

Designing with Sticky Notes

WENDY E. MACKAY,
Research Director, Inria Saclay – France
Email: mackay@lri.fr

HAVE TAUGHT Human-Computer Interaction classes and tutorials for many years, in multiple countries (Mackay, 2003). I find that the project topic that best crosses cultural and language boundaries is to create an ‘augmented’ sticky note, where designers learn to see sticky notes as both a design material and a key source of inspiration. Sticky notes suggest endless forms of user innovation—designers who observe sticky notes-in-use cannot help but be surprised and delighted by the many ways in which people appropriate them. Instead of mere rectangular scraps of yellow paper with semi-sticky glue, interaction designers quickly realize that sticky notes embody properties that people can adapt for their current needs. This tutorial encourages designers to move beyond static wireframes that represent screens, and instead focus on how users will interact with their proposed new technology. Sticky notes also offer a fundamental example of how embedding simple properties into an interactive system can significantly increase the user’s ability to explore and innovate. I have found that observing how people use sticky notes, and then systematically adopting sticky notes into the design process, results in significantly more interactive, innovative designs.

This chapter describes a one-day tutorial that teaches a highly user-centred design process (described in greater detail in (Mackay, 2002) and *DOIT: The Design of Interactive Things* (Mackay, 2020), see Figure 10.1. These activities have been tested and refined in both corporate and educational settings, and have been adopted by both novice and professional interaction designers. The process emphasizes rapid action and redesign, while minimizing excessive debate. Each activity involves gathering information, exploring it, and, importantly, creating a design artefact that supports future design. The methods are simple, rapid and easily learned, and encourage full participation by team members.

The course begins with a design brief: create an *augmented sticky note* inspired by observations of how people actually use paper sticky notes. Story-based interviews reveal both breakdowns and creative new uses of sticky notes. Brainstorming and video brainstorming, informed by the users’ stories, generate new ideas. Paper prototyping a design concept related to augmented sticky notes lets designers explore ideas for a future system to address an untapped need or desire. Shooting a video prototype, guided by title cards and a storyboard, illustrates how future users will interact with the proposed system. Finally, a design walkthrough identifies key problems and suggests ideas for improvement.

ABSTRACT

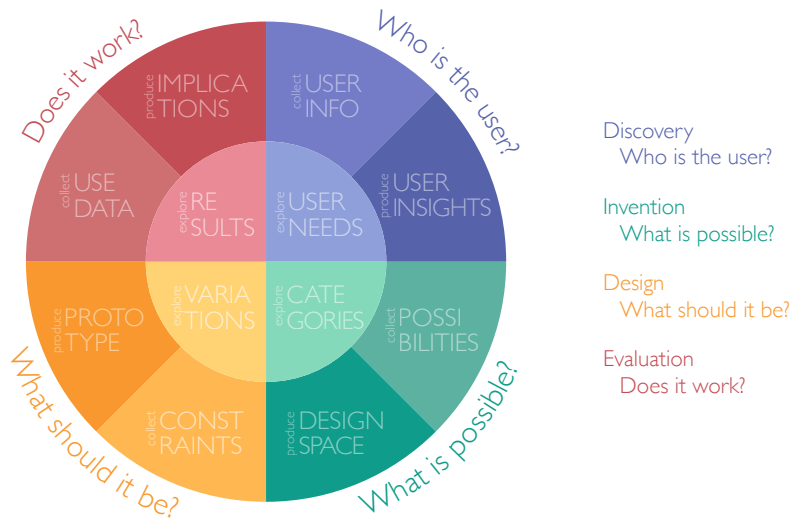
This chapter offers a practical guide for blending sticky notes with current technology to generate novel ideas for future technologies; create live, interactive simulations; explore design alternatives; and share results with designers, users, and other stakeholders.

