Revisiting public information management for effective e-government services

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Introduction: governments in an information society

The story of the impact of information and communication technologies (ICTs) in the field of government is much the same as with companies, although the timing differs. Companies have been exploiting for a long time the ever-increasing capabilities of ICTs in order to satisfy their customers. Now, “people know how easy it is to do business over the Internet and they are demanding the same level of service from government that they have come to expect from the private sector” (Schoeniger, 2000a). However, the public sector is deterministically following the same path as the private sector: from the pursuit of efficiency to effectiveness and from the use of ICTs by the same old structures to a complete internal transformation for maximum leverage. New management paradigms for the public sector as well as challenges and innovations incurred by the advent and intelligent use of ICTs in governance have been put forward by several researchers, e.g. Schedler and Proeller (2000), Bellamy and Taylor (1998), and Snellen and Van de Donk (1998). Moreover, the digitization of the social interactions and, subsequently, of the governance functions has given birth to ideas about the e-transformation of democracy (Grossman, 1995; Hague and Loader, 1999), citizenship (Friedland, 1996) and nationhood (Barrett, 1997)

The progress towards information society demands that governments not only formulate the appropriate legal and regulatory environment so as “to allow free-market forces to assert themselves unhampered by excessive government regulation” (Zwass, 1998), but also to transform themselves into lean and nimble organizations in order to accomplish their governance role, supported by a pyramid-like structure as in Figure 1.

In this pyramid, “information flows vertically, being ‘multiplied’ as it flows down and ‘refined’ as it flows up the pyramid. To date this process has almost exclusively been based on the movement of paper” (POST, 1998). Replacing the paper flows between the pyramid of government and the recipients of policy, as well as between the public/civil service “customers” and the pyramid of government with modern ICTs, is a major requirement for governments entering the digital age.

The seamless cooperation between a government and its “customers” is definitely not only an issue of electronic interfaces but, most importantly, a question of high quality and reliable services. Without underestimating the...
An information management philosophy towards e-government

Being entrusted with the government treasury, the GMoF interacts with all citizens and businesses involved in economic activities. Therefore, the effective use of ICTs by GMoF has a significant impact on the adoption of advanced technologies by both the recipients of the governmental policy as well as the “customers” of the civil service.

The GSIS of GMoF is responsible for managing all ICT-pertinent issues. At the bottom line, the core business of GSIS has to do with managing and adding value to information. This does not come as a surprise, since “government is deeply involved in the information sector, either as a primary producer or repackager of information – economic and social statistics, maps, weather, agriculture, export opportunities, health” (Kent n.d., Lesson no. 17). Therefore, an appropriate information management strategy has to be in place, with which decision making at all levels needs to be aligned.

Regarding the functions of a government and the role of the civil service in particular, the vision of GSIS is based on the premise that governmental policies are developed with a view to offer services to social recipients aiming at their prosperity, and achieving sustainable economic development. Such a vision is also in congruence with the Greek government’s e-commerce strategy, stating that “the vision behind the actions on electronic commerce
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aims at making Greece an equal and strong partner in the international commercial environment. The use of electronic commerce technologies and practices can give Greek firms competitive advantages, with a consequent increase in productivity and international competitiveness for the whole country” (Greek Prime Minister’s Office, 1999). Indispensable to this end is the optimal management of public resources, which, in the application domain of GSIS, is epitomized as follows.

- A public information system processes and manages not only public resources but also part of the public “information treasure”.
- A fundamental objective of public information systems is to support effectively the mission of the government and the civil service, and to leverage the social role of government.
- In this line of thought, management of the public information treasure must be optimised for maximum quality of service and resource-effectiveness.

