# SmartGov[1]: A Knowledge-based Platform for Transactional Electronic Services

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**Abstract.** Public transaction services (such as e-forms) although perceived the future of e-government have not yet realised their full potential. E-forms have a significant role in e-government, as they are the basis for implementing most of the twenty public services that all member states have to provide to their citizens and businesses. The aim of the SmartGov project is to specify, develop, deploy and evaluate a knowledge-based platform to assist public sector employees to generate online transaction services by simplifying their development, maintenance and integration with already installed IT systems. This platform will be evaluated in two European countries (in one Ministry and one Local Authority). This paper outlines key issues in the development of the SmartGov system platform.

## Introduction

According to the European Commission [1] "*transaction services, such as electronic forms, are perceived as the future of electronic government*". Although a large number of initiatives have been undertaken at a local, regional or even national level, it is evident that these initiatives have not provided the expected results and in most cases public administration authorities have so far failed to exploit the benefits of using online transaction services, such as e-forms, in their processes. As stated in the eEurope initiative [2] "*eGovernment could transform old public sector organisation and provide faster, more responsive services. ... However this potential is not being realised.*"

The SmartGov project suggests that an advanced knowledge-based platform for transaction services and particularly e-forms will allow realising the potential of these

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online services. The development of this platform however requires experience and expertise at different levels such as technical expertise in diverse areas (e.g. knowledge management, Internet, XML, networks, user-interfaces etc.), expertise in the operation of public authorities at all levels that aim to provide online services, expertise in process models and process improvement but also social aspects such as the fears of public sector employees when facing new technologies. As a result of the problem's complexity, the SmartGov project believes that a European synergy of public authorities, universities and industry is required in order to specify and develop a platform that will allow the potential of e-forms to be unleashed. By conducting that research at a European level not only the best players will be involved but also the results will be better evaluated and also disseminated and exploited.

The rest of the paper is structured as follows: The second section outlines the objectives of the SmartGov project with special emphasis on the issue of trust in electronic services, the third section depicts the technical issues concerning the development of the SmartGov platform and applications, the next section provides a summary of the two pilot applications of the project and the last section concludes with the future plans.

## SmartGov Objectives

The aim of the SmartGov project is to specify, implement, deploy and evaluate a holistic approach for online transaction services specific to the public sector. It will achieve this by developing a **knowledge-based platform** to assist public sector employees to generate **online transaction services** by simplifying their development, maintenance and integration with installed IT systems. It will capitalise on emerging standards (such as XForms by W3C) to create an **open architecture** that ensures **interoperability** between installed IT systems and to **develop new applications** to exploit that architecture. It will derive a knowledge management framework to facilitate both the deployment and acceptance of the online transaction services. Applications will be user-friendly requiring only basic IT skills -besides the necessary domain knowledge- to deploy and manage electronic services and will be tested in selected public administration application areas.

Based upon a thorough investigation of the state-of-the-art in online transaction services technologies, a survey of the current situation at Public Administration Authorities and an analysis of the user requirements for each of the user groups involved, the project will generate detailed specifications for the knowledge-based core repository and the SmartGov services and applications. The initial analysis has determined a number of potential technologies to be used for the knowledge repository, such as Data Bases, Data Mining, Data Warehousing, XML, XSL and XForms. On the whole, the core repository will contain the basic Transaction Service Elements (TSE), used to build electronic services along with domain specific information and knowledge for each TSE.

Furthermore, based upon the user requirements the project will develop services and applications to support the involved user groups in carrying out their tasks. As depicted in the next figure, the SmartGov platform will include services (e.g. the

SmartGov agent and the Information Interchange Gateway) to enable the communication with existing or new 3rd party Information Technology Systems.

