Video Prototype

Video prototypes (Mackay, 1988) use video to illustrate how users will interact with a new system. The goal is to refine a single system concept, making design choices that highlight and explore a particular design path. The technique appears similar to video brainstorming: Both involve small design groups who work together to create and interact with rapid prototypes in front of a video camera. Both result in video illustrations that render abstract ideas concrete and help team members communicate with each other. Both use paper & pencil prototypes or cardboard mock-ups to simulate novel technology. The critical difference is that video brainstorming expands the design space, by creating a number of unconnected collections of individual ideas, whereas video prototyping contracts the design space, by showing how a specific collection of design choices work together in a single design proposal.

Video prototypes are organized as scenarios that illustrate how people might interact with a future technology in a realistic setting. Video prototypes may also incorporate any of a variety of off-line or computer-based prototyping techniques. However, the focus should be on helping designers to consider the details of how users will react to and control new technology in the context in which it will be used. Video prototypes should be thought of as sketches that illustrate what the interaction with the new system will be like in a real-world setting. They should be quick, easy and inexpensive to create and are invaluable for communicating with design team members, users and outside stakeholders.

Video prototypes build upon a number of design resources created in earlier design exercises. The use scenario acts as the foundation, telling a specific, realistic story about how real people would interact with it in a realistic setting. The characters in the video prototype are represented as personas or extreme characters drawn from interviews and observations, placed are in a particular situation at a particular place and time. The scenario describes relevant motivations and their activities over time, organized into a series of 'interaction points' or incidents in which the users come in contact with the new system. The next step is to create a design scenario, which reassesses the use scenario and describes what would change if a new technology were introduced. The design scenario may illustrate how interaction with existing technology could be improved or suggest novel forms of interaction that address unmet needs or desires.

Once the design scenario is described in words, the designer develops a storyboard. Similar to a comic book, the storyboard shows a sequence of rough sketches of each action or event, with accompanying actions and/or dialog (or subtitles). Related annotations explain either what is happening in the scene or the type of shot, e.g., close-up or long shot. The storyboard is an important step between the design scenario and the video prototype, not only to guide how the interaction will be shot but also to encourage the designers to think more specifically about just how the interaction will work in context.

The "editing-in-the-camera" technique (Mackay, 2000) involves shooting each sequence of the video prototype in the order that it will be viewed, to avoid later editing on the computer. With a well-designed storyboard, this is easy and results in a finished finished video prototype that can be viewed at the end of the session. Unfortunately, the advent of digital video has made this term confusing and made it more difficult to convince directors to avoid in-camera or computer-based editing. Please, try to avoid this: it wastes time. Although it is tempting to use the camera's editing features to fix minor problems or to rearrange clips, it is much faster to simply follow the storyboard.

Be sure to use title cards, as in a silent movie, to separate video clips. This facilitates shooting, makes it easier for viewers to follow the story and simplifies handling shooting errors. If you make a mistake, simple reshoot the title card and the problematic sequence. You can view the result at the end of the session, or if you do edit on a computer, you simply delete the earlier sequence whenever a title card reappears. The goal is to create a finished artifact that everyone can view at the end of the session, rather than waiting for someone to spend time editing it. Editing always takes more time than expected and eliminates the quick, sketching quality of the video prototyping process.

Team members should actively participate in creating the mock ups of the technology. Everyone should also think about the interaction and how to illustrate it. Team members can play with lo-fi special effects, such as time-lapse photography. For example, record a user pressing a button. Next, pause or stop the camera (keeping it steady, ideally on a tripod or else braced against the camera person's body) and insert a new dialog box. Restart the camera to create the illusion of immediate feedback, i.e. that the dialog box 'popped up' in response the user's button press. Simulate a mouse cursor on a paper prototype by cutting a strip of a transparency and drawing an arrow at the end. Move the arrow to a post-it note menu item, pause the camera, show the result of the action with the arrow cursor in the same position on the 'screen'. Simulate typing by pre-writing the text and then having it appear through a slit in the paper, or using the time-lapse technique to jump forward in time, with the completed text. With a little ingenuity, you can illustrate a wide variety of interaction techniques.

Video prototypes should begin with a title card that includes the name of the system, the date and location of the shoot and any relevant information, e.g., the name of a participatory design workshop. The title card serves as a label to help you keep track of which video prototype is which: use different colors if you create multiple versions of the same design scenario. The next shot is usually an 'establishing shot', a long view that shows the user(s) in the context of the design scenario. Next, create a series of 'interaction points', each beginning with a titlecard followed by 1-3 shots that illustrate the user's interaction with the technology. These move the story forward and, importantly, show the details of how the technology might be used in practice. Shots may include mid-shots to capture a conversation between two people or a close-up of the technology in action. This is where paper-based special effects are important: it should be obvious how the technology works. Include detail: do not use a series of squiggly lines to indicate choices on a menu: pick several likely choices and print them. Do not shoot extensive video to motivate the story. Instead, concentrate on showing interaction and use other means to explain events that are not obvious from the video.

Some video prototypes use a narrator or voice over, others use only title cards, and still others rely on the actors in the video to explain what they are doing, either through natural dialog or through a 'talk aloud' procedure.The video prototype should conclude with credits at the end: a title card with the names of the authors of the video prototype. Note that using colored titlecards throughout the video prototype will make it easier to search through the video later for specific interaction points.

