A participatory design approach for the development of support environments in eGovernment services to citizens

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ABSTRACT
The introduction of eGovernment services and applications leads to major changes in the structure and operation of public administrations. In this paper we describe the work in progress in an Italian project called "SPO.T." aimed at the analysis, development, deployment and evaluation of tools and environments to support the people who plan, deliver, use and evaluate user-centred provision of One-Stop-Shop services to citizens. The "SPO.T." project has focused on two requirements: 1. the support tools and environments must facilitate the active involvement of all stakeholders in the definition and evolution of eGovernment applications and services, and it is argued that through participatory design changes of structure, process and culture can be delivered effectively; 2. they must embody a set of architecturally coherent resources which reflect the new roles and relationships of public administration and which are sufficiently generic to be relevant to a wide range of local contexts across the community.

Keywords
eGovernment services, Support tools and environments, Design in use.

INTRODUCTION
The area of eGovernment is one of rapid change where services are modernised and integrated. It is clear that such integration is not imposed from the outside or from above, but is generated from within the working contexts of service development planning and delivery. The most important dimension of change in the new concept of public service involves the breaking down of barriers between departments and units, the negotiation and

implementation of multi-disciplinary and multi-agency networks and protocols and in more efficient and effective communication, transaction and co-ordination.

Thus, the individuals who are responsible for the planning and delivery of public service respond to new policies, targets and priorities through a process of co-design and reconfiguration of their own working environments and relationships [1].

The maturity of eGovernment developments
The first stages in the development of eGovernment applications and the exploitation of new channels and media in the delivery of public and administrative services consists of little more than the creation of web sites which may inform about service availability and qualification but do not provide access. This, initial stage, however, soon generates issues of editorial control, maintenance and co-ordination. Furthermore, the issues of portals, which provide the electronic equivalent of a single point of access to information, emerge. Since such developments are often

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accompanied by the development of physical one-stop-shops, we often observe a parallel development on the intra-net of the call centre support functions with the internet and kiosk development of public access.

These, first generation applications generate a requirement to go beyond simple form handling and the introduction of electronic transactions. We see in these first instances of the introduction of the new channels and media a requirement for more fundamental change in administration processes and, indeed, the legal context in which they are delivered: electronic signatures and messages have, for example, to be acceptable as legal instruments. This leads to second generation eGovernment applications that provide integration and intermediation of service publicity together with support the transactions associated with service access and some aspects of delivery.

A characteristic of the first two generations of applications is that their technical provision and delivery can be achieved through quite conventional means: requirements can be defined, implementers can design and develop prototypes which can be deployed and evaluated in the field. This is because they represent the re-implementation of existing, well understood processes. However, such applications themselves start to create new demands and opportunities for restructuring the administration processes themselves. Our experience in the survey and analysis of eGovernment applications across Europe indicates that an important transition takes place at this stage and the conventional, waterfall oriented development lifecycle models become problematic. This is because the third generation applications are constructed in the context of significant changes at the organisational and policy levels and the full and effective participation of all stakeholders in these processes is critical for their success. (It is at this stage that the need for new sorts of partnerships between different sorts of public and private organisation emerge in the development and delivery of eGovernment services through new channels and media. The old, arms length procurement relationship is not necessarily appropriate in this context.)

Such participation requires appropriate technical means as well as the commitment of all the participants. Technologies such as work-flow and XML forms and proprietary products such as LOTUS Notes have been adapted and adopted to provide a concrete medium round which administration staff from different departments and functions can make their explorations and negotiations of new ways of working explicit in a similar way in which, in the past, they have worked with paper forms and pictures of organisation charts and process flows as a medium for co-design.

If eGovernment applications are to make this critical transition to the third generation, then the stakeholders must be enfranchised and empowered, they must be given the technical means to participate in co-definition and co-design processes of both the organisational and the technical systems.

