Tracking the Flow:
Evaluating the Use of Process Mapping and Visual Storyboarding in the Classroom

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At the 2005 Eastman/IDSA Education Conference, Stephen Wilcox gave a presentation on procedure mapping. The next day, Kevin Reeder, with Stephanie Munson, discussed visual storyboarding. Both procedure mapping and visual storyboarding are communication methods that emphasize viewing and discussing the entire use, storage to storage, of a product. In turn, the design team uses the broad view to pinpoint areas where greater research is needed, a competitive market edge can be achieved, opportunities for innovation can be identified, and empathy for the user becomes critical. As a process communication tool, a procedure or process map/visual storyboard can be a fluid, pin-up device to communicate project concerns to all parties involved. It can example the overlap of industrial design and business marketing issues or industrial design to manufacturing. In all cases, process mapping and visual storyboarding provide a broad, overarching message to the participants in the product development process.

At the 2005 Eastman IDSA Education Conference, Stephen Wilcox, a principal at Design Science, discussed the value of using information graphics to make complex forms of information understandable. As example, Dr. Wilcox discussed the construction of a procedure map and its function as a communication tool within the design team as well as with the client.

Michael Lee Smith, director of process improvement at ETS, on corporate procedures states that “Process mapping is a technique for making work visible.” and “There has probably never been a process map developed where someone has not said, ‘Why are we doing it that way?’.”

Chris Ahoy, associate vice president at Iowa State University describes a process map as “a workflow diagram to bring forth a clear understanding of a process or series of parallel processes.”

Adrian Mallon in an Internet article states storyboards need not take the considerable time that some think that it does, depending on how one goes about it (“Storyboarding Multimedia” 1). And there are significant advantages to be considered. There is a document, which everyone can point to as a common point of reference, enabling the design team (which includes client) to say, ‘Yes, that is what I meant’, or ‘No, we’ve a problem here’. Problems may be spotted from the storyboard that may have proven more costly to correct at a later stage.”

Since the 2005c, process mapping/visual storyboarding has been practiced in industrial Design courses at the University of Illinois, Chicago, as well as the Georgia Institute of Technology. This paper/presentation will compare notes from the participating faculty and discuss the successes and failures of the methods in the classrooms. From this comparative study, process mapping/visual storyboarding can be evaluated for validity and refined for further use and testing in ID courses as well as the professional practice.

Case Study: University of Illinois, Chicago

During the 2004-2005 school year, the University of Illinois Chicago's program in industrial design partnered with the Chicago Mercantile Exchange (CME) in a program initiative entitled Future Trading Technologies. The initiative begun as a discussion that generally sought to explore innovation within the futures trading market, and specifically investigate the design of new products for traders within an open outcry-trading environment (think New York Stock Exchange visuals). The project timeframe was set 10 years in the future, and the project aim was to look at creating the most innovative approaches to trading through the creation of new trading devices and/or products. The intent of these devices was to facilitate the way someone interacts with the market.

While seemingly a simple problem statement, it became impossible to make good progress on the project due to the future-forward requirements. Not only is it impossible to predict the future (which makes designing not only difficult but impossible), but also trading at the CME was in the middle of a massive transformation. Since its inception in 1919, trading at the CME was performed through a process called open-outcry trading, where trading occurs in pits with physical interaction through the use of hand signals and trading cards. In the 1990s, electronic trading began its ascent and began to rapidly overtake face-to-face (open-outcry) trading.

As we started the project, we became paralyzed by our inability to imagine what this future looked like during this time of rapid change—we were stuck not being able to imagine the types of environments where traders would be working, the types of people who would be trading, and the types of products needed for these people within these environments.

From Research into Designing

In order to transition from the research phase of the project into the design phase of the project, it was important to develop a picture of what the future world of trading would look like since it was (and still is) a time of rapid change. This was necessary in order to help the designers understand the needs of the traders, develop an understanding of what this environment would look like in ten years, and assess what types of products should be designed for this group of users (1).

What Did We Do?

The first step in designing was to gain an understanding of the different types of future trading environments. After observing, interviewing, and discussing the future of trading with traders and employees at the CME, we came up with three environments where trading might occur in the future—at the CME, at a trading firm, in a home office, or anywhere (on the go). We then described our vision of what each of these spaces might be like through a series of brief descriptions and corresponding key words.

After all of this information was analyzed, the goal of this learning was to create trader types, personas (fictional people created based on the different trading types), and daily scenarios (these illustrate the personas daily behaviors in action). This helped us to further understand the information we'd collected.