KEYWORDS

- Augmented sticky notes,
- Design walkthroughs,
- Interaction design process,
- Interaction points,
- Story interviews,
- Video brainstorming,
- Video prototyping

FIGURE 10.1

The iterative design process includes four phases: Discovery, Invention, Design, and Evaluation. Each design activity involves collecting information, exploring or interpreting it, and producing a design resource to support future design activities. Design may start in any phase and need not follow a particular order. However, designers should incorporate all four phases in each design project.



Sticky notes serve multiple roles throughout the process: in addition to being the focus of the interviews, they also support later data analysis; capture brainstormed ideas; form the basis of paper prototypes; and keep track of design problems. Embedding sticky notes into the design process introduces a recursive element that highlights both the flexibility of sticky notes and the constraints of many current computer systems.

TUTORIAL: Designing an Augmented Sticky Note

APPROACH: This tutorial follows a user-centred, iterative design process. Some activities will be familiar if you have a background in HCI or user experience design; others offer a unique twist. All complement and build upon each other and can be performed in any order, although it is usually best to start by finding out about the user. The following advice will help you succeed:

1. Think of each design activity as creating a design artefact, or *resource for future design*. Always summarize what you learn from each activity—even a quick written assessment is better than nothing, and will result in a richer, better-grounded final design.
2. Ensure that all group members participate on an equal basis. None of the activities require special skills, such as programming, drawing, or data analysis. The final video prototype provides a dynamic ‘sketch’ of the future design in use, and serves as artefact that everyone can and should contribute to.
3. Avoid ‘analysis paralysis’! These activities emphasize *doing* over talking. Instead of discussing the perfect solution, start with a clearly imperfect first guess and iterate from there. You will find that improving ideas is far easier than facing a blank sheet of paper. Borrowing from Nike™, our motto is: *Just do it!—then, make it better!*

PROJECT GROUPS: Design is a collaborative activity. This project works best with a small group, ideally four people with mixed backgrounds. Listen to and value diverse perspectives, and ensure that group members perform different roles in the different activities.

SUPPLIES: Each group needs a quiet place to work, ideally with access to a flipchart or whiteboard. Old overhead projectors are also great prototyping tools. We usually provide a supply box for each group, as well as a divided folder to keep track of design artefacts (see shopping list aside).

PROJECT TOPIC: ‘Sticky notes’ is the generic term for Post-It Notes™, which were invented by accident, a classic case of user innovation (Christensen, Halskov and Klokmoose: “Introduction” in this volume). Scientists at the 3M Corporation normally spend their time trying to invent better glues that adhere to a wide variety of surfaces. When one researcher discovered a glue that did not stick particularly well, he viewed it as a failure. But his colleague saw it as the answer to a problem he faced every Sunday: adding this not-very-sticky glue to small scraps of paper would let him mark pages in his hymnal. The Post-It Note™ was born! Today, sticky notes are considered an essential office supply, available in assorted sizes, colours and shapes, or as sticky note glue that can be applied to paper or other surfaces.

DESIGN FUNCTIONALITY: You have two options. You can either create an on-screen electronic sticky note that meets user needs you discovered in your group’s interviews, or move beyond the laptop and explore a radically-new design that combines the benefits of paper sticky notes with the computer. Consider the basic functionality (creation, modification, movement, deletion) as well as the context in which it will be used. Your goal is to create a simple, light-weight interface that addresses a real-world user need. Reflect on what makes sticky notes so useful and which aspects can be incorporated into an interactive version.

SHOPPING LIST

- Assorted sizes of coloured sticky notes
- Coloured paper
- Large paper (flipchart, A3 or legal size)
- Coloured flipchart markers
- Blank transparencies
- Coloured transparency pens
- Pair of scissors
- Scotch tape (sellotape)
- Dry erase slate or white board
- Dry erase markers
- Video camera, smart-phone or tablet
- Tripod or camera support
- Title cards
- Worksheets

The Design Brief:

Your goal is to design and implement an electronic equivalent or an interactive enhancement to a paper sticky note, based on your interviews and observations of how real people innovate with sticky notes. Consider the following:

- Why do people use sticky notes?
- Did a sticky note ever ‘fail’, and if so, why?
- Who writes sticky notes? Who reads them?
- What do people write on them? (text? drawings? something else?)
- Where do they put sticky notes?
- Are sticky notes ever moved? When, how often and why?
- Are sticky notes ever modified? When, how often and why?
- Do sticky notes have a typical life cycle? How are they created? Modified?
- Are there different types of sticky notes? If so, what distinguishes them?
- What aspects of an electronic sticky notes might be better than a paper version?
- What characteristics of paper may be lost when moving to an electronic version?

