Prototyping: Creating a design

Designing involves making decisions; pursuing some directions and omitting others. Unlike the idea generation phase, the design phase involves choosing a particular direction and narrowing the range of possibilities. The goal is to explore a more restricted design space, creating a grounded design that is both innovative and still makes sense to real users in the contexts in which it will be used. The purpose of these exercises is to create an innovative design for an electronic *Post-it®* note, in the context of how it might really be used, using scenarios, storyboards and video prototypes.

✎ **Scenarios** describe a sequence of events, illustrating the activities of one or more people in a real-world setting. The goals are to be realistic, detailed and concise. Since this is difficult to do quickly, it is best to cover only a limited period of time in the scenario. Unlike a task analysis, we are not interested in an idealized description of discrete tasks, nor should the activities be separated into "functions" that can be later be supported by technology. Instead, the goal is to provide a very specific description of what happens, including when interruptions and breakdowns occur. In real product development (and also in research settings), it is essential that people who actually perform these tasks are involved in the discussion: they are the only ones who can provide realistic details about how the work actually proceeds.

We distinguish between *use scenarios*, which are a form of analysis of the interviews and represent what happens today in real-world settings, and *design scenarios*, which are revised versions of use scenarios that illustrate how a new technology might be used. The following is an example of a use scenario derived from several interviews. The names and details of the setting have been changed, but the basic events are real.

Sample Use Scenario: Mary works as a secretary working for a large computer firm. She is responsible for supporting the manager of the marketing department as well as his staff (8 people). It is 9:15 on Tuesday morning and she is reading her electronic mail. Several of the groups that she works with regularly have been moved into a new building across town and they have all changed their telephone numbers. She finds a message from Anne, one of her colleagues and notes the new phone number. She crosses out the old number on a *Post-it®* note attached to her monitor and writes in the new phone number. As she is doing this, the phone rings. One of the marketing reps, John, is on the road and asks her to fax him some market data. He gives her the file name and his current fax number at the hotel. Mary notes this on another *Post-it®* and places it on her phone so she won't forget it. She returns to her email and finds a message she sent herself about a document she needs to edit and return the following week. She saves the file and puts a *Post-it®* note in her calendar that indicates the due date and the file to edit.

Twenty minutes later, Mary gets up to go to the copier to make copies of a presentation her boss is giving later in the day. On her way, she runs into another marketing rep, Joe, who asks her if the expenses have been filed for his last trip. Mary promises to check and borrows a *Post-it®* note from another secretary she knows, June, whose office is next to the copier. She makes a note to remember the expenses, sticks it on the copies of slides she has printed and returns to her desk. When she arrives, she sees that the receptionist has called to say that a package has arrived. She takes off the *Post-it®* reminding her of the expenses and places it on the filing cabinet

that contains the expenses. She then puts a *Post-it®* note on the copies of the slides for her boss reminding him that the presentation is at 15:00. She goes down to reception. The person who called is away on a break, but the other receptionist hands her the package, which has a *Post-it®* note on it saying that Mary has been called and will pick it up shortly.

⌨ **Design scenarios** are essentially enhanced versions of use scenarios, providing an envisionment of how a user's work will change when new technology is introduced. The design scenario should specify both how the users will interact with the new technology in the course of their work and illustrate how it might change their current activities. Just as in a use scenario, it is important that the discussion include people who actually perform the work, since they are most likely to be able to identify problems or unrealistic uses of the new technology. You may wish to evaluate the scenario against a checklist to ensure that no important issues have been left out.

Design scenarios usually begin on paper as text and sketches. They can then be formalized into storyboards, which will help in future videotaping or design workshops. Videotaping the storyboard directly, with a voice-over to explain the action, provides the simplest form of presentation of the ideas. Some film-makers do this, inserting background scenes, music, soundtracks, and actual scenes as they are filmed, to create an evolving document of the state of the project. You can do the same thing as you experiment with implementing different aspects of the scenario, using it as a springboard discussions among designers, users and management. Note that design prototypes can be developed directly from the video prototypes and tested with users in the same way.

🗐 **Storyboards:** Today, most artists and designers who work with temporal information, including cinematographers, video producers, animators, and multimedia producers, "sketch" their ideas with *storyboards*, proving a spatial representation of (usually) linear, temporal information. Storyboards outline the action and capture the key elements of the story. Like a comic book, the storyboard shows a sequence of rough sketches of each action or event, with accompanying dialog (or subtitles) and related annotations including notes about the scene, type of shot, or type of edit.

Storyboards help designers refine their ideas, generate 'what if' scenarios for different approaches to a story, and communicate with the other people in the production (camera, sound and actors or 'talent'). Storyboards can be informal "sketches" of ideas with partial information, created before any video has been shot. Other storyboards follow a pre-defined format and are used to direct the production and editing of the final material. Storyboards make it easy to jot down notes and get a quick overview of a lengthy visual presentation. If the elements of the storyboard are placed on separate cards, the designer can easily experiment with different linear sequences and insert or delete video clips with ease. You can provide a quick overview of what a presentation will look like if you videotape the sketches in your storyboard, with a voice-over explaining the intended action in each clip.

