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Guidelines to Specify HCD Activities in the Call for Tender for Public Administration Websites

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Abstract. Despite studies that document the economic benefits of usability evaluation beyond the obvious improvement in user satisfaction, this research in human-computer interaction has too little impact on software development practice. Consequently, many software systems developed show a very poor usability. This is true equally for commercial software and for public administration web sites. Government websites have the objective of improving the interaction between citizens and public agencies or government functions. And yet, our study of software engineers revealed an important but previously hidden result, namely: during product development process companies focus almost exclusively on the requirements formally established in the Call for Tender (CfT) of a particular project. Generally, such requirements do not include usability and user experience (UX) and, thus, those qualities are neither designed into the project, nor evaluated on the way to completion and delivery. In this position paper, we review the motivation for including UX and usability requirements in CfTs, suggest some beginning steps for how to specify these qualities in the CfTs and show the initial effort for how to evaluate the efficacy of these specifications and guidelines.

1 Introduction and motivation

The Digital Agenda, presented by the European Commission, is one of the seven pillars of the Europe 2020 Strategy. It defines the objectives for the growth of the European Union (EU) by 2020. Specifically, it proposes to better exploit the potential of Information and Communication Technologies in order to foster innovation, economic growth and progress.

A composite index, called Digital Economy and Society Index (DESI), summarizes relevant indicators on Europe's digital performance and tracks the evolution of EU member states in digital competitiveness [9]. The DESI

includes 5 main dimensions: 1) *Connectivity*, which measures the deployment of broadband infrastructure and its quality; 2) *Human Capital*, which measures the skills needed to take advantage of the possibilities offered by a digital society; 3) *Use of Internet*, which accounts for the variety of activities performed by citizens already online; 4) *Integration of Digital Technology*, which measures the digitization of businesses and their exploitation of the online sales channel; 5) *Digital Public Services*, which measures the digitization of public services, and focuses in particular on e-Government and e-Health.

Figure 1 shows the score of each DESI dimension related to 2014 and 2015. In 2015, the overall DESI score is 0.48, which highlights an improvement in digital development in comparison to the previous year, when it was 0.45: this shows that both the EU as a whole as well as individual member states are progressing towards a digital economy and society.

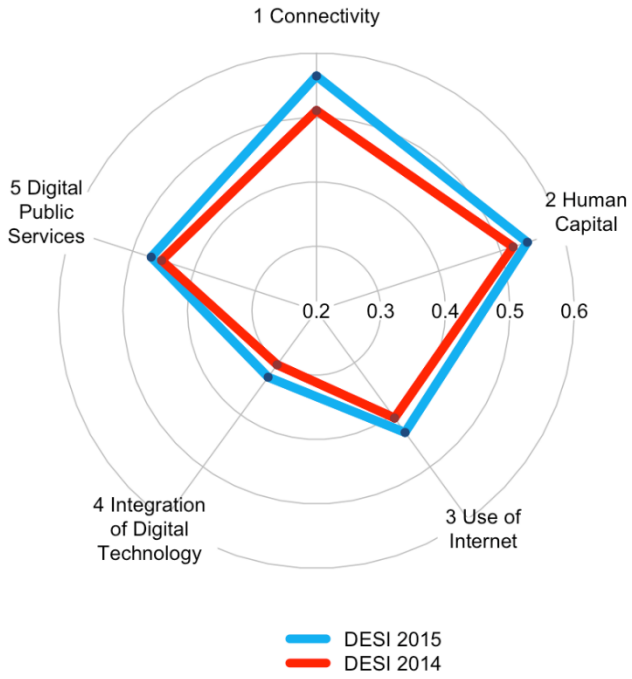

Figure 1. The score of the DESI dimensions related to years 2014 and 2015 [from https://ec.europa.eu/digital-agenda].

However, member states are at different levels of development and are progressing at different speeds. Digital Public Services is the dimension where the states' performance is most fragmented. Denmark and the Netherlands are among the leaders in the online public services not only in Europe but also in

the world, in contrast to Italy and Slovenia, countries that are moving more slowly toward digital public services.