This work-in-progress paper reports first experiences from a project in Italy in cooperation with the Public Administration of Trento. However, the research and development methodology has been developed for a joint EU application with Blekinge Institute of Technology and Ronneby municipality, and Newcastle University and Newcastle municipality. Our work in Trento is informed by ongoing research in all three sites in cooperation between the respective university and municipality. First results from the project in Ronneby are also presented in a separate submission to PDC2002 [2]

THE SPO.T. PROJECT

It is within this framework, that the project of the design, development, deployment and monitoring of a One Stop Shop (OSS) for services to enterprises and citizens in the Province of Trento, located in Northern Italy is taking shape under the code name *"SPOrtello Trentino per le attività produttive"* (SPO.T.).

The local government Provincia Autonoma di Trento (PAT) is fully committed politically in improving services offered to citizens and companies, adopting advanced technologies based on the Internet. Significant investments have been provided to support the Department for Information Services and the Department of Organization in this effort.

The PAT wants to develop an integrated, one-stop approach to accessing public services from the user's perspective. It will provide a range of access mechanisms and channels that meet the requirements of citizens when, where and how they want it, and make financial and other key public transactions easier and more secure. The implementation of the SPO.T. project aims to a more effective use of information and resources, both internally within the Public Administration (PA) and with partner organisations. To achieve the vision of eGovernment the PAT is developing an infrastructure broad band network connecting its offices distributed in the region as well as users in remote and rural areas (the Province of Trento is a region with mixed mountain and urban areas).

In the first phase of the project the provided services will address a subset of the most relevant administrative services identified at European and Italian level in the related eGovernment action plan [3]. They include procedures from all four Public Administration service categories identified at European level [3]:

- License services to provide various kind of authorization (building licences, starting of new activities etc..);

- Registration services to provide registration and information data for administrative procedures (identity, residency, stay permit etc..);
- Health and Welfare services;
- Income services: all interactions and transactions that include financial fluxes between citizen /enterprises and local public administration.

In order to fulfil these objectives PAT has established a working group that includes representative of all stake-holders involved in the process: internal organizational and IT managers, internal users, representative bodies of external users, an IT Consulting firm and the University of Trento. The mission of this working group is:

- to provide a feasibility study for the creation of physical and virtual One Stop Shop (OSS);
- to design and develop a first integrated software platform to support the people who plan, deliver services to citizens as well as the users of OSS services;
- to deploy the proposed platform in a subset of local administrations for a certain number of procedures (municipalities with more than 3000 residents)
- to monitor and analyse the results in order to support the growth and emergence of third generation eGoverment applications as well as to evolve the system to all municipalities and procedures.

Each participant in the working group is representative of specific stake-holder explicit as well as hidden goals, that need to be considered for the success of the overall project:

- Public Administration internal organizational and IT managers, are enforcing the overall commitment of the local government with the explicit goals of improving the level of services to citizens, internal efficiency and overall economic savings. Hidden goals are mainly of a political nature: enlarging consensus etc..
- The Public Administration internal users will bring their expert point of view in order to secure the successful use of the proposed supporting tools. Hidden goals are mainly of a social/syndicate nature: to be involved in the redefinition of human resources profile and allocation.
- The representatives of external users, such as Chambers of Commerce and Association of Citizen, will provide the necessary insights of the specific needs and requests from the final user of the OSS as well as their evaluation of the supporting tools devoted to the use of the services. Hidden goals are of a social-economic nature: improved efficiency, cost effectiveness and transparency of the administrative procedures;
- The IT Consulting firm is participating to provide knowledge on IT issues and application and technological guidance in the development of the tools. Hidden goals are of a commercial nature: market share, alliances with national and international hardware and software providers, re-use of developed solutions etc..
- The University has been asked to join the group to provide methodological guidance in the design and development phase and to assist in the organizational change management issues during deployment. Hidden goals are of academic nature: research opportunities, funding opportunities etc..

To understand and integrate all these different explicit and hidden goals in order to achieve a successful deployment of One Stop Shop services and supporting tools is one of the major challenges to the project.

In the first phase of the project the focus of the working group has been in the agreement of a shared methodological approach to be used. A consensus has been reached to first study the administrative procedure as they are performed at the present, to understand the difficulties and develop ideas how methodological elements from architectural discourse and use oriented and participative design, can support the project. Based on the experience with the deployment of these methodological elements, we will develop a first version of the tools and deploy it within a limited number of pilot procedures. The dynamic observation of this deployment will allow us to improve the tools into subsequent phases of the project.