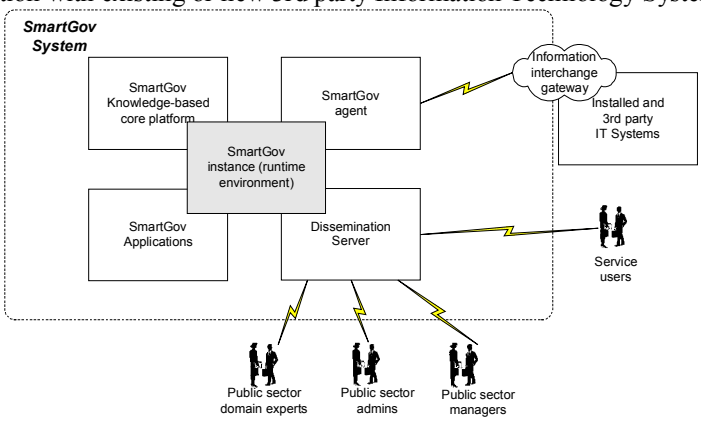


**Fig. 1.** Overview of *SmartGov* system

The platform will also include a dissemination service, to make available the SmartGov services to involved user groups, either internal to the public administration organisation (e.g. public sector domain experts, administrators and managers), or external user groups such as the end-users. Other envisaged SmartGov applications include administrative tools for capturing knowledge and for creating new transaction service elements.

User requirements analysis will also identify the end-user services that will be implemented and used to evaluate the SmartGov platform during the pilot application phase. In summary the SmartGov project will:

Improve the working environment of public sector employees by equipping them with a knowledge-based platform, a set of relevant applications and a methodology allowing them to create and maintain e-services in an intuitive, user-friendly manner.

Directly support staff involved in online transactions with citizens and businesses. The main features of the platform will include knowledge sharing and re-use, interoperability with installed IT systems, support of multiple access channels and full support of standards (such as XML and particularly XForms).

Merge knowledge management principles with emerging standards on e-services (such as XForms) to enable administrators to capture and re-use their domain knowledge in the area of e-services.

A key issue in the development of electronic services is that of trust. Trust is an important resource in an e-services environment. While people dealing with commercial organisations are typically looking for financial integrity and confidentiality, when they deal with government agencies they expect not just integrity and confidentiality but also a level of transparency in the process that ensures trust in the service being provided. In SmartGov, representations of trust, trustingness and trustworthiness that take a more socially oriented approach required for public sector online transaction services, will be developed.

### Trust in Electronic Services

To ensure that electronic services are designed, maintained, delivered and received effectively, it is important that people have trust in the components with which they interact.

**Designers** of services need to trust the procedures and tools that they use, particularly when redesigning existing services. They also need to trust the designers of other contributing or complementary services.

**Deliverers** of services have similar need of trust.

**Clients** (citizens and businesses) need to trust the behind-the-scenes people and procedures: trust that they are bona fide, trust that they will function as they are supposed to and trust that they will not misuse any information given by the client.

SmartGov, will endeavour to ensure that, in building models of electronic service delivery, models of trust will also be incorporated. Recent developments in social psychology suggest the value of studying situational trust, i.e. situations in which trust cues are provided by the situation or context as much as by the individual. This seems particularly relevant for services in which the various players may never come into direct contact with each other. This applies to many public authority services.

A comprehensive and informative analysis of *Trust formation in new organizational relationships* is offered by McKnight et al [3]. This report covers definitions of trust, the formation process, and the role of emotion in trust. Dibben [4] has decomposed business processes into a number of typical situations, and suggested what types of trust may apply in each of these.

There may also be particular relevance to SmartGov in studying "swift trust". The term "swift trust" was first used by Meyerson, Weick and Kramer [5] "to account for the emergence of trust relations in situations where the individuals have a limited history of working together". Relating this work to Dibben's examples of trust, learnt trust clearly does not exist in such scenarios and swift trust can arise as a result of situational trust.

## Technical Aspects

Two main technology areas have been identified and will be addressed by the project: the knowledge-based core system and the applications and services.

### The Knowledge-based Core System

The project approach introduces and incorporates the key notion of the transaction service element (TSE), which is perceived as the main building block of transaction services. A TSE is the equivalent of a form field (such as the input space for a citizens id number or surname) but also contains metadata and domain knowledge that is attached by the form developer. Metadata may encompass the object's type, value

range, multilingual labels, online help, while domain knowledge includes information about the relation of the object to other elements, legislation information, etc.