Proactively focusing on exploitation of the public information treasure instead of reactively responding to social partners’ requests shapes a new philosophy in public information management, where an attitude towards customer expectations prevails over the usual bureaucratic routine of carrying out civil service work. This shift of culture for public information management is interpreted into action:

- first, by offering seamless and reliable services through a variety of electronic channels at the customer’s choice; and
- second, by re-orienting the planning and operational exploitation of GMoF IT infrastructures from an internal focus towards a more customer-oriented, if not customer-centric, perspective.

If technology is eroding the manners of interpersonal communication, social interaction and economic and commercial activity by gradually becoming the most prevalent mediating and facilitating factor, then governments have little other choice than to establish ICT interfaces with their customers; and, although the use of the “customer” notion may not seem semantically fit, it is employed in the e-government literature to underpin the fact that governments have started considering their citizens as customers who can opt out for another “government service provider”, hence the need to keep them satisfied. According to traditional management literature, customer satisfaction and loyalty can only be achieved if customers can recognize the value proposition and consider a particular offering as meeting their perceived and/or latent requirements. Such a value proposition has to do not only with the product or service itself, but with the delivery channel as well. Focusing on the latter, government IT infrastructures need to be designed around customer needs and, what is more, as if they were to be operated by the customers themselves.

An IT modernization roadmap towards e-government
GSIS customer orientation and deployment of IT infrastructures to deliver high-quality customer-oriented service has been based on a simple modernization roadmap structured around four key milestones:

1. Business process streamlining and re-engineering initiatives.
2. Reversion of “introvert” orientation, failing to place emphasis on direct G2C and G2B service provision.
3. Conception and deployment of a backbone IT infrastructure functioning as a “digital nervous system” (Gates, 1999) for GMoF and its business partners.
4. Development, on top of this infrastructure, of several electronic interfaces for GMoF customers using modern as well as traditional ICT platforms (Web, facsimile, telephony).

Some outdated business processes have been overhauled and certain regulatory amendments have been necessary to prepare the civil service from an organizational point of view for the introduction of these new technologies. The classical “don’t automate, obliterare” principle of M. Hammer was applied as appropriate so that the ICT investments would ultimately support the government-to-business (G2B) and government-to-citizen (G2C) type of requirements. The G2B vision can be articulated as follows: “Government support and assistance should be anywhere and anytime available to aid the businesses succeed, facilitate their every contact with the State and regulate the environment for a healthy electronic market economy” (Stamoulis and Georgiadis, 2000). Similarly, the G2C vision is that “government support and assistance should be anywhere and anytime available to aid the citizen as a valuable customer, reflecting the fact that a government respects the citizen” (Stamoulis and Georgiadis, 2000). In light of these objectives, scattered information must be interlinked and cleansed, and IT islands must turn into service-providing networked
information systems. As a result of business process reengineering activities, the interconnection of information and systems islands has allowed for functional integration among various workflows, thus producing an avalanche effect on IT infrastructure exploitation as well as on augmenting added value of informational content.

As an outcome of this strategy a six-year IT project called TAXIS (taxation information system – named after ταξις, the Greek word for order) has been initiated by GMoF. TAXIS, representing one of GMoF’s strategic IT investments with an overall budget of approximately 60m euro contributed by national and EU (2nd CSF) funds, has provided IT support to tax agencies all over Greece for carrying out tax filing, calculation and payment transactions with citizens and businesses. Now in the final year of its deployment, TAXIS is based on a three-tier architecture and application architecture over a private WAN to serve over 98 per cent of tax payers and taxation transactions, with an objective of 100 per cent for this year.

TAXIS has undertaken the character of a digital nervous system upon which many internal GMoF administrative processes can be incarnated, including deployment of an MIS shell to support GMoF policy-monitoring and policy-making requirements. TAXIS also provides backbone network services to other GMoF IT infrastructures, such as the Customs Information System. Apart from that, TAXISnet network and database infrastructures can be exploited for offering services to other public administration agencies as well as deploying cross-PA horizontal co-operation schemes.

