Driving usability into the public administration:
the Italian experience†

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The Italian Public Administration (PA) represents an important testbed for fulfilment of
software usability in real settings. This is due to the volume of existing applications, the
various types of ongoing projects and the potential users to whom the produced
applications are addressed (both internal PA users and citizen-users). Most acquisitions
of computer products in the PA are made in terms of ad hoc developments. This type of
development could provide, in principle, the best condition for usability purposes, i.e. a
constant contiguity between designers and users. Unfortunately, this does not lead to
user-centred projects and usable products in reality.

To analyse the current situation and propose improvements, the Italian authority
which controls the software diffusion in PAs (Autorità per l’Informatica nella Pubblica
Amministrazione—AIPA) created a working group, the Usability Working Group—
UWG. Among the various activities of the group, two tests carried out for the PA on
two different development designs of interactive systems gave several hints. The UWG
also produced the guidelines for setting up PA contracts including usability as a key
requirement for the interactive systems to be supplied. This paper reports the tests,
compares the results with the ISO 13407 (1999) standard, and outlines the main
indications coming from the proposed guidelines. Finally, the outcome and influence of
the UWG activities on the PA contracts is discussed.

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1. Introduction

The latest ISO standards on the quality of software products, like ISO/IEC 9126-1 (2000), define the quality of a software product as its capacity to help specified users reach specified objectives in an effective, efficient, safe and satisfactory way, in specified contexts of use. We may read this as stating that the objective of a computerization project is not to provide a product without defects or with multiple functionalities or technologically innovative. It is instead, to establish a productive interaction between a software system and the user who utilizes it. To be more precise, the interaction should favour an increase in efficiency of people performing their duties without this causing extra organizational costs, inconveniences, dangers and dissatisfaction for the user, undesirable impacts on the context of use and/or the environment, or long periods of learning, assistance and maintenance.

In the literature, most of the above-listed requirements are associated with the qualitative characteristic called usability (e.g. Bevan, 1995). Note that the two major factors characterizing usability, i.e. users and context of use, are not independent of each other. Several studies (e.g. Hornby et al., 1992; McKeen et al., 1994) confirmed how the user’s perception of a product changes according to the context of use, the purpose of the use and the correlation between the product and other organizational and technological variables of the context. The multiplicity and variability of user needs and expectations, based on the different classes they belong to, represent other key factors to be considered when dealing with the usability of a product. In addition, the attitudes of the users keep on evolving. On one side, computers are increasingly becoming familiar and well-known devices, while on the other, computerization is almost required to give a “magic” contribution to efficiency without the need for the users to become computer specialists to obtain it.

Notwithstanding the complicated ruling factors, the allocation of more and more resources to usability is, however, a compulsory choice. Over the last few years, in-depth analyses showed that it is cost-effective for suppliers and users to invest in usability (e.g. Bias & Mayhew, 1994). Therefore, there has been an increase in standards, publications, associations, meetings and methods focusing on usability. Almost all these contributions are intended to identify techniques, methods and competencies by which to involve, in appropriate forms, users in the design and validation of solutions from the very beginning of the development lifecycle; a further aim is to anticipate/assess the impact of these solutions in the context of use.

However, although accepted and rewarded in principle, the involvement of the user is not so obvious in real-life projects. The first difficulty is cultural: many organizations and software producers keep on considering the involvement of the user first of all as a definite cost for an uncertain future benefit. Hence, they tend to implement design methods involving the user only if obliged by the demand of the customer. Within the global cost of development, the proportion of costs devoted to improving the application of usability is only half of the necessary amount (Nielsen, 1993). As a matter of fact in important realities such as the one we analysed, i.e. the Italian Public Administration (PA), not even the user has clearly expressed his usability needs. As a consequence, suppliers are not pushed to invest in the so-called “user-centred design”. Whereas, incorporating user-centred methods in the development process, according to
ISO 13407 (1999) and the associated ISO TR 18529 (2000) (see footnote¹), reduces development time, decreases the cost of the project, reduces support costs, with unquestionable advantages for suppliers, PA, and especially citizens, who are the end users (Earthy, Sherwood Jones & Bevan, 2001). Furthermore, a well-designed and usable system can enhance the e-government reputation. Currently, citizens are increasing their expectations about e-government, and are asking for less bureaucracy, more quality and better usability of PA front-ends.

