Meeting e-government challenges: the CiTel case

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ABSTRACT
E-government is a technical, economical and social challenge, and is also a good opportunity for all to knowledge advancements and competitiveness. Semantic interoperability is the next step and fits in the Semantic Web vision. International and Italian context are pushing towards conformance to web standards and interoperability. In the framework of a national call for e-government projects, the Comune di Pisa succeeded in implementing the CiTel project, where cooperation among different partners (administration, industry and research) was a key success factor. First evaluation of the project gives evidence of the positive results and suggests further improvements.

Categories and Subject Descriptors
H.3.5 [**Online Information Services**]: Web-based services; J.1 [**ADMINISTRATIVE DATA PROCESSING**] – Government; K.4.2 [**Social Issues**]; K.4.3 [**Organizational Impacts**]

General Terms
Management, Human Factors, Standardization

Keywords
E-government, Public Administration, Web Technologies, Interoperability, T-Government

1. INTRODUCTION
E-government is simply defined [5] as the use of ICT to improve the process of government. In a narrow sense it is sometimes defined as citizen's services, re-engineering with technology, or procurement over the Internet.

Government also engages in marketing and sales via the Internet (e-commerce), which however is not the heart of e-government. The core task of government is governance, the job of regulating society and not just marketing and sales. E-governance is defined as the transformation of (governance) processes (resulting from)

the continual and exponential introduction into society of more advanced digital technologies. It is generally considered as a wider concept than e-government, since it can bring forth new concepts of citizenship, both in terms of citizen needs and responsibilities. Its objective is to engage, enable and empower the citizen [9, 18].

Individuals and organizations interacting directly or indirectly with the government are known as the players of e-government. Government-to-Government (G2G), Government-to-Business (G2B), Government-to-Employee (G2E), and Government-to-Citizen (G2C) is how these interactions can be named [6].

E-government, which promises to make government more *efficient*, *responsive*, *transparent* and *legitimate*, is a technical, economic and social challenge, where wrong or short-sighted decisions can waste resources. New projects must take into account existing experiences and investments, show a good return of investment, and implement services usable by a large variety of people.

Recently, the Italian Ministry of Technological Innovation (MIT) advertised a nation wide selection for e-government projects. The CiTel e-government project has come in fourth position in this selection.

In the following we will briefly recall some e-government issues, outlining challenges, future directions and opportunities. Subsequently we will describe the CiTel project, outlining its achievements, technological issues, results of its evaluation, and envisaged future developments.

2. ISSUES ABOUT E-GOVERNMENT
2.1 Challenges in E-Government
E-government is a big opportunity to bring services to all citizens, but must also consider some challenging issues. It will be easily seen that these requirements are not orthogonal, and there will be some overlaps. Let us now give a brief sketch of the various issues.

2.1.1 Technical issues
Projects will not start "from the scratch", but will have to consider previous investments resulting in legacy systems. Some of them can be rewritten in new environments, while in some other cases this could be too expensive, and it is unlikely that available resources can support a full replacement of existing applications.

Interoperability with existing software and hardware platforms is a key success factor, and systems must be interoperable, both as the newly developed are concerned, as well with the existing legacy applications. As a consequence designing "open standard"

architectures, having well defined interfaces, is a must, to avoid heavy maintenance interventions on existing applications, perhaps just recently implemented.

Designers must also carefully consider *portability* and *compatibility* with future technologies. An e-government application is really effective if user can access it using different devices.

As personal data are processed and stored, and financial transactions must be executed, some legal aspects, like *security* and *privacy*, must be considered. To cope with such requirements, appropriate technical choices must be done. A critical obstacle in implementing e-government is the citizens' concern on privacy of their life and confidentiality of the personal data they are providing as part of obtaining government services. The guarantee by government will not suffice unless accompanied by technical solutions, transparency of procedures and possibly independent auditing. Privacy and confidentiality has to be highly valued in establishing and maintaining web sites. A basic task to fulfil is payment (of fines, taxes, etc.). Transaction security is an obvious requirement.