A case for e-government services

During master planning of TAXIS IT infrastructures back in 1995, core functional design was complemented by a number of internal business process streamlining and re-engineering provisions aiming at better quality of service for citizens and businesses. As it has become apparent in recent years, however, the initial conception of TAXIS, taking place at a period when IT support for GMoF internal business functions was urgently needed, suffers from an “introvert” orientation, failing to place emphasis on direct government-to-citizen and government-to-business service provision. This fact, combined with the expansion of Internet and the Web as global communication and transaction platforms for an emerging digital economy, has provided grounds for GSIS to formulate a strategy for making some “popular” internal TAXIS services directly available to the citizen and business tax-payer communities, thus providing the “missing interface” for extending an IT infrastructure for internal business processes to an “extrovert” IT platform for customer services. This strategic approach has resulted in the TAXISnet project, whose services are directly accessible to the public in the form of a Web site (www.taxisnet.gr). TAXISnet offers a Web-based interface from which end-users initiate transactions that provide electronic services. After a short initial, completely remote, registration procedure, TAXISnet users receive electronic credentials that enable them to access the full range of TAXISnet services. Now in the second semester of its pilot phase, TAXISnet offers, inter alia, e-filing services for income tax and VAT forms, as well as VAT e-payments via banking system services. Further TAXISnet development plans include:

- e-filing services for all major tax forms;
- deployment of TAXISnet services in Internet-enabled public kiosks; and
- integration with other national and European e-government services.

Table I shows measureable results regarding the user penetration of TAXISnet e-services.

For security purposes, data retrievals for TAXISnet transactions are performed upon an off-line-maintained replica of involved TAXIS database tables, whereas data updates are replicated off-line to the TAXIS database. As far as the software architecture is concerned, TAXISnet applications have been developed from re-usable TAXIS application components, whereas the aforementioned technical architecture requires a minimal amount of re-engineering in the original TAXIS applications and database schema. Therefore, the need for application software modifications or any other architectural adjustments has been minimized, thus also minimizing implementation time and costs.

The nowadays-observed electronic access points “obsession” should not distract decision-makers from focusing on the provision of seamless and integrated channel-independent services. Not only are there services that cannot yet be offered fully online, but also it is for customer convenience to choose whatever channel they would like to use each time they need to transact with GMoF. Therefore, as Kent notes, “… governments need a ‘clicks and mortar’ model. It is now clear that the new economy isn’t synonymous with the electronic channel, but involves the
intelligent pairing of on-line and off-line assets. This is not just because some may not have access to or be reluctant to use on-line channels, but because the same consumers may prefer to use different channels at different times of different purposes (e.g. counselling, appeals). The data available through these channels need to be identical and equally current. This implies that all channels need to be feeding into and drawing from the same information base – what we call channel transparency” (Kent n.d., Lesson no. 3). In order for GMoF to achieve channel transparency, TAXIS infrastructures as an IT backbone are of paramount importance. The ultimate goal of channel transparency is regarded as an ongoing task of continuous organisational structures, business process and information systems functionality improvement.

In its current status, TAXISnet offers 24×7 service availability and real-time response for all transactions, plus on-line FAQs and email-based help desk services for registered and prospective users. The main customer segments addressed by TAXISnet are individual citizens, with emphasis on remote regions, professional accountants as well as private businesses, with emphasis on SMEs. According to recent estimations, TAXISnet services are currently (May 2001) used by approximately 10 per cent of VAT-liable citizens and businesses, with a projected penetration of 15 per cent for December 2001 and 25 per cent for December 2002.

Operational exploitation has involved a number of legal issues, mainly relating to authenticity of e-communication respondents and validity of e-VAT forms; these have already been resolved by appropriate regulatory acts and lightweight technical measures. No major cultural obstacles, on the other hand, have discouraged end-users. As the current end-user penetration levels and rate testify, e-working habits as well as a trust-and-confidence culture have already been established by a sufficient number of citizens and businesses, who now act as a critical mass for maintaining the “success momentum” and attracting new users to the service.