In principle, institutions, suppliers and users are all convinced of the advantages of usability. The problem is finding the real means to support the planning, design and assessment of usable applications. This was one of the main goals of the Usability Working Group (UWG), created by the Italian authority which controls software diffusion in the PA (Autorità per l’Informatica nella Pubblica Amministrazione—AIPA) approximately 4 years ago. The main goal of AIPA is to improve services offered to citizens and companies by the PA through the use of information and communication technologies. One of the fundamental rights of citizens when they interact with the PA is the ability to easily access systems and services without, or with low use of, intermediaries. Such an ability on the one hand contributes to achieve the often-invoked transparency in PA acts and on the other hand is a fundamental step towards the equality of all citizens with respect to the PA. Since it is widely agreed that easy user–system interaction can be guaranteed only by “usable” systems, AIPA is particularly interested in studying (and if possible improving) the usability of the PA interactive systems.

Among the various activities of the UWG, two tests carried out on two different development designs of PA interactive systems gave several hints on the extent to which both suppliers of computer technologies and the public administration pay attention to product usability.

The UWG also produced the guidelines for setting up PA contracts including usability as a key requirement for the interactive systems to be supplied.

This paper describes the UWG activities and their fallout in terms of increasing the importance of usability and user-centred design techniques inside the PA. In particular, it discusses how the typical development process of software systems that are built for the Italian PA adheres to the ISO 13407 (1999) normative reference.

The paper is organized as follows. Section 2 introduces the PA scenario with respect to software usability. Section 3 summarizes the UWG tests and their outcomes. In particular, it concentrates on the analysis of the work methods of the design teams and on the participation modes of the PA in the design process with respect to the ISO 13407 requirements. Lessons learned from the UWG experience are discussed in Section 4. The UWG guidelines for producing feasibility studies and contracts taking into account the usability factors are outlined in Section 5. Finally, Section 6 describes the ongoing transformations in the PA contract awarding process which have also been caused by the UWG results.

¹All ISOs are published by the International Standards Organisation, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland, and are available from National Standards Institutes/Organisations.
2. Usability within the PA

The Italian PA is an ideal test field for the implementation of usability. This is due to the volume of existing applications, the various types of ongoing projects and the number of potential users to whom the produced applications are addressed. Typical users may be divided into two broad classes, namely Civil Servants (also called Clerks in the following) and End-Users. More specifically, by Clerks we mean PA internal personnel, while End-Users include both citizens (home and business users) and private sector intermediaries (for examples, accountants). At present, Clerks are those who mainly access public information systems, basically using *ad hoc* applications (which are often legacy applications). Professional end-users also prefer customized applications, and only a low percentage of home users exploit new Internet-based mechanisms, mainly for browsing web pages.

However, for various reasons, the information technology (IT) market in Italy is basically characterized by outsourcing contracts which cover all the product life-cycle phases, including software requirement elicitation, software design, delivery, installation, support and maintenance. The PA is no exception, and most acquisitions of computer products in the PA are made in terms of *ad hoc* developments. Starting from a feasibility study (which is mandatory for contracts over certain economic value), the supplier carries out all product life cycle phases following the typical waterfall model, until maintenance after delivery. This type of development could provide, in principle, the best condition for usability purposes, i.e. a consistent contiguity between designers and users. Unfortunately, this does not lead to user-centred projects and usable products in reality.

Various factors strongly determine the need to acquire usable systems for the PA. First, there is the growing computerization of the administrative processes (about 30% at the end of 1997), the diffusion of computers in public offices, and the consequent need of converting PA clerks to use new computer systems. Second is the effort to re-engineer the administrative procedures, through the introduction of workflow processes and functional decentralization.

These new services should spread the interoperability and cooperation between administrations and introduce the possibility of citizens having a direct exchange of information with governmental bodies through computerized means of various types (e.g. interactive kiosks, Internet), without the help of specialized intermediaries in administrative and/or information processes. Finally, making the PA focused on usability will trigger the market, increasing suppliers’ investments and demand for training.

Unfortunately, it has to be admitted that, notwithstanding the numerous positive expectations for usability in the PA, the response has so far been insufficient. This occurs although, as already observed, in the PA there exist particularly favourable conditions, like the contiguity between designer and user. Surprisingly enough, *ad hoc* products developed for PA users have so far proved to be less usable than what is offered by general-purpose products.

Figure 1 shows the expected medium term evolution of the PA applications in terms of quantity, access modalities and types of users. Use of packaged applications, essentially office automation tools and mailers, is still growing in the PA and is expected...
to grow further. Within 3 years, a consistent part of the interactions, both inside and outside the PA, will take place through web-based applications. The extent of this development will only be limited by the rate of penetration of the Internet among families and small enterprises, and by the availability of public services on the Web, whose increase will be in turn stimulated by the market expansion.

3. Case studies

Two case studies were conducted with the objective of assessing the design processes of two systems (made by two different design teams) in particular with respect to ISO 13407 (1999) requirements. The tests also offered the opportunity to determine possible areas of improvement and how to obtain it in the short–medium term.