The knowledge-based platform provides a storage schema that is capable of storing and handling the services and the associated e-forms as well as the corresponding knowledge. The schema will be expandable and allow for the adoption of new services. This schema will be populated with Transaction Service Elements, forming thus the Transaction Service Elements Knowledge database (TSEKDB), which includes the essential elements for developing transaction forms along with all relevant information and knowledge. The domain knowledge embedded in installed systems will be used for the development of the TSEKDB.

Public sector employees interact with the TSEKDB through a user-friendly front-end (administrative) tool, which enables both the retrieval of already existing knowledge, as well as maintenance activities such as the addition of new knowledge, in an intuitive and user-friendly manner.

## The Services and Applications

A Transaction Service (TS), within the SmartGov platform, is the equivalent of a form that contains a number of TSEs and some domain knowledge pertaining to the service as a whole. Under this scheme, development of a transaction service, consists of the following steps:

1. Selection of the appropriate TSEs to be included within the service
2. Decision of the layout that will be used to present the service to its users. This layout may be selected from within a standard template library (which may then be customised) or alternatively, any custom layout may be built from scratch.
3. Attachment of rules that govern the service, such as prerequisites for its usage, validation rules, triggering of other services etc.
4. Definition of MIS data and statistics to be captured for further processing.
5. When a transaction service has been developed, it may be deployed through service instantiation.

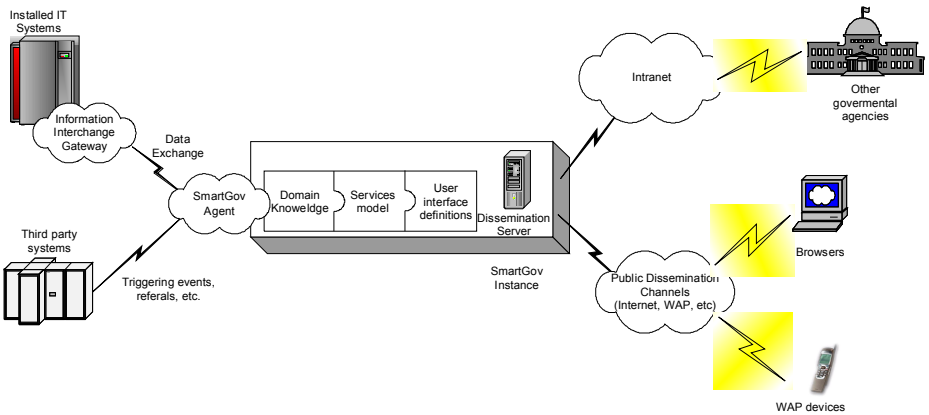


**Fig. 2.** An Operational SmartGov Instance

This procedure generates automatically a SmartGov instance, comprising of all web pages, forms, information repositories and programs needed to operate the service within the Web environment, wireless channels or any other supported service deployment infrastructure. The generated elements are installed on the Dissemination Server, which handles the presentation layer i.e. all interfaces with the applications users. The overall operation of an instantiated service is illustrated in Figure 2.

A service that has been deployed to the public may need to interact with an installed IT system in order to exchange data with it. All such communication is handled through the communication services, which include the SmartGov Agent and the Information Exchange Gateway. The Information Exchange Gateway is attached to the installed IT system and publishes an export schema, which contains all the data items that need to be accessed by services running within the SmartGov framework. The SmartGov Agent imports elements published within the Information Exchange Gateway's export schema within the SmartGov environment. Effectively, the Information Exchange Gateway encapsulates all peculiarities and idiosyncrasies of the installed IT systems, offering a uniform interface through which the SmartGov platform may communicate with virtually any IT system.

Besides providing the necessary link with the organisation's installed IT system, the SmartGov agent arranges for communication with third party systems the service should exchange data with, in order to access facilities that may complement or affect the running service. For instance, the SmartGov agent might provide linkage to document repositories where detailed instructions on form filling may be found, or support subscriptions to legislation databases, which emit alerts when legislation pertaining to the service operation is modified.

