From Introvert IT Systems to Extrovert e-Services: e-Government as an enabler for e-Citizens and e-Business A Framework of Principles

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Abstract. In an e-Government approach, focusing on the citizen as customer, the General Secretariat for Information Systems (GSIS) of the Greek Ministry of Economy and Finance has deployed TAXISnet, a pilot project offering VAT e-filing services directly to the general public, as a web-based extension to the TAXIS internal information system. Experience from TAXISnet development and operation has been generalized into a framework of critical success factors for deploying e-service schemes, as well as e-service-centered indicators for evaluating IT projects. GSIS has incorporated these methodological guidelines in its overall IT and business strategy for deploying horizontal e-service schemes and promoting e-services as a catalyst for administrative convergence.

1. Introduction

The notion of "e-Government", i.e. of governments and public administrations offering electronic services directly to citizens and businesses has gained wide-spread consensus in international fora and is being strongly promoted by means of dedicated national and supra-national initiatives [1,2]. In the context of the e-government approach, which forms an integral part of the "Information Society" and "Digital Economy" visions, governments find themselves confronted with a broad range of political themes arising from the need to re-establish their vision and role [3,4] and re-structure their services around the "citizen as customer" concept [5]. Thus, IT support for direct Government-to-Citizen (G2C) and Government-to-Business (G2B) transaction schemes [6] becomes critical, in order to provide citizens and businesses with ubiquitous (anywhere, anytime, any service) assistance [7].

The Greek government has articulated its strategic approach towards e-government and information society in a 1999 report by the Prime Minister's Office [8], which places great emphasis on planning-for-all and quality-of-service issues in order to ensure social cohesion and living standards objectives. Quality of the services offered to the citizens and businesses is also a top-level priority for the General Secretariat for Information Systems (GSIS, www.e-economia.gr) of the Greek Ministry of Economy and Finance (GMoEF), whose task is to deploy and operate information systems for taxation, customs and other business areas, to formulate and implement the overall GMoEF's IT strategy as well as to contribute to GMoEF's administrative modernization.

2. A Case Study: TAXIS and TAXISnet Projects

TAXIS (Taxation Information System) is a 6-year IT project initiated by GMoEF after an IT master plan in 1995. TAXIS, which represents one of GMoEF's strategic IT investments with an overall budget of approx. 60 mn euros contributed by national and EU (ERDF/ESF) funds, has provided IT support to the central tax authorities, located in Athens, as well as to local tax agencies, located all over Greece, for carrying out tax filing, calculation and payment transactions with citizens and businesses. The TAXIS information system is based on a 3-tier data and application architecture over a virtual private WAN and serves all tax payers and taxation transactions in Greece.

TAXIS exploitation plans include the deployment of an MIS shell to support GMoEF's policy-monitoring and policy-making requirements and the enhancement of TAXIS WAN with integrated data/voice/image services in order to support all of GMoEF's internal communication requirements, as well as to provide backbone network services to all of GMoEF's IT projects (e.g. Customs Information System). Apart from that, TAXIS WAN infrastructure and TAXIS database informational content can be exploited for offering network services to other public administration (PA) agencies as well as deploying cross-PA horizontal co-operation schemes.

Although the deployment of TAXIS has been complemented by a number of internal business process stream-lining and re-engineering initiatives aiming at better quality of service for citizens and businesses, it has become evident that the original conception of this project, dating back in 1995 when IT support for GMoEF's internal business functions was urgently needed, suffers from a strong "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 WWW as global communication and transaction infrastructures for an emerging, world-wide, digital economy, has led GSIS to the strategic conception of making some "popular" internal TAXIS services directly available to the citizen and business tax-payer communities, thus providing the "missing interface" for extending an internal IT infrastructure for introvert functions to IT support for extrovert services.

This conception 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 server-side applications are used to initiate transactions and provide user 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.

It should be noted that 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.

Generally speaking, the deployment of TAXISnet services has not encountered any major implementation problems, mainly due to careful design decisions. Experience from operational exploitation of the service with increasing numbers of users has shown that certain technical capacity enhancements may be necessary in order to retain the present quality of service under operation-in-the-large conditions, whereas a limited number of technically sound and practically feasible extensions to the functional and technical architecture are expected in order to establish connectivity (off- or on-line) between the TAXISnet service and banking system e-payment schemes.

After a short initial, fully electronic, registration procedure, TAXISnet users receive electronic credentials which enable them to access the full range of TAXISnet services. TAXISnet offers e-filing services for VAT and income tax accompanied by payments through bank accounts, with an objective to enable e-payments via established banking system infrastructures as the next step. Further development plans for TAXISnet include e-filing services for all major tax forms, provision of TAXISnet services through additional public access points and integration on the long run with other national and European e-government services.

In its current status, TAXISnet offers 24x7 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 (a) individual citizens, with emphasis on remote regions, (b) professional accountants and (c) private businesses, with emphasis on SMEs. According to recent estimations, TAXISnet services are used by more than half of the Internet-enabled and VAT-liable citizens and businesses.