Through this process, three trader types were identified: the CME trader, the on-the-go trader, and the trading firm trader. Each type was distilled into its archetypal characteristics, which included information such as work behaviors, needs, desires, daily routines, and personal characteristics—descriptions were then developed. After we had a clear idea of the different trader types, three personas were developed for each trader type. This helped the students really understand the users they were designing for. We discovered many qualities that make a trader successful, background information on the different trader types, daily routines, daily behaviors, mindsets, and motivations. All of these things were helpful in allowing the students to begin the form-related development of the design process. Throughout this process, iteration became key to generating good models since we were still learning throughout this part of the process.

Conclusion

This project was challenging in many ways. First, it was a challenge for these student-designers in that it introduced them to client-sponsored design activities. Prior to this experience, students worked on design projects of their own creation, and hence were not accountable to any 'true' end-user. This is an imperative experience for any student to have prior to entering the working world. During this project, student-designers were able to present and receive feedback regarding their ideas to a group of users targeted to use their products. Additionally, it pushed their presentation and communication skills within a client environment—this was greatly beneficial in improving (and obtaining) the necessary design communication skills.

A second major challenge for this course was an incredibly complicated subject matter—understanding the psychological underpinnings of a trading mind was incredibly difficult for everyone involved. It presented a tough challenge, but garnered interesting results. Thirdly, was balancing client expectations against industrial design needs. This project dictated working at the intersection of tangible product and futurist, visionary thinking. While the client demanded innovative, future-forward thinking—the industrial design aspect demanded that the results be grounded.

Last is the challenge of designing interactive products. The students learned that designing products in the future (those influenced by computing technologies) will truly be a multi-disciplinary effort. In this class, an ideal outcome would involve participants from industrial design, graphic design, architecture, computer science, electrical engineering, mechanical engineering, psychology, and anthropology. This dictates new abilities for the industrial designers of tomorrow. New skills are necessary in order to illustrate product interactions, and prototyping that showcases actual product interactive behaviors (2).

The hope is that this process is translatable to other design projects and problems—projects that seek to look holistically at designed systems and the objects within them—of particular relevance are the general areas of sustainable design and design for emerging technologies.

Case Study: Georgia Tech

ID 3012, Junior Industrial Design Studio Course

This course is the second studio course in the junior year for students at Georgia Tech. Traditionally, this course requires the students to work in teams to research the topic, develop a solution, and design an exhibit or retail interior space. In this manner, the students address all the aspects of a product design project, the user, ergonomics and movement, form/image, and manufacturing/fabrication, but at a different scale. The pedagogical goal is to broaden student's experience and further develop their understanding of the transportable nature of a design process. It also provides a useful example of dealing with multiple users and applying regulatory constraints to their space solutions. Overall, it is an academically loaded semester that reinforces and expands upon previously introduced design dogma and presents broader reaching ideas and practices to their experience.

In the spring 2006 semester, students were asked to design a shower-spa for Aqualair, a manufacturer in Dahlonega, Georgia. The company or client has a limited product line and is very interested in expanding their product's impact in several markets. The instructor's for the three sections of the course, R. Bernard, K. Reeder, and F. Vollmer agree that the course would be an appropriate venue to test the effectiveness of using a visual storyboard to communicate the design problem, develop innovative design solutions, and to gain an empathy for the targeted users. The natural variation in teaching style and pedagogical priorities were deemed acceptable and a reasonably fair assessment could be made at the conclusion of the project.

The project began with broad research activity that bridged across the three sections, which totaled 12 design teams. Research was collated into a consistent format and presented to the client. The client agreed to establish the targeted user as an older affluent person or couple and that the markets categories would be travel or residential installations. With the project defined in this manner, the students were introduced to the techniques of developing and employing process map/visual storyboard prior to the conceptualization phase of the project. Presented information focused on the communicative value of the map to the team, the instructor and the client, and the use of the map identify areas where greater research is needed, a more competitive market edge can be established, innovation can be achieved, and empathy for the user can be integrated.

With empathy for an older user in mind, class lectures focused on general subjects of aging such as; depreciation of vision, physical adroitness and sensory input of digital ends at the feet and hands. Lectures on control design discussed the importance of relating the user's experience and expectation to the design and layout of shower, water jet, and spa controls. The larger intent in these discussions was to remind the students that they are not members of the user group and that they need to design for the characteristics of the older user in order to develop a successful product solution.