3.1. TEST DESCRIPTION

Both systems were delivered to users in their first release when the tests were conducted. A total of four designers, three users participating in the design process and 12 users not participating in the design process were involved in the tests. In the following, the systems are referred to as Product A and Product B for confidentiality reasons. Product A is an interactive system meant to collect from one or more data sources the necessary information to create documents. Product B is an interactive system for retrieving and exchanging information among different PA offices for various purposes.

The UWG members focused their attention: on the work method of the design teams (methods of obtaining information on end-users and context of use, receptiveness to usability, types of product evaluation procedures, etc.); on the participation modes of PA users in the design process (methods of interaction with the design team, type of information provided, typology of users involved in the design, participation in the verification procedure, capability to provide useful information to solve problems, etc.) and on the users’ self-evaluation of the system usability with respect to their implicit and explicit needs.
No product usability tests were carried out since that was beyond the objectives of the UWG tests.

The tests were carried out in two phases: (1) an interview with the design team and the users involved in the design and (2) an interview with the end-users (those involved and not involved in the design) after a product utilization test.

A detailed description of the tests can be found in Catarci, Matarazzo and Raiss (2000). The interview forms used in the two case studies are reported in Catarci, Matarazzo and Raiss (1999).

In the first test, the design and development process of Product A was analysed. The test was carried out when the product was about to be released. During the tests, meetings were held with different kinds of people involved in the project, including designers, a user involved in the development process and final users of the system. During the interviews, the designers declared that sufficient information about end-users was collected from just one “highly representative user”. Other users, not involved in the design process but interviewed during the investigations, found that the solution chosen was quite rigid, and difficult to transfer to offices other than the one of the “highly representative user”. Users also said that the solution chosen to search for information in the data sources is not the best one. They considered the solutions offered by commercial browsers easier to use. Finally, they remarked that a greater involvement of the users, during the design phase, could have given significant inputs.

The second test was performed on Product B. Interviews of designers revealed their scarce attention to the need of analysing the context of use and in general their low interest in usability issues (even though the design team was assisted by an external expert to carry out the analysis on the usability aspects). Two users considered to be prominent representatives gave information on the work organization and context of use. Information on end-users collected during the interaction with such representative users were considered adequate by the designers. The users involved in the design regarded meetings with the designer to be satisfactory. However, they declared that the intermediate prototype they were asked to evaluate was hastily prepared and they complained that the tests they went through were only those already prepared by the supplier. Users who were not involved complained about the poor attention given to the end-user needs and were wondering about the organizational changes in their workflow, particularly in the distribution of the tasks which the introduction of the new system was going to produce.

3.2. ASSESSMENT

In this section, we analyse the design processes of the two systems with respect to the ISO 13407 (1999) requirements. We recall from Maguire (2001) the basic principles and key processes to be performed in a user-centred design together with some relevant activities.

3.2.1. ISO 13407 (1999) requirements. The basic principles to be followed in a user-centred design are given below.

(1) Involving in the development process end-users who have knowledge of the context in which the system will be used.
(2) Determining which functions of the job or task should be handled by software and hardware and which should be handled by people.
(3) Iterating design of solutions, with a large use of prototypes, in order to receive feedback from end-users analysing their use of proposed solutions.
(4) Using multi-disciplinary teams to design solutions.

Key processes and related activities are as follows.

(1) Plan the human-centred design process.
   (1.1) Define planning and scoping of the project.
   (1.2) Perform cost–benefits analysis.
(2) Understand and specify the context of use.
   (2.1) Determine the characteristics of the intended users.
   (2.2) Identify the task the users are to perform.
   (2.3) Specify the environment in which the users are to use the system.
(3) Specify the user and organizational requirements.
   (3.1) Analyse the performance of the system against operational and financial objectives.
   (3.2) Provide benchmark for design testing.
   (3.3) Consider work design and organization.
   (3.4) Analyse task performance.
   (3.5) Deal with management of change.
(4) Produce design solutions and prototypes.
   (4.1) Use existing knowledge for multi-disciplinary design solution.
   (4.2) Use simulations, mocks up, etc.
   (4.3) show the solution to the users and simulate the tasks.
   (4.4) Use feedback to improve design.
   (4.5) Follow iterative design.
(5) Evaluate design against requirements carrying out user-based assessment.
   (5.1) Produce evaluation plan.
   (5.2) Provide design feedback.
   (5.3) Assess whether objectives have been achieved.

3.2.2. Assessment results. In this section, we discuss the results of the tests on Products A and B in the light of the above guidelines.