Interactive video prototypes offer an interesting variation. They use the Wizard-of-Oz technique to simulate the experience of a user interacting with the paper prototype. This works with simple transparencies and an overhead projector or a video camera connected to a video projector and a whiteboard or flipchart. The wizard and other team members arrange the objects that will be projected to the user: either by placing transparencies on an overhead projector or on a table with a video camera pointed at it. The idea is to create a proposed screen layout that can be projected in such a way that the user can interact with it, usually against a wall, but occasionally against another surface. The user faces the monitor or screen with the projected image and performs various actions, such as pointing, clicking on a menu, swiping the screen, or issuing a voice command. The wizard team stands behind the user so they can observe her actions and react appropriately. They move the relevant objects or make things appear and disappear. This works best when following a storyboard, but can also be used to brainstorm alternatives that arise. It helps to be prepared for more open-ended sessions, since users will often try things that go beyond the design scenario. For example, create a set of different pre-written menus or capture information from a computer screen or partially operational software prototype.

Interactive video is powerful as a live activity but is also a very effective method of video brainstorming or creating a fully storyboarded video prototype.

The example below from *W. Mackay* used a video camera, video projector, whiteboard, overhead projector and transparencies. The setup allowed two people to experience how they would communicate via a new interactive communication system. The user below tried different strategies for adding information to a simulated RADAR screen:

Hand-drawn transparencies are projected onto a wall. Team members move aircraft to simulate an interactive RADAR screen while the Wizard reacts to the user's actions.

Next, we projected a live image of a person playing the role of a distant controller, the blond woman, onto the left-side of the wall. She could see and talk to the brunette, both had the experience of communicating at a distance. The overhead projector displayed hand-drawn transparencies, manipulated by two other people, in response to gestures made by the brunette. The entire interaction was videotaped by a second video camera. Note that this video was created by participants in a workshop on user interfaces for air traffic control. None had ever used video prototyping techniques but all were able to use this Wizard-of-oz environment to generate new interaction ideas in less than 30 minutes.
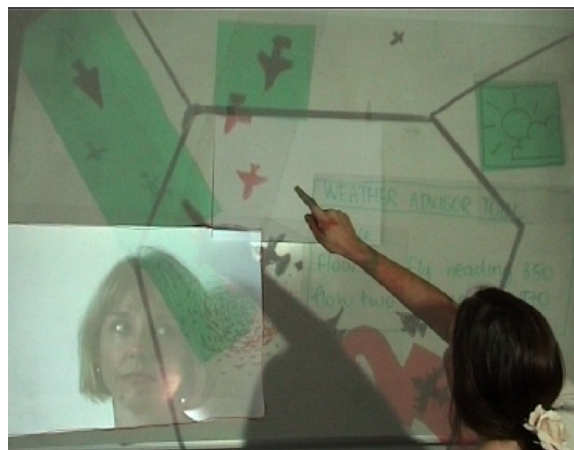
Complex wizard-of-Oz simulation, with projected image from a live video camera and transparencies projected from an overhead projector.

Group _____

Roles: *Director:*   Chooses an idea and assign jobs to the other group members.
          Scribe: Writes the titlecards, fill in the idea summaries, and collect materials.
          Camera: Videotapes the idea (not the discussion about the idea!)
          Makers: Create paper prototypes or mockups of the technology being explored
          Actors: Represent the personas as they interact with the paper prototypes.

Preparation: Gather the following design resources:

Storyboard: Provides a step-by-step guide to shooting the video. Base it on the design scenario, include personas, context and series of interaction points.

Function-Interaction Table: Useful for considering alternative forms of interaction as you create the video prototype. Also, update the table if new ideas arise.

Paper prototypes: Screen-based interfaces are easy to prototype with colored paper, transparencies and post-it notes. Use foam, cardboard and other materials to illustrate tangible interfaces.

Title cards: Each video prototype should have a colored title card and a set of 'intertitles' to explain each interaction point. You should also include a final 'credits' title card with the names of all the participants in the video. Use different colors for subsequent versions of the video prototype.

Procedure: Choose a director and a camera person. (These roles can change as you proceed, but it is better to have one person in charge at a time.) Also decide who the key actors are and who is responsible for manipulating which paper prototypes.

Discuss how to present the new system in context, including the initial establishing shot. Simulate settings with whatever is around or sketch simple cues about the environment on a whiteboard or flip chart. For example, simulate being in a car by drawing a steering wheel and a windshield on a whiteboard and placing a chair facing it. Shoot over the actor's as she pretends to move the steering wheel. Use transparencies or post-its to show changes in the view through the windshield.

Create the materials necessary to illustrate the idea, rehearse once, video the titlecard and then video the interaction. Decide how you will communicate the motivation and the key incidents of the story: title-cards only, an off-camera voice-over (who will speak?), or through dialog by the actors. Illustrate the idea through action as much as possible and include details. Don't use squiggly lines to indicate menu choices, show what is real and relevant.

Begin by shooting the initial title card (4 seconds) with the name of the project, group, date, time and version number. (Change colors for subsequent versions.) Next, shoot a titlecard (3- 5 seconds) that identifies the personas and the basic setting. Next, shoot an establishing shot that shows the user(s) in context.

Now, begin shooting the series of interaction points that both tell the story and illustrate the details of the interaction. Each interaction point should begin with a titlecard, followed by 1-3 video clips that show: How the system appears to the user, what the user does, how the system responds. Continue adding interaction points that address different design issues. Early versions of video prototypes are usually linear and emphasize how the system provides the user with novel functionality. Later versions address surprises and breakdowns as well as help designers explore and assess different alternatives.