The four basic design phases

The following activities provide a basic introduction to user-centred design techniques, chosen because they are quick to learn and take advantage of video to capture and communicate ideas. They involve the four basic design phases of any user-centred design process: finding out about users, generating new ideas, designing a prototype, and evaluating the system. Note that in real-world design, these activities may occur in any order, ideally with multiple iterations.

TECHNIQUES:

Story Interview,
Current Scenario

Phase 1: Discovery: Who is the user?

What do people actually do with sticky notes? Begin by reading about story-based interview techniques, then find several people who use sticky notes on a regular basis. Conduct 15-minute interviews to find out how they use sticky notes in different settings. Look for creative new uses and breakdowns, summarize your findings, and write a current scenario, represented as a series of ‘interaction points’ that illustrate an interesting problem to solve.

TECHNIQUES:

Standard Brainstorming,
Video Brainstorming

Phase 2: Invention: What is possible?

How can you take advantage of the properties of paper sticky notes to address a real-world user need? First, brainstorm ideas, captured on sticky notes, and vote on your favourites. Next, shoot video clips that illustrate the most promising ideas, focusing on how the user would interact with the system. Every group member should direct at least one, ideally two video brainstormed ideas (20”-60” each).

TECHNIQUES:

Concept,
Future Scenario,
Storyboard,
Video Prototype

Phase 3: Design: What should it be?

How will users interact with your new system? Building upon the previous activities, develop a design concept that addresses the needs identified in your current scenario, incorporating relevant brainstormed ideas. Next, transform the current scenario into a future scenario that shows how several users would interact with it in a realistic setting, modifying the scenario or the design as needed. Illustrate the future scenario with a storyboard, then use the storyboard as a guide to shoot a video prototype that reveals functionality through use. Do not forget to include potential breakdowns and workarounds.

TECHNIQUES:

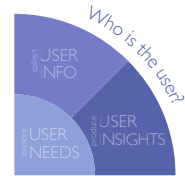
Design Walkthrough

Phase 4: Evaluation: Does it work?

What would make the system better? Run a design walkthrough with another group. First play the video prototype and then walk through each interaction point, asking for specific, constructive comments from members of both groups. Summarize these as specific implications for improving the design.

PHASE 1:

Discovery: Who is the user?



Users offer a key source of innovative ideas, if you know how to observe and interview them. This tutorial focuses on *story interviews* (Mackay, 2020), based on critical incident interviews (Flanagan, 1954), that elicit stories of innovative or problematic uses of sticky notes in a real-world context. The most useful stories reveal breakdowns, workarounds, and user innovations with respect to existing technology or material, and offer the best chance of sparking new design ideas. The next step is to analyse these stories, by categorising them and extracting key *interaction points* that illustrate surprising uses of sticky notes or inspirations for future design. Interaction points capture what the user does, how the system reacts, and how the user reacts to the result. These may be expressed as miniature storyboards to illustrate the interaction (shown later in Figure 10.3).

The next step is to reinterpret your interview results with respect to your design problem, from the user’s perspective. Select and organise anonymised *interaction points* into a *current scenario* (Bødker, 1999) that tells a story of how people actually use sticky notes. Although set in the present, current scenarios serve as the foundation for later *future scenarios* that explore possible futures in which the same people, with the same goals, will interact with your proposed new technology.

ACTIVITY 1:

Story Interview

Begin by asking the user to select an ‘interesting’ sticky note and ask about its life history. These are usually, but not always, visible on their desk, wall, screen or other object. Ask when and how did it get there? Who wrote it and why? What has happened to it since? What is likely to happen to it next? Focusing on the specifics will reveal if this is a typical or atypical use of a sticky note is, and spark similar or contrasting stories about other sticky notes.

