

Current State of HCI Practice in the Estonian Software Development Industry

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Abstract. The information society is expected to use information technologies extensively. This expectation often results to pressure on the software industry to develop rapidly, software systems to provide e-services to the society. Unfortunately, many unusable systems are developed and deployed to the society in the process. In Estonia, more than 90 % of the inhabitants use IT for various activities, and most government and business services are delivered through the Internet. Further, the field of human-computer interaction (HCI) is still very young, and Tallinn University, remains the only institution in the Baltic zone, running a programme (masters) in HCI. This study presents the preliminary results of a recently conducted online survey on the extent of uptake of HCI practices. The outcomes of the study show that awareness and knowledge of HCI are still very low in the Estonian software industry.

Keywords: HCI · Human-centred design · User experience · Human-centred software engineering

1 Introduction

A major reason for unusable software products is often the lack of knowledge of HCI practices, needed for the production of successful software [1]. Unfortunately, the information society suffers from the consequences of this considerable lack [10].

The transition of the society from the industrial age to knowledge, suggests that information technologies will become pervasive. Although HCI has been an important issue for software organizations over time, its practice and other aspects such as usability, user experience (UX), and human-centred design (HCD), remain at a low rate of uptake in most software industries of different regions of the World [10, 14]. For example, in Eastern Europe and, in Russia in particular, although there is “a significant number of experts who day by day perform routine usability activities under orders of the developed Russian software industry, and the quality of their work meets the commonly accepted standards”, there is no indication for the industry to boast of

greater achievements in the HCI aspects [4, p. 22]. In some other developed countries such as the US, government regulations make it mandatory that software product development complies with certain HCI standards [3]. There are very scarce studies in Estonia, however, to describe the state of HCI practice in the local software industry. This research aimed to determine the extent of HCI awareness, and perceptions of usability, and UX, and approaches to human-centred design practice in the Estonian software industry.

In the next section, we provide an overview of the Estonian software industry. Next, we present our method, provide our results, and finally, we discuss and provide the implications from our study.

2 The Estonian Software Industry

Software development is concentrated in the IT departments of the banking sector in Estonia. The software divisions of Hansabank (now Swedbank), and Uhispank (now SEB), were once regarded as informal leaders in the software industry [2]. These banks developed in-house banking applications to support automated teller machines (ATMs), mobile and internet banking services, thereby reducing operational costs of running several branch offices [2, 6]. Thus, “the fast development of the Estonian banking sector and the high-tech solutions elaborated by the banks’ own product development departments have reinforced their need for quality software, and trustworthy and secure products, thus having also positive effects on generating innovative solutions” [9, p. 8].

The Institute of Cybernetics, Tallinn, used to be where Estonians’ software expertise was developed during the Soviet days. Unfortunately, sustainability was lost and potential threats for business development, innovation and growth were the consequence [2]. A study by Kalvet, [8] revealed that “compared to the Estonian ICT manufacturing industry, which is largely consolidated, heavily export-intensive and based on foreign capital, the Estonian software industry is different. The number of companies in the sector is very high, production volumes and exports are low and specialization is still not established” (p. 7). Dutta, [6], reiterated the need for Estonia’s participation in the global software market when he warns, “in-house innovations may never leave the “house””. The author gave an insight that most applications developed by the private companies such as the banking sector are tailored to sectional needs to gain a competitive edge in the local market. The author summed up by suggesting that Estonia would need to “package and sell its innovative ICT services abroad” in order to be recognized as a global e-leader.

A strategy proposed by Savisaar, [12] “to ensure the development of innovative products and services”, is to intensify “co-operation between research institutions and entrepreneurs”. The author reasons that such cooperation would cause a re-orientation for practitioners from low value-added ventures to production of higher added value activities. The concern would therefore, be, how these proposals could be achieved without considerations for the HCI dimensions, such as user values, and design practice. This study stems from the need to diffuse HCI values, and practice in the

Estonian software industry, in order to promote the development of software products that deliver user and market values rapidly.

3 Method

The research online survey questionnaire was designed based on the literature review of HCI-Software Engineering integration. As HCI is relatively new in Estonia, we rely on existing literature, to draw our questions, and conduct a quantitative exploratory investigation of the Estonian software industry. The questionnaire contained both closed-ended multiple choice and open-ended questions. Some questions allow multiple answers. The descriptive statistics and visualization techniques were used to analyse the closed-ended questions, and thematic analysis was used for the open-ended questions. The purposive sampling approach [13] was used to invite organizations to participate in the survey. The emailing addresses of twenty-seven Information Technology and Software Services companies were obtained and these companies were invited automatically.

We partnered with an IT service company (Trinidad Consulting OÜ), which specializes in HCI consulting services. The company helped in inviting organisations, which carry out some form of software development. These organisations are found in the government, banking, and telecommunications, among others. The Developers Club, Estonia, was as well partnered with, and members were invited through their emailing list. The survey was deployed using the ‘LimeSurvey’ open source survey facility. The questionnaire was designed in such a way that some questions would only appear if the answer to a preceding question is relevant to the one proceeding it. Some questions also allowed multiple options and some do not. The survey ran from June 1st, 2014 to 30 September 2014. A total of one hundred and seventeen invites were sent and sixty-two organisations participated, bringing the response rate to 53 %. However, only thirty-two responses were complete and useful for the analysis. Incomplete responses were discarded.

