CONSIDERATION TO IMPROVE E-GOVERNMENT INFRASTRUCTURE

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ABSTRACT
Several Italian Regions develop e-Government solutions with the aim to increase interactions between Public Administrations (PAs) and users through the use of infrastructures built around citizens needs. In order to reach a flexible system we take into consideration basic functionalities to solve key questions in e-Government domain. Aspects as authentication and authorization, service publishing and discovery as well as composition are fundamental to build efficient and effective architectures. We present a case study about shared and standardize services that integrates them into a Web portal for Italian citizens and firms. In particular, ‘Marche Region’ provides an interesting benchmark in e-Government solution development.

KEYWORDS
e-Government, authentication, authorization, subscribing, discovery, composition.

1. INTRODUCTION
Nowadays there are several e-Government definitions in literature. In this paper e-Government refers to the “use of information and communication technologies in Public Administrations combined with organizational change and new skills in order to improve public services and democratic processes and strengthen support to public policies” [Commission of the European Communities 2003]. Moreover, the definition of e-Government is a large opportunity to [Bolici 2003, Dittrich 2003, Friis 2002]:
• transform organizations of public sector reaching innovative and user-centered PAs;
• provide high quality services with low cost promoting economic development;
• improve governance allowing an effective access to information through flexible and transparent institutions.

Our studies suggest that the best model for e-Government reflects a vision based on the abstraction of service concept and Service Oriented Architecture (SOA) [Hao 2003]. In particular, SOA maintains aligned the Information and Communication Technologies (ICT) functionalities with strategic demand of PAs: when a process is created, or changed, it is sufficient modifies workflow that combines services supplied by organizations to reorganize their interactions. Indeed, SOA approach permits: (i) integration among software resources; (ii) availability of public software interfaces that are universally accessible; (iii) possibility of services realization through composition of functionalities that implements PAs business logic, (iv) reuse of already existing software previously developed. This increases efficiency in terms of cost and PAs productivity perceived by users [Huhns 2005].

The needs just analyzed finds their natural application in the domain of interest. In this paper, we present an architecture to solve common problems in e-Government domain [Corradini 2005 (c)]. For example, the sharing of activities, processes and services to reduce citizens’ time dedicated to bureaucracy, to increase quality of services and to allow knowledge sharing. For the realization of efficient and effective framework we need important functionalities: authentication and authorization of users, publishing and discovery of services, and last but not least services composition [Dawes 2003, Král 2001, Mecella 2001].

The portal TECUT (‘TECnologia Utile’) is realized by Marche Region taken advantage of ‘Choesion’ [R.T.I. Neta 2003, Corradini2005 (c)] infrastructure. This is a framework used to implement infrastructural
services to deploy applicative cooperation actions, secure front-office access, content management services, and workflow. For regional citizens and firms this developed portal represents an unique access point to information and services. Also, services provided can be used by other agencies of Public Administration inside the Region. In this architecture the unique access point hides complexity and the back office organization of involved institutions [Wimmer 2001, Wimmer 2002] to the users of PA procedures.

The paper is organized as follows. Section 2 introduces base functionalities that must be part of e-Government architecture. Section 3 explains Marche Region case study on development of an unique access point to information and services. Finally, Section 4 complete the work and presents future extensions.

2. BASIC FUNCTIONALITY OF E-GOVERNMENT INFRASTRUCTURE

e-Government services provisioning can have important social-economical impacts reducing costs and time to fulfill administrative tasks. In this way, a transformation of PA internal process is performed. These transformations increase the control over the PA activity and it increases also the possibility for public employee to satisfy citizens and firms needs.

2.1 Authentication ed Authorization

Information and Communication Technology development and services proliferation promote significant challenges both for services providers and users. The introduction of services personalization can solve a lot of difficulties. As a matter of fact, it can be said that every user must explicitly declare its identity and its credentials (attributes) to make its Digital Identity (e-ID). At the same time PA must develop architectures able to realize this concepts. It allows an electronic representation of sensible information concerning individuals or organizations. In this manner, every entity is able to recognize the user controlling over sensible information [Bonatti 2003]. The main aim of e-ID is to build a representation universally known to identify citizens under different perspectives. We propose to transfer e-ID from the infrastructures supplying it to applications. It is required to identify users [Corradini 2005 (b)].

Moreover, we want to underline the management activity of Digital Identity supplying a mechanism to identify subjects inside e-Government domain. e-ID in today’s society solves the fundamental problems to build and to maintain trust relationships [Claub 2001].

e-ID management requires the arrangement of technological, service oriented and social researches that comprise (i) security and privacy related problems, (ii) organizational and linguistic interoperability problems, (iii) ontological management of identity, (iv) introduction of technologies for identification and authorization.

In e-Government domain generally there are many services provided by different institutions and for each of them the user must carry out an authorization process. Moreover, it is possible that users don’t have complete access. Usually, there are users that can access a set of services not available to others. According to security features, it is needed to manage access for single users. For example, the relation between users and resources must be defined in advance. More in detail, authentication and authorization represent basic functionalities in e-Government architecture. In particular, authentication is the process allowing the validation of user’s credentials from an authority. If validated, credentials allow users to be considered a valid identity. A main advantage from authorization is the possibility to keep trace of user’s activities. In this case, it is possible to know which user can derive benefit from resources or services.