Operational exploitation has involved a small number of legal issues, mainly relating to authenticity of e-communication respondents and legal validity of e-VAT and e-income tax 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, with respect to internal IT support for paper-based transactions, include (a) elimination of paper work and physical transport, (b) continuous service availability, reduced response time and a substantial decrease of errors, and (c) 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 all TAXISnet applications run server-side, only a low-end Internet-enabled computer and a browser (most probably already available to end-users) are needed to access the full range of TAXISnet services.

Furthermore, direct availability of TAXISnet services to all Internet users eliminates the need for additional distribution channels. Awareness on the service is promoted via the mass media, via regional and sectoral events as well as in co-operation with local Internet connectivity clusters (e.g. university departments). Just as the case with TAXIS, GSIS has outsourced the implementation of TAXISnet services to industrial IT solution providers, whereas service maintenance has been initiated on a co-sourcing basis.

3. Critical Success Factors and Methodological Guidelines for Deploying e-Service Schemes

The initial conception and subsequent deployment of the TAXISnet service has been approached by GSIS in a systematic fashion, taking under consideration a set of principles for formulating an optimal scope for the project and ensuring that the functional/technical choices and design decisions all contribute to the overall business objectives. These principles, which can be viewed both as critical success factors (CSFs) and as methodological guidelines for the design and pilot scoping of e-government services, are as follows:

a. In order for a PA agency (GSIS, in particular) to promote the accumulation of a critical mass of users for e-services there should be identified, in the first place, certain business services characterized as of "critical interest" for citizens and businesses, on the one hand, as well as for the PA agency on the other. Furthermore, these services should be prioritized according to strategic business objectives, so that an overall time plan for their IT support through e-service schemes can be formulated. GSIS has selected VAT and income tax filing and payments to be a service of such critical interest, whose business characteristics justify its prioritization for e-service support.
b. For each service included in the e-service scheme project, the interested PA agency should proactively identify and call for contributions all involved service stakeholders, i.e. collective bodies of interested citizens and businesses, as well as intermediary parties. With respect to VAT services, GSIS has identified business associations and professional bodies of accountants as interested stakeholders. After a call on behalf of GSIS and a presentation of the overall idea, most stakeholders have actively contributed to the investigation of certain business and legal issues, as well as to the formulation of operational procedures and functional specifications. This consensus building approach has enabled GSIS not only to take educated design decisions but,

even more important, to establish an early acceptance of the overall idea and promote awareness to a maximal community of prospective users.

c. Due to the novel nature of e-services, which results in various political, cultural as well as legal issues that have to be solved in order to achieve successful implementation and use, the planning and implementation of an e-service scheme for any given service should be preferably initiated with a pilot system. This system, which must be designed for seamless extension into the full-scale scheme, should offer the core service functionality and satisfy the major non-functional (e.g. response time, security etc.) requirements, so that it can be exploited as an appropriate proof-of-feasibility and cost-effectiveness showcase while, on the other hand, optimizing implementation time and effort.
d. Pilot system scoping consists in specifying (i) involved stakeholders and prospective pilot user communities, (ii) operational procedures and (iii) technical architecture and platforms, with respect to the core functional and non-functional requirements. These specifications should take under consideration that
   - participating stakeholders should be selected according to maximum preparedness of IT infrastructures and services, as well as cultural acceptance of e-services in everyday business practices
   - technical architecture should promote the idea of server-side applications that can be produced by re-using already available application software and access “internal” databases via off-line replication; this architectural scheme minimizes the extent of re-engineering necessary to integrate e-service schemes with internal information systems while, at the same time, nearly eliminating the technical complexity on the end-user side and thus reducing additional requirements posed to prospective end-users
   - technological platforms should be selected according to technical maturity and commercial availability criteria, as well as in compliance to open architectures and standards, so that bias or preferentiality towards specific technologies is minimized.

4. An e-Service-Centered Evaluation Framework for IT Projects

Experience drawn from the TAXISnet project, as well as from the planning of additional e-services, has been generalized by GSIS into a framework of indicators that can be used for evaluating IT projects, whether currently operational or under formulation, with respect to their contribution to the establishment of e-service schemes.

The evaluation framework is based on a categorization of e-services provided to citizens and businesses by public administration agencies as (a) informational and (b) transactional. Informational e-services include provision of general (i.e. user-independent) information about some particular service domain, as well as provision of personalized (i.e. user-specific) information about matters such as economic rights and debts, processing of an application and estimated completion time, and the like. Transactional e-services, on the other hand, include e-filing of applications, forms, etc., electronic submission of accompanying documents, electronic production and dissemination of legally valid certificates as well as e-payments.

It should be noted that the following evaluation indicators are mainly qualitative and may not be readily applicable to all cases of e-services; some domain-specific specializations and quantifications may be necessary. Apart from that, the list of indicators should rather be viewed as a representative, rather than as an exhaustive one. Additional domain-specific indicators are expected to be quite useful for certain cases.