✂ **Rapid Prototyping:** Developing software is time-consuming and expensive, particularly software that is robust. Prototyping is a way of exploring different design approaches and evaluating specific alternatives. (In this course, we are concentrating on prototyping as a way of exploring design from a user's perspective. But prototyping is, of course, also useful in any aspect of system development.)

Prototypes can take many forms, from very informal paper prototypes, to very elaborate video prototypes with special effects, to working systems. The goal is to create the illusion of real interaction between users and the future system. A good

prototype need not be realistic in every detail, but it should be sufficiently detailed so that users (and developers) can judge what a "real" version of the system would look like. Note that the problem here is generally to discover what the interesting questions are; not necessarily the solutions. Prototypes allow you to explore a design space and try out different ideas, to better understand what the issues are. Implementing an efficient and effective solution can only occur when you have a clear idea of what it is that you are trying to develop.

Prototypes are developed for a variety of different purposes. If the goal is to present information or see how a user will follow a particular procedure, it is often possible to start with just paper. The designer can present screen dumps or sketches to the user and react based on the user's responses to the information on the screens.

☻ **Wizard of Oz:** Sometimes, it is useful to give users the impression that they are working with a real system, even before it exists. The "Wizard-of-Oz" technique lets users interact with partially-functional computer systems. Whenever they encounter something that has not been implemented (or there is a bug), a human developer who is watching the interaction overrides the prototype system and plays the role destined to eventually be played by the computer. A combination of video and software works well, depending upon what you wish to simulate.

▣ **Video Prototyping:** In a participatory design process, users of the new system actively participate in prototyping exercises. However, most users are not trained designers. Video prototyping and related methods help users and designers with different skills, interests and responsibilities communicate with each other in a productive way. Video prototyping scenarios show situations that are relevant to users, while providing a concrete specification of what to build.

Video is very useful for creating a more complex or sophisticated simulation of an interaction. Here, we're using video not as a way to capture events in the real world or to capture design ideas, but as a tool for sketching and visualizing interaction. This technique works best if the video can be projected, either by hooking it up to a monitor or to a video projector. But you can also do it "live" with the tiny screen in the camera. Set up the video camera so that it points either to paper or a partially-working software simulation. Connect the output of the camera to a monitor, seen by a person acting as the user. As the developer, you can present information to the user on their monitor, observe their actions, and respond accordingly. This is most effective if the developer is well prepared for a variety of events and can present semi-automated information. If possible, ask users to participate in a brainstorming session (videotaped) immediately after trying out the video prototype. Let the users try alternatives and suggest different ways of interacting with the system.

Prototyping Exercises

Exercise 3:   Develop a use scenario from the interviews. Then, incorporating the brainstorming ideas, develop a design for a new *Post-it®* Note. Create a design scenario, by revising the use scenario: show how a real user would interact with the new system in a realistic setting. Change the scenario and change the design, as needed. Then, illustrate the design scenario with a storyboard and then shoot a video prototype that demonstrates the new electronic *Post-it®* note application in use.

Use Scenario: The goal of this exercise is to describe how a particular (fictional) person uses paper *Post-it®* notes in the context of their work. The scenario must identify WHO is involved and WHERE the activities take place. Be very specific: Give the user a name and describe his or her background and basic job responsibilities. Describe the environment in which he or she works. Use real people as the basis for your description. The scenario should describe WHAT the user does over a specified period of time. Be specific: choose a particular day and describe, step by step, what happens, emphasizing the use of *Post-it®* notes. Use your own experience and what you learned from the critical incident technique interviews to build the scenario. Be sure to include not only things that work well, but also breakdowns and misunderstandings and explain what the user does in response. Include typical and unusual events, as well as positive and negative examples. Think about planned activities and "situated action", i.e. how people respond to the situation at hand, including unexpected events. Tell a story about what happened to this person as he or she used *Post-it®* notes, based on situations that really happened.

Design scenario: Drawing from your use scenario and ideas generated during the brainstorming session, develop a design scenario to envision how the user will interact with your new *Post-it®* note system. It will become apparent that some things work best on paper, whereas others are better handled electronically: change the events in the use scenario to highlight these differences. You are exploring a design space, not coming up with a final solution. Try different alternatives for interacting with your new system. Think about what people will want to do with it. What are the most common and most important functions? Make these easiest to access. As you explore different ideas, think about the design problems they pose. Do you have enough information about your user population or are there questions you still have? What problems will this system solve for your users; what problems might it create? Use real *Post-it®* notes to simulate menus or buttons, use transparencies to show how information on the screen changes. Build upon the isolated brainstormed ideas and systematically apply them to the use scenario to illustrate the interaction.

Storyboard: After completing the design scenario, illustrate it with a storyboard, using one of the alternatives provided. Consider not only the details of how people will interact with your prototype system, but also consider the types of shots you'll need as well as the props and settings. Work out what the title cards should say, as well as what the actors will say.

✂ **Video Prototyping:**   Make mockups of the prototype and follow the storyboard. Begin with a title card and shoot each scene in sequence. Keep scenes short, practice at least once, and try to shoot it correctly the first time, to avoid rewinding the tape. Using intermediate title cards, as in a silent movie, will make the story clearer and will make things easier if you find that you do have to reshoot a sequence.

Worksheet: Use Scenario

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Other people: _____

Date:_____ Time: _____

Setting:_____
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Worksheet: Design Scenario

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Video Prototype

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Credits