Planning the human-centred design process. As has been demonstrated by several studies, the success of a user-centred design requires the process to be carefully planned and managed throughout all parts of the development life cycle. For instance, AIPA recommends to start the projects by involving all stakeholders to discuss and agree how usability can contribute to achieve their objectives, linking business goals to usability goals, defining which costs the different stakeholders are ready to pay and agreeing on the development plan and which are the priorities. This and other information important to create a wide agreement on the project are analysed in a feasibility study. Writing this document is compulsory in Italy for projects which cost over a certain amount or are defined as critical by AIPA. For the development of both Products A and B a feasibility study was conducted. Both studies included a cost/benefit analysis.
and much important high-level information, such as why the system had to be
developed, what were the overall objectives of the system, and how to evaluate
effectiveness, efficiency and quality of the software product. ISO/IEC 9126-1 (2000) was
used as the reference model for software characteristics and metrics. The study also
analysed the intended users and their tasks, their abilities and expertise, the technical
constraints, the key functionalities to be developed in order to support the user needs,
the overall workflow for the system in use and the expected service level for assistance in
using the system.

We observed that in such feasibility studies some important information for usability
design was missing, such as what are the usability goals and which GUI style should be
used. Some users were involved in writing the feasibility studies, but most of their
requirements were related to functional characteristics and expected performance
of the system. Quite often, when involved in feasibility studies at this step of the
development life cycle, users give almost only functional requirements since they have
no knowledge of usability issues. They are mainly interested in what the system can do
to support their job. Thus, the feasibility study typically contains the analysis of the
allocation of functions between users and software, about organizational changes, and
management constraints (planning, costs, use of resources, etc.), but does not contain
quality in use or usability requirements. Moreover, the users who are involved in the
studies are a limited number and do not generally cover the different classes of
stakeholders. Most of them are representative of the acquirer, not of the end-users. As a
consequence, the real elicitation of the quality in use requirements only starts later,
when the next step of the development begins. Note that, according to the Italian
legislation, the feasibility study has to be carried out by a supplier other than the one
that will develop the product.

Understand and specify the context of use. The design groups of the suppliers
consisted of seven people (Product A) and three people (Product B), respectively. They
mainly had technical backgrounds (engineers and computer specialists). The integration
of the team with external usability specialists was not envisaged for Product A, whereas
the design team for Product B was assisted by an external expert to carry out the
analysis on the usability aspects. Specific human-centred design techniques were not
used, although prototypes had been produced during the development.

During the design process the supplier teams interacted only with one and two users,
respectively. Such representative users were both final and customer users (to be
responsible for the procedures offered by the application once it would have been
released). According to the designers, during the design process 35% of their total
commitment to the design was given to interviews with the users.

The user population for which both products were to be developed was composed
mainly of internal experts and inexperienced employees. No groups with special needs
were expected to be supported by the products. In the initial design step, suppliers
performed some interviews to determine the characteristics of the intended users. We
observed a lack of representativeness of the few interviewed users who were experts.
Also, these users had a good knowledge of previous products, where usability and
interactivity were very poor, so they seemed to have developed over time a significant
ability to interact with non-usable product interfaces. This fact could have influenced
their sensitivity to usability requirements.
Moreover, designers did not show any striking awareness of the need to analyse the context of use of the product neither did they use any specific techniques. During the requirement elicitation, tasks to be supported were analysed in isolation, not considered as part of a workflow. No alternative scenarios of use were discussed, in order to clarify to the users how the system would work in different situations.

This approach led to products that are not flexible and are difficult to adapt to slightly different tasks.

These products were thought to be used mainly within an office and professional environment. No analysis was performed in order to understand users’ health and safety requirements. For example, the user workload and the required support were not among the analysed requirements.

Finally, designers did not seem particularly interested in usability costs–benefits. No particular attention had been given to reaching specific usability objectives.

*Specify the organizational requirements.* This aspect of the system requirements was not considered by the requirements elicitation process. In the specific contexts of both systems it seemed to be difficult for the designers to understand obligations, responsibilities, levels of controls and autonomy or the value of ethics. No relevant statutory or legislative requirement was identified. No analysis was performed on the performance of the new systems against operational and financial objectives; no benchmark was provided for design testing. The impact of new products on work organization seemed to be underestimated, including the need for providing the users with a training programme and for managing the resulting changes in the workflow. In particular, the usage of Product A requires the user already to know Microsoft Word and an Internet browser. The user may be exposed to organizational changes with the introduction of such a product, since some manual tasks are scheduled to be automated. The adoption of Product B could cause the complete reorganization of the external relation offices of the public administration customer.

*Produce design solutions and prototypes.* In both cases, the design process seemed to be performed with scarce attention to the typical user-centred design criteria. No multidisciplinary design teams were activated. No paper-based prototypes were used. For both products, the first prototype was a software copy of the complete system. Such computer-based prototypes were shown to a few users, mainly to evaluate their ability to perform some simple tasks. No organizational prototype was developed by the suppliers. Moreover, we observed a lack of attention to users’ suggestion and comments, that in any case were not obtained with structured and formal methods but as a sort of brainstorming. We did not observe any iteration of design solutions.