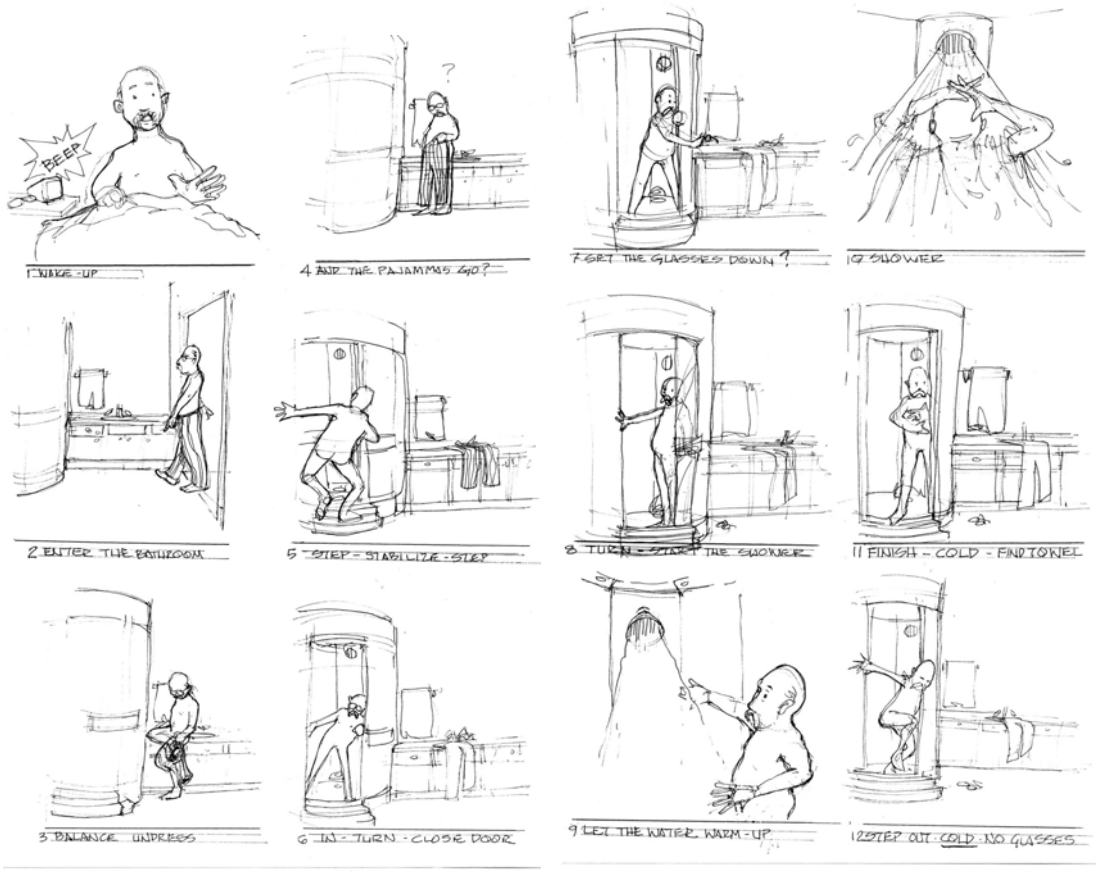

Figure 1. A sample visual storyboard for an older user.

Next, the instructors discussed the need to understand the big picture of using the shower-spa in order to determine areas of focus for conceptualization and hopefully innovative solutions. The students were asked to construct a process/map/visual storyboard as a means to identify parts of the shower-spa process that were not addressed, unresolved, and/or provided an opportunity to develop new and innovative solutions (see Figure 1). The students were instructed in the use of research and personal experience as well as sketch and/or photographic techniques to produce a process map/visual storyboard. In addition, examples and demonstrations were used to discuss the advantages and limitations of a process map/visual storyboard so that the students could facilitate the use of the tool and make the most of their time. For instance, the students could assume that washing in the shower is a cultural norm but activity prior to or directly following the shower may provide areas for significant design innovation.

Results

Across the three sections the students were divided into 12 groups. All the groups constructed a process map/visual storyboard using quick sketch techniques at varying levels of readability, and all the groups relied on their research data and process maps/visual storyboards to develop project concepts.

Empathy for an Older User

The process maps/visual storyboards displayed by the students, addressed basic issues of entry and exit from the shower-spa, seating within and location of controls, showerheads in reference to users of varying stature and age. But, the groups in general did not review the basic aging issues described previously (Figure 2). They did not consider the older person's visual impairment, nor did they consider the use of a handrail for guidance and support once in the shower. In addition, they were slow to realize the need to locate controls consistently with the user's experience in order to facilitate the shower process and the user's comfort.

Failure

It can be concluded that the students did not use the process map/visual storyboard to gain empathy for the user. But, with further discussion and instructional prodding these issues were addressed quit satisfactory for the students, the instructor, and the client. The three instructors agreed that with additional provisions like the construction of personas, the process map/visual storyboard can enable students to be empathic and to visualize the needs of an older or younger user.