Service maintenance is also a major issue in operating transaction service environments that need to exchange data with installed IT systems. When a service undergoes modifications, for example due to legislation revisions, the electronic service published through the SMARTGOV instance must be 'in sync' with the organisation's private IT system, in order to carry out a full processing cycle for the service. In many cases, however, updating the private IT system may be quite cumbersome and time-consuming, while the 'front-end' part of the service, such as declaration submission, must resume operation rapidly. The SmartGov framework caters for these situations, by providing submission spooling mechanisms. These mechanisms allow for operating an electronic service and storing the submission data in a local information repository, until the organisation's back-end IT system is synchronised with the SmartGov instance. When the back-end IT system has been appropriately modified, the SmartGov instance may 'push' all collected submissions to the back-end, triggering thus the completion of the submission's processing cycle.

## SmartGov Pilot Application

Pilot application will take place in two participating Public Administration Authorities: the General Secretariat for Information Systems, of the Ministry of Finance in Greece and the City of Edinburgh Council in Scotland.

### General Secretariat of Information Systems

The General Secretariat of Information Systems (GSIS) is strategically oriented towards e-alignment of the services that it offers to citizens and businesses in taxation, customs and other application domains, exploiting the web as a major service delivery platform and interoperability technologies for integration with back-end IT infrastructures.

In this respect, exploitation of the SmartGov platform will present some substantial benefits for GSIS:

GSIS employees at different levels will enjoy a user-friendly environment for implementing and maintaining e-services for the public (or even inter-organisational ones), as well as for transparently and seamlessly integrating these services with existing workflows and back-end IT infrastructures.

Valuable domain knowledge associated with the e-services deployed through SmartGov will be preserved in a re-usable form that can be maintained as an organisational memory artefact.

Various quality dimensions related to effectiveness, resource efficiency and reliability of the e-services deployed through SmartGov will be improved, whereas on the other hand the establishment and enactment of a performance management scheme is facilitated.

These benefits can substantially contribute to GSIS objectives for (a) achieving high quality of services towards citizens and businesses as a top-level strategic goal, as well as for (b) promoting Service Level Management (SLM) as a major operational policy.

### City of Edinburgh Council

The City of Edinburgh Council (CEC) foresees a number of possible, different levels for the implementation of the SmartGov pilot application.

At the **national level**, with the establishment of the new Scottish Parliament and the Scottish Executive's commitment to modernising government through partnership working, there is an environment in Scotland that is conducive to testing new ways of sharing transaction knowledge and integrating service provision.

At the **city level**, the Smart City initiative in Edinburgh aims to provide a city portal that will be a single gateway to all relevant services and information.

At the **local community level**, there are many policy agendas and associated funding initiatives. The complexity of the mix is confusing and often leads to fragmented and disjointed efforts to take advantage of the opportunities presented.

The different conditions at city level and local level suggest that there is some value in running pilot applications at both levels, to compare the effectiveness of SmartGov in different situations. At the city level, policy is clear and SmartGov research can dovetail with the existing Smart City initiative. At the local level, there are particular challenges that SmartGov may find harder to address.

At the city level, the City of Edinburgh Council is in the process of establishing its Corporate Customer Service Model (CCSM), as a vital component of the Smart City. CCSM has many streams of activity, focused on people, process, technology and

infrastructure. It presents an opportunity for SmartGov to make an impact on the Council's approach to designing and maintaining services efficiently and effectively. Staff at the International Teledemocracy Centre is working closely with Council staff to model existing processes, identify potential improvements and create a framework in which SmartGov principles can be applied. At the time of writing, several potential pilot applications have been suggested, such as citizens applying for housing benefits or businesses applying for licences to run bars.

At the local level, the West Edinburgh Community Planning Partnership area provides a challenging environment to test the SmartGov developments in conjunction with the local community. The area has:

- a strong infrastructure of community groups and local organisation with a history and experience of partnership working
- a local partnership organisation with multi-agency and cross sector representation
- an adopted Digital Inclusion Strategy
- a Community Learning Plan
- a number of access to employment initiatives

Key policy objectives of the Partnership are to increase access to learning, improve access to employment and enable social inclusion. These all require high levels of inter-agency trust and collaboration to be effectively delivered. At the time of writing, the Partnership is considering an appropriate application to do with access to learning and access to employment.

## Current State and Future Work

SmartGov commenced on February 2002. So far, work has focussed on conducting a thorough investigation of the state of the art for e-services in the public sector, capturing user requirements and creating a high level set of system specifications. In the next phase work will continue to refine system specifications for each of the system components and to consequently implement them.

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