*Evaluate design against requirements.* No usability evaluation plan was produced by the suppliers. Evaluations had been implemented according to the personal receptivity of the designers.

For Product A, in the final verification phase, a total of 15 end-users were involved in three workshops held on 3 separate days. According to the designers, significant inputs were given during the workshops. Designers mostly used user suggestions concerning the product characteristic of “structural navigation” (which, in the opinion of two users later interviewed, is one of the less significant characteristics of the application!). Inputs given by the users caused the project to be partly modified. According to the designers, the user representative gave the most important information. A further evaluation test
of product A (after the user-driven modifications) with user representatives was not held. The final evaluation was limited to the conformity of functional and operational characteristics.

For Product B, four meetings were held with the two representative users during the design process. The designers defined these users as a significant sample of the real users of the product. According to the designers, the meetings with the users provided very significant inputs. These inputs caused the design to be modified in the revision phase of the prototype. A final evaluation test of the product was carried out with the same representative users. The supplier, following his own standard procedure, in which the designer is a non-participating observer, conducted the test. In particular, the test aimed at checking: the correct understanding of user requirements; the completeness of the displayed data content; the appropriate functional organization accomplishing the objectives of the user tasks; the easy understanding of already defined interaction and navigation methods; the guessability of the menu items and the organization of the screen layouts. The functional and operative features of the product were evaluated to highlight both difficulties in the interaction and possible improvement interventions.

Having no clearly defined objectives, during the tests the designers were mainly looking for feedback about functional problems. Techniques to assess usability were almost ignored by suppliers. No video recordings had been taken, no check list was provided to perform a controlled user test and no satisfaction questionnaire was provided to capture users' subjective impressions. When tests were performed, no specific reports describing the results obtained and the recommendations for system improvement were written. Because of the absence of quality objectives in the feasibility study, tests to evaluate the achievement of ISO/IEC 9126 quality characteristic level were not performed.

4. Lessons learned

From the findings of the above tests and the analysis of other data coming from the monitoring of existing processes/products, the UWG detected two main typologies of problems obstructing the achievement of acceptable usability values for systems in use by the Italian PA. As we will discuss in Section 6, the PA is presently facing some of these problems. One of the hints to solve them is the introduction of new rules in contract awarding, but much work in all directions is still needed.

4.1. ORGANIZATIONAL/CONTRACTUAL DEFICIENCIES

The problem of the representativeness of the users involved in the project arose in a significant way. The issue was how many users and which classes of users should be involved and in which phases of the cycle. The characteristics and functions of the systems analysed seemed to be tailored on the information provided by one single user, in one analysed case, and by two users, in the other one. Generally speaking, people who will not be the end-users order products. Almost always they are executives or officers who act on behalf of all users of the organization and for all projects. Whereas, it is important that the different classes of users are involved in the phase of definition of the terms of the contract, in order to express therein their own specific needs and
become responsible for reaching and assessing the results. In the same way, tests and evaluations made throughout the semi-finished products in the development life-cycle phases are not carried out by the users who will utilize the products.

It has to be mentioned that in the development methods adopted by suppliers, the techniques of usability analysis and assessment were typically not taken into account and that, as stated above, designers knew very little about human-centred design procedures. The design teams were not multi-disciplinary, as user-centred procedure requires. However, not even the users/customers were really aware of the contributions they could give to the design, neither, as already stressed, are they aware of the methods through which their active involvement should have been organized (the so-called user involvement techniques). Therefore, the participation of the users was reduced to the minimum with respect to numbers and classes. Also, it was temporarily limited and often occurred when the product was about to be released (or it is requested in the phase of prototype validation only). Most of all, it was not organized by the supplier in a systematic way.

Generally speaking, contracts did not make adequate provision for the involvement of users and the criteria for awarding them do not adequately reward quality and basically never consider usability. Quality plans defined in contracts hardly mentioned usability and scheduled testings are always only functional and related to reliability. User satisfaction was never considered as an instrument to define the contract terms with suppliers and to indicate areas of development.

4.2. METHODOLOGICAL/CULTURAL DEFICIENCIES

At the time the UWG was conducting the tests, quite often designers tended to consider users as competitors, with whom they have to communicate as little as possible, rather than as partners with whom they can achieve a common objective. As a consequence, user involvement, when it occurred, hardly started in the early phases of the development life cycle; rather it intensified in proximity to the release or presentation of a prototype. Unfortunately, we have to remark that this mental attitude is still alive today.