2.1.2 Economical issues
Economical issues are mainly concerned with return of investments and safeguard of the previous ones. Cost/benefit analysis and effectiveness of the resulting application are points to add to the previously mentioned interoperability considerations.

Implementation, operational and evolutionary maintenance *costs* must be low enough to guarantee a good cost/benefit ratio.

Regulations and device characteristics can vary, and the system must be capable to second the emerging needs. *Maintainability* is a key success factor for long living systems in a rapidly changing technical and regulatory environment.

E-government must be seen as a nation wide plan. Implemented applications, or at least some of their modules, must be *reusable* by other administrations.

Independence from hardware/software platforms is a primary requisite for *portable* applications, to help in possible reuse by other administrations.

2.1.2.1 Social issues
Social issues are mainly concerned with accessibility, usability and acceptance by a large variety of people. The interface must be usable by disabled or elderly people, understandable by low literacy or non native language people, and any service should be accessible by anybody from anywhere anytime.

The concept of e-government is claiming for increased efficiency and effectiveness of government, but these goals will be achieved only if service will be available to one hundred percent of citizens. Even if Internet population is exponentially growing, there is a significant portion of the people who may not be able to access e-government for various reasons. Some users may have physical or cognitive limitations, both permanent as well as temporary. Some others can have limited access to ICT technologies and devices. Therefore, *universal access* is still a mirage. Similar services must be maintained outside the web, such as physical service facilities and automated telephone response systems. Governments may want to provide Internet access through public terminals as a part of their universal access

efforts. In Italy *accessibility* issues are regulated by the 4/2004 law [13].

Users are often non expert users, or, at least, they may use applications in a sporadic way, and need guidance to find the right way to perform their transactions. Governmental web sites must be *usable*, to be effective. This aspect has been considered in the technical regulations for the law 4/2004, which provide for a minimum accessibility level (objective/heuristic) and higher quality levels (subjective/empirical). In fact, the most important characteristic of any successful web site is its *quality* [14].

Successful implementation of e-government requires a reconceptualization of government. As e-government becomes a reality, the public sector organizational structure will change accordingly both internally and externally. The focus of change will be on the system efficiency and the citizens. Internally, the power conflicts over departmental boundaries and control of services will become more apparent as integration progresses. Externally, government processes will be organized for citizens' convenience instead of the convenience of the government. In other words, the integration should not be driven by efficiency and effectiveness alone, while general *acceptance* is an important target to achieve. A relevant issue will be to have all the citizens well aware of the facilities offered by the e-government infrastructure, and have them to trust in it. This task may require appropriate marketing actions and education of less skilled people.

2.2 An E-Government Development Model
We are going now to consider e-government challenges related to the stages of e-government development. [8] describes a four stage model to develop a fully functional e-government. Based on technical, organizational and managerial feasibilities, the paper suggests that e-government is an evolutionary phenomenon, and posits four stages of a growth model for e-government: (1) cataloguing, (2) transaction, (3) vertical integration, and (4) horizontal integration. These four stages are arranged in terms of complexity and different levels of integration. In this section we will explain these four stages, following the original paper.

The first stage is called "*cataloguing*" because efforts are focused on cataloguing government information and presenting it on the web. In this first stage efforts are focused on establishing an on-line presence for the government. In terms of G2C, this stage offers the least amount of functionality for the user. At this stage technological requirements are relatively simple. Nevertheless, there are some challenges on managing these sites, namely balancing on-line presence and resources, maintenance of information, privacy. The reduced scope of the web site under this stage makes organizational challenges limited.

The second stage, where e-government initiatives will focus on connecting the internal government system to on-line interfaces and allowing citizens to transact with government electronically, can be called "*transaction-based*" e-government. At this stage, e-government efforts consist of putting live database links to on-line interfaces. Electronic transactions may offer better efficiency for both the customer and the agency than simply "cataloguing information". This stage presents government on the Internet as an active respondent. It is now a two-way communication, where citizens move from a passive to active role. Citizens transact with government on-line by filling out forms and government responds

by providing confirmations, receipts, etc. The issue (cost, time) of integration of legacy systems comes onto the scene. As the information collected by governments may be politically sensitive, installation of appropriate security mechanisms may be an important technical consideration. At the same time, many other policy issues need to be resolved, such as authentication and confidentiality.