Most stories begin with the person’s goal: what did she want to accomplish with that particular sticky note? You can point to a particular sticky note and ask: “*Can you tell me how that sticky note got there?*” She might answer: “*I wanted to be sure to remember to return this book to Ann, so “I wrote ‘Thanks Ann!’” on sticky note and then stuck it to the cover, and put the book next to the door, so I will remember it when I leave this afternoon.*” At this point, probe for more details: “*Why did you choose a blue one?*” “*I keep blue ones in my desk drawer, which I use for reminders.*” Ask for details, especially disruptions, breakdowns, workarounds, clever innovations or anything they found surprising. For example: “*Why is this one taped to an inside page, not the cover?*” Answer: “*The book has a cloth cover, so the sticky note didn’t stick well. I ended up taping the sticky note to a piece of paper and slid it inside the book, to make sure it didn’t get lost.*” Ask the person to reflect on her choice—is the sticky note a reminder, a message to Ann, or both?

Once you get the first story, you can obtain more stories by asking if this was a typical or unusual use of sticky notes. Whatever the answer, ask for a story about the alternative. Once they understand that you really *are* interested in the details of their use of sticky notes, most people will enjoy telling additional stories.

REMEMBER: Always aim for specific details first, and only ask for generalizations after you have two or three interesting stories. Listen for ‘red flags’ i.e. when the person starts to tell you what they *usually* do or offer a *general* opinion, which is far less useful for design. If you hear, “Normally, I...”, listen, then say: “That’s interesting, but can you tell me exactly what happened this particular time?” If you hear: “I think that...”, listen to their opinion, but then say: “Great, can you describe a specific example?” Each story should include the person’s goal or relationship to the sticky note, as well as each step of their interaction with it. The latter serve as *Interaction points*, which are very useful for the design phase of the project.

BEFORE YOU START: Plan several questions and follow-up probe questions to get more detail about what happened. Be prepared to ask about negative situations (disruptions, breakdowns, unsuccessful workarounds) as well as positive ones (successful workarounds, clever tricks or innovations).

DURING THE ACTIVITY: Plan for a 15-minute time slot for each interview. Begin by introducing yourself and explain your purpose. For example: “I have a class assignment to gather specific examples of how people use sticky notes. Would you mind if I asked you a few questions? It should take about 15 minutes.” If the person says no, do not argue, just find someone else. Next, proceed with your prepared questions. (Remember—never start with a general question such as “Do you use sticky notes”! Instead, immediately ask for a story, then probe for more details.) Try to get at least three different stories.

CREATE A DESIGN RESOURCE: After you thank the person, reflect upon what you heard and saw. Try to schedule at least 30 minutes immediately after the interview, so you can write down your overall impressions while they are still fresh and fill in any missing details.

FIGURE 10.X

STORY INTERVIEW: Ask a user questions that elicit recent stories about specific events or objects relevant to the design brief



Example: Interview results

Write the most interesting events on sticky notes, then categorize and organize them (see Figure 10.2). Then, summarize your key insights and mark them with numbered superscripts that relate back to relevant examples from your interviews. Here, the key inspiration for the project is highlighted in bold. **SELECT QUOTATIONS:** Which are most interesting, relevant or surprising? Add numbers to link insights to quotations.

