HCI and SE – The Cultures of the Professions

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Abstract. The author reviewed and participated in several exemplar industry projects from the Indian IT industry to study the integration of human-computer interaction (HCI) design into software development by Indian software vendors. While several problems occurred because HCI skills were either not used, or were not used early enough in a project, or when the HCI professional lacked process support to carry out all HCI activities in the project, at least some of the problems occurred because of the cultural differences between the professions of designers and engineers. In the one case where HCI professionals were indeed used early and with a multi-disciplinary team, the results were positive. The case studies point to a greater need to integrate HCI into existing software engineering process models with commonly accepted roles, activities and deliverables leading to mutual respect between professions.

Keywords: HCI and SE integration

1 Introduction

The processes of human-computer interaction (HCI) and software engineering (SE) should, in theory, affect each other deeply as they are primarily concerned with creation of common artefacts. Traditional SE literature has been found to have several lacunae from HCI design perspective [1]. The chief among these have been that many HCI decisions happen during requirements specification and that HCI design is viewed as only skin-deep activity by SE literature. Elsewhere [2], the author had argued that educational institutes offering programs in HCI will do well by becoming more interdisciplinary in their educational approach.

Software development has in the past been compared to making of films [2]. Like software, films are made by groups of multidisciplinary, creative professionals (director, writer, cinematographer, editor, sound technician, musician, actor etc.). The different disciplines in the film world seem to be mutually respectful, well-coordinated and woven together in a common 'professional' culture.

By contrast, there exist major gaps between HCI and SE, both in academic institutions and in the industrial practice [3]. Deliverables of one group are not evidently useful to the other, hampering workflows. There is an apparent disconnect between the priorities of the two groups. These gaps lead to communication and coordination problems, duplication of effort, compromises in the process and eventually the quality of the output.

Here we focus on the differences arising between the culture of professions of HCI designers and software engineers in practice. We hope to identify these through some industrial case studies from the Indian IT industry and identify some lessons we can learn from them.

2 Case Studies

The author reviewed as case studies real-life projects from the Indian IT industry to understand how the work of software development actually happens in practice in the process-conscious Indian IT industry. The author participated in some projects in the role of a HCI designer or usability evaluator. Additionally, professionals in the industry were requested to contribute live case studies. The questions we were trying to answer were:

- How and when do HCI design decisions happen in SE process?
- What role do HCI design professionals play? How do they influence the SE process?
- What are the common objects between HCI and SE process?
- Are the concerns [1] about HCI in SE literature handled? How?

Many contributors were concerned about confidentiality and information security policies within their organization and their contractual agreements with the clients. In spite of these difficulties, seven case studies could be analyzed. The case studies are anonymous to protect the identity of the concerned on their request and all confidential information was removed before the case study was used in this document.

While selecting the case studies from within these constraints, we have tried to make sure that they represent typical cases rather than exceptions. We have also tried to represent a variety of organizations in terms of their size and usability maturity.

2.1 A Last Straw Project

A UK-based company S has a legacy software product for universities. S was migrating this product to a .Net platform in a phased manner. S outsourced part of this phased migration activity to a software development company T in India. T hired a design consulting company D to help T to do a usability evaluation of the product at a time when the product was nearing its delivery. Heuristic evaluation was done by five evaluators, several usability problems were identified and design solutions suggested. However, the product got delivered with several known usability problems as it was too close to the delivery date to implement many changes. Some of the usability problems could have been easily fixed had they been identified sooner.

2.2 HCI design without HCI designers

A large, CMMi level 5 company was doing a 'rewrite from scratch' of a large legacy system with over 130 use cases to an extranet application for an insurance client. There were no HCI professionals involved in this project. An inspection of the requirements documents revealed that a good number of premature (and poor) HCI design decisions were already taken and specified in the use case documentation. No apparent HCI design process was followed to make these decisions.