However, citizens' demands and changes in society will push governments to go further as the critical benefits of implementing e-government are actually derived from the integration of underlying processes not only across different levels of government but also different functions of government. Citizens desire to see the government as an integrated information base and contact one point of government to complete any level of governmental transaction. We can refer to this as a "*one-stop shopping*" concept.

This integration may happen in two ways: vertical and horizontal. *Vertical integration* refers to local and central administration connected for different functions or services of government, while *horizontal integration* is defined as integration across different functions and services. In defining the stages of e-government development, the vertical integration across different levels within similar functionality can often be attained before the horizontal integration across different functions, because of their different level of complexity.

At the vertical integration stage, the focus moves toward transformation of government services, rather than automating and digitizing existing processes. Electronic government is not simply a matter of putting existing government services on the Internet; it requires a re-conceptualization of the government service itself. In the long run, the full benefit of e-government will be realized only when organizational changes accompany technological changes. Perhaps at this stage G2G transactions are more important than G2C ones. The target of vertical integration is to seamlessly integrate the central and local systems for cross referencing and checking. Beginning in this third stage, communication and integration-oriented technologies become more important. Several technological issues emerge: signal authentication, format compatibility of electronic data interchange, exposure level of internal legacy system to outside, etc. Even though stage three may provide improved efficiencies, privacy and confidentiality issues must be carefully considered.

The last stage of e-government, *vertically and horizontally integrated*, represents for citizens an ideal situation, in which they have on-line access to ubiquitous government services, with internal organization barriers transparent to them. The horizontal integration of government services across different functions of government will facilitate "one stop shopping" for the citizen. Technically, integration of heterogeneous databases and resolving conflicting system requirements across different functions are major stumbling blocks for any government to reach this stage. However, it is not only a technical challenge but also a management challenge. Horizontal integration requires a change in the mindset of government actors. In many respects, horizontal integration provides more access for other governments and possibly businesses than it does for the citizen. However, it is important that the citizen does not perceive horizontal integration as the beginning of a society in which the electronic data collected is used to glean information about the individual.

2.3 Future for Interoperability

Semantic interoperability remains a big obstacle in e-government. In fact, as recalled by [7], "lack of interpretation of the meaning of data objects and interfaces in focus is the key obstacle for networked computer applications in administrative processes and services". Such semantic mismatches are caused by differences in conceptual schemas of cooperating applications, or different structures and granularity of information.

Semantic Web technologies [15, 12] are promising to overcome these difficulties. It is very probable that next generation e-government applications will heavily rely on these technologies (RDF, OWL) as they will become more common and mature, to achieve maximum vertical and horizontal integration.

2.4 Opportunities in E-government

The present emphasis on e-government is a major opportunity for all the actors in the ICT panorama. There are many areas of challenge where government is a demand leader [10]. These areas include confidentiality, trustworthiness, ubiquity of service, information access and management, human-computer interaction, middleware, security, organisational and social issues, large scale systems, software technology, etc.

There are some interesting points to note about the relationship between e-government innovation and IT research. First, there is a mutual reinforcement between government's role in investing in long term research and acting as a farsighted customer addressing its own long term technology needs. Second, government benefits from collaboration between the two groups which are at the opposite ends of the IT supply chain: government users and IT researchers in developing e-government capabilities. Researchers can directly understand real challenges, while administrations will be aware of emerging and future technologies, having also the opportunity to influence their evolution.

Looking to this issue from a merely technical point of view, it is evident that successful e-government implementations and emerging normative standards from Europe and central governments make an extensive reference to the W3C Recommendations [19]. In fact, applications conformant with the basic W3C goals (web for everyone, web on everything, knowledge base, trust and confidence) and design requirements, like interoperability and decentralization, are perfectly in line with the present and future requirements of e-government applications.