- I put Ann's name on sticky note on a book I borrowed from her, to remind me to give it back to her. ¹
- I put a sticky note on my door to remind me to take home my yogurt from the office fridge. ²
- I put this sticky note inside my desk drawer with my passwords, where it's sort of hidden. ²
- I took a call from my son's girlfriend and put a sticky note on his plate, where I know he'll see it. ²
- **My sister is a maternity ward nurse who puts coloured sticky notes with drawings of animals on the baby's cribs. It's her code for problems that other nurses, but not parents understand. For example, she drew a yellow duck to mean the baby might have jaundice.** ³
- I treat my fridge as a big 'to do' list, adding sticky notes when I need to do things. ⁶
- I used a sticky note to attach a business card to my lab notebook, using its glue. ⁴
- We scotch tape coloured sticky notes to beakers with different solutions, to label them. ²
- I put a sticky note at each leg of my tripod, and was able to reposition it when it moved between shots. ⁴
- I used sticky notes to hold down the edges of my paper prototype. ⁴
- I used a folded sticky note just underneath when I was drilling a hole in the wall, to catch the sawdust. ⁴
- This is my monthly calendar with sticky note pads for each day. I mark events and then remove the top sticky notes at the end of each month. This appointment was moved from last month. ²
- I label my socks as clean or 'sort of dirty' in my sock drawer. ²
- I put this sticky note on the inside of my laptop to remind me of critical stuff when I open it tomorrow. ²
- I taped a yellow sticky note on the water cooler to remind people to not pour tea and coffee there. ^{2,5}
- I drew slightly different images on several sticky notes in the pad to create this 'flip book' animation effect. ⁴
-

HIGHLIGHT KEY INSIGHTS: What are the most interesting patterns?

- ¹ Sticky notes can be attached to and move with objects.
- ² Sticky notes can be attached to places to anticipate viewing at a relevant time in the future, as situated reminders.
- ³ Different people may interpret the same sticky note in different ways, a nice example of a 'boundary object' (Star and Griesemer, 1989).
- ⁴ Sticky notes have physical properties that can easily be appropriated.
- ⁵ Sometimes sticky notes are not sticky enough.
- ⁶ Sticky notes can also support peripheral awareness of a whole situation, in addition to the detailed information on the sticky note.

ACTIVITY 2:

Current Scenario

Describe how particular fictional people or ‘personas’ (Pruitt and Adlin, 2006) use paper sticky notes in the context of their daily lives. Identify *who* is involved and *where* and *when* the activities take place. Be specific: Give personas names, backgrounds and basic demographics, and briefly describe the setting and context. The current scenario should tell a story about how the personas interact with sticky notes, drawing inspiration from events from your interviews and observations. Specify the *interaction points* i.e. the specific moments where the person creates, uses or deletes a sticky note. Next, assemble the interaction points into a realistic story that offers interesting opportunities for design. Stay specific: choose a particular day and describe, step by step, what happens, emphasizing the use of sticky notes. Be sure to include not only things that work well, but also breakdowns and misunderstandings and explain what the person does in response. Include typical and unusual events, as well as positive and negative examples. Think about both planned activities and how people respond to unexpected events. The goal is to create a brief, detailed story about how these personas use sticky notes, based on realistic events, that suggest opportunities for design.

BEFORE YOU START: Gather your interview results and key insights, plus any other relevant information you may have about the users or their context.

DURING THE ACTIVITY: First create one to three *personas* and choose a specific setting, time, and use context. For example, Nan and Daisy are the night and day nurses. The time is 6:40 am, just before the change between the night and the day shift. Next, construct the current scenario in the form of a story containing specific *interaction points* that could really occur. Each interaction point should include a back-and-forth interaction between a user and an artefact or technology, in this case, a sticky note. For example: one nurse might want to intercept a baby’s father before he arrives at the nursery. The receptionist is away from her desk, so she leaves a yellow sticky note with her beeper number stuck to the receptionist’s phone, where she is sure to see it. When the receptionist returns, she removes the sticky note and places it so she can just see the yellow edge underneath the sign-in sheet, so she does not forget to call when the father arrives. Try to choose interaction points that suggest opportunities for design, especially interruptions, repeated activity patterns, breakdowns, workarounds, user innovations or anything that sparks ideas for a new solution.

CREATE A DESIGN RESOURCE: Write a short, text-based story, like a one-act play, beginning with your cast of characters (personas), the time and place, and any relevant context. Then, describe the users’ activities, with special emphasis on their use of sticky notes. Underline these interaction points so you can modify them in your future scenario. This current scenario is inspired by the interview with a maternity nurse, with added events from other interviews. The superscripts refer to key insights from the interviews.