From a social science point of view, the project methodology can be described as researched development. Researchers accompany service and software development practices and reflect their results back to the practitioners and through that support the ongoing pilot projects. From a computer science point of view, the project methodology implements a process for iterative method and tool development [4] , using the experience with the deployment of prototypical elements and early version of the method and framework to improve the final outcome.

EMERGING ISSUES

In the present section the main ideas that are shaping the definition of possible solution for the SPO.T. project will be briefly presented. They comprise architectural, participatory design and IT issues as they are emerging in the extended group of research institutions mentioned in the introductory section.

Intermediation and brokerage: the architectural idea

The development of the first generations of eCommerce as well as eGovernment applications [5] has emphasised concepts such as the front and back office co-ordination with the call centre and the One-Stop-Shop as means of integration for users. In the context of social, clinical and welfare services, concepts of the communities of practice and managed service networks have also become important.

Finally, responsibilities for service commissioning, planning and provisioning are no longer seen as separated from those of delivery and evaluation but as integrated parts of the same quality loops and evaluations which must encompass and involve clients and users as well as providers and deliverers.

The concepts of intermediation and brokerage provide an extremely powerful abstraction for exploring changes in the way service relationships are understood. In its most general formulation a proposed intermediation and brokerage architecture [5] identifies four (abstract) stages or epochs defined in terms of responsibilities and relationships. These should not be interpreted as a process sequence but as highly interacting and parallel. They are:

Formation where the set of available resources, capabilities and service offers are identified, recruited, assembled, organised and presented. Here we see the requirement for registration classification and validation resources and capabilities are co-ordinated around the generic concept of the catalogue.

Rendezvous where specific relationships between elements of supply and instances of demand are identified and selected. Here decision support and knowledge management resources are brought together with records and histories. The issues at stake are whether this combination of services and functions is an appropriate and available response to the needs of the client and whether the client qualifies for them. At the level of populations, this becomes a question of whether we have the appropriate range of services which combine to meet the expected needs according to the prevailing policies and targets.

Transaction is concerned with the activation and supervision of delivery which may be distributed over both time and space. Case management resources and capabilities figure in this epoch of intermediation.

Post-transaction and evaluation closes the service loop providing the basis for quality management, failure analysis and recovery and the potential for organisational learning.

This description of intermediation is, necessarily abstract. It is used in the following ways: firstly, it provides a conceptual framework for service integration and delivery – the front office and the one-stop-shop are brokerage environments. Secondly, it provides a framework for co-operative work and mutual support in communities of practice where public administration, social, clinical and other care professionals intermediate their own skills to each other in the construction of multi-disciplinary and cross department client and citizen oriented plans at both the individual level and as guides of policy and good practice. Finally, it provides the basis for a more flexible and responsive approach to service planning and management where the ever changing needs for information about performance, effectiveness, demand and opportunities are themselves satisfied through information intermediation and brokerage processes rather than by the redesign and implementation of specific management information systems with each new demand. Current approaches to this capability tend to assume monolithic organisation and rely on the concepts of the "data warehouse" and of "data mining". While these have a place in some current eGovernment implementations, the more generalised solution of highly distributed and federal information environments emerge from the more generic notions of brokerage we are developing here.

As has been indicated in the definition of brokerage epochs, the abstract concepts map onto a number of quite familiar tools and methods: these include the catalogues, client records and case management, decision support and guidelines, quality systems and knowledge management tools. At a level below, these user oriented applications concepts are a further set of quite well known platform or middle-ware concepts such as workflow and distributed transaction services, security services which provide authentication, signature, non-repudiation, directory, audit and so on.

Thus, we propose to construct a cogent set of links ranging from a very abstract set of concepts to more concrete and specific ones. The generic concepts must be powerful enough to provide a useful conceptualisation of the organisational changes implied by third generation eGovernment applications across the wide range of political and cultural contexts. The concrete ones must be sufficiently accessible to provide a basis for the participative exploration and co-design of new administration processes and practices.

