USABILITY EVALUATION IN ETHIOPIAN SOFTWARE ORGANIZATIONS

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Abstract

Usability is central especially in context with highly heterogeneous user groups like developing countries. User involvement and participation towards developing a usable software has positive impacts in system success. But how does industry in developing countries work with usability and usability evaluation? The paper reports from a survey on usability evaluation practices in Ethiopian software companies. It aims at exploring the practice of usability evaluation and user participation in software industries in Ethiopia. The survey question is adapted from a previously conducted survey in Italy and Denmark and further expanded with a set of questions on user involvement and participation. The survey was triangulated with interviews with a subset of the respondents. The results show that the percentage of organizations performing some form of usability evaluation is low in Ethiopia. The challenges of usability evaluation observed in the study has been analyzed with respect to the challenges of 'digital divide' among the developed and developing nations using real access/ real impact criteria. The result shows that there are some unique challenges of usability not discussed in the literature reviewed or in any detail elsewhere such as less IT skills, lack of trained professionals and lack of awareness. However more than 80% of the surveyed companies claim involving users in some kind in product development. The implications of these findings with respect to the need to contextualize usability methods are discussed.

Keywords: Usability evaluation, user involvement, awareness, skill, context

1 INTRODUCTION

In many cases in developing countries IT services are leap frogging paper based administration. Outside of the cities and the capital, part of the population is illiterate or semi-literate. Addressing usefulness and usability in context is of core importance to the people in such context.

Human Computer Interaction (HCI) is a well-established sub-discipline of computer science and provides a whole bandwidth of methods for user centered design (UCD) and interaction design. (See for example the course book on interaction design (Preece, Sharp, &Rogers, 2015).) Two central elements are user involvement and usability evaluation.

Though it is not originated from the fields HCI or UCD, the Real Access and Real Impact (RA/RI) criteria consists of set of guidelines useful for user centric design contextualizing to the developing world (Bridges.org, 2005). It describes real access to Information and Communication Technology (ICT) as access that goes beyond just physical access and makes it possible for people to use technology effectively to improve their lives. Real access (RA) criteria set by the digital divide (Bridges.org, 2005) consists of local economic environment as a condition for technological impact among others. It also discuss the need for human capacity and training: '*any technology will be insufficient if people do not understand how to put it to effective use as part of their lives or their work, either because they are not trained to use it, or they cannot imagine the possibilities for how they could use it. People will be encouraged to use ICT only when it is apparent to them that it will have a positive impact on their daily lives'*. The RA criteria aim to highlight sensitive and critical issues that need to be

considered from the developing world perspective. The implication of RA/RI criteria is that usability and hence UCD and user involvement are central parts in the development of ICT.

User participation and involvement has been reported to have a positive impact on the system success (Abelein & Paech, 2015). Earlier research supports that involving users early in the development is efficient as it reduces the costs involved in changes and redesigns late in the software development (Noyes, Starr, & Frankish, 1996). Especially the research in Participatory Design has develop a broad range of tools and techniques (Simonsen & Robertson, 2013).

User involvement is often regarded as costly in terms of effort and access to users. Usability evaluation involves techniques that do not necessarily require access to the intended users of the software (Preece et al., 2015), however the techniques cannot substitute evaluation with users. Indeed, there are cost-effective methods, such as usability inspection, which only require experts of usability who evaluate the software products with respect to well-known usability principles (Nielsen, 1993; Bias & Mayhew, 2005). Related research indicate that HCI/UCD and usability methods are developed within the context of developed countries and might not fit for the developing country's context (Maunder, Marsden, Gruijters, & Blake, 2007; Preece et al., 2015). These publicly available methods need to be appropriated and adapted to the context of the use situation and the environment. For example usability heuristics methods developed by Neilsen (Preece et al., 2015, p. 27) are developed with respect to the western context and adopting as they are to the developing world does not work. This is confirmed by our study detailed in section 3 that usability evaluation is difficult because of lack of ICT expertise by intended users. With other words, aspects mentioned in the RA/RI text are becoming visible as challenges in our study.

Usability evaluation comprises a set of methods including usability testing with users, interview and survey methods. The details of the methods can be found at (Nielsen, 1993). In some organizations, these methods are carried out by dedicated usability professionals, while in other organizations, they are carried out by the software development teams. Specific methods suitable for people who are not expert evaluators are defined (e.g. (Lanzilotti, Ardito, Costabile, & De Angeli, 2011)). Some of the documented benefits of evaluating the usability of software products are increased sales, increased user productivity, decreased training costs and decreased user support (Kujala, 2003).