Example: Current scenario

Setting: Maternity ward, with a glassed-in area for infants.
 Time: End of night shift
 Personas: Nurses: Nan—Night nurse, Daisy—Day Nurse
 Babies: Colin—has colic, Johnny—getting jaundice
 Parents: Chris—Colin’s mother, Jane—Johnny’s mother

SCENARIO: Nan checks on the infants in the infirmary. Colin is crying again, and might have colic. She draws a cat on a pink sticky note and places it on Colin’s chart ¹²³. She notices that Johnny’s skin looks a bit yellow, which the day nurse should keep an eye on. She draws a duck on a yellow sticky note and puts it on the baby’s medical chart ¹²³. She uses a second sticky note as ‘extra’ glue ⁴. She places orange flowers on the other babies’ charts. Later, Daisy arrives, sees the yellow and pink sticky notes that stand out from the orange flowers ²³⁶. She checks on Colin and

Johnny first. Their mothers, Chris and Jane, see only the duck and cat ³ and are not worried that something may be wrong. <scenario continues>

CURRENT SCENARIO ASSESSMENT. Supports: capturing information that is attached to objects that move ¹ or is visible in expected places as a notice or reminder ²; as well as multiple interpretations of same information by different people ³; ability to appropriate ⁴ and override properties ⁵; and peripheral awareness ⁶.

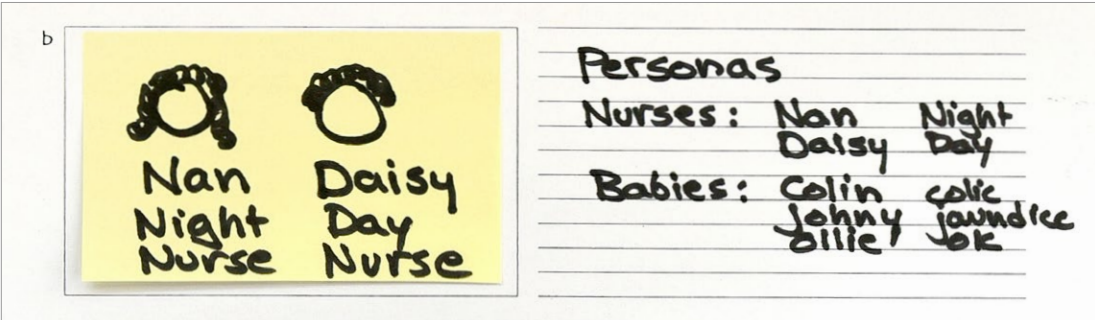
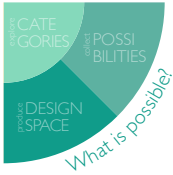


FIGURE 10.XX.

About personas.



PHASE 2:

Invention: What is possible?

Brainstorming (Osborn, 1953) helps expand the space of possibilities and encourages you to explore new design directions. The basic procedure involves a small group of people who focus on generating ideas about a specified topic for a pre-agreed period of time. The most common method involves participants suggesting ideas out loud and then posting them on a large, shared surface, such as a whiteboard or flipchart. A moderator tracks the time, and ensures that comments remain constructive, focusing on idea generation, not discussion. Good brainstorming sessions are fun and intense and, if done well, leave everyone energized and excited by the ideas, not tired and bored. Brainstorming usually has two phases: first generate ideas, then reflect on them.

PHASE 1: Everyone suggests ideas, no matter how impractical or silly they seem at the time. The most important rule is: *do not discuss or evaluate the ideas*. Statements such as “*that’s stupid*” or “*somebody already did that*” are forbidden. In fact, to encourage everyone to offer unfinished ideas, I usually insist that everyone put in at least one “stupid” idea—but don’t say which one it is! Remember, your goal is to produce the maximum number of ideas. If you do not like someone’s idea, build on it and suggest a better one.

