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Addressing Usability and UX in Call for Tender for IT Products

Rosa Lanzilotti, Maria Francesca Costabile, Carmelo Ardito
Dipartimento di Informatica, Università degli Studi di Bari Aldo Moro
via Orabona, 4 – 70125 Bari (Italy)
name.surname@uniba.it

Abstract. A body of research in literature has demonstrated the benefits for software companies of adopting methods to address usability and user experience. However, as revealed by the very poor usability of many software systems, companies very often do not consider such methods in their development practices. From our previous studies it emerged that one of the reason is that usability and UX are quality requirements not formally established in the Call for Tender (CfT) for developing software products to which they respond. Therefore, they do not commit resources to satisfy usability and UX requirements. In this paper, we report a systematic review of 44 national and international CfTs for IT products, which aimed at investigating whether and how usability requirements are mentioned.

1 Introduction

Since the 80s, when Human-Centred Design (HCD) was proposed, a significant amount of research has been done with the aim to define methods that support professionals, who work in companies that produce software, in designing and evaluating interactive systems. However, our experience confirms that HCD and other methods to ensure usability and good user experience (UX), even if always mentioned in the literature, are very rarely applied in the actual practice of software development [3, 5, 12]. Today many companies invest most of their resources to produce software that can be competitive on the market. However, the daily experience with a number of software products show that, despite the powerful features offered, users experience many difficulties in using them. A user interface that is difficult to understand and use causes many problems. Usability is a measure of the degree to which users are able to conduct their activities in their specific context of use with effectiveness, efficiency and satisfaction [11]. A low level of usability means that users cannot understand how to use the interactive system, regardless of its functional complexity [13]. Therefore, usability becomes the main goal and usability evaluation represents a fundamental activity of the entire software development.

We increasingly feel the need that this situation must be changed. Several researchers have suggested methods and techniques to maximize the impact of

usability and UX of software products. Our experience with companies has shown that presenting to them methodologies and techniques to be used in their practice of software development it is not enough. We realized that the real integration of activities aimed at improving the usability and UX products requires a thorough analysis of the software development practices, performed together with the professionals while working with them within the company. Through this collaboration, methodologies and techniques for the assessment of usability and UX can be identified and adapted to the specific company.

In recent years, researchers from the IVU (Interaction, Visualization, Usability and user experience) laboratory of the University of Bari Aldo Moro have spent a considerable effort to transfer in companies and organizations methods and tools for dealing with UX along their software development practices [2-4]. More recently, an experimental study has been conducted with the aim to investigate to what extent companies take into account usability and UX, and to analyse how they can modify their process of development, in order to create better products. It represents one of the few studies conducted with the involvement of software companies, in order to reduce the gap between what is proposed by the academic world - and widely published in the literature - and the actual practices of software development. The results show that still too many companies overlook important quality factors, such as usability and UX. The study also revealed an important reason why companies do not take into account usability engineering methods. In their development processes companies focus primarily on the requirements formally established in the Call for Tender (CfT) to which they respond. In general, these requirements do not include usability and, therefore, they do not commit resources to satisfy usability and UX requirements. For example, one respondent said: "*I do not burden my company with what it is not explicitly required in the call for tender*."

As described in Section 2, in order to investigate this result, we performed a systematic review of 44 national and international CfTs for IT products, with the aim to investigate whether and how usability requirements are mentioned. In Section 3, we report the results of an online questionnaire that we also administered to experts in the field of ICT, in order to collect their opinions about the presence of usability requirements in call CfTs for IT products. Section 4 concludes the paper and outlines future work.

2 Usability requirements in CfTs for IT products

In the last few months, we have performed an analysis of 44 CfTs for IT products issued by public and private organizations (26 in Italy and 18 in

European countries) in order to investigate to which extent the CfTs explicitly indicate usability and UX requirements. The public organizations that issued the analysed CfTs ranged from National Government institutions (e.g., Ministry of University and Research, Ministry of the Interior) to small municipalities. The private organizations were Small-Medium Enterprises. Preliminary results revealed five different categories (see Figure 1).