Research by Winschiers-Theophilus (2009) and Zewge, Dittrich and Bekele (2015) indicate that not only the design of user interfaces, but also the design methods themselves need to be adapted to the socio-cultural context in which they are deployed. Likewise, research by Biru (2008), and Oyugi et al. (2008) indicate studies in Europe and North America might only tell little about the practices in developing countries relating to a different context. Besides cultural differences, differences in application requirements, jobs and work environments, attitudes and behaviours in the workplaces, organizational structures are mentioned (Biru, 2008). Furthermore, lower IT skills of the intended users compared to the developed countries bears influence in usefulness of design methods and usability of the products. Doerflinger and Dearden indicate that also technical ICT development methods would need to be adapted to the infrastructural and cultural contexts (Doerflinger & Dearden, 2013). The authors propose a close collaboration and cooperation between project stakeholders, and emphasize a systematic approach to study end users using local personnel instead of relying on researchers who are new to the local community.

The question then is how does the software industry address these usability challenges? And what are the practices, the experienced benefits and challenges of usability evaluation in Ethiopia? Earlier study published in the year 2008 shows that most of the software

organizations in Ethiopia are young startups and inexperienced; the software industry is in its early stage (Biru, 2008). The study reported that there are no methods available that support the local software industry, and recommends developing contextually adapted software development approach. Another local study in 2012 (Dino & Bekele, 2012) reported that only few companies follow some form of approach such as waterfall, iterative, agile etc. From the few organizations surveyed, Dino reports that usability testing is confirmed by 56% of the respondents, it though is informal, for example collecting feedbacks and comments via telephone conversation. Her study is limited as it considers only few organizations (Dino & Bekele, 2012; p.33).

Also the context in which the software companies operate is constraining: In Ethiopia the software procurement has to meet the requirements of federal public procurement directive (FPPD), which is responsible for all public procurement including, for example, engineering and office equipment procurement, and which is very rigid (Aregawi & Lemma, 2013). According to Aregawi, 82% of the customers of software providers are government organizations who adapt the FPPD (Aregawi & Lemma, 2013). He reported on the opinions of software developers that software has to be revised over and over again after deployment as the experiences with the usage leads to requirement changes, which in turn increases the cost and time of development. With this regard the twelve's criteria of the RA/RI (Bridges.org, 2005) is to have 'political will and public support'. Most developing countries take the ICT as a driving force and enabler for economic development. However due to lack of economic power they often try to meet the short term demands of their constituencies. ICT policy failing to have appropriate software procurement and failing to motivate to work on user centric issues and usability, taking for example a failure to consider usability in the call for tendering (CFT) documents may affect software organizations and stakeholders from taking the necessary actions.

The study is under taken to explore to get a more recent, representative overview over how software companies in Ethiopia address usability and what benefits and challenges experience. In order to help the design of the questionnaire, we decided to adapt the usability evaluation survey by Ardito et al. (2014).

The paper is organized as: in section 2, the research methods are discussed. In section 3, the result of the survey on usability evaluation is presented. Section 4, the result on user contact and participation are presented. And, finally, discussions, conclusions and future implications are presented.

2 METHOD

As mentioned in section 1, the survey is adapted from the one that has been carried out four years earlier in southern Italy (Ardito et al., 2011) (Ital-study), which in turn was adapting a survey by Bak et al. (2008) carried out in in Northern Denmark (Dk-study). The questionnaire used in Ital-study has been translated to English with the help of the authors of Ital-study. Questions addressing user involvement and participation have been added to the translated questionnaire. The survey has been tested first with colleagues at IT doctoral program of Addis Ababa University for checking the language and appropriateness to the Ethiopian context, and thereafter by sending it to four software organizations located in Addis Ababa. Their feedback has been used to finalize the questionnaire. We further decided to triangulate the survey with interviews of selected companies.

