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Government Information Quarterly 24 (2007) 353–376

**Government
Information
Quarterly**

Applying participatory design and collaboration in digital public services for discovering and re-designing e-Government services

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Available online 10 January 2007

Abstract

E-Government projects are currently service oriented, focusing on the implementation and diffusion of digital public services through one-stop points of access for citizens. E-Government strategic plans are political, directed at cost and time minimization during the execution of public services, and they do not take into account citizen needs or public administration operating procedures. Although these plans have led to the development of projects that have succeeded in cost and time savings for both citizens and public administration, surveys conducted around the world show that users evaluate digital public services and do not hesitate to return to traditional methods rather than using digital channels to transact with the public administration again; neither would they recommend the use of digital services to others. This article presents collaborative and participatory tools and methods designed to exploit the knowledge and experience of public servants in the improvement and execution of custom and non-automated public services. Collaborative tools can succeed in the development of real one-stop shops for e-Government, while on the other hand they can encourage both citizens and civil servants to participate in the e-Government era.

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Keywords: e-Government; Collaboration; CSCW; Participatory design; Digital services; Knowledge collection; Virtual teams; XML; Policies; Web services

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1. Introduction

E-Government development is currently based on strategic plans that are designed under the responsibility of governments and that all specify similar targets for public administration modernization: cost and time minimization during public service execution and the development of an improved, citizen-centered public administration.

In general, the development of e-Government strategic plans is a “top-down” procedure, meaning that central governments supervise the design and execution of national e-Government initiatives. The “top-down” procedure is defined in detail by means of educational methods (Jorgensen, 2005), where an instructor presents the general concept of a system and proceeds to its subsystems. In e-Government initiatives, the instructor is the government – usually with the support and knowledge of special consultants invited from the private sector – which plans and monitors multiple projects. “Top-down” developed e-Government plans contain policies and targets, but not methods and principles. Information and Telecommunication Technology (ICT) vendors have provided solutions for e-Government and for digital service execution that are mainly e-Commerce-based applications, transformed and parameterized to public administration methodologies (Lawry, Albrecht, Nunamaker & Lee, 2002).

Surveys conducted around the world show that although current e-Government initiatives have succeeded in time and cost savings for both citizens and public administration (European Commission, 2004), current designation procedure of government plans inhibits the acceptance of e-Government by both citizens and public administration.

New considerations arise from citizens’ evaluations of e-Government solutions and digital services, and from the reluctance of civil servants – as evidenced in surveys conducted in Greece – to participate in e-Government evolution. These considerations concern the expectations of both citizens and civil servants from the modernization of public administration. The involvement of civil servants in e-Government design can lead to the “bottom-up” design of e-Government, which can be regarded as the procedure whereby different participants (end-users, public seniors, politicians) participate, share knowledge, and support administration modernization. The “bottom-up” design, too, is defined in detail by means of educational methods (Jorgensen, 2005), where participants consider e-Government as a hierarchical system consisting of multiple elements (subsystems) that need to be identified, combined and analyzed – from multiple perspectives – in order for the whole system to be realized. Participants’ start by setting out their expectations with regard to e-Government systems, digital public services and their simplification, and the smooth transition from traditional to ICT-based procedures.

The eGG (from the initials e-Government Groupware, which has a metaphorical meaning of the re-birth of public administration) is a tool that can be used for establishing public servants’ involvement in the design of digital services and of e-Government in general. The eGG is a cross-border collaboration application through which civil servants can offer and execute all possible digital public services. The concept of the system has been presented in WCIT 2004 (Anthopoulos, 2004) and in EEE05 (Anthopoulos, 2005).

This article presents the benefits for e-Government of the “bottom-up” design, executed with the participation and knowledge sharing of public servants via such an application, while

the incorporation of participatory design methods is proposed as a means to support the discovery and essential improvement of digital public services and to achieve their social acceptance.

In Section 2 of this article, current e-Government design is analyzed according to strategic plans from leading countries in e-Government. In Sections 3 and 4, public administration and citizen perspectives on e-Government are presented, showing the benefits of the “bottom-up” design. In Section 5, the involvement of civil servants in the execution of digital services via the eGG system is described. In Section 6, this involvement is extended to the participatory design of digital public services and to the collection of distributed knowledge that can support service improvement. In Section 7, information is given about how easily this involvement can be established, according to data collected from the digital city of Trikala, Greece. Finally, in Section 8 the impact of the eGG system and civil servant participation on e-Government evolution is presented.

2. e-Government strategic plans

Four major strategic plans were investigated in order for the top-down method of e-Government development to be analyzed. The aims of the investigation were (a) the identification of the procedure followed before and during e-Government implementation, (b) the discovery of targets set for e-Government in different countries/regions, (c) the resulting ICT platforms and applications developed under those plans, and (d) current results and the outlook for achievements. The strategic plans investigated were the U.S. Federal Government’s e-Government action plan (FEA Working Group, 2002; U.S. Federal Chief Information Officers Council, 2004) (U.S. Federal Government, 2002), the UK’s Modernizing Government plan (UK Cabinet Office, Office of the e-Envoy, 2002; UK Cabinet Office, 2000), the European Committee’s eEurope 2005 Action Plan (European Commission, 2002), and the German Federal Government’s BundOnline 2005 (German Federal Government, 2003). Furthermore, a few one-stop government portals were analyzed with a view to identifying both the policies that have been applied for their development and the policies that govern portal operation: the French (www.service-public.fr), the Austrian (www.help.gv.at), the Canadian (<http://www.canada.gc.ca>) (Government of Canada and Treasury Board Secretariat, 2001), and the Singaporean (www.gov.sg). Finally, useful conclusions of the methodology followed during the development of digital public services, together with the identification of a common e-Government architecture, were discovered through the investigation of two major e-Government projects: eGov (eGov Consortium, 2002) and SmartGov (SmartGov Consortium, 2001). Some of the key findings are presented in Tables 1 and 2.

The investigation showed that all of these plans have been designed according to the top-down procedure, while the same procedure has been used for the implementation of all supervised projects. All governments designated an agency that – with the support of senior consultants from the private sector – supervised the necessary steps in e-Government development (design, implementation, evaluation, improvement, management of change) and all related projects.