In fact [11], technical interoperability, portability, accessibility are just a consequence of conforming to W3C Recommendations, and any existing application conformant to these standards will conform to emerging regulations with little or no effort.

Therefore, being active actors in developing web technologies can be an excellent opportunity to be competitive in the market. Even more important, moving without taking into account what's going on in the field, can result in a tremendous waste of resources.

3. THE ITALIAN CONTEXT

As pointed by [1], all case studies confirm that political involvement is essential for the success of e-government projects.

A complete discussion of what is going on in this area at the international level is outside the scope of this paper. However we will just recall that at European level an interoperability

framework for pan-European eGovernment services [4] has been defined, and UK government [17] published the e-Government Interoperability Framework (e-GIF), which dictates very detailed specifications with extensive reference to XML technologies.

In Italy, with the Decree (DPCM) 14 February 2002, a first advance of 120 million Euro was directed to the financing of e-government projects presented for evaluation by PA organisms. A system of "co-financing" was provided, where e-government public funds could cover only a part of the total amount of the projects, up to 50%. The rest of the expenses should be financed directly by the project proponents. This e-government plan issued by the Ministry of Technological Innovation (MIT) aimed to introduce innovation in Public Administration and was offering many opportunities to the ICT actors [2]. A relevant step towards the horizontal integration was the explicit reference to the "*events of life*" metaphor whose support was requested.

More recently (9th January 2004) the Italian Parliament approved a law (4/2004) which is imposing that impaired people should not be discriminated, and must have access to the services supplied using ITC technologies. This act, which became really effective on August 2005, greatly affects Web sites and e-government applications [13].

Starting from January 2006, the Digital Code for Public Administration is in effect, so accelerating the full support of digital technologies in all activities by citizens, namely email, certificates, teleconferences, reuse of technologies, co-operation, digital transmission of documents, digital signature, etc.

As far as multimodal interaction is concerned, a great attention is devoted to digital terrestrial television [16].

4. THE CITEL PROJECT
4.1 Generalities and previous experiences
The municipality of Pisa was since long time looking to ICT innovative applications [3] and was proposing several projects. The CiTel project "*Telematic Front office for the citizen*" was born in the context of the Tuscany Telematic Regional Net, where local administrations since several years operated towards a comprehensive environment for technological innovation and Information Society. The project would not have born in absence of this technical infrastructure, an 8000 Km high speed network connecting local administrations and optical fibre Pisa infrastructure.

In 2002 the CiTel project has been proposed in the framework of the multi-project E-Toscana in the selection advertised by MIT. The project ranked in fourth position in the national selection, and first among the E-Toscana project (area "services for citizens and enterprises"). The total cost of the project has been about 3.36 Millions of Euro (about 1.6 MEUR by Comune di Pisa, 1.1 MEUR investments by private firms, 630 KEUR as Ministry co-financing).

The CiTel project is a good example of successful adoption of standard conformance strategy, with a fruitful cooperation among public administration, private firms and research institutions. It received several awards[1].

4.2 Design requirements
CiTel project is oriented to the realization of a telematic service desk to citizens and firms on several channels, both virtual and real.

The municipality of Pisa was mainly looking for:

- enhancement of services;
- increased transparency (citizens should be well aware of what is going on);
- set up of the "Digital Office";
- development of infrastructures in the regional area;
- optimization and organizational costs saving.

To fulfil these requirements some well defined and concrete objectives have been identified:

- Setting up a unique municipal desk. The service to the users is performed by the front-office, and citizens perceive it as the "unique" office.
- Set up of a call-centre, whose task is offering front-office services as well as supplying first-aid information and accepting claims, as usual.
- Activation of a bi-directional web based communication channel between citizens and administration.
- Allowing payment of a wide variety of services through the web.
- Allowing access to services also through distributed multimedia kiosks.
- Supplying information to citizens using several media, like SMS and e-mail.
- Extending service offering to tourists.