Our goal was to identify a representative sample of the Ethiopian software industry. We have considered all kind of software development organizations: software with graphical interface, including mobile based applications, web based applications, development for customers or

internal use. Most of the Ethiopian software organizations are based in the capital, where few have regional branch offices. We, therefore, constraint our sample to Addis Ababa. To locate software engineering companies in Ethiopia we used several sources. We started by sending the questionnaire to Ethiopian ICT Industries Association (www.ictet.org/) using info@ictet.org describing our objectives and consent. The association has about fifty software organizations as a member, as one of the committee member confirmed. Only one organization replied. We therefore resented to personal contacts and exhibitor lists of the 2014 and 2015 ICT exhibition held at Addis Ababa to get contact information of potentially relevant companies. These companies have been first contacted by telephone to make sure that the company developed software. The questionnaire has been sent to forty organizations. In three weeks' time, we have got about ten responses and a reminder email was sent. In many cases, it has also needed additional phone calls to remind the organizations. In the end we got a total of twenty-six responses to our survey. Given the numbers of the ICT Industries Association, we estimate that we got responses from about half of the Ethiopian software industry. The surveyed organizations have been requested for an interview after analyzing the questionnaire to help triangulate the result and seven of them agreed to participate, among them 4 were from those evaluating the usability of their software and 3 were non-evaluating organizations.

The closed questions have been analyzed using quantitative analysis. The open questions have been analyzed using qualitative coding techniques, i.e. thematic analysis (Preece et al., 2015): Themes were identified from the responses of each open question by the first author following similar approach to grounded theory. These themes where then categorized, and the categories have been used to code each sentence. The second author reviewed and guided the analysis. The responses on the interview have been analyzed in a similar manner with the open questions.

3 RESULTS REGARDING USABILITY EVALUATION

The first group of questions concerned general information and profile of the companies. Most of the software organizations surveyed, i.e. 88%, are small size organizations with less than fifty employees. 81% of the surveyed companies have less than ten years of experience in software development; 42% have only between one and five years of experience. From the 26 surveyed organizations only three have between one hundred and two hundred employees. The number of employees in these three organizations is higher because they do not only develop software but provide also public services, such as billing for telecom or electricity using their software as a service (SaaS) product or providing networking and security services in addition to software development.

3.1 Understanding of Usability Evaluation

The first focused question asked into the respondents was understanding of 'usability evaluation'. The 26 answers have been coded into eight categories: *usability evaluation*, *usability definition*, *acceptance test*, *problem solving*, *functionality*, *customer involvement*, *security*, *do not know*. As shown in Figure 1, six respondents provided an explanation of usability evaluation that can be considered correct. For instance, one respondent said: "Usability evaluation involves watching real people use a product (or prototype), and using what is learned to improve the product". Another respondent answered: "Usability Evaluation is an evaluation performed to assess how suitable the user interface of a given system is to the end users of the product". Three respondents gave explanation that can be read as usability definition. One of them wrote: "how well users can learn and use a product to achieve their goals". Two respondents provided definitions resembling acceptance testing. Five respondents provided definitions that we coded with 'problem solving'. An example is "the

evaluation of how much is the developed system used by the client or user; how much is the problem of the users solved by the system". Two respondents defined usability evaluation as adequate functional coverage, for example one response is "customer feedback on functionality and UI, incorporating customer input ..."

The answers indicate that usability evaluation was always understood as evaluating the system together with users. Analytical methods such as inspection and heuristics were not mentioned or indicated.

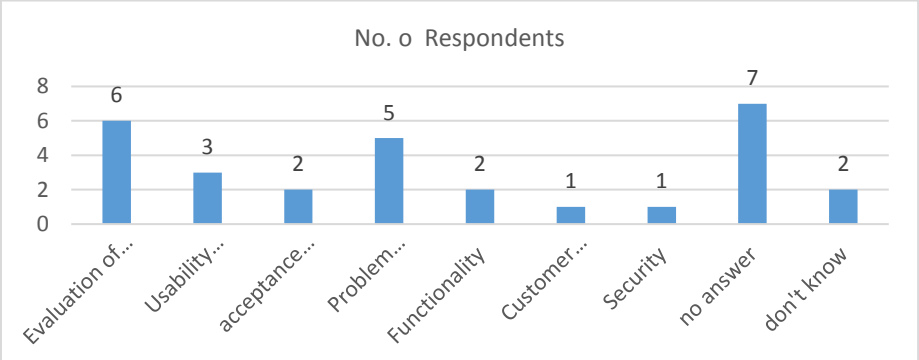

Fig. 1. Respondents' understanding of "usability evaluation"

3.2 Deployment of Usability Evaluation

From the 26 respondents, 54% of the organizations answer that they are performing usability evaluation while 46% are not performing usability evaluation.

3.3 Challenges in Usability Evaluation

The 14 respondents whose organizations perform some kind of usability evaluation were asked to report on the challenges they encountered. The responses grouped into the categories are shown in Figure 2 along with the number of respondents under the category. The most frequently mentioned challenge by the respondents is categorized as 'Resource Demands' followed by 'Lack of trained personnel' and 'Developer mindset'. In this paper we discuss the most mentioned categories of the challenges.