The main comparative advantages of TAXISnet, as observed against internal IT support for paper-based transactions, include:

- elimination of paper work and physical transport;
- continuous service availability, reduced response time and a substantial decrease of errors; and
- open API specifications for integration of TAXISnet service calls into third-party commercial software products (office automation packages, ERP systems etc.).

A key issue in the deployment of TAXISnet services has been the minimization of additional technical know-how and economic investments required on behalf of end-users; since most TAXISnet applications run server-side, only an Internet-enabled computer and any browser are needed to access the full range of TAXISnet services.

Building open-to-customer IT infrastructures is inextricably interwoven with potential security threats. A number of security servers have been deployed to safeguard the flow of messages from and to TAXISnet services. Servers are protected by firewalls and they are connected to leased lines, which form a secure virtual private network. Pursuant to the security policy, user groups have been formed and granted with the appropriate user rights for accessing information resources, i.e. functions and information. In each server,

<table>
<thead>
<tr>
<th>Table I</th>
<th>Figures on user penetration of GSIS electronic services (as of May 2001)</th>
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<tbody>
<tr>
<td>E-VAT (May 2000-May 2001)</td>
<td>Filed forms: 100,000, Registered users: 75,000 (approx. 10%), Registration rate: approx. 300/day</td>
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<tr>
<td>E-income tax (March 2001-May 2001)</td>
<td>Filed forms: 30,000, Registered users: 130,000 (approx. 3%), Registration rate: approx. 800/day</td>
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<tr>
<td>E-tax clearance statements (May 2000-May 2001)</td>
<td>Issued certificates: 75,000, Registered agencies: 3,400 (approx. 34%), Registration rate: approx. 300/month</td>
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<tr>
<td>E-income tax assessment info (May 2000-Dec 2000)</td>
<td>Info requests: 4,000,000 (approx. 40%), Request rate: approx. 17,000/day</td>
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only the appropriate applications have been activated, so that certain transaction security and site security levels can be ensured. The transaction security is based on message encryption, authentication by means of 1,024-bit certificates and user credentials that are delivered to registered users only. Multiple security zones and multi-level firewall designs have been applied for hardware and systems protection. This technical architecture has proven in practice to be a stable and effective solution as far as system security, data encryption and user authentication is concerned. It should, nevertheless, be noted that no security or authentication problems have been observed thus far. The establishment of these technical infrastructures is followed by detailed procedures for detective, preventive and corrective actions. Counter-measures systematically check for intrusion patterns and organize dummy security attacks aiming at identifying possible security shortcomings. With particular reference to user authentication, it is also noted that the introduction digital signatures is planned for the near future (mid 2002), in accordance with progress of the national legislation framework of Greece.

Anticipating diverse requirements and characteristics on behalf of end-users, it has been opted to deploy GSIS e-services in a pilot, rather than big-bang, approach. This has facilitated focusing on the business areas where the provision of electronic services is deemed most critical and their added value may be maximized. Pilot deployment has been combined with systematic e-mail-based communication with end-users, targeted both at rendering prospective users aware of the new services and at gathering feedback from registered users. This feedback, which has been mainly collected in the form of replies to RFC-style messages, has been extremely useful for improving certain functional, ergonomic and performance aspects of the e-service delivery scheme, which in turn allows to consider that a certain level of satisfaction has already been achieved. This view is further supported by current statistics on registration and usage rates, such as those summarised in Table I.

It is important to note that initial registration rates have surpassed many times the average – which has been quite anticipated due to long-held public expectations for electronic services – and that there have not been any periods of extremely low registration rates – which is considered as an indication of sustained public interest. What is more, no drop-out (either un-registering from or abandoning the service) cases have been observed, which means that all users that have used the service once, have come back and used it again and again. This is perhaps the most important indication of user satisfaction.