Table 1
Summary and key findings of the investigated e-Government strategic plans

Strategic plan	Supervisor	Method followed	One-stop shop	Primary targets	Achievements
“Expanding e-Government” Initiative (USA)	e-Government Task Force	Top-down	FirstGov	<ol style="list-style-type: none"> 1. Citizen-centered, results-oriented, market-based public administration. 2. Federal and state agencies interconnected in a one-stop portal. 3. Guidelines and standards for all unique initiatives, performed by state or local agencies. 	<ol style="list-style-type: none"> 1. FirstGov portal. 2. G2C, G2B, G2G transactions 3. IEE: efficiency in public administration 4. e-Authentication environment. 5. Life-event-driven public services. 6. Downloadable digital forms for most of the public services. 7. Digitally executed simple public services.
“Modernizing Government” (UK)	Office of the e-Envoy	Top-down	UK-Online	<ol style="list-style-type: none"> 1. Knowledge economy revolution. 2. Transformation of business, government, people. 3. Citizen-focused government. 4. Better services for citizens and businesses. 5. Application of e-business methods in public sector. 6. All key services available online by 2008 	<ol style="list-style-type: none"> 1. UK-online portal. 2. Government Secure Intranet (GSI). 3. e-GIF interoperability framework. 4. Gateway: portal for authenticated services. 5. Life-event-driven public services. 6. Downloadable digital forms for most of the public services. 7. Digitally executed simple public services.
“BundOnline 2005” (Germany)	Federal Ministry of the Interior	Top-down	Bund.de	<ol style="list-style-type: none"> 1. Define and deliver online federal public services. 2. Client-orientation services. 3. Transparency and faster processing for federal services. 4. Quality and security of public services. 	<ol style="list-style-type: none"> 1. Bund.de one-stop portal. 2. Life-event-driven public services. 3. Downloadable digital forms for most of the public services. 4. Digitally executed simple public services.
“eEurope 2005” (European Committee)	Information Society Directorate General	Top-down	Europa.eu.int	<ol style="list-style-type: none"> 1. Citizen-centered public administration. 2. Encourage participation. 3. 25 primary digital public services for all European member countries. 4. Multilingual one-stop shop. 5. Telecommunication’s costs reduction. 6. Pan-European network of public administrations (IDA) of member countries. 	<ol style="list-style-type: none"> 1. Europa multi-lingual portal containing documents and information from the European Committee 2. Most European countries have under implementation, relative strategic plans, directed to primary targets. 3. Many e-Government projects have been funded by the IST program, while major directions have been set under the IDA program.

Table 2

Summary of key findings referring to policies followed and applied on investigated e-Government one-stop portals

One-stop shop	Services to	Services presented	Targets	Applied policy
French	Citizens, enterprises, civil servants	Life-event oriented	<ol style="list-style-type: none"> 1. Present public information 2. Offer online forms 3. Present relative legislation 	<ol style="list-style-type: none"> 1. Accessible 2. Life-event-oriented services 3. Define key services 4. Present services interconnected with agencies
Austrian	Citizens, enterprises, individuals	Categories	<ol style="list-style-type: none"> 1. Present public information 2. Direct applications to responsible agencies 	<ol style="list-style-type: none"> 1. Accessible 2. Multi-lingual 3. Grouped key services and interconnected with agencies
Canadian	Citizens, enterprises, civil servants	Organized primarily by: (1) subject or cluster; (2) audience group; (3) life events.	<ol style="list-style-type: none"> 1. Offer improved services (according to SII initiative) 2. Continuous improvement of user-friendliness 3. Agency discovery according to metadata criteria 4. Current, accurate, understandable and trustworthy content 	<ol style="list-style-type: none"> 1. Government online initiative 2. Accessible 3. Usable 4. Horizontal integration of agencies 5. Bilingual information 6. Security and privacy principals
Singaporean	Government, resident citizens, enterprises, non-resident citizens	“Service package” (town) oriented	<ol style="list-style-type: none"> 1. Present public information 2. Offer online forms 3. Present legislation relative to services 	<ol style="list-style-type: none"> 1. Accessible 2. Define key services 3. Provide guides for all key services

Additionally, all of these plans set common primary targets for the transformation of public administration: the development of a citizen-centered, results-oriented, and market-based public administration, where corruption and bureaucratic phenomena will be eliminated.

The achievement of these targets – in all investigated plans – has been based on the implementation of multiple projects, culminating in the development of a one-stop e-Government portal where simple public services are executed via software applications, while a directory of public services offered is interconnected with agencies responsible for their execution. The execution procedures of many public services have been simplified so that they can be offered online.

Moreover, in all of the above strategic plans, e-procuring platforms were installed as a means for treating corruption in public administration, while transparency is necessary in all public transactions. Some major problems – citizen authentication, interoperability between new and legacy systems, the establishment of secure transactions, and the training of both civil servants and citizens in basic ICT skills – have been identified in the development of e-Government.

ICT solutions that have been installed under all plans were developed according to mature e-Commerce technologies and systems, which were transformed and parameterized to

government needs. This approach has high risks for governments (Peters, Janssen & Engers, 2004; Schorr & Stolfo, 1998) because they become dependent on specific Information and Communication Technology (ICT) solutions.

Furthermore, there is some literature that sets out the principles and axes of improvement and optimization of e-Government portals as public points of access (Gant & Burley Gant, 2002): openness, usability, customization, and transparency. All of the investigated one-stop e-Government portals follow these principles. Moreover, portals present online digital public services offered, grouped mainly according to life-event logic. On the other hand, only a few public services are offered in fully automated format. All other services presented online are either offered as downloadable digital forms or directed to the back-office agencies for further execution. In this case, workflow systems have been proposed (Podgayetskaya & Stucky, 2004) to execute and improve public transactions. These systems establish vertical and horizontal integration among different agencies, but they retain the Weberian hierarchical structure of public administration (Tat-Kei Ho, 2002). In many cases, this structure places various restrictions on information flow and it does not result in service simplification, which is one of the primary e-Government targets.