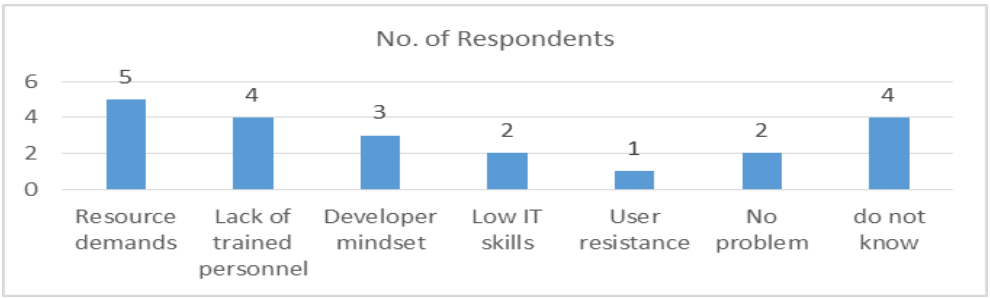

Fig. 2. Challenges of Usability Evaluation

Resource Demands. Under this category we subsumed answers that mentioned challenges related to time, personnel, individual preferences, and the heavy work that comes after the evaluation. Many of the respondents in the category said, it demands high resource and personnel but without specifying how. One of the respondents under this category said for example: "it needs time and resources, there is no standard that we can negotiate, every customer has his/her preference that cannot be entertained". Some of the responses seem to

indicate that usability evaluation is done in the final stage of development: "Usability evaluation requires resources such as dedicated man power and time to undertake. Sometimes the evaluation uncovers complicated usability issues and handling these requires extra effort." Similar views are also reflected from the non-evaluating companies.

The interview brought a more in-depth result and it presents 'lack of resource' as a challenge and is highly rated. A more articulated response we have got from the interview is: "Entertaining clients request and building based on their comments and feedbacks after some presentation of the working system takes time and resource."

Lack of Trained Personnel. Four respondents in this category answered related to lack of skill and lack of awareness in usability evaluation by the developers; developers use own experience to evaluate usability of the software, and lack of professional in the area. One respondent wrote: "there is lack of skilled people as there is also no HCI/usability professional" and another one is "lack of dedicated usability expert, usability evaluation is carried out by developers as additional task." The later response is attributed to the fact that Usability or HCI course is included in the modular curriculum of public universities late in the year 2014.

Developer Mindset. In this category, we listed answers such as "lack of interest from developer side to work with users", "using own assumptions to design user interfaces rather than practicing focusing on customer preference on user interfaces".

The interview study depicts the challenge in more depth. For instance one interviewee said: "Developers want to do only what is needed based on their decision. Developers set of mind is the difficult condition to work with usability and they do not like to give time to communicate users because they consider it not important".

Categories of challenges mentioned by few but more contextual are *'low IT skill*' of the intended users or '*user resistance*' by one respondent each. Two subjects replied there is "*No problem*". Four subjects answered that they "*do not know*".

The interview study shows better in depth results. One of the interviewee responded: "Lack of usability skill and knowledge by developers…" and another interviewee responded: "We do not have specific specialized person working in it, developers are doing it from their experience in the software development". The rate of response in the interview responding '*lack of awareness on usability*' is high compared to the answers given in the survey. From the interview study one can also understand that there are no specific usability evaluation method used in the companies. The RA/RI criteria (Bridges.org, 2005) set the need for human capacity and training, affordability of technology and economic situation among its twelve criteria for better ICT usage in developing countries. The challenges *low IT skills, lack of awareness* and *lack of trained professionals* reported here in this survey makes the challenges listed in the RA/RI criteria more visible.

3.4 Benefits of Usability Evaluation

The next questions for the respondents who said their organization carries out usability evaluation addressed the benefits of usability evaluation. Answers to this open question have been coded as: *Ease of use*, *Functional coverage*, *User satisfaction*, *Customer acceptance*, *Quality improvement*, *Resource saving* and *Do not know* as shown in Figure 3. In this paper we describe the most frequent once.

Fig. 3. Benefits of usability evaluation, as reported in the survey.

Ease of use. In this category the responses are short and are not descriptive. One response is: "Reduce error, user friendly and fully functional product which satisfies the needs of our customers." Another response is: "It ensures the system developed is friendly and easy to use".