4.3 Achievements
With the realization of the project the citizen can approach the desk for information or services directly by her/his computer, by mobile phone or by telematic kiosks installed in several points of the town, avoiding rears and bureaucratic routes.

These services are intended not only for the citizens of Pisa but also for residents in some neighbouring cities (Calci, San Giuliano Terme, Vecchiano, Volterra, Vicopisano and Cascina). Therefore, presently 8 municipalities (for a total of about 200.000 potential users) are yet having access to these services, and three more (San Miniato, Pietrasanta and Santa Maria a Monte) just joined.

The citizen will be admitted to services after being identified through various levels of credentials, starting from the login and password (low credential) to the Electronic Identity Card (strong credential) and the digital signature.

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[1] The project "Pisa Città Cablata" has been presented at the *Forum PA 2001* and has been awarded in the "punto e-government" prize. At the *Forum PA 2002* the municipality of Pisa has been awarded in the prize "100 progetti per il cittadino" (100 projects for citizens) for its project "exchanging information on line in the school", which was bringing basic internet services (videoconferencing, e-mail, portals, etc.) in each school room. In 2004 Citel was awarded at "5° edizione Cento Progetti al servizio dei cittadini" (*Formez*, Dipartimento della Funzione Pubblica), and resulted the winner in "2° edizione premio *P.A. aperta 2004*, La lotta al digital e al social divide per l'inclusione sociale e le pari opportunità" (Forum P.A., CNIPA, Ministro I.T., ASPHI)

Citizens not using the more advanced technologies may contact the usual information and service desk and the Call Centre by a toll-free number. In this case, the operator will be able to answer in a more complete way than in the past, having fast and effective access to the relevant information.

The CiTel telematic desk is thought not only for citizens, firms, Tax Assistance Centres but also for tourists (who can book and pay tickets for exhibitions and museums), students (it is possible, for example, to have access to timetables and class registries).

As a first step, we tested the real desk for the first services on line: acknowledgment system, automatic routing to the proper office without knowing the final destination, estimation of citizen satisfaction, access to own files, delivery of requests and fiscal statements checking the own position and calculating the money due, sending of SMS to citizens about events they are interested in.

Connecting to the website (http://www.e.pisa.it/) citizens can obtain the major part of the services included in the e-government project for the ten cities of the Civic Net of Pisa. Among the services, we will recall: payments on-line, account statements for firms, building declarations and application, access to the own data, self-declarations on line, changes of residence, applications for schools, school meals and school bus, generalized payment system for all local taxes, booking and tickets for museums, class registries in the schools of Pisa.

Citizens can access with a unique acknowledgment system and make payments using the same mode for every involved local authority.

The virtual front-office activates a bidirectional communication channel allowing citizens to make applications and express their own satisfaction without moving themselves and without knowing the office of competence.

4.4 Technological issues

We want point out that on the technological level the project uses an efficient, modular platform of services. The fundamental architectural component of the system is the Base Framework, proposed by Regulus. It consists of all the components common to the services to the citizens and of the management and control applications used by the operators:

- Authentication and Authorization Management
- Menu Management
- LOG Management
- Notifications Management
- Orders Management
- On line Payments Management
- User Session Management

This framework can be tailored to specific needs, depending on the context of the application environment adopted by the local administration selected by the user, making available local data.

It interacts with CIG-Citizen Identification Gateway, which is the CiTel security system. CIG is an Authentication Server independent from the other components of CiTel, and can be used by several, even external, applications.

The Base Framework has been implemented in open source environment using standard technologies, both as architecture (Linux, Apache Web server, TOMCAT, etc.) as well as development and management platforms (SUN J2SE/J2EE platform, Struts framework, AXIS, standard XML/SOAP interfaces as required by the Web-Services model, etc.). As DBMS, Oracle has been selected.

The CIG security system can contemporarily handle several different credential typologies (User/Password, Digital X.509 certificate, CIE[2], CNS[3], etc.). Authentication is based on the *challenge-response* mechanism, according to the governmental specifications for *strong authentication*.