PHASE 2: When time is up, the moderator reads all the ideas out loud, then participants mark their three favourite ideas. Any clusters of votes indicate the group’s most popular ideas. Note that the reason for voting is not to evaluate the ideas, per se, but rather to encourage everyone reflect on the ideas and get a sense of the group’s common interests. Do not worry about ‘less popular’ ideas, which often reappear later in the project.

ACTIVITY 3:

Standard Brainstorming

BEFORE YOU START: Choose a topic inspired by the interviews, the more specific the better. The moderator keeps time and helps everyone focus on idea generation not discussion.

DURING THE ACTIVITY: The goal is to generate as many ideas as possible for a new ‘augmented’ sticky note. Everyone must participate. Be creative and do not forget to include “stupid” ideas. Do not worry if it is a “good idea”—quantity, not quality, is the goal.

CREATE A DESIGN RESOURCE: The moderator rereads the list of ideas out loud and everyone marks their three favourite ideas. List the ideas with the most votes to pursue later.



FIGURE 10.2. Sticky notes are helpful in identifying, categorizing and organizing key story events from the interviews.

Example: Brainstorming ideas

TOPIC: What physical properties of a sticky note (mobility, attachment, size, shape) can we support with technology? Favourite ideas (with votes from four people) are marked below:

VOTE	IDEA #	IDEA
✓✓	1	Have a floating sticky note that moves where I point.
✓✓	2	Have a sticky note that fades or changes colour as it gets older
	3	... or as it becomes more urgent!
	4	... or it could get smaller and smaller.
✓✓✓	5	When you write on the paper sticky note pad, capture the ink digitally, with the date and time. Then you can use the physical paper sticky note but track what you wrote.
✓	6	Keep a log of everything written on a particular sticky note pad (using Anoto technology?)
✓✓✓	7	Use a mini projector to project contents written on the sticky note onto the ceiling. If you look up, you see them, otherwise, they stay out of the way.
✓	8	Have the mini projector swivel to move the projection from the ceiling to the door, when you're about to leave the room.
✓	9	Dictate a message onto a sticky note. Touch the sticky note to replay the message.
	10	Have a drone that projects content from a sticky note onto a specific location, say the recipient's desk.

FAVOURITE BRAINSTORMING IDEAS: 1. Pad of sticky notes that uses Anoto technology to capture what is written; and 2. A mini projector that projects information from a sticky note onto the wall or ceiling. Note: Anoto technology involves a unique, patented dot pattern that can be laser printed onto ordinary paper. An Anoto pen leaves traces of ink, but also contains a tiny camera that captures the corresponding digital stroke, letting users write on paper and electronically at the same time.

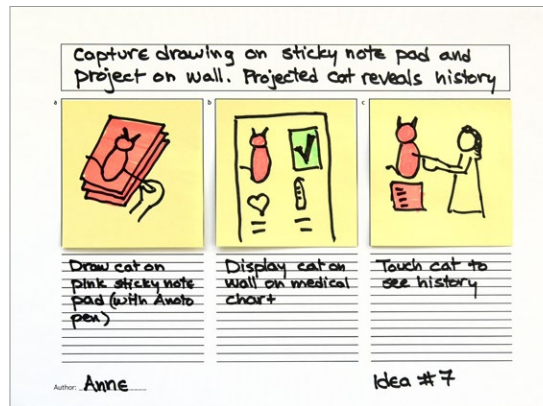
ACTIVITY 4:

Video Brainstorming

Video brainstorming captures how a user might interact with a particular technology idea, simulated with sticky notes and other paper prototyping materials. Each video brainstormed idea captures a single interaction point, illustrating the back-and-forth interaction between the user and the new technology, usually in 20 to 60 seconds. The goal is to quickly explore and record key ideas in a form that is easier to understand and remember than written notes. Focus on interaction: act out what it would be like to interact with the new system. Work quickly: a group of four should be able to produce eight video brainstormed ideas in an hour. Although video brainstorming generates fewer ideas than standard brainstorming, each idea is explored more deeply, and can be later reused in the context of a video prototype to illustrate key interaction points. It helps to illustrate interaction points as miniature storyboards that show what the user does and how the system reacts, followed by how the user reacts. (Figure 10.3 shows an illustrated interaction point, based on a modified version of idea #7 above.)