Functional coverage. Five respondents said that usability evaluation helped in meeting functional requirements and building a functioning product. The response might be due to lack of understanding about usability evaluation. One of them said: "It becomes a tool to gather missed functional requirements from users (as they usually comment on missed fields etc.)". Another respondent said: "The experts performing usability tests and assessments have required domain knowledge in the functional area for which the system is developed making it functionally sound".

Quality improvement. Relatively many respondents are in this category. The respondents are also considering usability as one of the quality attributes. Few of the responses in this category are: "to make sure we are building the right product, to assess how users receive our products and is a learning to incrementally improve value offered by our products"; "Better understanding of the needs of users, making solution suitable to users"; "building stable systems, better user feedback, low support visiting users".

3.5 Organizations Not Performing Usability Evaluation

12 of the surveyed organizations responded that they are not carrying out usability evaluation. For these organizations four specific questions were asked. The first question was the reason for not performing usability evaluation. Most of these organizations reasoned that there is 'lack of awareness by the management and developers about usability evaluation' (10), 'lack of skilled personnel in the area of usability evaluation' is another reason (4), 'lack of resources and cost' (3). Three responded: "we feel not important". We relate this last response with that of the Ital-study and DK-study as "developer mindset", as it has been revealed during the interview session by the respondent as: "users have no other alternative

currently, they can learn it, we have no fear of competitiveness and we better focus on functionality first that usability evaluation can be seen in future". This respondent is prioritizing functionality and usability can be addressed as other non-functional requirements possible later in the process. These responses match the challenges reported by evaluating organizations.

Only one respondent said that his companies was considering to introduce usability evaluations, possibly as activities assigned to external consultants, while, 8 replied "No" and 3 replied that they did not know. They were also asked if it could be possible to minimize the reasons they mentioned for not performing usability evaluations, eight replied 'Yes', one replied 'No' and three replied 'I do not Know'. Finally, respondents were asked if they believe that the products of their company could improve by performing usability evaluations, nine replied 'Yes', one replied 'No' and two replied 'I do not know'.

4. RESULTS REGARDING USER CONTACT AND USER PARTICIPATION

Surprisingly, user involvement is wider spread among the surveyed organizations than usability evaluation. 81% of the organizations responded "users are involved whenever it is necessary", and 85% of the organizations responded that they do involve users in their development projects. Around half of the surveyed organizations (46%) responded they practice early user involvement. The interviews revealed, though, that user engagement seems to come after deployment, as one of the respondents said: "The practice of user involvement is not mature. Users come or call for support as a complaint after delivery when they face difficulty on operations" and another respondent said "Some users do not like to follow up the process, instead wants to see only the last workable version and may say 'this is not what I want' ".

The open questions of the questionnaire on the challenges of user involvement, the responses are analyzed using the same process as the usability evaluation questions and categorized as: *Developer mindset*, *Time*, *User motivation*, *User availability*, *Cost* and *Low IT skill* as shown in figure 4. Under *Developer Mindset*, the responses include: "One challenge is building the discipline of developers to think from the perspective of the clients/users", another response is: "sometimes expectation of clients and what can be done are different. Clients and users may not know their needs". Under the category *User motivation*, the responses include: "users are less willing to actively participate in project planning, specification and testing", "… making users to involve is difficult as they have their own job and clients not aware of its advantage". Seven respondents said challenges of user involvement related to *time*, for example one said: "In most cases users do not convey their requirements properly resulting in delays in project implementation", another more articulated response is: "users are most of the time able to clearly describe their requirements after a couple of presentations to them. This increases the cost and delays the project time".

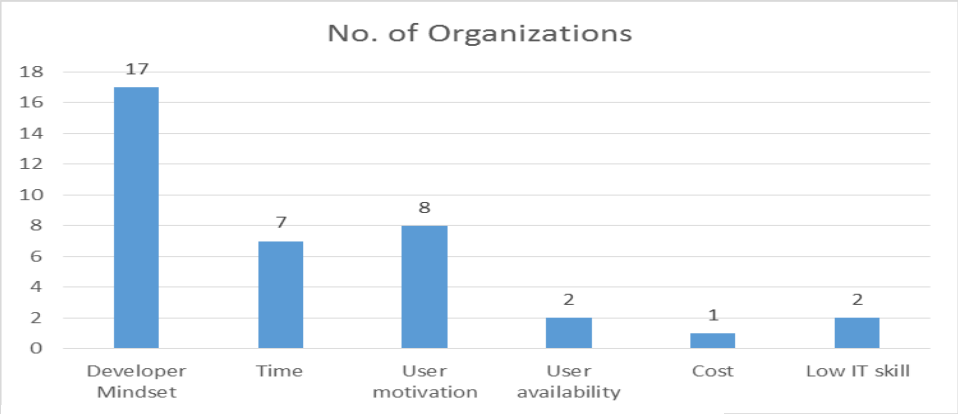

Fig. 4. Challenges of user involvement

5. DISCUSSION AND CONCLUSION

We set out to investigate the state of usability practice in Ethiopia and the previous sections provide a number of interesting results. We here would highlight a number of aspects we find to warrant further research and discussion.