### Modelling e-government service deployment as an ICDT spiral

Conception and deployment of TAXIS infrastructures and TAXISnet e-services have formed two pillars for GMoF e-government initiatives, which nevertheless need to be in line with an appropriate e-government strategy. According to international best practice, “governments should take a building block approach to e-government. […] Start with rudimentary, easily understandable processes. Then coordinate those activities into an overarching strategic vision for how e-government will serve citizens, businesses and other agencies” (Schoeniger, 2000b). GSIS has endorsed these recommendations into a step-wise approach that facilitates rapid social penetration of e-government services.

The e-service “business” strategy of GSIS can be described in terms of the ICDT model (Angehrn, 1997), named after a typology of information, communication, distribution and transaction services which divides the virtual service space into four corresponding quadrants. Since certain TAXISnet services are attributable to each ICDT quadrant, the entire ICDT virtual service space is populated by GSIS electronic services:

1. **Virtual information space**: publication of documents, including news bulletins, calls and RFCs.
2. **Virtual communication space**:
   - email communication for citizens and businesses;
   - income tax assessment info.
3. **Virtual distribution space**: direct distribution of tax clearance statements to requesting agencies, including public authorities, banks and certified notaries.
4. **Virtual transaction space**: registration procedures;
   - e-filing services for VAT and income tax forms.

Prioritization of time schedules for deploying the electronic services of GSIS has not been a trivial task. It has taken into serious account the fact that good planning can have an influence on prospective users, by “educating” them to deepen their relationship with GMoF via electronic interfaces in order to enjoy the benefits of an improved value proposition. If the virtual service space is represented as four ICDT
quadrants, then the process of offering improved added-value for the electronic interfaces available to citizens and businesses (i.e. the GMoF “customers”) can be depicted as a spiral model that unwinds from the center of the ICDT circle towards more valuable propositions (see Figure 2).

Service deployment according to this spiral model is in line with the “think big, start small” best practices mentioned above. This route, which GSIS has taken both on the grounds of strategy and out of experience, has indeed proven quite successful. Despite the relatively few TAXISnet services available today, it should be noted that a single new service may introduce content to more than one ICDT quadrant. Assessing the current status of GSIS electronic services, it is felt that a successful e-government strategy can only be attributed to the population of all four quadrants towards the direction of augmenting value propositions to the customers.

**Conclusions**

One may identify trends such as “the ever-growing information and technology share of government budgets, the rapid pace of technology change, growing globalization, more multi-centered government organizations, rising public expectations, and growing emphasis on measuring performance” (Morin et al., 1999) which make e-government seem less of a subject for the agenda of the far future. E-government has already become an everyday reality, but still one that needs to be shaped with vision and methodology. GSIS has identified the necessity of clearly articulating its e-government policy and objectives and has entered the process of re-orienting its information management strategy towards deploying the digital interfaces that will provide citizens and businesses with high-quality services. Modelling of the outcome in terms of an ICDT-style virtual service space shows that GSIS employs a theoretically sound strategy towards its customer community. What is more, GSIS is actively seeking co-operation with third-party stakeholders in order to establish single-stop integrated services to citizens and businesses in Greece. In this respect, GSIS is interested in launching horizontal e-service initiatives in co-operation with:

- **“e-service partners”** (incl. regional, national or European public administration agencies, as well as bodies representative of business sectors and citizen communities);
- **“e-service enablers”** (incl. banking, telecommunication, security and certification service providers);
- **“e-service facilitators”** (incl. promotion, dissemination and awareness channel operators); and
- **“e-service practitioners”** (including existing e-service schemes as well as e-government best practice groups).

In pursuit of such partnerships, GSIS operates as an e-service “centre of excellence” for the public sector, spreading the word and proving the concept for

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**Figure 2**

A spiral model of adding value in the virtual space
e-government initiatives. The major argument backing up this strategy has always been and still is the necessity for re-orienting IT infrastructures towards citizen- and business-centric services.

References