Suppliers and customers were not well informed about usability principles. Although customers in particular expressed the desire to participate in the definition of the requirement and the validation of the solution, they did not possess procedures or guidelines that guarantee an adequate involvement of end-users in the design process. Customers should not be expected to have broad personal experience in the development of projects for software applications. Suppliers, on the other hand, were noted to have very little knowledge about human-centred development methods and, in particular, to give very little attention to the contexts of use of the products they develop. Also, the process of collecting information from the users (the so-called review meetings) was not subject to procedures and it was generally implemented according to the personal receptivity of the designers. A solution to these communication problems between suppliers and customers could come from the introduction of a new common industry format (CIF) for documenting usability results for use in the procurement process (see also Section 6). CIF has been developed by a US-based group of companies.
coordinated by NIST (Bevan, 1999; Blanchard, 1998). The format has been approved as American standard (ANSI/NCITS 354), and is intended to be submitted to ISO.

Since usability is not just a software feature which the designer may or may not include in the product at any phase of the life cycle, but a characteristic of the interaction between user and product, the designer must necessarily acquire all data on the roles of the users with respect to the product and the tasks they will carry out with its help. This requires analysing the conditions of use of the systems with real and potential users in an environment which is the destination or very similar to that. An analysis should be made of the effects of the products and of the functions of the products on the work processes (individual and group work), on the activities carried out and assisted by the new products (More effective? More efficient? More satisfactory? With less stress?), and on the organization of the work (new flows and procedures, redistribution of workloads and responsibilities, etc.).

Regarding the practices observed, the analysis of the requirements should have been carried out in a more detailed and systematic way, including more users and classes of users, long before the release of prototypes and products and considering more use cases. All these analyses required adequate methods, capacities and means that suppliers seemed not to possess.

Another relevant methodological deficiency concerned the techniques to assess the usability of products that were practically ignored by suppliers (usability laboratories operating now are very few) and by customers who should, in principle, test the supplied products. Real interdisciplinary competencies in development teams were (and are still!) lacking. They were too often oriented to satisfy only the engineering (functional) aspects of the product.

A series of causes connected to these deficiencies were identified by the UWG.

1. The persistence of technological constraints caused a large part of Italian PA applications to use Cobol or languages of the third generation, with very simple graphic interfaces and little interaction with the user, only within limits of rigid parameters based on an alphanumeric type of data entry. These obsolete applications inevitably hinder the innovation spur of the development environments. In 1997 (source AIPA balance sheet) only 6% of the application software in use was written in advanced languages of the fourth generation (see Figure 2).

2. Suppliers were not much convinced of investing in usability so that, as already mentioned, it was not considered a rewarding factor when contracts are awarded. Usability represented a definite additional cost in terms of decrease in software production rate, increase in product control and revision procedures, and acquisition of new expertise, against benefits that are not easy to evaluate. Even if usability experts are generally of the opinion that a greater attention given to usability can produce commercial and competitive advantages, this opinion was not diffused in the PA scenario. Existing procedures (e.g. contract adjudication) prevented suppliers from appreciating possible competitive advantages deriving from focusing more on usability.

3. The same attitude of the customer towards usability seemed ambiguous. On the one hand, usability was considered important to increase efficiency, effectiveness, safety and comfort of the product. On the other hand, usability was seen as an additional...
cost to be paid to the supplier, or as a delay factor in the delivery of products. The various types of PA users, user/customers, users involved in the design process (working closely with external designers) and end-users, also felt different with respect to usability. The latter were undoubtedly more concerned for the immediate advantage of usability. However, as a matter of fact, contracts were still awarded almost always in favour of non-qualitative factors and lowest costs.

4) Suppliers’ poor knowledge of user-centred development methods, whose peculiar processes, even when considered in a project, were often applied out of context and, once in a while, to old and not very flexible methods.

5) Lack of competencies in user-centred design available in the market. The training field, because of the limited requests, was just starting to get organized to provide specific competencies.

Finally, not enough attention was given to the effects of the users’ involvement in the analysis and validation of the proposed solutions. Users should hence become in a certain way co-responsible for the chosen solutions. In fact, this way of proceeding gave rise to juridical and organizational problems that are yet to be assessed and are probably not in line with the present work organization of the PA.

The list of the above-mentioned deficiencies and causes substantially indicated the possible strategy of intervention. At the time of the UWG studies, a law was introduced, containing the definition of the “Plan–Do–Check–Act” innovation cycle for the PA, based on feasibility studies. The requirements for the supplier in contracts have to be deduced from the content of the feasibility study. It is necessary for these documents to contain a demand and reward for quality, renovation of the environment, prototyping development and the adoption of user-centred methods, plus a constant appraisal of users’ satisfaction as the structural instrument for the supplier to plan the improvement of his development methods. These are the necessary conditions to bridge the cultural gap mentioned before and to encourage awareness of the co-responsibility of users and knowledge for all those involved in the development processes of user-centred principles and development methods. It is necessary to create conditions to enable PA users to make an organized request for usability and for suppliers and the training field to give an adequate and convincing response.