The implementation of all investigated strategic plans has not considered the special needs and peculiarities of public administration, some of which are as follows:

- Civil servants work and execute public services mostly according to their personal experience.
- Knowledge is distributed to different public organizations (Traunmüller & Wimmer, 2000) and its allocation is unknown.
- Each public servant feels him/herself to be a unique entity with special abilities.
- Proper legal framework is a pre-requisite for every attempt at transformation within public administration, even for internal procedures of an organization or for the cooperation of different agencies.
- Public administration reacts and conforms to changes very slowly, as compared to the private sector.
- Most public organizations are non-profit and many of the public services – such as social care services – affect a government’s social image. Hence, government modernization must focus on citizen satisfaction rather than cost savings.

3. Public administration perspective

A “top-down” design, combined with the particularities of public administration presented above, leads to the following problems:

- Strategic plans are general and they present policies and targets and no solutions, resulting in the non-treatment of each special need for public administration, without each solution installed being combined with the pre-installed ones, in order to result in a global digital environment.

- There is not an association between different e-Government actions. Different organizations develop separate projects (such as e-procurement, e-auctions, etc.), which fails to lead to a global environment. For this reason, new projects – such as FirstGov, in the United States – are developed to interconnect previously developed projects.
- The public sector is supplied with tools and methods coming from related e-Commerce products. These tools can be parameterized to government needs only to a limited extent. The public sector has to adapt to and follow the characteristics of these tools and transform internal procedures according to them. In some cases, public administration depends on those tools.
- Public administration is supplied by high-cost infrastructures (Table 3), without viability studies for maintenance and extension having been carried out.
- Current e-Government solutions offer fewer than ten fully automated digital public services (Table 3), while they can offer a limited number of public services. Furthermore, it is estimated that less than 45 percent of available public services can be made digital in the EU (DG Information Society and Cap Gemini Ernst and Young, 2004), due to their complexity and customization.
- Current e-Government infrastructures have not yet been incorporated into organizations' procedures and they function as discrete and independently operated virtual organizations.
- Public executives appear reluctant concerning e-Government (Anthopoulos & Tsoukalas, 2005) due to the possibility of job losses and a downgrading of their role.

The above results show that current e-Government design and development threatens public administration: software and hardware infrastructure collapse is possible due to technological evolution and to high-cost operation and maintenance. Furthermore, current e-Government projects do not succeed in the essential modernization of public administration, but a new “virtual administration” is installed, operating in tandem with the traditional one.

Additionally, a partial success for e-Government is possible, but only in the areas of commercial and financial interest for governments, such as the electronic submission of tax

Table 3

ICT investments compared to number of offered digital services in leader e-Government countries according to World Bank's 2003 survey (Kaufmann, Kraay & Mastruzzi, 2003)

Country	Government investments in ICT (\$ millions by 2001)	Public services offered online (% by 2002)
USA	812,635	5.4
Canada	80,896	5.1
UK	137,726	5.1
Germany	154,845	5.1
France	120,569	5.1
Italy	64,555	5.1
EU (average, including new member states)	38,732	4.3
Japan	431,772	5.1
Hong Kong, China	26,810	5.1
Singapore	9592	5.2

forms (European Commission, 2004). Generally, discrimination between e-Government and e-Administration is required in order for all possible public services – such as care services – to be offered electronically.

4. Citizen consideration

Top-down design does not consider how citizens experience public transactions: citizens visit public organizations without knowing what service to apply for, or the methodology they must follow. Citizens act according to special life events or their personal demands. Most e-Government projects group public services according to life events. If simulation of real life “suffers” in e-Government projects or citizens fail to access and execute the proper service due to usability errors, social dissatisfaction occurs. Citizens consider the accessibility, usability, efficiency, and simplification characteristics of digital points of access. Furthermore, citizens do not return to government portals if they fail in service execution; nor do they recommend their use to others (American Customer Satisfaction Index (ACSI), 2005).

Usually, e-Government projects focus on the technical characteristics of one-stop government portals (Traunmüller & Wimmer, 2001; Wee, Devanshu & Sourav, 2002), together with the provision of a customized digital environment for citizens. However, what really matters is whether citizens are served and satisfied. Surveys conducted in the United States show that citizens evaluate both digital public points of access and digital public services (Accenture, 2005). Citizens who used digital means to access government seem to opt for a return to traditional methods rather than using electronic methods again (Horrigan, 2003). Additionally, the increment rate of use of the digital services has fallen (American Customer Satisfaction Index (ACSI), 2005) during the first months of 2005.

5. Participation of public servants in e-Government

The above results lead to thoughts on the re-designing of e-Government platforms offering public services. Some useful data supports this re-designing: citizens feel more confident and familiar transacting with local town-hall agencies (Layne & Jungwoo, 2001). Moreover, in the Digital City of Trikala, Greece (Anthopoulos, 2005), a survey was conducted, with the use of questionnaires, in which 1000 citizens, the heads of all 40 local agencies, and 200 public servants were questioned about digital transactions. The survey was conducted in order for the local administration to assess the expectations of the local community with regard to e-Government and make the optimal choices for digital transformation.

The survey (Table 4) showed that only 10 percent of citizens have full confidence in digital public services. Additionally, almost all (98.2 percent) prefer executives’ involvement during public transactions. On the other hand, in government-to-government services, most of the public agencies (87 percent) agree to the use of ICT systems to automate their routine transactions.

Table 4

The results of the survey carried out in the area of the Digital City of Trikala, Central Greece, in order for citizen and civil servants' opinion of e-Government to be investigated

Subject	%
Citizens interested in digital public services.	82
Citizens skeptical about existing e-Government systems.	90.5
Consider digital services appropriate for their needs.	40.5
Certain about ICT systems in official transactions	7.4
Citizens who consider training in ICT skills would make them feel more confident about e-Government systems.	15
Would use e-Government systems only to access public information and documents.	34
Would apply for digital services if 100% secure.	69
Consider necessary the existence of public executives to supervise digital public services.	98.2
Expect job losses for civil servants as necessary for cost minimization and for the modernization of public administration.	1.1
Agencies that use digital government-to-government services.	87
Agencies which have difficulties during government-to-government digital transactions	24

The survey results lead to thoughts about the essential involvement of civil servants in the execution of digital public services, so that while citizens feel satisfied, civil servants feel they are active members in e-Government. A collaboration environment – such as a groupware application – was the result of these considerations (Anthopoulos, 2004). The environment would gather public executives to create teams and cooperate in service execution. The application is called eGG (Anthopoulos & Tsoukalas, 2005).