These implementation concepts are under consideration within our pilot environment. We aim to provide a coherent architectural framework so that incremental developments and progressive levels of co-operation between different administration departments and agencies can be reliably positioned in longer term strategies and that appropriate and effective links can be made between different levels and domains of administration.

Use Oriented and Participatory Design

As network technologies like internet-intranet-extranet are used more and more to provide governmental services, the interaction and mutual dependency of the design of services and the supporting eGoverment application become more and more visible. The re-development and the integration of the services, that becomes necessary with the introduction of computer support, provide a challenge in itself. Different professional cultures and practices of service provision of different departments have to be related to each other. The work practices in the departments have to change when a common infrastructure is to be used.

Such re-design of services and provision of services can only be achieved with the participation of the practitioners involved. The architectural design concepts therefore have to be complemented by methods, mediating representations and tools that allow for the anticipation and discussion of and commitment to the embedment of the supporting infrastructure in the work practices and the related organisational changes.

Participatory Design and methods [6] can be deployed to mediate between the architectural concepts and elements and the concrete practices of service provision. The methods, tools and the principles regarding organisation of projects have been successfully applied in research as well as industrial projects mainly in Northern Europe [7]. Experiences with complex IT infrastructures for heterogeneous user groups, like hospital information systems, have been reported [8]. The following parts have been identified as key ingredients in the overall methodology:

Design workshops between developers and users [9] addressing the future organisation of work as well as the concrete design of the computer application on as equal terms as possible. The future users as domain experts provide an important resource for the design process.

The usage of concrete representations like rich pictures, mock-ups and prototypes as boundary objects between developers and users: using ordinary language and easily understood representations allows the development of a foundation for co-operation that is highly relevant for the design of usable software.

An iterative and evolutionary approach [10] allowing for feed back and learning as the impact of re-organisation and changes in the work practices and their interaction with technical features of the software under development can not be anticipated in the same way as the design of a computer application.

The participative approach together with the architectural discourse applied in this project is in our opinion a sustainable support for the development of a platform in public service provision for enhanced co-operation, coordination and integration of services and the continued design in use of services and IT infrastructure.

An important issue that remains open and that we wish to address in the project is how to use the methodologies and experiences of participatory design developed in Northern Europe in the Italian Public Administration environment This translation process will involve cultural, technological as well as social issues that will be investigated.

ITC Supporting environments

One of the objective of the SPO.T. project is to develop a general platform for ICT supporting tools to the OSS operations, which may be adapted for use in an extended range of administration contexts and stages of the local eGovernment maturity. This will also be achieved in the form of XML schema and object oriented computation projections as a framework for the generic solution for supporting systems in eGovernment services. There could be many solutions which are acceptable to Public Administrations who intend to engage in eGovernment services: it will be a requirement on these schema and projections that they exhibit a wide range of configurability and composability. The concept of object oriented computation projection provide a powerful abstraction for exploring this solution space. An initial proposed configuration includes four major computational components each of which comprises a small number of sub-components. They are:

Catalogue environment: the organization and presentation in a catalogue of services and information within a Public Administration. This collection and organization of such information is also central to the concept of brokerage. Tools like Web sites, innovative portals and distributed databases lie within this domain.

Transaction Environment: the purpose of the transaction service is to ensure that, once a service is requested by a specific customer, all the required pre-conditions are met before commitment and that all post-conditions are achieved after commitment. Middle-ware concepts and tools such as workflow and distributed transaction services, security services populates this environment

Decision Support Environment and **Case Management Environment:** Public Administration face an ever-growing amount of information management to enable them to provide services to citizen and enterprises. Tools like Decision Support Systems and Case Management Repositories based also on the previous catalogue and transaction environments can supply a more comprehensive overview and enable more efficient access to the range of services provided across different parts of the organisation.

All ITC tools of the proposed framework will be utilized by two main categories of users: (1) operators in physical OSS to assist them in their service provision and (2) citizens and enterprise personnel to assist them in the navigation and utilization of virtual on-line OSS services.

CONCLUSIONS

In the SPO.T. project we believe that a participatory approach together with the architectural discourse proposed in the project will support the development of a platform in public service provision for enhanced co-operation, coordination and integration of services as well as the continued design in use of services and IT infrastructures.

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