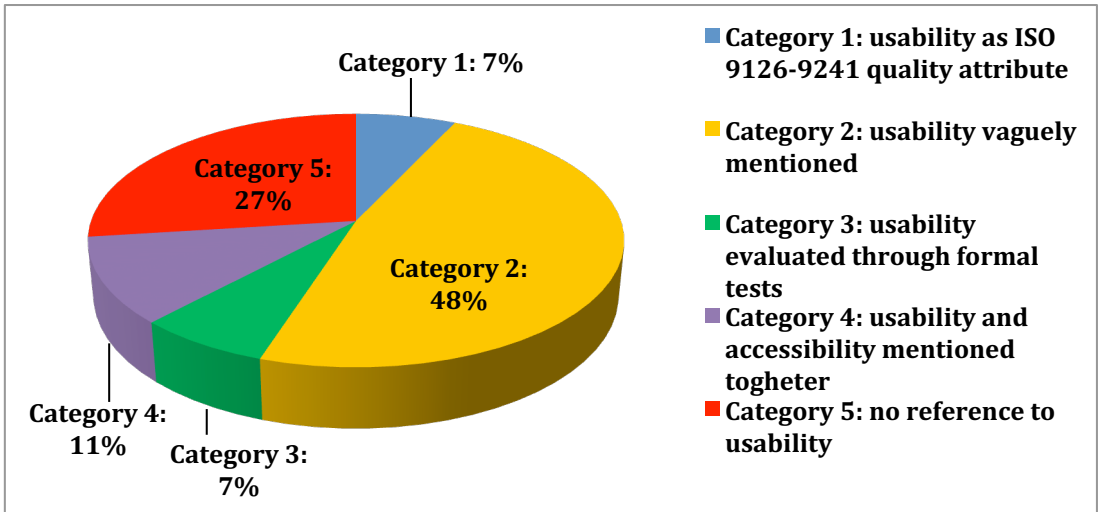

Figure 1. Results of the analysis to investigate to which extent 44 CfTs for ICT systems issued by public organization explicitly indicate usability and UX requirements.

Category 1) The 7% (N = 3) of the analysed CfTs only mention usability by referring to the ISO 9241 and 9126 standards [10, 11]. For example, in the CfT of the Italian Apulia Region government for the development of a system for registering employees presence there is only a sentence that refers to usability [6]: "*Application programs should preferably meet the quality requirements, as those reported in the ISO 9126 (i.e, functionality, reliability, usability, efficiency, maintainability and portability)*". The word "preferably" clearly 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 consider it.

Category 2) In the 48% (N = 21) of the analysed CfTs, more attention is devoted to usability aspects, but they are still expressed in very general terms. For example in an Italian CfT [7], it is written "*The website must be characterized by its immediacy [i.e. learnability] and ease of use*", "*It must be organized clearly [...]*", "*Great care must be devoted to creativity, ..., usability and accessibility*". Again, it is not clearly specified how the usability level of the final products has to be measured.

Category 3) The 7% (N = 3) of the calls explicitly require to perform formal usability tests. For example, in the CfTs issued by the International

Centre for Trade and Sustainable Development (ICTSD) for the redesign of their website [8] 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*." Thus, a rigorous process to verify the usability of the software system is required. Two usability tests should be conducted, with particular attention to subjects sampling, tasks execution and results reporting. The final report of the first test will identify a list of the most serious problems, which have to be fixed before running the second usability test.

Category 4) In the 11% (N = 5) of the analysed CfTs, the concept of usability is mixed with that of accessibility. For example, in [9] it is reported: "*Most importantly, they should demonstrate their understanding of and ability to implement accessibility and usability standards and maintain a high level of practical accessibility*". In some countries, like in Italy, there are laws that clearly regulate the levels of accessibility of software products. For example, in Italy it is mandatory to comply with the Stanca law about accessibility, which was approved by the Italian Parliament in 2003. Thanks to this law, it is easy to specify accessibility requirements in the CfTs. As a consequence, attention is devoted to product accessibility but not to usability.

Category 5) The 27% (N = 12) of the analysed CfTs did not mention usability at all.

3 Online questionnaire on usability in CfTs

An online questionnaire was administered to experts in the field of IT, in order to collect their opinions about the presence of usability requirements in CfTs for IT products. The questionnaire was created and made available online using Google Forms. Various social media, such as Facebook, were used to promote and share the questionnaire to different groups, including Italian Startup Scene Italian Startup Scene - Puglia, and Digital Natives.

The questionnaire was structured to address:

- • *Respondents' profile*: to identify the basic characteristics of surveyed users, i.e. socio-demographic, academic qualifications, work experience.
- • *Experience with call for tender*: to check the presence of usability requirements in CfTs, to collect information on metrics and guidelines

possibly specified in the calls, and to know the respondents' opinion about advantages/disadvantages of including usability requirements in CfTs.

In the following we summarize the collected data.

3.1 Respondents' profile

The questionnaire was completed by 54 professionals and / or experts in the ICT sector. 44% of the respondents (hereinafter also referred to as participants) were developers, 15% designers, 11% managers, 7% analysts, 22% other people (data analysts, computer experts, students, consultants, systems analysts, and so on). 46% is made up of first-level graduates, 28% of second-level graduates, 22% of high-school graduates, 2% of PhDs, 2% do not indicate any qualification.

Regarding work experience, 46% of participants have between 1 and 5 year experience, 32% have been working for more than 10 years, 11% have between 5 and 10 years of experience and another 11% have less than 1 year experience.

91% of participants claimed to be familiar with usability. However, when asked to provide a definition of usability, only 15% of them gave a correct definition, 33% a definition partially correct; 6% indicated references where to get a usability definition. The answers of 28% participants revealed that they confuse usability and accessibility; 7% gave an incorrect definition, 11% clearly said that they are completely unaware of usability.

