Scenarios for E–Collaboration are Only Part of the Story

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INTRODUCTION

Addressing human factors in the development of artifacts has always been crucial for their usability (Norman, 1998). Within the domain of human-computer interaction (HCI), a number of advances have been made since the invention of computer systems, but the paradigm shift to what we are familiar with today started in the early eighties with the invention of GUI, graphical user interface (Pew, 2003). The early work in HCI tended to concentrate on an individual's cognitive system. The range of possible interactions between human and computer then was comparatively simple due to the limited capability of the technologies.

With the emergence of computer-supported cooperative work (CSCW), human factors were taken to a new dimension and opened up a number of different perspectives in terms of human factors challenges—personal, team, and organizational (Dourish, 2001; Olson & Olson, 2003; Orliskowski, 1992). Multiple channels (text, audio, and video) could be used in a variety of ways to facilitate collaborative work.

This article explores the issue of how human factors can be addressed during the development of e-collaboration systems, in particular at the early stage of design since these systems may require new ways of working. It can be difficult to capture requirements for e-collaboration from existing users for two reasons. Firstly, engaging the potential users in requirements capture can be problematic as those users may not perceive themselves as potential users at the outset and hence not putting themselves forward in any consultation exercise. Even with the interested parties (or stakeholders) identified, they may not understand the full potential of how these new tools help people work more effectively with each other. Hence, requirements capture is a challenge for developing e-collaboration systems.

Another area of challenge lies in the evaluation of e-collaboration systems. If requirements cannot be fully articulated at the outset, then evaluation of a prototype may provide useful feedback to the development team for the next iteration. However, evaluation of e-collaboration systems is known to be problematic due to the complexity of influencing factors (Ross, Ramage, & Rogers, 1995). Furthermore, the traditional human factors approach such as usability tests can only examine the hygiene factors and not necessarily the motivators (Herzberg, 1959; Zhang & von Dran, 2000). In the HCI domain, hygiene factors are those that will cause dissatisfaction for the user if they are absent (e.g., readable fonts and good color scheme). Motivator factors are those that will encourage users to continue using the system. For e-collaboration systems, both factors are crucial for their sustainability and any feedback from evaluation on these factors will be valuable.

Scenario-driven techniques have been offered as possible means to engage different stakeholders (Rossen & Carroll, 2003) during a development process. These techniques can be used in a variety of ways and at any stage in the development life cycle (Carroll, 1995; Rossen & Carroll, 2003). In particular, scenarios are used to capture requirements and to provide basis for evaluation. There is a potential to apply the techniques to help meet the two challenges identified above. However, for an inspired user of scenario-driven techniques, there is a danger of stopping at the story-telling stage with the full potential of the techniques not being realized.

This article will share the experience gained from three empirical studies in using scenario-driven techniques at different stages of the development cycle of e-collaboration systems. A discussion on how scenarios can be used in conjunction with the other techniques during the development process will be provided.

BACKGROUND

A scenario is defined as "a concrete description of an activity that the user engages in when performing a specific task, a description sufficiently detailed so the design implications can be inferred and reasoned

about" (Carroll, 1995, pp. 3-4). In software engineering, it is commonly used in a story-telling fashion to illustrate how a piece of software is intended to be used. The power of scenarios can be extended by different techniques, such as involving the stakeholders in the writing of the story, hence increasing the credibility and ownership of the story, or using people to role-play the story, hence verifying the logic of the story line. These are collectively labelled as scenario-driven techniques in this article.

Two groups of scenarios are identified in the literature. The first group is the "as-is" scenarios where narrative details are provided on how the operations are currently being performed. These are referred as "problem scenarios" (Carroll, Rosson, Convertino, & Ganoe, 2006; Rosson & Carroll, 2003). The second group is the "to-be" scenarios, which are more visionary and serve as a target for development. These are further split into "activity scenarios," "information scenarios," and "interaction scenarios" (Rosson & Carroll, 2003). The concept of to-be scenarios is particular well-suited for developing e-collaboration systems, as these scenarios can be used as vision statements of how people can collaborate in a different, hopefully better, way.

Scenarios can be used in different stages of a system development life cycle, although they are more commonly used at the requirements stage. It is reported that the design team of the National Digital Library began the requirements with 81 scenarios (Shneiderman & Plaisant, 2005). Apart from using scenarios for capturing requirements, there are also attempts to use them in the requirements analysis stage (Sutcliffe, 1998). Sometimes, scenarios are linked to use cases in the Unified Modeling Language (UML). In that context, each scenario is an instance of a use case (Sutcliffe, Maiden, Minocha, & Manuel, 1998; Preece, Rogers, & Sharp, 2002). A survey on the use of scenarios in system development reveals the following variations (Weidenhaupt et al, 1998):

- Form (text, diagrams, and to a lesser extent, animations)
- Purpose and usage (concretization of abstract models, definition or validation of structural models, facilitation of interdisciplinary development and partial agreement amongst stakeholders, and/or complexity reduction)
- Content (with focus on system context, system interaction, and/or the operations within the system)

- Utilization within the life cycle (as an artifact which evolves throughout the development life cycle, for capturing stakeholders' views, and/or for deriving test cases)

However, most developers in the above survey agreed that scenario creation was a craft and there was very little guidance on the process of scenario construction (Weidenhaupt et al., 1998). There is still a need to collate local innovations of scenario practices to further our understanding on how scenarios can be best exploited (Rosson & Carroll, 2003). Furthermore, a scenario-based method is not a set-book approach and it very often requires the use of other data collection and analysis techniques (Bardram, 2000; Kazman, Carriere, & Woods, 2000; Iacucci & Kuutti, 2002; Haynes, Purao, & Skattebo, 2004).

Following are three examples of scenario construction for e-collaborations. In each case, the context will be explained to illustrate the kind of e-collaboration system involved and at which stage of the development cycle the scenario-based method was applied. A discussion of how other techniques were used in conjunction with the scenario(s) will follow. It will then conclude with the lessons gained from the experience.

CASE ONE: SETTING UP A NEW PRACTICE

- **Context:** This example took place at the concept phase when a new business model was perceived by a legal expert for the provision of mediation services with an innovative e-collaboration system (Barnett & Dew, 2005). The common practice in mediation service required the parties in dispute to prepare the evidence and related paperwork in advance separately, followed by one or more face-to-face hearing sessions. A trained mediator would chair the sessions until an agreed settlement was reached. An example of disputes could be a building project which involved multiple international contractors. The actual mediation process was not entirely prescriptive, with possibilities of break-out sessions in sub-groups during a hearing. This process was known to be time-consuming and getting all parties together at meetings could cause further delays. To test the feasibility of the business model, a proof-of-

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