2.2 Subscribing and Discovery

The Public Administration is involved in a digital growing process that causes interconnection among open, dynamic and distributed systems containing heterogeneous resources. In this context subscribing and discovery of services represent a complex scenery in e-Government domain [Corradini 2005 (a)]. Hence, we have necessity to study a solutions in order to manage Web services of PA and to simplify administrative processes.

The first functionality that we want to show is the possibility for the PAs of registering and publishing services to be offer to citizens and firms. For this reason, the e-Government solution must dispose of a
personalized and flexible service repository. This is able both to contain information in order to describe and use the service and to provide available services to customers. This functionality is realized through a registry. It can manage metadata that describe services offering search functionality to the customers. These characteristics allow users to discover the service that satisfy its needs [W3C 2004 (a), W3C 2004 (b)]. Another functionality deals with the discovery of services. It is desirable that users can individualize the service through discovery in a fast way, using the minimum of resources. Of course, the discovery process implies an activity of cataloguing carried out previously.

The complexity of the problem arise when an organization wants to publish a service: a description must be inserted in the registry, already organized in categories. Then, it is possible to answer complex queries and to discover activities. A customer will use registry functionalities in order to find services of its own interests, based on peculiar criteria. Metadata, that are consequence of a description activity, will allow a characterization of access modalities that can run alone several characteristics of the service. They must be comprehensible from the machine; consequently they must be realized in a language that is "User friendly", not ambiguous and able to express the existing functionalities of the services that we want to represent. Service Oriented Architecture, based on standard technologies and protocols, operates and delineates in this way, allowing the interoperability between systems with characteristics that can often vary.

In many areas like e-Government, the customers can formulate requests for complex services. Moreover, the search and the execution of a single service can produce a parallel or sequential execution of more services. These require specific inputs and then they deliver determinate outputs. In this context a workflow can be useful in order to decompose these activities in a single request using a Web Service. Furthermore, this allows increasing perception of service quality and the realization of applications and Web portals with an optimal organization in search and presentation.

2.3 Services composition in Public Administration

In the e-Government domain, among main problems to be consider, there is the dynamism of norms due to the continuous process of modernization that are dictated from the competent subjects. A flexible system is needed in order to resolve this requirement. It must be able to answer the continuous evolution in efficiently and quickly way. Internet is the natural support for creating proper models with such characteristics, taking advantage of the Web Service concept. In this range, the composition renders a more flexible the offer of services, allowing an evolution and adaptation of those applications that regulate PAs according to any modification. In particular, the composition adapts the realization of new services in an easy and scalable way based on the needs of citizens and firms.

These composite services can access various PAs resources. Conversely specific solutions realized with single component services, composite services represent a fundamental solution to integrate systems. They do not need a deep phase of analysis or integration of further code, but they automatically reuse the applications already developed, reducing costs in a remarkable way [Peltz 2003]. In this manner, the customer has a great number of e-Government services looking like traditional ones and that can be accessed in a simple way, directly from the Web. Indeed, composite services derive from specific tasks that imply cooperation between two or more PA organizations. Using applications based on this service, the connection and the exchange of information among organizations are realized using Web Service that performs such required operations.

Furthermore, if we analyze the processes performing PA tasks, we notice that information exchange among PA organizations is a continuous flow specially in a cross-sectional way. This evidences the necessity to enrich the e-Government framework with composition functionality. In fact, every organization must be able to interact with other PAs to perform a valid administrative procedure. Every procedure can be composed by several parts called "acts" (implemented as component services); they are distributed as services from the organizations and must be composed in order to come out to a unique complex service satisfying the original demand (Figure 1). Requirements of the composite services can change in time in compliant with the norms that regulate Public Administrations. To this aim, reusability is a key characteristic of a component service.
Figure 1. Composition of services in the Public Administrations

Offering composite services in this way means to offer added-value services to the users. However, it is necessary to identify both the characteristics of services to be composed and the quality of interactions among the parts. Moreover, digital composition supports both collaboration among PAs promoting the administrative procedure completion and control of the procedure right execution.

3. CASE STUDY: REGIONE MARCHE SOLUTION

In this section we look at a specific e-Government solution in the context of the Marche Region Government. According to a recent study the skills proposed in the previous sections are “good practices” in e-Government. The discussion takes into consideration our Region where TECUT, a fully integrated government portal for shared and standardized services, is introduced.

In particular, the case study refers to the Marche Region model, that has allowed lots of small and medium enterprises to grow, to encourage the local economy making them more competitive. The model is certainly susceptible to modifications and to adaptations due to the political, social and economic conditions. We propose a global vision of this area that, further to financial arrangements and aggregations, involving enterprises, banks and citizens, has developed a territorial coalition to increase the national and international competition of its production system. As a matter of fact, the Marche Region is among the first places in Italy as far as welfare, cohesion and competitiveness are concerning. Last but not least, Marche presents an innovative and authentic culture of social relations in which freedom and responsibility, autonomy and interdependence, efficiency and solidarity are deeply linked.