It should not be forgotten that the issue of usability does not end with supplying the user with a product, even if it is in line with the usability requirements of the order. Actually, the after-release phases of an application life cycle are as important, if not more important, as the development phases based on how the users judge the quality of
a supplied product. Maintenance and assistance, the capacity to respond in a flexible way to the various customer needs and the capacity for continuous improvement are important for the users’ satisfaction. Consequently, it is necessary for the projects to focus on users’ needs, to follow the dynamic nature of users’ usability perception, through a constant long-term monitoring led by improvement interventions after release.

The UWG conclusions included two further notes, namely:

(1) Both suppliers and customers should be made to understand possible usability benefits, showing them how the introduction of specific methods actually decreases the cost and duration of projects and as such reduces inconsistency in requirements, user dissatisfaction and the need for costly corrections in the advanced phases of the life cycle. The key to this awareness is represented by a new receptivity towards usability in contracts and should include adequately terms to favour the use of human-centred development processes and/or quality plans with specific usability objectives.

(2) Only an activity that integrates the above-mentioned areas of development could produce considerable results in the short or medium term. However, such an activity emphasizes cultural and organizational issues connected to the refusal to change consolidated procedures, of both the suppliers of computer technologies and of customers, such as the PA.

5. Feasibility study guidelines

As another core activity, the UWG issued a document including usability-related recommendations and the definition of the planning, design and validation criteria for new developments (or adjustments of already existing ones) of user-oriented systems. The aim was to integrate with what AIPA had already issued on Guidelines for preparing Feasibility Studies, concerning the acquisition of goods and services based on IT.$

Planning criteria included the following.

(1) Criteria to choose the usability requirement in an application development project; in particular, criteria and methods to analyse the “context of use” of the application, based on scrutiny, available budget, environment, duration of the project, profile of the future users, and other required characteristics of the system (reliability, velocity, accuracy, solidity, flexibility, etc.). See also Annex A of ISO 9241-11 (1998) see footnote\[7\].

(2) Distinguishing features which make an application “usable”. A possible reference is the ISO standard on the quality of IT products [i.e. ISO 9241-10 (1996) (see footnote\[7\]) for the dialogue principles of an interactive application, ISO/IEC DIS 9126-1 (2000) for the definition of the quality characteristics of a software product].

$\text{Guidelines for feasibility studies have been published by AIPA in the supplement No. 3/97 of AIPA newsletter.}$
(3) Criteria to estimate the cost of development on the basis of the type of design process and the quality models of the product. Furthermore, definition of cost/benefit analysis criteria that take into account risks and cost of “non-usability”.

(4) Identification of the control document system, and its contents, to be demanded from the Supplier (i.e. the Project Plan and the correlated documents based on ISO 9000-3 to assess the Execution of the Project, the Quality Plan to verify the Quality of the Product, etc.), as well as the definition of the rules to be applied to update these documents. The customer will evaluate the observance of the terms of the contract using the control system.

*Design criteria*, which have to be included in the contract and, in all cases, established before the activities start, must make provision for the following.

1. Determining the user-oriented design methods that suit the context (participatory design, iterative design, human-centred design in general); a possible reference can be found in ISO 13407 (1999) and ISO TR 18529 (2000) (see footnote z) on the Design Processes.

2. Determining the most adequate development cycles (e.g. prototyping) for a human-centred design.

3. Determining the competencies (e.g. types of resources, multidisciplinary features) and tools which are needed to implement a project focused on usability.

*Evaluation criteria*, which have to be included in the contract also and, in all cases, established before the activities start, contained the followings.

1. Competencies and tools needed to evaluate the usability of the product in the various phases of the development life cycle.

2. Techniques and methods to be used in the usability inspections made by end-users and/or by experts during the life-cycle phases [a possible reference can be found in ISO 10011-1 (1990) (see footnote y) on how inspections are carried out, ISO/IEC 14598 (1998–2000) on the evaluation of software products and ISO/IEC TR 15504 (1998) on the evaluation of processes].

3. Methods to carry out the long-term monitoring of the qualitative levels in use. This monitoring, that must be constantly carried on by the customer (or on his behalf), aims at finding the way to update the quality in use to suit the continual change of user expectations.

