that affect their development (especially back-office development). The first step in that direction has been taken with this paper, which is focused on the technological and organisational aspects of developing integrated services, and which should in future be further supplemented with other aspects that would place that development in a wider context. To put this into practice, one must precisely define individual indicators and the mutual dependency, and define methods for assessing and aggregating individual scores into partial and final results.

References