The eGG system was designed on behalf of the Municipality of Trikala – the first Digital City in Greece (Anthopoulos, 2005) – according to the following principles, which can guide policy makers in similar situations:

- (a) e-Government targets to be achieved: the treatment of both bureaucracy and corruption in public transactions and time and cost savings for citizens and the public administration. The collaboration environment should impose rules of participation to prevent current administration problems from being incorporated into it.
- (b) Synchronization between the collaboration environment and current or future e-Government projects is to be established.
- (c) The new environment should be economical in development, maintenance, and extensibility, while it should demand only basic ICT skills from the participants.
- (d) Support for the improvement of e-Government projects in offering non-automated public services, the treatment of every custom citizen need through one-stop points of access.
- (e) The installation of ICT tools in public administration, which support self-maturation of civil servants on e-Government issues.
- (f) The essential transformation of the public administration, so that ICT tools can succeed in:
 - (i) the horizontal interconnection of separate agencies,
 - (ii) the motivation of civil servants,

- (iii) the evaluation of performance in the public sector, and
- (iv) the establishment of transparent public transactions.
- (g) The collection and mapping of distributed knowledge in the public administration.
- (h) The encouraging of both citizens and civil servants to participate in e-Government initiatives.

6. Presentation of the eGG system

The technical implementation of the components of the eGG system is beyond the purposes of this article. The eGG considers public administration as a unit. Civil servants are grouped according to specific roles that they will have to play during cooperation procedures, and not according to their title and the agency to which they belong. This consideration leads to the “suppression of physical borders” between different public agencies, and the elimination of the hierarchical, Weberian (Tat-Kei Ho, 2002) structure of the public administration.

The system demands all civil servants be recorded in a unique directory system. The catalogue created will be interconnected and synchronized to distribute directory systems managed by different agencies (IBM, 2004). Each agency will be responsible for the data of its own directory.

Citizens will apply for public services through a four-generation government portal (Gartner Group, 2003), by filling in an application form via an XForm (<http://www.w3.org/MarkUp/Forms/>) application, offered on the e-Government portals. The application will offer pre-constructed and flexible forms in order for the citizen to describe his affair. Citizen applications, which will refer to fully automated public services, will be directed to components and applications already installed in investigated strategic plans, which follow similar architectures to those presented in e-Gov and SmartGov projects. Meanwhile, applications for custom or non-automated public services will be mapped on XML documents (Code 1) and will be treated by groups of civil servants (Fig. 1).

The group team of civil servants is inspired by the Straus model for public document creations (Kistin Eschenfelder, 2002). The team consists of four specific roles: the dispatcher (D), the legal expert (L), the financial expert (F), and the signer (H). For this reason, all civil servants will be grouped in the directory system according to the role they can play in the groups for service execution.

When citizens apply for a service through a government portal, LDAP-based queries will construct a collaborating team to execute the service. Queries will consider the directory as a database, where they will seek executives to play all necessary roles. Queries will also take into account the number of cases an executive has participated in, and no executive “appearing busy” will be selected for the group. Queries will consider all executives as “equal” for selection.

Query results will be a RecordSet containing IDs, e-mail addresses, and ID of the agency. A mail server will submit automatically created messages, calling all selected members to participate in service execution.

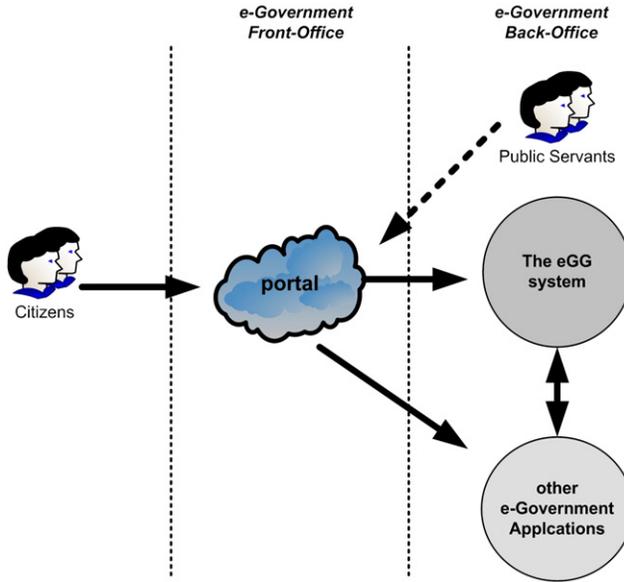


Fig. 1. The incorporation of the eGG system in e-Government platforms.

Executives will collaborate through the use of a Web browser via the government portal. The service execution will result in an XML document, called *target XML document*, as a certificate with the same value as traditional official certificates. Members will collaborate asynchronously, in discrete phases, according to the following explicit scenario of participation (Fig. 2):

1. Dispatcher (D) will enter the system, study citizen application form and document attached, and seek relevant data kept in other government legacy systems. The dispatcher will try to ascertain the citizen's need and describe it in the target XML document, with the proper schema (Code 2). The dispatcher will then call the legal expert (L) to follow up the service execution.
2. The legal expert (L) will enter the collaborating environment and will study the target XML document described above. He will seek a legal framework store – built in LexML or LegalXML format and containing official rules – to discover rules that relate to the citizen affair. Results will be attached to the target XML document, as is the case with official certificates. The legal expert will consider the regulations relevant to dispatcher's findings as described on the target XML document. The legal expert will conclude whether the citizen application will be accepted or not and the new version of the target XML document will be as presented in (Code 2).

The legal expert will notify the dispatcher to follow up the procedure. *If the legal expert considers the citizen application "valid,"* the dispatcher will call the financial expert (F) to follow up the procedure. *Otherwise,* he will call the signer (H) to finalize the execution of the service.

