

# Framework for Integrating Usability Practices into the Software Process

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**Abstract.** Software development organizations wanting to introduce usability practices into their defined software process have to undertake laborious efforts for that purpose, since, for the time being, there exists a lack of reference model or framework which indicates where and how in the software process usability needs to be considered. They also have to overcome the important differences between HCI (Human-Computer Interaction) and SE (Software Engineering) in terminology and approach to process definition. We offer developers who have the objective of integrating usability practices into their software process, a framework that characterizes 35 selected HCI techniques in relation to six relevant criteria from a SE viewpoint, and organizes them according to the kind of activities in the development process where they may be applied, and to the best moment of application in an iterative life cycle. The only requirement for the existing software process is to be based on an iterative approach.

## 1 Introduction

Usability has been present in software quality attribute decompositions since the late 70s [1], but it has been recently that it has begun to appear as a highly relevant attribute for customer-perceived software quality. For managers, for example, usability is a major decision factor, particularly for selecting a product [2]. Emerging fields like web development have contributed to this increased impact of usability into software development. According to Donahue, having a competitive edge in usability is crucial for e-commerce sites [3]. But not only web development is concerned by usability, it is relevant for any interactive software system with human users.

The HCI field has been pursuing the development of usable software products for a long time. HCI offers a large number of techniques which may be applied for the aim of producing usable software. They are widely applied in development projects where usability is the main (or only) quality attribute taken care of. But the application of HCI techniques is decoupled from the overall software development process.

This state of things is changing. Recently, software developers are becoming aware of the importance of usability issues [4]. A clear sign of the importance that usability issues and their integration with the rest of development activities is gaining, lies in the newly created Usability Process in the first amendment to the ISO/IEC Standard

12207 for Software Life Cycle Processes [5]. The first activity in the Usability Process deals with specifying how user-centered activities fit into the whole system lifecycle process, and to select usability methods and techniques. In this way, usability practices integration into software the process is no more an area of interest for some specialists, but an endeavor that matters for the SE software process area.

In despite of that, software development organizations wanting to properly manage the usability level of their software products, still face a real challenge when dealing with the integration of HCI techniques into their defined software development process [6]. Current SE practice does not correctly address usability issues throughout development. Developers sometimes wrongly consider usability as being just related to the design of the visual elements of the GUI, and therefore it is dealt with late in the development. On the contrary, a proper user-centered development (the HCI approach to software construction) deals with usability issues all over development. In particular, observing users and checking that their needs and likings are considered early in the process is crucial for the production of usable software. On top of that, usability integration into the process is hindered by the differences in terminology and development philosophies between HCI and SE [2] [7]. HCI literature does not offer to organizations that follow a strong SE approach a ready-to-use manual for HCI technique application in a SE development process. Some HCI techniques are not allocated to particular activities in the process, and the activities terminology varies between HCI authors [8]. As a result, the effort of interpreting HCI literature from a SE perspective presents an added difficulty to the task of usability practices integration.

Our approach is to offer software developers a selection of HCI techniques which are more appropriate to be incorporated into a defined software process. The HCI techniques are integrated into a framework organized according to the kind of SE activities and to the moment in an iterative development where their application yields a higher usability improvement. The characterization of HCI techniques is based on a SE perspective, in order to use a terminology which is familiar to developers. The framework aims to be a flexible enough tool so that a particular process model is not required for its application. The only requirement for the existing development process is to be based on iterative refinement, since it is necessary characteristic of any user-centered development effort. Our general approach to HCI integration into SE development processes is discussed in [9], along with a review of other existing proposals to the integration issue.

The framework is aimed to software development organizations with a strong SE background, which have identified the importance of usability and want to enhance their software process with HCI techniques and activities. The selection of HCI techniques for inclusion in the framework responds to these organizations needs. For example, it favors techniques which require less training for a software engineer, and techniques that yield a higher improvement in the usability of the product compared to the application effort.

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