At this point, we propose the Region scenario-base techniques and tools for requirements elicitation and validation, it respects the basic features previously mentioned. About authentication process, it represents the instant when the system determines the association between the digital identity and the user. The recent proliferation of digital services has raised concerns about a lot of authentication mechanisms. Marche Region supports the realization of a central authentication solution through Cohesion. It is an infrastructure that provides solutions for complex technical problems and a set of common standard services predisposed to realize applicative cooperation as the national e-Government plan states.

Authentication services for centralized management access in private areas are provided by Single Sign On (SSO) [Jan De Clercq 2002] and Profiling system. The SSO’s tasks are predisposed for the transfer of credentials between authenticated users and access portals. In particular, the authentication on the framework is possible with different levels: via weak and strong registration, via the use of a smart card for the digital signature or via services regional cards “Raffaello” [Regione Marche 2003]. Furthermore, SSO allows a transparent access to the portal’s reserved areas without further authentications and it allows that authentication credentials and user profiling are made available to different application domains. Indeed, the user authentication check is delegated to the service. It uses a regional services register to validate the profile in respect to the access roles. Profiling system is dedicated to the coordinated management of credentials information, logically divided in a static subsystem and in a dynamic one, containing a series of attributes
able to indicate the user’s preferences when accessing the services. A part of user base profile will be requested during the registration phase, and another part is communicated after explicit request, when a specific service is used.

About discovery process the basic element is UDDI registry [OASIS 2005], that plays a fundamental role in digital services distribution. The final aim is to develop a repository capable of manage PA’s services information. The services registry must be able to host information concerning applicative services and tools available to the communities. The portal’s architectural model is evolving towards a distributed and cooperative approach with regards to organizational skills. In particular, Marche Region presents a federate community for discovery process in which interoperability and cooperation are fundamental concepts. This federated reality allows the sharing of digital services and their fair distribution, saving time and costs. The case study in discovery process considers also metadata to introduce a flexible and extendible PA services representation. In this way, a description of services with high accuracy level is provided and the metadata allow to introduce different classifications: life events, geographic locations, user targets etc.

Finally, the service composition in the Region takes into consideration orchestration process. An “execution engine” governs on Web Services interacting upon each other at the message level, including the business logic and execution order of the interactions. These interactions may span applications, organizations and result in a lifelong transaction. Service orchestration, can be invoked as simple Web Service and can be stored in the repository. Instead of service orchestration, documental flow and the management of complex processes, we need the introduction of “workflow management” functionality. It is a particular PAs system that enables to specify, execute, monitor, and coordinate the flow of documents within a distributed environment.

Figure 2. TECUT Home page

The portal (Figure 2) is able to offer a vision of on-line Public Administration, near to citizen needs. We point out that the used services and information are made easier. All this engraves on the service niceness and related popularity. At the same time the portal become a reference point at organizational level providing back office governance. Nowadays the portal is a gateway for 531 organizations, provide 65 different kinds of services and 34.515 running services. Finally, the potential requirements of TECUT portal providing interaction among users and another systems can achieve a specific business goal; as are showed in Figure 3.
4. CONCLUSION

In this paper, we have proposed an overview about e-Government in the Marche Region model. It offers innovative solutions for authentication, authorization, discovery and composition. For each of this functionalities we are working on related quality aspects.

About authentication we want to introduce federated identity. It defines mechanisms for communities to share identities information among domains. In this context the federation represents a good solution to manage a system “core business”. As a result of federation, they are able to create identity-based applications to enable increasing access to cross-boundary information. Federated Identity can be introduced to establish a standards-based mechanism both sharing and managing identities information; as it moves between discrete security, legal and organizational domains. It enables a cost-efficient means of establishing Single Sign-On to cross-domain and it provides communities managing multiple security domains with an efficient, lightweight mechanism of linking redundant identities. Federated Identity can deliver several interesting benefits to organizations.

The study about discovery process, propose a semantic description of the services. We would like to introduce a representation of services using a shared representation (ontology) to promote interoperability and machine reasoning. At the same time a semantic domain description, to reach a complete reality conceptualization, is needed. Nowadays, the discovery is based on string matching at syntactic level, the introduction of semantic description of services and domain can bring the introduction of logics matching and at the same time a lot of benefits. Mainly the develop of flexible and “on-demand” supply chain. The introduction of ontology allows the automatization of Web Service discovery and composition reducing the time and costs. In this way, we promote a dynamic service composition using a formal description of users requests and PA services.

The Web should evolve from a network that interconnect machines to a network that is able to support human interaction at high level. The Web Service must take advantage of the semantic level so as an infrastructure for global computations and business process integration does. This vision can offer a new level of automation. Nevertheless, today’s Web Service implementation are far to reach these objectives, whereas integration of heterogeneous applications is a delicate task. This is due to the fact that requirements change during the time. On the other side technologies consolidation will be available and PA agencies will organize their cooperation activities and their business relations in a more effective manner.
REFERENCES


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