None of the responses in our survey mentioned a specific usability evaluation method or tool. During the interview session, only one of the subjects raised a discussion about using low fidelity prototypes saying "we have two phase of evaluation, first using low-fi prototypes, evaluation with developers acting as users … ". This is in similarity with the finding of Ital-study that none of their subjects presented a specific usability evaluation method, its challenge or benefit.

Looking at the response of the question asking into understanding of the term 'usability evaluation', two respondents wrote that they 'do not know' and seven did not respond to the question. We read these answers as an indication that the respondents were unsure about the definition.

The percentage of organizations performing usability evaluation in our case is low (54%). An interesting finding in the results is that the challenges of usability evaluation confirmed by the respondents in our survey include *lack of trained personnel* (by four respondents) and *low IT skill* of users (by two respondents). Additionally, lack of awareness has been mentioned frequently by the interviewees. None of these usability challenges have been mentioned by the Ital-study or DK-study. *Developer mindset* has been mentioned by four respondents in our survey and also *resource demand* as a challenge by five respondents in our survey.

Understanding of Usability. The predominant understanding of usability evaluation seems to be an informal one and, many answers indicate that usability evaluation is understood as evaluation with and by users. No usability evaluation method has been explicitly mentioned in the survey answers. Also a high percentage of respondents did not provide a definition of usability evaluation. The answers given in the Ital- and DK- studies have been more elaborate, e.g. describing usability evaluation in terms of either the process of evaluating usability or definition of usability (Ardito et al., 2011).

Lacking skills. This is confirmed by answers to other questions: as one of the most often mentioned challenges for usability evaluation 'lack of trained personnel' was mentioned. Also the 'developer mindset' and the lack of awareness among developers and managers indicate the lack of training. This is also supported by related research indicating that the organizations are at their early stages, small and inexperienced, follow ad hoc processes and

methods, and are suffering under inadequate staff education and training (Biru, 2008; Dino & Bekele, 2012). HCI is not institutionalized; and the curricula at the public universities have included HCI only in the year 2014. The current practitioners in the industry are not the result of the harmonized curriculum, however the course can bring improvements on skill and awareness levels.

Socio-economic context. The socio-economic context in which software engineering in Ethiopia takes place shows in the mentioning of specific challenges for usability evaluation: 'low IT skills' of users and 'end-user resistance' have not figured in the Ital-study and DK-study. This might also be the reason why, as the answers indicate, usability evaluation and also user involvement seem to take place after initial deployment. The lack of focus on usability in governmental procurement procedure in Ethiopia mentioned by our respondents and supported by (Aregawi & Lemma, 2013) mirrors similar shortcomings in the developed countries (Ardito, Buono, Caivano, Costabile, & Lanzilotti, 2014). However, the effects on the societal development and inclusion of heterogeneous users with partly very low IT literacy might be more problematic in Ethiopia than in Europe. The need to consider public support and policy for ICT development in developing countries has been also discussed in the RA/RI criteria (Bridges.org, 2005).

Real Access to ICT: access that goes beyond computers and connections so that technology use makes a Real Impact on socio-economic development. Lack of awareness and lack of skill by the users and lack of trained professionals on usability and HCI and furthermore lack of funds for projects responded by the subjects of our survey are all unique challenges that are not critically discussed on the two previous surveys which might make visible the challenges to the so called 'digital divide' that discriminates between those that haves and those that do not have and has been discussed in the RA/RI criteria (Bridges.org, 2005).

Emphasis of user participation. To our surprise, practices of user participation and involvement were widely spread among the respondents. We can only guess the reasons here. As with Hofstede's concept of culture (Walsham, 2002), categorization might provide a first indication: Ethiopian culture is analyzed as a 'high collectivism' culture (Hofstede Center, n.d.). Research by Zewge confirms the existence of strong collective decision-making traditions (Zewge et al., 2015). As Zewge's work as well as several PhD theses (Biru, 2008; Kifle, 2014) indicate, the methods, tools and processes to support usability and user centered design in Ethiopia might need to be adapted to the specific cultural context and societal challenges here.