4 Results

The outcomes of the study show that awareness and knowledge of HCI are very low in the Estonian software industry. Majority of the respondents (82 %), have between one and ten years of experience in their main roles, and this suggests that there could be more young professionals in the Estonian software industry. Nineteen organizations, out of thirty-two, are aware of HCI practices, and the rest are not.

The software development cultures in the thirty-two organizations remain largely SCRUM, waterfall, lean, and extreme programming respectively.

In Fig. 1, we see that the proportion of practitioners involved with HCI roles such as usability and UX is very low compared to other roles such as software engineers, programmers, and project managers. A study by Venturi, [14] shows a similar trend.

Further, the organisations report that they select own employees for usability testing. Thirteen organizations do not prioritize usability, and only five, always do. As

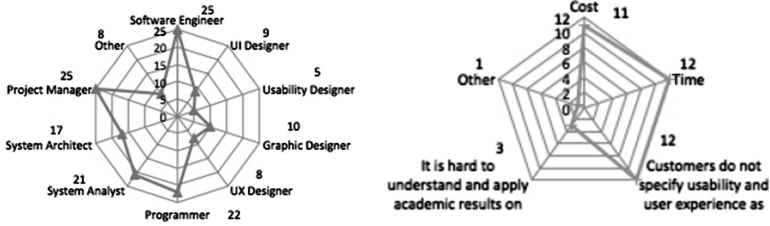


Fig. 1. Software teams’ roles in respondents’ organizations and reasons for lack of priority for usability testing.

it can be seen also from Fig. 1, the major reasons provided by the organizations is cost and time, for lack of priority for usability testing (Multiple options was allowed). The result is consistent with the findings of Ardito et al., [1] and Bygstad et al., [5].

Regarding how the respondents perceived UX, the results in Fig. 2 suggest that the organisations surveyed may not understand fully, the distinction between usability and user experience. The finding on UX perceptions is similar to the work of Wechsung et al., [15].



Fig. 2. How the respondents perceived UX values

In terms of human-centred design (HCD) practice, the major principle being followed by the twenty-five of the organizations is the understanding of users, tasks and environments. Other principles, as specified in the ISO 9241-210 framework [7], appear to be less prioritized.

The results from the analysis of the open-ended questions are captured into Table 1. The answers were provided by twenty-five, out of the thirty-two respondents.

A major challenge indicated by the respondents is the lack of HCI awareness by the customers. One respondent remarked: *“Customers have no idea of the background of ICT development and how big part HCI has in it. For them it seems just like non-material, additional cost”*. Similarly, another respondent reiterates: *“I think not. I think it is mostly up to the customer and they do not focus too much on usability requirements”*. However, these respondents suggest to: *“Raise overall awareness*

Table 1. Challenges for uptake of HCI values and practices in respondents' organisations

Challenges for the uptake of HCI values and practices	Number of respondents
Lack of customers' awareness of HCI practices	5
Lack of interest from software organisations	15
Difficult to collect UX feedbacks	1
Resource demands (HCI Expertise)	3
Deep knowledge of the market	1

regarding HCI values inside the organization and among partners. Make following HCI values obligatory in certain public procurement procedures". Another suggestion is: "Quantifying the cost of bad usability or bad HCI in general".

On user feedbacks, one respondent indicates: "How to efficiently get user feedback? For example, we use in design phase user testing with max three persons. When they feel UX OK or good, still afterwards in masses". The respondent suggests a solution: "There should be balance between continuous user testing with many users AND efficient use of time and money. It has to be found in every project :)".

On resource demands, one respondent indicates: "Mainly resource challenges as there are very few UX experts available". This respondent, however, believes it is up to the university to address this need: "We have addressed the need to universities".

Finally, the challenge posed on deep knowledge of the market, is the need "to locate and understand the different personas; deep knowledge of the market (about the users on the market); overcoming the customer view, to user view". On what could be done, a suggestion is to "show the differences and learn from example projects that are developed within the company".

It is sad, however, to note that fifteen organisations declined to share their challenges. One of these organisations retorts: "No challenges as no interest".

5 Discussion and Implications

The outcomes of the study present a mixed reaction. On the one hand, awareness and knowledge of HCI are still very low among the organizations surveyed. For example, fifteen organizations declined to share their challenges, and it could be difficult to investigate level of HCI practice in this set of organizations. On the other hand, there is an indication that HCI practice could succeed in some of the organizations surveyed. This set of organizations, however, appears to be limited by insufficient HCI expertise, especially, in UX, and human-centred design aspects.

Another major concern emerging from our results is that of lack of awareness of HCI practices in the customers' organisations. Some issues with customers' organisations include reluctance to allow end users participate in software projects, perception that HCI is time consuming and a general lack of prioritization of non-functional requirements [11].

Overall, when compared to other Eastern European countries such as Denmark, Finland, Norway, and Iceland, the fundamental issue still remains the lack of priority for certain HCI aspects such as usability and UX. Thus, the results obtained are similar

to those by Venturi, [14] and Wechsung et al., [15]. This study as well shows an indication for the need to diffuse HCI awareness in customers' organisations.

The lessons derived from this study provide some implications. For the researchers, there is a need to promote HCI by looking more closely into software methodologies and adoption cultures of the software industry, and increasing both customers, and users' awareness of the importance of HCI dimensions. Short-term training programmes could be organized to mitigate the shortage of HCI expertise in the industry. Practitioners also need to include HCI topics in their events and programmes. Finally, client organizations and Tender offices need to make HCI values such as usability, and user experience mandatory in their requirements.

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