Another important result concerned the deployment of usability evaluations in the participants' companies. 35% of the participants confirmed the presence of a usability expert in their company and indicated interviews, questionnaires, focus groups, and direct observation, as the methods mostly used. The remaining 65% of the participants said that their company has no usability experts.

3.2 Experience with call for tender

The first question asked to indicate whether the participant had read at least once a CfT. 70% responded positively. We first asked them how frequently they found usability requirements clearly expressed in the CfTs. 60% said rarely, 24% never, 13% often, and only 3% said they had found usability requirements in each call they have read (see Figure 2). 90% of those who have found usability requirements in CfTs have never found explicit indications about methods or guidelines, but only references to documents issued by CNIPA (Centro Nazionale per l'Informatica nella Pubblica

Amministrazione, or, in English, National Centre for IT in Public Administration), DigitPA (Digital Public Administration) and AgID (Agenzia per l'Italia Digitale, or, in English, Agency for Digital Italy).

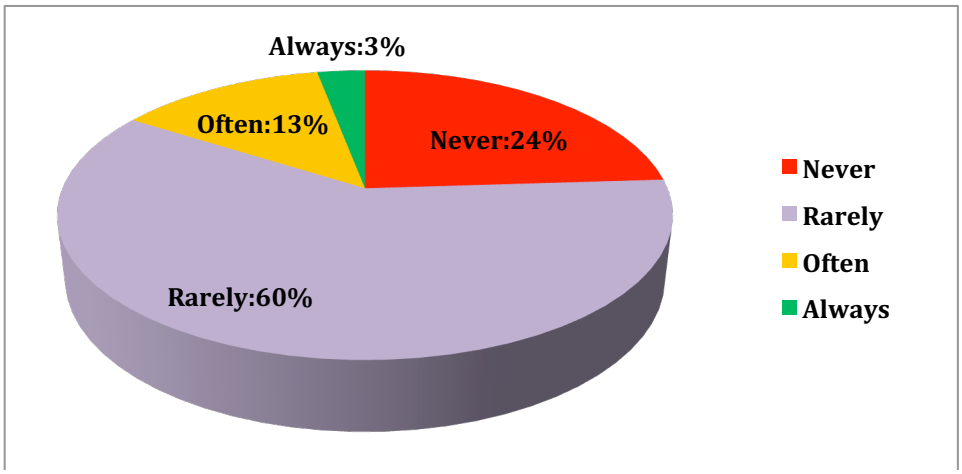

Figure 2. Presence in the CfTs of usability requirements clearly expressed, according to interviewees' experience.

Then respondents were asked to give their opinion on the convenience of including usability requirements in CfTs, also indicating advantages and disadvantages. 89% of respondents agreed on the need to include usability requirements in CfTs. In fact, they believe that this would bring benefits to end users in terms of ease of use of the final product, reducing the time spent to request support and assistance, decreasing the number of mistakes, improving productivity, etc. Also software companies can beneficiate, because of the lesser costs for system maintenance, increased productivity, improvement in the ROI (Return On Investments). The remaining 11% partially or totally disagreed with the inclusion of usability requirements in CfTs. 50% of them believe that the inclusion of usability requirements would cause an increase in production costs; 33% thinks that this would increase the resources for carrying out usability evaluations; 17% believes that there are other reasons why usability requirements should not be in CfTs. For example, "*There is no an objective way to evaluate usability, so it must stay out of CfTs. The only way to evaluate it is through controlled experiments on a sample, and it is extremely expensive if you want that the sample is even vaguely representative of the final users. In any case it is difficult to generalize the results*." Such a response highlights the huge confusion of this participant about usability evaluations.

4 Conclusion and future work

The analysis of 44 national and international CfTs showed that many of them do not mention usability requirements or refer to such requirements very vaguely. As a consequence, companies do not bother to develop their products following a Human-Centred Design approach, because their goal is to satisfy the requirements clearly expressed in the CfTs. To change the current situation, it is necessary to convince the public and/or private organizations to mention explicitly the usability requirements in their calls, so companies will be obliged to consider them. On the other hand, the research community must work to define usability requirements which are objectively measurable.

We are currently 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. The GLU aims at improving the usability of Public Administration websites and other e-government systems. Indeed, in May 2015, the GLU published a new version of a document that provides detailed guidelines for the design of the websites of the Public Administration, called eGLU Protocol 2.1 [1], 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 very few resources in terms of time and people. This document describes all the needed tools (e.g. modules to report the usability problems, spreadsheets to analyse the acquired data according to the identified measurement criteria) and the specific steps to organize and perform an effective usability test by using the thinking aloud technique, which is well known for allowing to perform an accurate evaluation at low cost [13]. Together with the GLU members we are also working at the definition of a framework to facilitate the inclusion and specification in CfT of requirements related to the adoption of HCD techniques by software companies. Depending on the complexity of the system to be developed, the framework prescribes to adopt different HCD techniques (e.g., personas, scenarios, interviews, questionnaires, user tests).

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