The Italian level of use of digital public services is still under the European average: only 18% of Internet users interact with Public Administration (PA) websites. This puts Italy in twenty-fifth place among the 28 EU member states measured by the DESI. PA websites are judged poorly because of incomplete implementation of digital services, and poor usability [6].

In order to improve this situation, every PA website should be designed for user experiences (UX) that enable citizens to assert their rights and fulfill their duties, and evaluated for usability. Usable websites that provide a positive UX to their users is both a formal and ethical responsibility. Italy has had legislation and policies that require PA to work toward usable and accessible services since 2001 [4]. Transparency in government is a goal that can be accomplished for e-Government and Open Government. If embraced fully, enormous amounts of information/services could become available to every citizen, regardless of his/her status, employment, age, education level and on any device he/she uses (e.g., computer, tablet, smartphone). How shall we provide motivation to software developers or organizations hired to produce PAs that Human-Centred Design (HCD) methods produce usable websites.

In the last few years, a considerable part of our research has been devoted to this aim. Our study [1] called out an important problem about the reasons companies do not address usability engineering during their product development process: many companies focus almost exclusively on the requirements formally established in the project Call for Tender (CfT) (comparable to a Request for Proposal RFP). Generally, such requirements do not include usability and UX and, thus, those methods and activities are not built into the plans, the customer acceptance criteria, nor as part of the system requirements. What's missing are guidelines about User Experience and usability to help the PA to introduce HCD methods in their CfTs in order to improve measures of usability and usefulness for websites or other digital public services.

Since July 2013, we have been collaborating with members of the GLU (Gruppo di Lavoro per l'Usabilità), an Italian working group on usability related to the Italian Ministry of Public Administration, in order to improve the usability of PA websites and other e-government systems. In May 2015, GLU published a new version of a document that provides detailed guidelines for the design of the websites of the PA, called eGLU Protocol 2.1 [8], whose aim is to guide web masters and web editors, who do not have experience on usability and UX evaluation, in the identification of usability problems of the

websites they work on, by committing limited resources in terms of time and people.

This is very important, but it is not enough. Government website designers should make usability a priority [5]. In according to [5], creating usable website means: 1) making the experience familiar: sites have to conform to evolving web design norms; 2) understanding citizens: websites should be organized around citizens' needs; 3) practicing appropriate consistency: citizens have to feel they were in an integrated place when they left home base; 4) testing and evaluating website designs: usability can be reached only if the website prototypes designs are evaluated from the early stages of the software lifecycle.

Different countries have defined guidelines aiming at supporting designers in creating usable government websites. See, for example, guidelines proposed by United States of America (see [10]), but also those one issued by Italy [4]. In this position paper, we illustrate a set of guidelines to introduce the HCD act in the CfT for the PA websites.

The remainder of this paper is structured as follows. Section 2 reviews our analysis of Italian and international CfTs to determine whether and how HCD, UX and usability are mentioned. Section 3 presents the guidelines we have developed to integrate HCD software development practices in CfTs. Finally, Section 4 describes an ongoing experiment in including HCD in a contracted software project for digital public services.

2 HCD in the Call for Tenders

A considerable part of our research in the last years has been devoted to methods for addressing usability and UX in software development, trying to convince software practitioners of the advantages of integrating HCD techniques in their development practices. To this aim, we conducted an experimental study with software companies to investigate the use of HCD in their software development processes and, in particular, to analyse how they address usability and UX of the products they create [1].

As mentioned above, software companies attend to requirements mentioned in the CfT, and put aside any other concerns they might include in a differently drawn project. To understand how often UX and usability are mentioned in CfTs, we have performed an analysis of 44 CfTs for ICT systems issued by public and private organizations (26 in Italy and 18 in International countries) in order to verify to which extent the CfTs explicitly requires the use of HCD techniques. Table 1 shows the preliminary results revealing 3 different categories.