A. evaluation indicators applicable to IT infrastructures providing, or IT projects aiming to provide, informational and transactional e-services
   - A.1. point-of-access density
     - A.1.1. absolute figures
     - A.1.2. density per capita of concerned citizens
     - A.1.3. density per geographical region

A.2. point-of-access usability
  A.2.1. provision of single vs. multiple services
  A.2.2. complementary provision of third-party (e.g. banking system) services

B. evaluation indicators applicable to individual e-service schemes (for both informational and transactional e-services), whether currently operational or in the planning phase
  B.1. facilitation of registration procedures
    B.1.1. necessity for registration procedures
    B.1.2. electronic submission channels for registration information
    B.1.3. electronic distribution channels for registration credentials
    B.1.4. normal completion time for registration procedures
  B.2. facilitation of operational procedures
    B.2.1. electronic submission channels for end-user information
    B.2.2. electronic distribution channels for informational or transactional results
    B.2.3. synchronous (real-time) vs. asynchronous response to service requests
    B.2.4. (for asynchronous response) necessity for multiple sessions
    B.2.5. necessity for accessing multiple different service points vs. a single one
    B.2.6. overall reduction of paper work (total, partial, exceptional etc.)
    B.2.7. overall elimination of physical transport (total, partial, exceptional etc.)
    B.2.8. on-line end-user support services
  B.3. integration to third-party services schemes
    B.3.1. transparent initiation of transactions with third-party service schemes in order to complete service provision
    B.3.2. transparent access to third-party information in order to complete service provision
    B.3.3. electronic credentials of individual user provide access to third-party service schemes as well
  B.4. promotional policies
    B.4.1. dedicated awareness and dissemination channels
    B.4.2. exploitation of general-purpose media and events
    B.4.3. end-user motivation policies

C. evaluation indicators applicable to currently operational individual e-service schemes (for both informational and transactional e-services)
  C.1. quality of provided service
    C.1.1. normal completion time for service provision
    C.1.2. improvement in service provision time with respect to predecessor service schemes
    C.1.3. maximum first-response time to end-user inquiries
    C.1.4. frequency of end-user errors
  C.2. penetration to user communities
    C.2.1. estimated ratio of active/registered to prospective users
    C.2.2. (if predecessor service schemes continue to run in parallel) estimated ratio of conventional to e-service transactions
    C.2.3. business performance metrics (e.g. tax-collecting capability of VAT e-payments)
  C.3. acceptance by user communities
    C.3.1. level of awareness of prospective users (never heard of, aware that exists, aware about details etc.)
    C.3.2. level of satisfaction of active/registered users

5. Concluding Remarks : e-Services as a Catalyst for Horizontal Initiatives and Administrative Convergence

The framework of critical success factors and methodological guidelines which was presented in a previous section for formulating pilot e-service schemes, as well as the e-service-centered

framework outlined above for evaluation of master-planned, evolving or operational IT projects, have been incorporated by GSIS as substantial part of its overall business and IT strategy. With a vision of offering best-quality services to the public, while at the same time exercising public policy and serving the policy-monitoring and policy-making needs of the Greek government, GSIS is oriented towards co-operation with third-party stakeholders in order to establish single-stop integrated services to citizens living and businesses operating in Greece. In this respect, GSIS is interested in launching "horizontal e-service initiatives" in co-operation with

a. "e-service partners" (regional, national or European public administration agencies, sectoral professional bodies and bodies somehow representative of affected citizens)
b. "e-service enablers" (banking system institutions, Internet, telecommunication as well as postal service providers, secure infrastructure providers including trusted third parties and certification authorities)
c. "e-service facilitators" (including promotion, dissemination and awareness channels)
d. "e-service practicians" (including existing e-service schemes as well as best e-practice centers).

Apart from that, it is a fundamental premise for GSIS that e-services have the potential to catalyze modernization and re-engineering activities undertaken within public administration in a manner some times ad hoc and ineffective. Thus, e-service schemes are capable to substantially contribute to the themes of the so-called "administrative convergence" agenda recently set forward by the European Union as a critical domain for convergence between the member states. As already presented in the opening case study of this paper, even a small-scale pilot project such as TAXISnet that addresses a critical domain of service is able, once conceived and designed according to a robust framework of CSFs and methodological guidelines, to demonstrate considerable contribution to administrative effectiveness, cost-efficiency of the public administration modus operandi as well as quality of the services offered to the public, namely to three of the major objectives for administrative convergence.

It is our belief, therefore, that the main achievement of the TAXISnet e-service pilot, with all its potential for offering additional services of improved quality, may not be the service scheme per se; perhaps the most valuable contribution of the TAXISnet project has been the promotion of the "quality-of-service" concept as a top-level objective in the public administration agenda, as well as the experience accumulated with respect to critical success factors, methodological guidelines and evaluation indicators that public administration must cope with in order to deploy successful e-services. GSIS intends to exploit this "business know-how" in order to establish generalized e-service schemes in co-operation with all interested and mature stakeholders, as well as to gain preparedness for achieving the standards of quality required by both the national administrative modernization and the European administrative convergence agendas, with a view to assisting, rather that failing to consider, e-Citizens and e-Business in the years to come.

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