3. If the citizen application is "valid," the financial expert (F) will enter the collaboration environment and consider the target XML document. The financial expert will verify

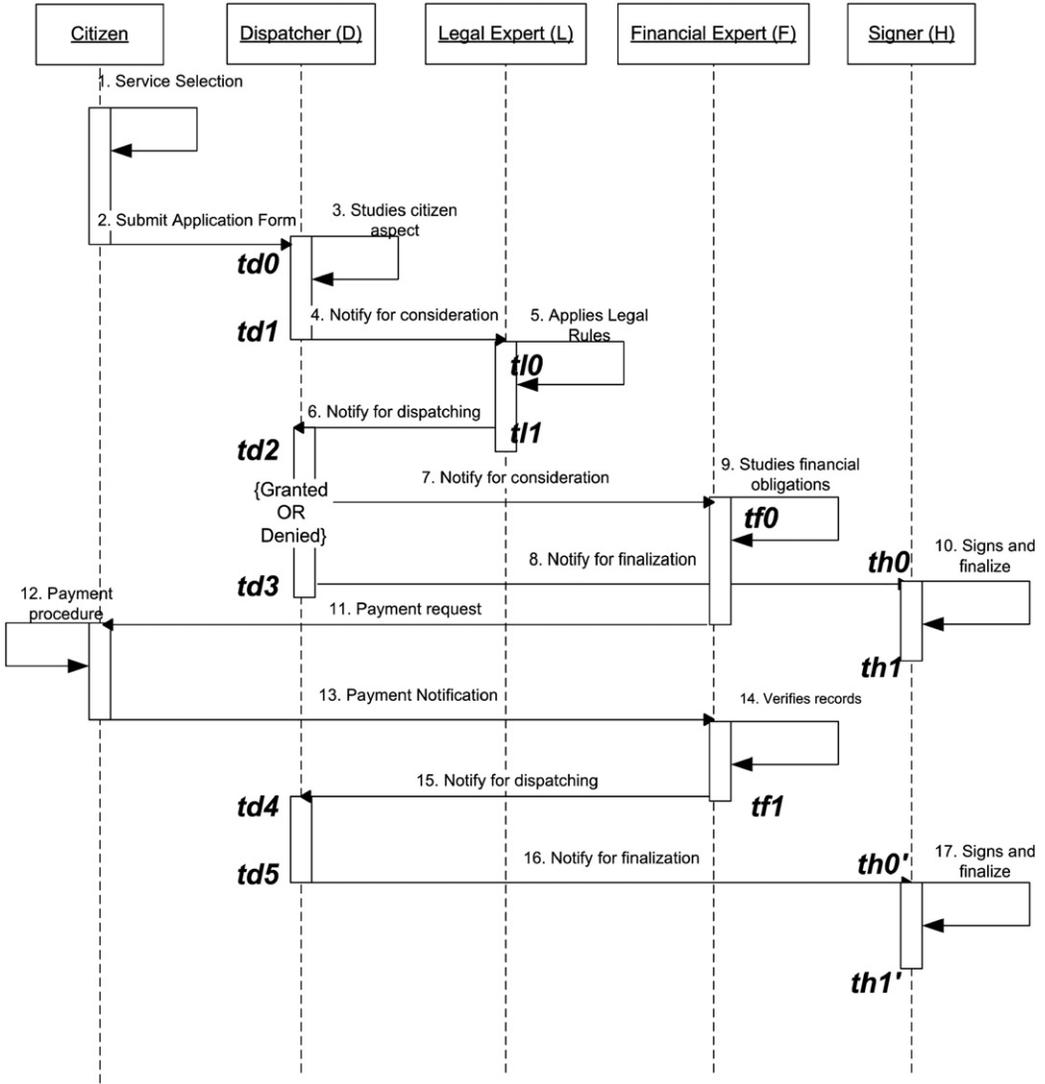


Fig. 2. A sequence diagram describing the eGG collaboration scenario and the time stamps for the discrete phases of each member’s participation.

whether service execution requires payment made by the citizen. In this case, the citizen will be invited to proceed to payment via an appropriate e-payment system. After payment is submitted by the citizen, the financial expert will be notified and will insert information about the payment and a time stamp of the payment that has been made into the target XML document. The target XML document will have the structure presented in (Code 2). The financial expert will then notify the dispatcher to proceed.

4. The dispatcher will call the signer (H) to finalize the procedure. The signer will add his “signature” to the target XML document, and he will store it in order to lock it from any

further alterations. Additionally, an automatically created message will be submitted to the citizen informing him of the content of the target XML document. The content of the document will have the form of (Code 2).

The eGG system, with the incorporation of functions based on Web service architecture, will automatically submit a SOAP message to the public authority responsible for the executed public service, and make the proper record updates.

The scenario presented above will be executed asynchronously, according to the availability of each participant and to the tasks he has to undertake during a typical workday. However, the eGG system will have limits of “tolerance,” according to empirically estimated values, describing the duration of delays for each member. With the exceeding of those limits, automatically created electronic messages will be submitted to the headquarters of the public administration, initiating investigation.

All participants will cooperate on the target XML document through the use of a Web-based interface and XForm application, which can access XML DOM and add or alter fields and values of the document. The eGG operates far beyond the collaborating e-writing tools (Lawry et al., 2002).

None of the participants will be aware of the identities of the other members, or of any kind of identification data (such as e-mail, etc.), so that the service can be executed transparently and corruption can be avoided. Furthermore, each member will have the authority to access only the relevant field of the target XML document. Additionally, citizens will be able to monitor the execution of the service and to enter claims for unjustifiable delays. This characteristic of the eGG system will strengthen citizen confidence in the transformation of the public administration into a modern and citizen-centered organization.

7. Participatory design of public services over the eGG system

According to the eEurope 2005 action plan (European Commission, 2002), 15 services for citizens and 10 services for enterprises must be made digital by the end of 2005 in all EU member countries. During the last three years, citizen access points – KEP (www.kep.gov.gr) – have been established throughout Greece. These offices work as agents who discover and execute public services within the Greek public administration. According to KEP data, in Trikala alone (Anthopoulos, 2005) citizens applied for 84 different services during 2004, which shows the significant divergence between the action plan’s target and reality.