Future Work. The survey presented here was implemented in the context of a PhD project on including user-centered design in agile development in Ethiopia (see also (Teka, Dittrich, & Kifle, 2016)). The article (Teka et al., 2016) is based on an initial case to take measures and solutions for the usability challenges resulted here as well as the detail findings of the case.

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Usability evaluation in companies

***Instruction*:** *The questionnaire has 5 parts. Part 1 requests general information to all the respondents. Following part 1, part 2 and part 3 requests usability evaluation practices for companies making internal and external usability evaluation respectively. Part 4 belongs to those companies with no usability evaluation and finally part 5 requests for all respondent companies about user contact and user participation. Use **yellow** highlight color to indicate your response for the questions with indicated alternative responses.*

Part 1. General information

1. What is your position in the company? _____
2. How many employees does your company have? _____
3. Does your company develop/customize software (including web pages) and/or hardware that presents a user interface? □ Yes

   □ No **(*go to Part 5*)**
4. What types of IT solutions does the company provide? (may select more than one answer)
   □ Solutions tailored to specific customers
   □ Commercial of the shelf software
   □ Other:
5. What types of products does your company develop? (may select more than one answer)
   □ Management Information Systems
   □ Web pages
   □ Games
   □ Hardware - Embedded Software
   □ Other:
6. For which platforms is the software developed? (may select more than one answer)
   □ Systems for desktop
   □ Systems for mobile devices
   □ Online applications/contents
   □ Other:
7. Do you train users for the use of your products?
   □ Yes
   □ No
   □ I do not know
8. Which development method is used in your company? (For example, linear development process - also called waterfall model, iterative development process, spiral model, extreme programming, etc.).
9. Explain what you understand by "usability evaluation".
10. Do you think that your company carries out usability evaluation?
    □ Yes, they are carried out internally (the company has employees who carry out usability evaluation) **(*go to Part 2*)**
    □ Yes, they are carried out externally (the company defers to outside consultants the usability evaluation) **(*go to Part 3*)**
    □ Yes, they are carried out both internally and externally **(*go to Part 2*)**

□ No **(*go to Part 4*)**

Part 2. Internal usability evaluation

11. How long has your company been performing usability evaluations? Enter the number of years _____
12. What problems have been encountered in the introduction of usability evaluation and in their execution? _____
13. What benefits do you have in making usability evaluation?

    _____

    How many employees in your company work with usability evaluation? Enter the number of employees _____
14. Does your company employ resources to update/further develop usability evaluations and skills in this area?
    □ Yes
    □ No
    □ I do not know
15. In what form are the results of usability evaluations presented? (may select more than one answer)
    □ A seminar in which all the representatives of the development team and the evaluation team participate
    □ A meeting of two representatives (e.g., a developer and the person who has carried out the evaluation)
    □ A report
    □ Other:
16. Who receives the usability evaluation report in your company? (describe the roles involved and how the contents of the report is used)
17. How are the results of the usability evaluation used? (may select more than one answer)
    □ To correct and improve the current product
    □ For inspiring the design of future (versions of the) products
    □ Not used
    □ Other:
18. If you make adjustments to the product, do you carry out further usability evaluations?
    □ Yes, always □
    No, never
    □ Yes, sometimes
19. Do members of the development team themselves carry out usability evaluations?
    □ Yes, always □
    No, never
    □ Yes, sometimes
20. What training do the developers who carry the usability evaluation have? (Type of degree or diploma, specific training courses, etc.).

21. Does your company also carry out external usability evaluation in addition to the internal evaluation, i.e. by external consultants?
    □ Yes **(*go to Part 3*)** □
    No

End of the "Usability evaluation in companies" questionnaire (*go to Part 5*)

Part 3. External Usability Evaluation

22. How many years have you conducted usability assessments entrusted to external consultants?

Enter the number of years: _____

23. What problems did you encounter in introducing usability evaluations and in their execution?

_____

24. What benefits do you get in making usability evaluations?

_____

_____

25. How many members of the company that runs the evaluations are involved in the usability evaluations? _____
26. Does the company use resources to update/develop usability evaluation methods and skills in this area?
    □ Yes
    □ No
    □ I do not know
27. In what form are the results of the usability evaluations presented? (may select more than one answer)
    □ A seminar attended by all members of the development team and the external usability experts
    □ A meeting of two representatives (e.g, a member of the development team and a person who has carried out the assessment)
    □ a report
    □ Other :
28. Who receives the usability evaluation report in your company? (describe the roles of the employees that analyze the report and work with its results)
29. How are the usability evaluation results used? (may select more than one answer)
    □ To correct and improve the current product
    □ For inspiring the design of future (versions of the) products
    □ Not used
    □ Other:
30. If you make adjustments to the product, do you carry out further usability evaluations?
    □ Yes, always
    □ Yes, sometimes
    □ No, never
31. What training do the developers who carry the usability evaluation have? (Type of degree or diploma, specific training courses, etc.).