2.3 Users reject unusable software

A finance company in the US, X upgraded one of their desktop-based applications by porting it to J2EE technologies. X awarded this project to N, a large IT organization in India. Usability professionals from N were involved, but they lacked sufficient process support and their estimates went haywire. As a result they could not do any contextual user studies. The delivered software lacked an important need of users – keyboard shortcuts, which was noticed during user acceptance tests. The task completion time for a frequent task went from 5 minutes to 20 minutes and users rejected the product outright. N was obliged to carry out the changes at its cost.

2.4 Usability group in project conceptualization

A mid-sized Indian company U was migrating an application from laptop to a mobile phone based application for use by thousands of field engineers of a UK based telecom company. U set out a team comprising of software engineers, business analysts and HCI designers to identify a business case for the project. The multidisciplinary team successfully created a proof of concept and justified the business case that went into development.

3　Lessons about the Cultures of Professions

The following were the lessons learnt about the cultures of professions from these and other case studies:

- "Design during requirements!"
  Use cases over-specify HCI design, particularly in the context of outsource software development (perhaps to exercise better control on the output). Getting these HCI design decisions right is very crucial. A wrong specification in the use case can have a ripple effect in several activities of software development and may lead to avoidable iterations. Hence HCI design and usability evaluation inputs are

needed early in a software project – certainly before freezing UI design, and possibly before freezing on requirements. Late inputs have little impact and are expensive, early inputs have significant impact and are cheaper. However, because of the terms 'design' and 'evaluation' associated with HCI activities, traditional software engineers are averse to accepting and including these activities during the requirements specification phase.

- "A process is not a formula."
  The growth-oriented, scaling-up culture of Indian IT organizations has the underlying assumption that any person can do any activity and everyone is dispensable. When HCI skills are not available, HCI design decisions are taken by the available people. When skilled HCI professionals are available, and when they do a good job, managers tend to worry about the 'un-repeatability' of the work they do. No matter how process-driven one is, HCI design is person-dependant activity. In other words, given the same process, one designer can often do a better job than another designer. While a well-defined design process can streamline activities and improve the quality of the outcome, creativity of the individual designer plays an important role. Companies tend to equate HCI skills to other skills (such as .Net or Java) and expect high level of compatibility.

- "Client centred or user centred?"
  Several HCI designers have a user-centred design culture. On the other hand, offshore software development companies seem to have a client-centred culture, particularly for HCI design. In typical offshore projects, requirements documents are created onsite, in collaboration with the client. The client is often called upon to specify many HCI designs in the guise of specifying requirements so that the off-shore development can happen smoothly. Similarly, if a product tests well during an acceptance test by the client, it is considered to be usable by end-users as well. While the client is an important stakeholder in the design process, client-centred approaches don't by themselves lead to optimal design.

- "It is important to approach HCI design holistically."
  Engineers are typically trained in reductionist, deductive thinking patterns. For example, SE aims at minimizing coupling between modules and maximizing cohesion within modules. This allows companies to break up large projects into smaller modules, which are developed by smaller teams and with minimal interaction across teams. It also allows companies to develop modules sequentially. Unfortunately, same approach can't be used in HCI design. Inconsistencies creep in a product user interface if it is designed by different people at different times. Even if development of a project is scheduled to happen piecemeal, early HCI design inputs can develop the bigger picture and a rollout plan. This leads to better software design as well as a better UI design. However, such approaches are usually not taken during software development. Several engineers may accept holistic approaches in principle, but these are often shot down in practice due to time and budget constraints.

5 Conclusion and Further Work

Though there were several limitations in these case studies (such as their number and the details that one can study), some trends emerge. The return on investment of usability and HCI has been established extensively. However, these case studies show the need for better integrating HCI activities into the software development process. SE techniques were developed to create multi-version software by multi-person teams. They need to be expanded to include multi-disciplinary teams. Further, it is important to integrate the cultures of the HCI and SE professions and inculcate a feeling of mutual respect among professionals.

Going forward, we plan to propose process models that integrate HCI with SE processes. In this, we propose to clearly define roles, activities and deliverables in a common multi-disciplinary process framework that is acceptable to both professions.

References

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