The eGG system can support the execution of non-automated public services and motivate public executives (Anthopoulos & Tsoukalas, 2005). The operation of the collaboration environment will gather useful meta-data regarding all public services applied for and executed in public administration; the knowledge used for the service execution; and the participation of the group members. Beginning and ending time stamps of all participants can be used for the evaluation of civil servant performance (Anthopoulos & Tsoukalas, 2005). More accurate and objective methods can be applied for civil servant evaluation if the time

stamps are recorded in data warehouses, which will be treated as time series. Methods used for mining these series can be used to discover similarities and rules.

However, there might be cases of participants who will not be able to execute a service because they will probably not be aware of the proper procedure, or because the legal framework will not cover a specific service execution.

A pre-execution session is proposed in order to handle such events. This session will be requested by the dispatcher and approved by the signer, and all members will be obliged to participate. The pre-execution session will consist of brain storming and negotiation of the execution procedure. In cases where the team cannot agree on a procedure, the signer will request support from the public agency officially responsible for service execution. The duration of the pre-execution session will be limited by the eGG system. The procedure discovered in the session will be mapped on an XML document and it will have the power of contract among participants. The pre-execution phase will be optional, and will cover cases where the teams are unable to execute a public service.

The pre-execution session will be handled by a separate component of the eGG system, the development of which is beyond the purposes of the article. The component will be accessed via a Web-based interface and will take the form of a discussion forum environment. Team members will participate asynchronously and the signer will be the moderator of the negotiation and have the power to impose administrative sanctions on those who do not participate.

The dispatcher will compose *the supplementary XML document* in which the execution procedure is described. This document will be stored in the back office and can be retrieved as a guide for future similar cases.

The pre-execution process is very similar to the participatory design of a system. This proposed novel procedure refers not to the participatory designing of a system, but to the designing of a public service for which the execution process is unknown or unmapped. This method can incorporate “democratizing development” (Oostveen & Van den Beselaar, 2004) and, moreover, “democratizing simplification” of public services, which can lead to maximum acceptance by citizens. The contribution of a large number of users is necessary in e-Government (Oostveen & Van den Beselaar, 2004) since multiple points of view are extracted from a variety of users regarding issues of broad community interest.

Such participatory design processes can be applied to the entire public administration, involving an extended number of participants. This fact can lead to accurate results regarding the discovery, simplification, and improvement of digital public transactions, achieving benefits for the public sector. Various *supplementary XML documents* that describe the execution process of the same service can be evaluated by administration seniors, who can determine the optimal form of the process.

7.1. A presentation of a real incident handled via the eGG system

Consider a citizen who requests a certificate that authorizes him to teach the German language in Greece. The citizen must visit the responsible agency of the Ministry of Education or one of the agencies of primary or secondary education. According to the traditional procedure, the citizen has to fill in an application form and attach a number of official

documents. Consider that the applicant is a Greek, born in Germany, has studied in a Greek school and graduated from the psychology department of a German university. The Greek legal framework provides certificates for teaching a foreign language to those with the following qualifications:

- (a) Greeks who have graduated from a Greek academic department of a relevant foreign language literature.
- (b) Greeks who have graduated from a relevant academic literature department in an EU member state.
- (c) European citizens born in the country where the relevant language is spoken and who have graduated from a literature department.
- (d) European citizens who have graduated from a relevant literature department in an EU member country.

In the current case, the citizen cannot understand whether the legal framework authorizes him to get a certificate for teaching German and he could apply to the eGG system. The execution procedure would be as follows:

1. Citizen visits the government Web portal.
2. Citizen fills in a flexible XML form describing his situation, giving the following information:
 - a. Citizen ID—provided automatically by the eGG’s authentication system
 - b. Service description (Code 3).
3. Citizen submits the application form to the eGG and is provided with an automatically generated service ID.
4. Citizen visits one of the KEP offices and submits all relevant certificates: certificate of birth – certifies that he was born in Germany – citizenship certificate, and university degree.
5. The eGG system composes the team to execute the service and invites selected members to participate.

The dispatcher studies the application form, compares the applicant’s data with that described in attached documents and composes a draft version of the target XML document. However, he is not certain how to proceed or what the Certificate of a Foreign Language is. In such a case, he requests a pre-execution session from the signer.

The signer invites all participants to discuss the specific affair. The legal expert notifies all concerning the legal framework that covers the specific issue. However, they cannot conclude whether the citizen can get the certificate or not. In this case, the signer has to contact the relevant agency to request assistance. The public agency responds that “the citizen is not authorized for the certificate” and the signer records the response (Fig. 3).

The signer notifies the other participants through the discussion forum and requests that the dispatcher compose the supplementary XML document with the following information: *citizen is a European born in Germany, who has not graduated from an Academic Literature Department. He is not eligible to receive a license to teach the German language.* The