Figure 2. Storyboard of shower process.

Innovation

Several groups were able, through the use of their process map/story board, to focus on determining the shower temperature prior to the actual experience and improving the temperature transition at the conclusion of exist the shower. The concepts were innovative and quite able to be manufactured. One group focused on the issue of entry and implemented a technology where the shower temperature could be activated at a selected level from the bedside. Several of the

groups examined the use of warm air or heated towels to provide comfort to the wet, existing user.

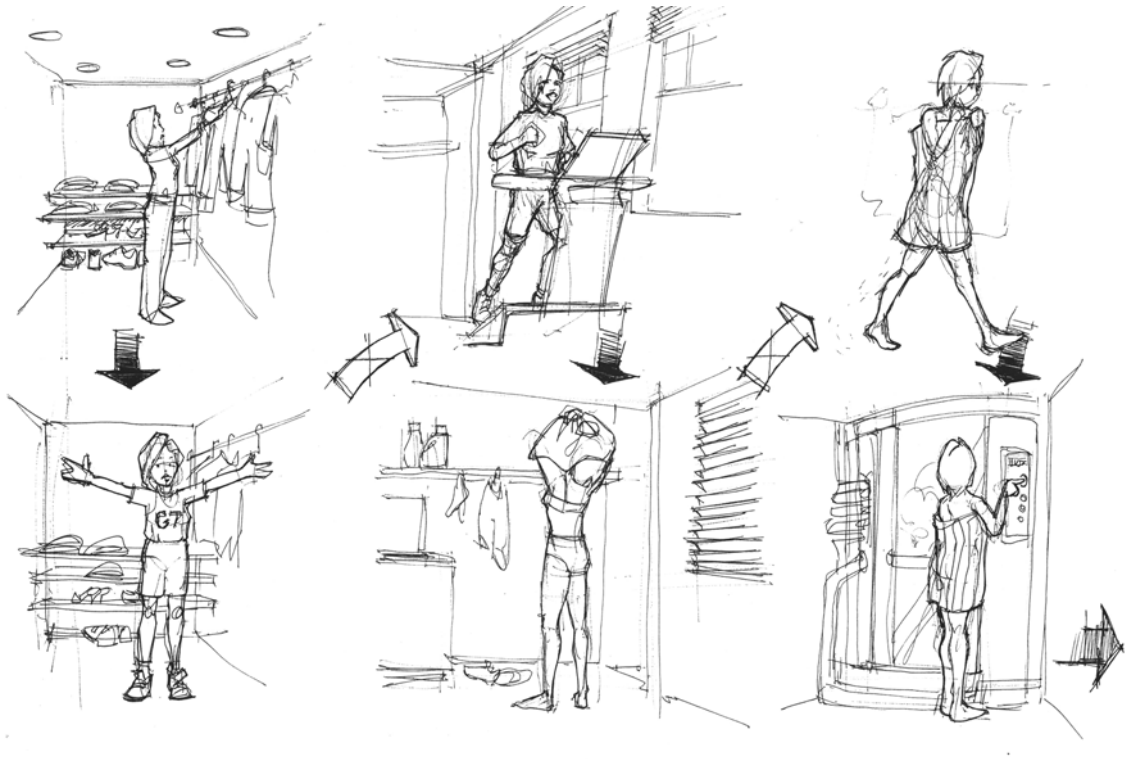

Figure 3. Storyboard of preshower activity.

Success

In this instance the process map/storyboard was an advantage and facilitated discussion between the students, instructor, and client and helped the students to focus on problem areas external to the immediate issue of developing the form and function of the shower enclosure.

Florian Vollmer, designer and adjunct professor at Georgia Tech, in regards to the class, stated: “the use of a storyboard helped the students especially in the sequential situation like the morning shower, it helped to really understand all the steps involved” (Figure 3).

Conclusion

Process mapping/visual storyboarding cannot provide all the insight and visual projection that is needed for an industrial design student to successful grasp the nuances and implications of every thing that they do. But it is a powerful tool for the student and practicing designer to communicate the entire process of using a product or space and to identify steps in the process that are not addressed by the competition, steps in the process that are waiting for innovative solutions, areas in the process where human use and fit need to be examined and steps in the process where additional design tools will aid the overall design process.

Notes

(1) Munson, S. (2005), Trading Technologies: An Investigation at the Intersection of Artifact and Information. *Crossing Design Boundaries: 3rd International Engineering and Product Design Education Conference Proceedings*. Napier University: United Kingdom.

(2) Munson, S. (2005), Products for Traders, presented at *Envisioning Design for the 21st Century*, UAM Mexico City, Mexico

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