32. Do members of the development team themselves carry out usability evaluations?
    □ Yes, always
    □ Yes, sometimes
    □ No, never

Now go to Part 5 (“Questions about user contact and user participation”)

Part 4. No Usability Evaluation

33. Which are the reasons why your company did not choose to perform usability evaluations during product development? (may select more than one answer)

_____

34. Did your company consider to introduce usability evaluations, possibly as activities assigned to external consultants?
    □ Yes
    □ No
    □

I do not know

35. If it could be possible to minimize the reasons you mentioned for not performing usability evaluations, might your company consider to perform usability evaluations?
    □ Yes
    □ No
    □
    I do not know
36. Do you believe that the products of your company could improve by performing usability evaluations?
    □ Yes
    □ No
    □
    I do not know

***Go to Part 5 (*"Questions about user contact and user participation"**)

Part 5. Questions about user contact and user participation

1. How many years of experience does the company has in software development projects?
   □ 1 – 5
   □ 6 – 10
   □ 11 – 15
   □ More than 15 years
2. How often do you meet and work with users? (may select more than one answer)
   □ On daily basis
   □ On monthly basis
   □ On weekly basis
   □ Whenever necessary
   □ Other, please specify _____
3. Do you practice early focus on users and tasks in understanding their needs by the help of tools such as paper prototype or wireframes?
   □ Yes
   □ No
   If your answer is Yes go to questions 3.1, 3.2 and 3.3 otherwise go to question 4.

3.1. Why do you use it?
3.2. What are its benefits?
3.3. What are the challenges?

4. Do you involve users in system development?
   □ Yes
   □ No
   If your answer is Yes go to questions 4.1, 4.2 and 4.3 otherwise go to question 5.

4.1. What form of user involvement is usually practiced in your company? (May select more than one answer)
   □ Informative (users provide information like in requirements gathering)
   □ Consultative (users comment on a predefined service or range of facilities)
   □ Participative (users influence decisions relating to the whole system)
   □ Others, please specify:_____

4.2. What are the benefits?

4.3. What are the challenges?

5. In what way does your company studies users' feelings, challenges and satisfaction about use of its products?

6. In what way do users express their comments or communicate their request to the company?

7. Who will react to users comment or request for support?

8. What have you ever tried to know most about the user when designing a user interface? (may select more than one answer)
   - □ User knowledge of basic computer operations
   - □ User's situation (disability issues, culture, age group, etc)
   - □ User expertise for the tasks
   - □ other, please specify: _____
9. Do you consult guidelines and standards on user interfaces during design (to select and adapt interaction styles)?
   - □ Always
   - □ Sometimes
   - □ Never
10. When designing the UI, what techniques and tools do you use to get user needs and interests? (may select more than one answer)
    □ Screen mockups, wireframes
11. □ Paper Prototypes
12. □ Scenarios
13. □ Others, please specify:_____
14. From your experience of software development, where do you think users contribute most? (may select more than one answer)
    □ Requirement gathering

    □

    Implementation phase
    □ Interface design

    □

    When testing prototypes
    □ Other, please specify _____
15. Which of the following activities are included in your system development lifecycle? (May select more than one answer)
    - □ Study of functional requirement
    - □ Study of non-functional requirements
    - □ Study of user needs and their environment
    - □ Study of how frequently a certain task is performed within a specified period of time
    - □ other, please specify_____
16. Which of the following activities are included in your system development lifecycle? (May select more than one answer)
    - □ Functional testing
    - □ User acceptance testing
    - □ Usability testing
17. In what form is user training performed for the use of your products? (may select more than one answer)
    - □ Face to face using training manuals
    - □ Online training
    - □ Others, please specify:_____

18. What challenges do you or your training offices encounter during user training of use of products? (May select more than one answer)
    - □ Users take too much time in learning the product
    - □ Low IT skill level of users
    - □ Users are not motivated
    - □ User frustrations
    - □ Others, pleases specify:_____

Thank you, for the time dedicated to completing the questionnaire and best regards.

If you have any additional comments, please, share them with us.