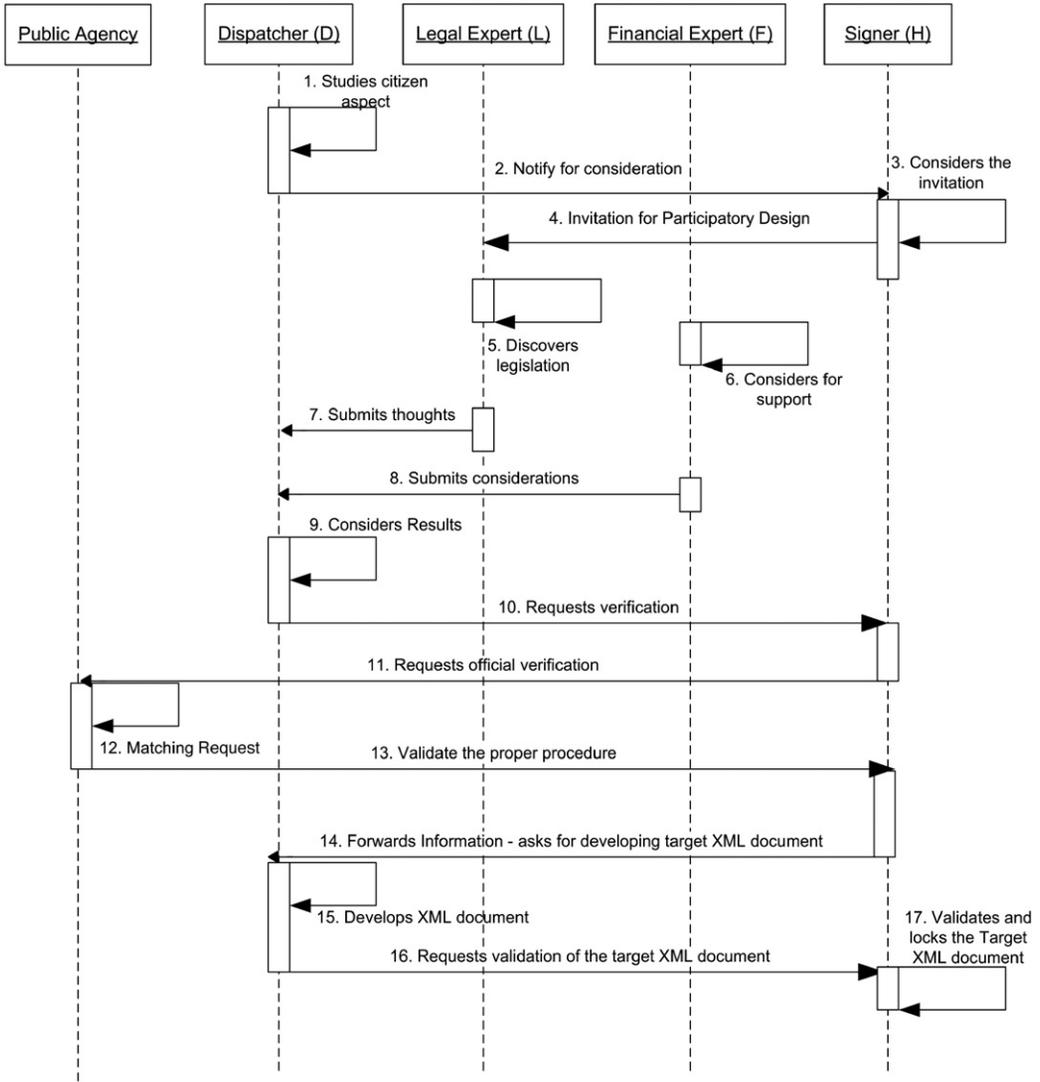


Fig. 3. A sequence diagram describing participatory design of the public service. Negotiation phase contains steps 7, 8, and 9, which can be executed more than once.

participants consider the supplementary XML document and discuss any further observations. The dispatcher stores the supplementary document at the end of the discussion and the execution procedure begins as described in Section 4. The citizen is provided with both XML documents (supplementary and target) at the end of the execution procedure.

It is estimated that after a short operating period, a satisfied inventory of supplementary XML documents will have been developed for use by civil servants during multiple public services. Furthermore, public experts can apply statistical analysis to both supplementary and

target XML documents, study extracted results, and determine specific methodologies for public servants to transform custom public services into fully automated ones.

The procedure described above was a participatory design phase of a custom and non-automated public service. The result can be a guide to citizens who request the same public service in the form: *Europeans who have not graduated from an Academic Literature Department cannot be certified to teach their maternal language.* This phrase can be a new rule of the service *Certification of foreign language teachers.* Relevant conclusions generated by other teams of civil servants can be studied in order for the legal framework to be “decoded” for citizens and for the public services to be simplified. Furthermore, civil servants will become mature and feel themselves as the “owners of their knowledge,” while on the other hand they will feel themselves to be active participants in the transformation process of the public administration and e-Government.

8. Future steps

The eGG system has been designed in order for real one-stop e-Government shops to be developed and administration modernization to be achieved. However, the collaboration scenario and the execution procedure raise some critical issues:

- (a) *Executives from different agencies – Y, Z, W, K – will probably participate in the execution of a public service for which Agency X is responsible.* This issue requires proper legislation.
- (b) *Information previously generated, stored, and belonging to Agency X will be produced and stored in the eGG's components.* In this case, every target XML document must be marked with the responsible agency, which will be the only authority able to access and use it. Obviously, the eGG system will be a “trusted third party” for the global public administration.
- (c) *Sensitive personal data known only to Agency X will now be known to Y, Z, W, and K authorities.* In order for this issue to be resolved, the eGG has been designed to keep citizens’ personal data hidden from all participants except the dispatcher. Furthermore, the citizen will be informed of the procedure and his consent will be requested.

However, the predisposition of public agencies to be involved in such a collaboration environment has to be investigated. The eGG system will initially be implemented and installed in Trikala, the first Digital City in Greece (Anthopoulos, 2005). The system will involve five (5) local public agencies – the Municipality, the Tax Agency, the Prefecture Agency, the Forestry Authority, and the Local Financial Delegate – in service execution collaboration. The eGG will be developed under a project funded by the Greek Information Society Framework Program (www.infosoc.gr).

The acceptance of the eGG system has been investigated in the area of Trikala. The heads of all forty (40) local public agencies participated in a survey carried out with questionnaires, consisting of questions in two categories: (a) general questions posed to

discover participants' ICT skills, together with their knowledge of e-Government and of digital public services, and (b) specific questions, asking participants to confirm whether (1) they would permit their executives to participate in public services of other agencies and (2) whether they would authorize other agencies' executives to participate in the execution of internal public services.

The results are hopeful (Table 5). Of the forty (40) public agencies, all (100 percent) appear informed on e-Government and digital public services, while 57 percent of them have already executed a digital service. Moreover, 85 percent of the agencies would offer their executives to participate in other agencies' services. However, only 42.86 percent of them would authorize other agencies' executives to participate in internal public services.

The results presented above show that public administration officials are interested in modernization and they welcome radical change. However, they appear reluctant concerning the involvement of third participants in internal issues, a fact that shows the lack of trust in cross-border transactions. However, it is estimated that the eGG pilot project will encourage all local agencies to participate in the collaboration environment.