### 6. Outcome and influence

During the last few years, the Italian PA has been undergoing a deep renovation, in the direction of improving the services offered to citizens. This is due both to the need of conforming with the European Union regulations and to the growing demand of citizens, who are more aware of their rights and have experienced the availability of modern technologies through the Internet.

One of the key factors in the automatization of the PA procedures is the Unitary Network of the PA, which is now, at least partially, available. The Unitary Network...
allows different offices of the PA to share information through a unified environment
and the citizens to interact with a single Web site to get information about records
involving such different offices.

The increase of the web technology diffusion has caused a consequent growing
interest on user interfaces and web sites, in particular from the point of view of the
usability requirement. As a consequence, some of the UWG recommendations have
been seriously put into practice.

In particular, as discussed in Section 4, the UWG highlighted two main typologies of
problems that obstruct the achievement of acceptable usability values for applications
in use by the Italian PA: organizational/contractual deficiencies (e.g. scarce representa-
tiveness of the involved users; criteria for awarding contracts not adequately rewarding
usability) and methodological/cultural deficiencies (e.g. suppliers and customers not
well informed about usability principles; designers considering users as competitors).

To face these problems, AIPA has started several initiatives, such as those given
below.

(1) **Procurement**—The PA offices have been formally asked to introduce the usability
requirement in the feasibility studies for applications whose economical value is 5
billion liras or above. A booklet, based on the UWG guidelines presented in
Section 5, containing suggestions and indications for dealing with product usability
in the feasibility study, has been produced and distributed by the AIPA to the
various PA offices.

Analogously, in contracts referring to the realization of interactive systems, the
public administrations have to explicitly mention the achievement of usability
requirements (specified in accordance with ISO 9126 and 9241). Also, it is
mandatory for the suppliers to follow user-oriented design procedures containing
prototyping development techniques (according to ISO 13407).

It is now recommended by AIPA not to award contracts on the basis of non-
qualitative factors and lowest costs. On the contrary, quality factors in general, and
usability in particular, have to be considered rewarding factors.

Finally, AIPA has promoted the involvement of the Italian Ministry of Justice in
the EU-funded PRUE project (Bevan, Bogomolni & Ryan, 2001). PRUE aimed at
demonstrating through different case studies the value of the CIF for documenting
usability results for use in the procurement process. In particular, PRUE has helped
the Italian Ministry of Justice introducing usability requirements into the
procurement of a new enhanced version of the existing dial-up legal information
service (Bevan, Claridge, Muguire & Athousaki, 2002). Summative evaluation
results reported in the CIF have been very useful in helping the Ministry understand
the needs of different user groups, and in establishing usability requirements for the
new system. The user testing has also clear benefits in helping the supplier better
understand Ministry of Justice requirements.

(2) **Methodological issues**—The analysis of the context of use is now explicitly required
by the PA. Consequently, several suppliers have started exploiting new design
methodologies based on use cases, introducing multi-disciplinary competencies in
their design teams, and even activating usability laboratories to test product
prototypes against real users. Relevant studies, involving several types of end-user,
have been conducted in particular for large projects at the Finances and Education Ministries.

(3) **Information dissemination in the PA**—AIPA has promoted several short courses and workshops on user-centred design and system usability, with a special focus on usability and PA (how to introduce it in the contracts, how to evaluate it, etc.).

(4) **Monitoring**—Usually, the PA specifies monitoring procedures for each large contract. Very recently, usability has been introduced among the software characteristics to be monitored. In particular, a sample of products still under development has been selected to undergo a series of usability tests with real users from PA offices. The outcomes of such usability tests resulted in improvements to the interfaces and interaction procedures of the products. Such improvements have been subsequently evaluated again through further usability tests.

(5) **User involvement**—A wide programme for evaluating the satisfaction of the final users in interacting with the software products has been started and the first results should be available during the year 2002.

7. Conclusions

This paper reports the positive experience of a working group promoted during 1997 by AIPA with the goal of stating the level of usability of PA interactive systems and proposing some guidelines to improve it.

During its activity the Usability Working Group (UWG) performed two tests on two different development designs of software products for the Italian PA and produced a document containing both directions to increase the usability culture in the PA and indications to define, in feasibility studies and contracts, usability needs and ways to assess them. In particular, such a document tried to answer some crucial questions such as: considering the Italian PA scenario, which are the ideal conditions for achieving the usability objective and with which resources? How can the cost and benefits of this choice be quantified? Which requirements make a product usable? Which are the most appropriate design and implementation processes for obtaining a usable product? How can the usability level of a product in any stage of the development cycle be assessed?

Recently, many of the UWG indications have been put in practice by AIPA, in particular by issuing official guidelines for the awarding of contracts for PA software acquisition and development. The first positive results of this new approach are emerging and we hope to experiment soon with a wide diffusion of really usable systems in the PA.

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