		Category		
	Organization	**Specific requirements**	**General Requirements**	**No requirements**
Italian CfT	*Public*	0	12	4
	Private	1	9	0
International CfT	*Public*	2	7	8
	Private	0	1	0
Total		**3**	**29**	**12**

Table 1. Preliminary results of the analysis investigating HCD requirements in CfTs.

Only in 3 CfTs analysed (i.e. 1 Italian CfT issued by one private organization and 2 CfTs issued by international private companies), formal usability tests are specifically required (see Specific requirements in Table 1). For example, in the CfT issued by the International Centre for Trade and Sustainable Development (ICTSD) for the redesign of their website [3] it is written: "*Usability: Clarity of interaction between the users and the site is crucial, and must be paramount in the redesign. The web team will run at least two usability tests throughout the design and development process of the new site (to create a short list of the most serious problems and a commitment to fixing them before the next round of testing). A specific usability testing plan (with details on number of participants in each round, who we test with, where/when we test, who watches, reporting, etc.) will be released before the beginning of the design process*." The CfT also stated that the most serious problems identified in the first test have to be fixed before running the second usability test.

Twenty-nine analysed CfTs (i.e. 12 CfTs issued by Italian public institutions; 9 CfTs by private Italian companies, 7 CfTs by International Public institution and finally 1 CfT issued by International private institution) refer to HCD techniques as a general requirement. For example, in the CfT of an Italian PA for the development of a system for registering employees presence there is only a sentence that refers to usability [2]: "*Application programs should preferably comply with the quality requirements, as those reported in the ISO 9126 (i.e, functionality, reliability, usability, efficiency, maintainability and portability)*". The word "preferably" indicates that software quality is not mandatory. In particular no specific requirements about usability are provided, so it is not clear if and how companies would attempt to fulfill or evaluate this aspect.

Finally, 12 of the analysed CfTs (i.e. 4 CfTs issued by Italian public institutions and 8 CfTs by International public institution) did not mention any requirement related to HCD, usability or UX.

From these several studies, there is little or no attention to HCD, usability and UX issues in the CfTs, since in most cases relevant requirements are poorly specified, or are not valid and verifiable. Without specific requirements for UX or usability in the CfT, the software companies will not use HCD techniques in their projects.

3 Guidelines to Introduce HCD in the CfTs

HCD activities and techniques can be specified in a CfT at different phases of evaluation and selection of a contractor [7]:

- *Qualification phase* - it requires tenderers to demonstrate previous experience and/or expertise in HCD (e.g., the company has employees that are expert in usability, or company has evaluated their own products previously).
- *Selection phase* - a bonus is assigned (in terms of points during evaluation of response to a CfT) to companies whose software development lifecycle is based on an HCD approach.
- *System requirement phase* - HCD specific requirements are included within the technical specification documents that the contractor must fulfill. Even more specific would be usability measures as part of a customer acceptance test.

Each of the three phases increases the quality of the CfTs and of the activities contractors have to carry out. Table I shows a series of more complex or complete HCD activities the contractor has to perform: User requirements analysis, Usability and/or UX monitoring, Navigational scheme test, and Usability/UX test. We've proposed three different levels of requirements related to website complexity:

1. *Basic requirements* – to be included in the CfTs related to websites of low complexity with reduced budget and execution time; they require preliminary evaluations with some qualitative usability assessments.
2. *Medium requirements* – to be considered in the CfTs related to websites of medium complexity and medium/high budget and execution time; they require to specifically identify the target users, monitor the perceived usability (through questionnaires) and navigational scheme along with some qualitative assessments of usability.
3. *Advanced requirements* – to be included in the CfT related to websites from medium/high to high complexity and medium/high budget and

execution time; they are similar to the Medium requirements but with more attention to quantitative as well as qualitative assessments.

For example, if the requirement level is "Basic", the User requirement analysis is performed using questionnaires and interviews in order to gather the most important characteristics of the target users, their needs, etc. While if the level is "Advanced" a specific user profiling is required through techniques, such as personas and scenarios.