When the eGG has been operational for a given period of time, policymakers will have a useful inventory of service data, which they can evaluate with statistical analysis methods in order to realize most requested services, decode and simplify complex services, and allocate distributed knowledge in the public sector. These data will be helpful in optimizing further design of e-Government initiatives. Policymakers will utilize the existing resources in the public sector and succeed in the optimal incorporation of e-Government tools and methods into administration.

9. The contribution of the eGG to e-Government

The eGG system has been designed as a supplementary component of the global e-Government architecture. It can work either standalone – in cases/countries where no e-

Table 5

Results of the survey carried out in e-Trikala digital city in order for the ease of installation and acceptance of the eGG to be investigated

Subject	
1. Trained on basic IT skills	100
2. Informed of the concept of the digital public services	100
3. Have executed a digital public service once	57.14
4. Would prefer to personally supervise the execution of a public service treating his/her affair	57.14
5. Would encourage the existence of digital public services	100
6. Would offer staff of the organization where he is headmaster, to execute public services of other public agencies	85.71
7. Would accept other's agencies staff to participate in the execution of public services, where the organization I am a headmaster is responsible.	42.86

Government architectures have been installed – or in cooperation with other e-Government platforms as presented in this article, without influencing other e-Government initiatives. The eGG’s benefits can be summarized as follows:

- a. It delivers all possible public services online, via a one-stop government portal.
- b. It encourages civil servants to participate and become self-matured in e-Government initiatives, by offering their experience for service discovery and simplification and by participating in digital service execution.
- c. It encourages citizens to apply for public services online and opt for digital services when transacting with public administration. Moreover, citizens will feel confident that civil servants will treat their affairs.
- d. It supports the transition of public administration into e-Government era since civil servants will not feel their role to be degraded in digital transactions.
- e. It offers methods for the treatment of corruption in all public transactions.
- f. It establishes the incorporation of e-Government practices and tools into administration procedures, avoiding the development of a new “virtual administration” working in parallel to a traditional one.
- g. It can collect useful information from the participatory design of public services, in order for civil experts to apply statistical analysis to the service inventory and decode and simplify it.
- h. It requires low funding for development and maintenance – as compared to other ICT solutions for e-Government – and it can be installed and accessed easily. Moreover, it uses open standards, rendering its operation accurate and trustworthy.

On the other hand, the installation of the eGG in public administration requires an appropriate legal framework. The eGG will eliminate physical borders between different agencies and make optimum use of available human resources.

Policymakers have to consider the eGG as an area of trust for all involved parties; an area where knowledge will be collected and assessed, optimizing administration modernization. The eGG can involve all interested parties in e-Government, in the simplification of public transactions and in achieving social satisfaction.

Collaboration among various agencies will bring public administration into the e-Government era, where traditional inflexibilities will be overcome and real modernization will be established. Additionally, it will encourage the public sector to make use of the e-Government systems already installed in the public administration.

10. Conclusions

The route to e-Government is currently based on general and political plans, which do not include citizen or public administration expectations. As a result, what appears is the partial offering of digital public services and the definition of financial and commercial targets.

Furthermore, ICT infrastructures installed for e-Government are based on e-Commerce solutions, parameterized to public administration characteristics. E-Government infrastructures focus on time and cost savings for both citizens and the public administration, but they are not accompanied by business plans for maintenance and extension.

This article sets out the characteristics of the eGG collaboration environment and investigates its potential implementation. The eGG system can succeed in involving civil servants in the e-Government era, can cooperate with current or future e-Government systems, and can be used in the participatory design of public services, in order for their discovery and improvement. The eGG can lead to the implementation of real one-stop e-Government portals, achieving citizen satisfaction and public administration modernization.

Appendix A. Code lists

A.1. Code 1: XML document presenting the structure of the application form

```
<?xml version="1.0"?>
<application_form>
<CitizenIdentity>
  <ID>id</ID>
  <surname>surname</surname>
  <fname>fname</fname>
  <address>address</address>
</CitizenIdentity>
<ServiceApplication>
  <date>datetime</date>
  <service_category>category</service_category> //eg. Health,job,financial
  <application_type>type</application_type> //eg. Complain, Application
</ServiceApplication>
<Service_description>
  <title>title</title>
  <content>content</content>
</service_description>
</application_form>
```

A.2. Code 2: The structure of the target XML document

```
<service_document>
<legalExpert_part>
  <legalExpert_ID>value</legalExpert_ID>
  <date_of_creation>value</date_of_creation>
```

According to the following legislation:

```

<legalExpert_field>
<legislation>
<rules>
<rule>
<rule_ID>value</rule_ID>
<rule_title>value</rule_title>
</rule>
...
<rule>
<rule_ID>value</rule_ID>
<rule_title>value</rule_title>
</rule>
</rules>
</legislation>

```

and according to the following application form:

```

</legalExpert_field>
</legalExpert_part>
<dispatcher_field>
<Citizen_ID>value</citizen_ID>
<service_description>
<sdata>Request for a certificate</sdata>
<sdata>Kind of certificate</sdata>
<sdata>Use purpose</sdata>
</service_description>
<citizen_data>
<cdata>Information certified from attached document1</cdata>
...
<cdata> Information certified from attached documentn</cdata>
</citizen_data>
</dispatcher_field>
<legalExpert_sign>
the application is <permission>granted/denied</permission> for the citizen
<ID>value</ID>.
</legalExpert_sign>
<financialExpert_field>
Service <payment_obligation>required/not required</payment_obligation>
<payment_value>value</payment_value>
<payment_date>value</payment_date>
</financialExpert_field>
<Signer_field>
<Signer_Title>value</Signer_Title> <Signer_Date>value</Signer_Date>
</Signer_field>
</service_document>

```

A.3. Code 3: An instance of the XML document, which contains necessary metadata for the real incident

```

<service_description>
  <servicedata>Request for a teaching certificate</servicedata>
  <servicedata>German Language</servicedata>
  <servicedata>Secondary Education</servicedata>
</service_description>
<citizen_information>
  <citizendata>Greek</citizendata>
  <citizendata>Born in German</citizendata>
  <citizendata>Psychology Degree</citizendata>
  <citizendata></citizendata>
</citizen_information>

```

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