# "But Where's the Spec?" – Learning Through Collaborative Development & Discovery

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## ABSTRACT

In academia, there has always been a divide between what is taught and what is done in industry. The question that must be asked is how the higher learning institutes can rise to meet this challenge and better prepare its students for the demands that lie ahead. This paper investigates issues regarding evolving project requirements and communication and collaboration among diverse team members, exploring how storyboarding tools and collaborative Wikis can help to mitigate these issues.

## Categories and Subject Descriptors

K.3.2 [**Computers and Education**]: Computer and Information Science Education–*accreditation, computer science education, curriculum, information systems education, self-assessment.*

## General Terms

Design, Human Factors

## Keywords

HCI, education, storyboarding, CSCW, Wiki

## 1. PROBLEM AND MOTIVATION

Throughout the world of academia, there has always been a divide between what is taught and what is done in industry. Often, the skills a student leaves college with falls short of the needs of industry in entry-level positions. With the market becoming increasingly global, many high-tech jobs are moving off shore, forcing individuals to be more competitive in the job market. How can the higher learning institutes rise to meet this challenge and better prepare its students for the demands that lie ahead?

In an attempt to probe this question, we organized a development project that would involve three separate classes of students and observed some of the tensions encountered the techniques to overcome them, and the effectiveness of the supporting tools and technologies used.

## 2. BACKGROUND AND RELATED WORK

This research development project's goals were not only to automate the design process in Human Computer Interaction [1], but our underlying intent was to expose students to factors they will encounter in the "real-world." Primary among the factors is the evolving project requirements, leading to the titular question from students "But where's the spec?" Also important is communication and collaboration between and among team members as they seek to achieve different goals.

The high-level goal of this project is to better understand the areas lacking in academia with regard to industry and to investigate ways to address these areas. The vision of LINK-UP is to develop a system by which distributed designers could contribute to and reuse design knowledge in design/development activities for interactive software systems. This system is web-based, requiring an assortment of tools to achieve a wide variety of functions, ranging from storyboarding, collaborative work, and testing.

Organizing this project involved identifying the hurdles encountered, solutions to these hurdles, and the tools used to assist. These tools include Wikis [2] for easy posting of online information and DENIM [3], a tool for storyboarding. Along with these tools, this project required a strong understanding of the system being developed, known as LINK-UP [1].

## 3. APPROACH AND UNIQUENESS

Our project teams consisted of a mixture of two or three grad students (tasked to develop the conceptual approach) and one or two undergraduates (tasked to storyboard and implement the tool). Another group of six undergraduates, less familiar with LINK-UP and HCI concepts, were tasked with testing the work developed by the other groups. All of the efforts had to not only work individually, but also work as a collective tool as envisioned in [1]. The author's role was that of a paid undergraduate project coordinator, encouraging use of tools and techniques and observing the issues discussed in this paper.

As mentioned previously, the first issues one must confront are the hurdles that come about through the use of complex project situations, heightened as groups become more distributed and projects become more complex. One of these obstacles is that of evolving project requirements. Whenever a team sets to undertake a development effort, the key stakeholders often have not fully thought through many of the steps involved to achieve the intended objective. Many times, the intended objective itself may not be clear enough. This results in the project changing, or evolving, as time goes by. As the team becomes more immersed in the project, going through the steps they previously identified at a higher level, these problems arise and require the team to re-evaluate previous design decisions.

Another problem one may face is the wide variety of people in a given team. Many members may have different backgrounds,

different professions, or merely different priorities. This results in a sort of discontinuity among the members, who have all come together for the same basic purpose. This also, is a concern that must be addressed for effective collaborative development efforts [4]. This can be seen in our project, as the members differed by academic status and general expectations for their individual contribution to the team as a whole.

After identifying these hurdles, the natural response is to embrace practices and techniques that help mitigate these challenges. We discuss three of these general concepts that were used in our development efforts: collaborative work, storyboarding, and iterative review. Collaborative work lends itself strongly to responding to the problem of team diversity and ensuring that all members work together effectively. Storyboarding helps a team react efficiently to the never-ending issue of evolving project requirements, as a low cost method of hammering out the details when an objective or step are likely to change [3]. Storyboarding, when used in conjunction with iterative review, helps teams synchronize with each other and aids in ensuring the requirements are clear and acceptable for all members.

To support the practices and techniques we have described, we required a wide variety of tools to aid us. All the tools were selected to support our general practices of collaborative work. DENIM, a storyboarding tool [3], was used for iterative development of project module for screen flow. A Wiki server [2] was used as a centralized point of communication for all project management and team coordination. While we observed many positive features of these tools, we recognize that there also existed shortcomings that had to be addressed through the development process.

## 4. RESULTS AND CONTRIBUTIONS

Analysis of this work involved looking at the effectiveness of our hypothesized solutions and the tools used to facilitate these solutions. This work will serve as a guide to anyone teaching students in a field that would benefit from collaborative work in a design field, particularly those involving the development of internet content - as groups of students are challenged to develop tools that would access this content, they will encounter many of the issues we discuss.

As mentioned earlier, there were positive and negative aspects from our selected tools. DENIM provided a very simple and flexible environment by which to take one's ideas and quickly instantiate them in a form that could be easily accessed and edited by all members of the team. However, at the same time, DENIM could not handle a large-scale complex storyboard well, as we noticed bugs and crashes creeping in. Its simplistic nature also did not provide features that may have been helpful as development went along. The ability to take storyboards from separate groups and merge them together in order to see how they flow would have been a nice feature to have.

Wiki environments provide limited structure for web-based information, both a blessing and a curse for organizing information. Its lack of rigid structure and simplicity made posting information a painless process. However, this same lack of structure would some times cause confusion on the type of information needed by all members. Support for forum-like features would have also aided in discussions.

LINK-UP, because it is a development environment, should embody the lessons described in this paper. LINK-UP will be used in the design process and is therefore prone to all the hurdles encountered during it development. The lessons learned during this continual development process will be addressed so that the user of LINK-UP has available to him/her all the tools and methods necessary to develop a high-quality product. Teaching these undergraduates and graduates gave me an exposure to the bigger picture; a perspective on how a group of diverse people can work together effectively and ineffectively to develop a large-scale project. The real-world is a more fluid, if not chaotic, environment, where sometimes the best skill a person can have is the ability adapt to and look at a situation from multiple angles. Tools that can help this process are our ultimate goal.

## 5. ACKNOWLEDGEMENTS

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