Services have been structured separating various logical levels:

- *Presentation* (*User Interface*) in designing the Web interface W3C-WAI Recommendations have been taken into account, to achieve accessibility. The presentation is XHTML 1.0 Transitional valid, making use of Cascading Style Sheets (CSS), designed to modify the look of pages and the way different areas in the page are arranged and filled.
- *Application Logic (Management of the Service)*: implements and controls user's operations sequence, interacting with the infrastructure modules of the web portal.
- *Integration with the Back Office (Data Management)*. A fundamental goal in CiTel was to avoid duplication of application data in its database. The implemented integration architecture allows keeping application data in the back offices of the participating administrations. When citizens need to operate on them, they are retrieved from their source, used and eventually updated back in their place.

CiTel services have standard interfaces towards back offices of the various administrations, therefore every service can operate on specific data stored on the administration the user has selected.

The interface between services and back office systems has been implemented through the Web Services model, developed according to WSDL and XML/SOAP standards, and according to the indications supplied by the authorities of e-government. It is open to the standards of the cooperation plan established in Tuscany that includes Pisa as participant.

The planning effort with Cedaf lied in realizing a Front Office which uses own information as well as info acquired by web services to obtain a right level of cooperation between the various local authorities: so it is possible to improve efficiency and quality of service to citizens and firms.

The 3 levels structure allows improving a multi-channel fruition of services and integration with back-office services.

It is worth to point that issues related to the standardization of interfaces between Web Services and back office applications, aimed to an easier reuse of the projects by different administrations, are concern of a specific activity involving AssInform and some e-government projects, including CiTel. Additional effort is required to the administrations, to plan all the activities required to make directly accessible to citizens correct, verified and consistent data, with the appropriate levels of security.

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[2] CIE: Carta di Identità Elettronica (Electronic Identity Card)

[3] CNS: Carta Nazionale dei Servizi (National Services Card)

4.5 Reuse

The reuse plan is an important issue. For this purpose cooperation has been activated between the Agencies acting as coordinators of e-government plans. It is established the reutilization of all the products, documents and applications realized in the project. All the applying Agencies may obtain the technical documents produced in the planning and analysis phases.

Some Local Agencies, namely Livorno, Lucca, Pietrasanta, Carrara, already participated in our analysis and reutilization, attending the project advancement meetings. We tried to take advantage ourselves by their professional skills. Presently, three e-government projects are going to reuse the base framework and three municipalities (Pietrasanta, Santa Maria a Monte and San Miniato) started to reuse CiTel modules to supply services to their citizens.

The CiTel portal shows some interesting features for reuse, namely: *Integrability* (with applications of other administrations), *Adaptivity* (to different usage scenarios and operational environments), *Scalability* (for increasing number of users and new services), *Monitoring* (measuring services usage), and detection of *Customer satisfaction*.

It is important to stress how reuse is not simply the technical issue of reusing the code. In fact, it is the full solution, including the organisational one, which must be exported and integrated in a different environment. Seven self-consistent modules participated in a call issued by CNIPA (National Centre for Informatics in the Public Administration), to build a *national catalogue of reusable solutions*. The modules are relative to different areas: *real estate* (construction and payments), *school* (education and class registries), *payments*, *demographic data*, *tourism* (reservations and museum tickets payments), *mobility* (local police), and *citizenship* (SMS and monitoring of bureaucratic process).

4.6 Technical and Organisational Impact

An integrated e-government plan has to face some problems, related to legacy applications, acceptance by involved administrations and personnel skills.

To overcome these difficulties appropriate initiatives were taken. People belonging to the administrations initially involved in the project where educated about e-government issues, digital signature, technical and management issues, to gain the skill needed for a successful acceptance, implementation and operation of the plan. Another key point was the participation to the analysis phase, to set up services aware of the needs of the participating administrations.

To make the project operational the Pisa Municipality modified its internal organisation and in 2003 presented a project named "Rethinking services supplying system", awarded at Forum P.A. 2004 ("I Successi di cantieri").