Activity	**Basic requirements**	**Medium requirements**	**Advanced requirements**
User requirements analysis	Questionnaires Interviews	Personas Scenarios	Personas Scenarios
Usability and/or UX monitoring		Online questionnaire for monitoring usability	Online questionnaire for monitoring UX
Navigational scheme test		Card sorting or reverse card-sorting	Card sorting or reverse card-sorting
Usability/UX test	At least 2 formative test involving 5 users for 6 tasks Questionnaires for assessing the perceived UX	At least 2 formative test involving 5 users for 8 tasks Questionnaires for assessing the perceived UX	At least 2 formative test involving 5 users for 8 tasks Questionnaires for assessing the perceived UX Summative test involving at least 15 users

Table 2. The three levels of HCD requirements.

In the following, there is an example of a section, which can be inserted in the CfT related to PA websites, illustrating the basic requirements related to the HCD activities.

Human-Centred Design, usability and User Experience

In order to follow the indication provided by the 2011 Guidelines for the PA Websites (Chapter 4.4.2 "Usability")[1],

[1] Downloadable from http://www.funzionepubblica.gov.it/lazione-del-ministro/linee-guida-siti-web-pa/indice/cap4-garantire-la-qualita-dei-siti/indirizzi-sullusabilita.aspx

the contractor must specify the methodology and the process to follow in the evaluation and implementation of the website (ISO 9241-11) through the use of the Human-Centred Design approach (ISO 9241-210).

This process considers at least the following activities:

1. Identification of the specific characteristics of target users through the involvement of their representatives in the definition of requirements through interviews and/or questionnaires
2. Execution of at least 2 formative usability tests, with a minimum of 5 participants and 6 tasks for each test to be carried out during the development of the prototypes, wireframes or pre-release versions of the website, in order to identify the main usability problems and to have them fixed before the final release. The types of participants and the navigation tasks to be used during the test must be proposed by the contractor and approved by the customer. Participants involved in the second test should be different from those involved in the first. The results must be documented by a report including:
   - Number of participants, their demographic characteristics, and the navigation tasks they performed;
   - Success index;
   - List of the identified problems (with possible solutions) and their seriousness;
   - Subjective metrics (es. SUS, Umux).

The execution of these activities is compulsory to consider the implementation of the work complete, but there is no restrictive covenant respect to the level of usability measured.

For clarification of the used terminology in this section, please refer to the Section "Terms and definitions" of following technical standards:

- ISO 9241-11 " Ergonomics of human-system interaction - Guidance on usability"
- UNI EN ISO 9241-210 - Ergonomics of human-system interaction -- Part 210: Human-centred design for interactive systems
- ISO/TR 16982 - Usability methods supporting human-centred design
- ISO/IEC 25062 - Common Industry Format (CIF) for usability test reports

4 Current work and anticipated next steps

This paper has presented a proposal for guidelines to specify the execution of HCD activities by contractors in the calls for tender related to Public

Administration websites. The guidelines are based on three different levels of HCD requirements that are characterized by the growing website complexity. A first application of the advanced requirements is currently ongoing. Specifically, these guidelines were included in the CfT for the redesign of a government platform. A restricted procedure involving 5 selected software companies was carried out. The contracting company was glad to introduce HCD techniques in the platform development process. The company did not propose HCD techniques in its proposal, because the cost associated would have priced them out of consideration for the contract. The company has already defined personas and scenarios for the user requirement analysis activities and now platform prototypes have been created. At the workshop, other results of the public platform development developed according to HCD approach will be presented.

It is worth highlighting that, at this stage, our aim is to test/share the proposed guidelines both with the PA (for case studies) and with professionals/researchers to improve and complete them. The execution of the prescribed HCD or usability techniques is compulsory to consider the implementation of the work complete; however, possible usability problems detected will not prevent the final acceptance of the system.

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