4.7 Evaluation

CiTel has now passed the delicate phase of starting the use of the services by citizens and firms. Accessibility or e-learning modules for every service cannot by themselves guarantee that these services are actually and effectively used. The actual estimation about the use has been possible only when a lot of services have been activated. We heavily used the customer satisfaction analysis to assess the quality of service.

Customer satisfaction evaluation has been based on automated and non automated data collection, the former from all the users accessing the portal and services, and the latter using an on-line questionnaire. The on-line questionnaire has been proposed to a selected sample of 1200 registered users, and we received 700 answers back.

From this survey it emerged that (the question allowed multiple answers, percentages are calculated relative to respondents): 55.5% of respondents were thinking that e-mail support was needed, 36.5% were requiring a contextual help desk support, 31.5% were asking for a toll-free phone number. We can infer that the electronic channel does not fulfil per se all the needs, but must be supported by human help, and a traditional paper channel must be kept alive at least for a while.

About 77% of respondents considered the usefulness of accessing services very important, while an additional 21.4% considered it relatively important. Only a 1.6% was negative (with a 0.5% saying "not at all").

The final judgement about how CiTel services fulfil their needs, 30% was very positive (very satisfied), 60% was quite satisfied, 7% not much, and a 3% was not at all satisfied.

It is worth to point that the main fraction of the less satisfied people is from municipalities which didn't yet implemented all the services. Results seem to indicate that the quality of services is good, but there are margins for additional improvements.

4.8 Future work

CiTel will obviously evolve in increasing the number of services available trough the web interface.

In addition, it is already planned to modify its infrastructure and some services to make use of television channel, probably the most popular and widespread technology in Italy. In this aim an evolutionary project, T-CiTel, has been presented. It has been one of the 29 projects in Italy which got funding in the framework of a contest for digital terrestrial television transmissions, managed by the Ministry for Innovation and Technologies. The main task is to bridge the digital divide, supplying selective and personalized information to all the people who are not using more sophisticated technologies.

Even if the user interface of CiTel has been developed taking into account the W3C Recommendations, and especially the WAI Guidelines [20], an additional effort will be required to make CiTel conformant to the Italian regulation for accessibility of public sites, which is very strict [13].

In the short period, CiTel is participating to a new contest, aimed at the "reuse of solutions" issued by CNIPA (MIT), with the seven modules inserted in the catalogue of reusable solutions quoted before. The contest is reserved to the projects implemented in the first e-government call (about fifty), and the budget provided for co-financing is about 60 MEUR.

5. CONCLUSION

E-government presents several technical, economical and social challenges that will surface as the e-government development moves from the initial "cataloguing" stage toward full vertical and horizontal integration.

Semantic interoperability is the next step, and will get advantages from the scientific effort put in this research area.

Regulations and guidelines, both at European as well as national level move towards a solid and reliable technical framework, mainly based on the Web technologies. E-government requirements fit well in the W3C long term goals like web for everyone, web on everything, knowledge base, trust and confidence. In implementing e-government solutions conformance to the W3C Recommendations is an important issue towards improving quality, reducing costs, and saving previous investments. Even more important would be to actively participate in the definition of the Web technologies.

Governmental nation wide initiatives are essential to trigger new projects and investments, but it is necessary to invest in research and development to attain a suitable level of quality and competitiveness.

Facing the e-government challenges, CiTel resulted in a successful experience. The project was a cooperative effort, and contribution of partners, involved Agencies, Ministry of Technological Innovation, was very valuable to keep the schedule.

Main points are the conformance to an open standard architecture and compliance with W3C Recommendations, which resulted in saving of investments, high interoperability and flexibility towards new technological framework.

Modules and solutions in CiTel are reusable.

Evaluation of the project showed that users are generally satisfied, even if there are margins for further improvements. It emerged that the paper channel must be retained even after the activation of the electronic one. Presently the usage of the electronic channel is increasing, with some services showing a much higher usage than others. Finally, the implementation of the electronic channel has lead to some internal reorganization and certainly to a greater efficiency in human support as well.

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