FIGURE 10.3.

Illustrated interaction points describe the back-and-forth interaction between the user and the system, with both images and text.



BEFORE YOU START: Review the brainstormed ideas and choose two ideas per participant. If two people like the same idea, simply create two variations. Collect paper prototyping materials and, if possible, use a tripod or support for the camera, phone or tablet.

DURING THE ACTIVITY: Group members take turns acting as the director, who chooses the camera operator, actors and prototype makers. The director explains and illustrates the idea to the group. Everyone uses sticky notes, transparencies and other prototyping materials to create an interactive version of the idea. Next, the actors practice manipulating the paper prototype. *Always* create a title card with the director's name, date, time, idea number, and a brief description of the idea, which serves as an index to the video. Use different coloured title cards for different ideas. Write in big letters with a thick marker, to ensure the text is legible when played back. *Always* shoot 3 seconds of the title card before shooting the idea.

Note that the director makes all the decisions for a particular idea, without arguments. If someone disagrees, that person should direct their *own* variation of the same idea to create what we call 'theme and variations'. Reshoot the



FIGURE 10.4

A video brainstormed idea that shows the nurse checking the status of two infants. Green sticky notes mean the infant was fed. The infant with the orange flower is fine, but the one with the pink cat might have colic. The nurses can tell the difference, but parents only see cute animals and flowers.

same title card with a sticky note saying ‘take 2’ before you shoot the second idea. Ideas should be detailed enough to show the actual interaction. Keep each clip short (20” to 60”). If you envision a series of actions, capture them as separate takes. If you decide to explore several variations of the same idea, each variation is also considered a new take. If you make a mistake, simply record the idea again, and label it “take 2”. Remember, the goal is to capture as many ideas as possible.

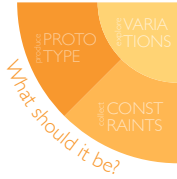
NOTE: We have designed *HCI Video Clipper* to support video brainstorming and video prototyping (available in the Apple App Store for use on an iphone or ipad). The ‘Video Brainstorming’ project provides coloured title cards for each idea. Fill in the title card, then shoot a user interacting with the paper prototype, taking advantage of several very simple special effects. At the end of the session, you will have a viewable, labelled set of video-brainstormed ideas. If you do not use *HCI Video Clipper*, be sure to shoot the coloured paper title cards before shooting each idea, to make it easy to search for each idea.

CREATE A DESIGN RESOURCE: At the end of the session, everyone should have directed and shot two different ideas. Create a folder (a folded A4 or legal sheet works well) to store the coloured title cards together with their corresponding paper prototypes. On the front, list the date, time and participants, and other relevant information about the video brainstorming session.

Example: Video brainstorming an idea

The video brainstormed video clip of idea #7 (see Figure 10.4) illustrates how the nurse interacts with the paper prototype described in the interaction point, shown earlier in Figure 10.3. Here, the nurse drew a cat on a pink sticky note, and the camera panned up to show a pink cat appear, projected onto the ceiling, as part of an infant’s medical chart. This image shows her about to touch the cat to see the medical history with respect to the infant’s problem.

Video Brainstorming insights. We need to think about how to code for different information: who decides that a cat means the baby has colic? Or is it colour coded? Who can change the information?



PHASE 3:

Design: What should it be?

Up to this point, your goal was to generate as many ideas as possible. Now, your challenge is to make some design decisions. You need to narrow your options in order to delve more deeply into specific design details. Paper prototypes, especially when combined with sticky notes, offer an easy way to illustrate your design ideas, specifically how users will interact with your future system. A good prototype need not be realistic in every detail (Beaudouin-Lafon and Mackay, 2002), but it should be sufficiently detailed so that users (and developers) can judge how a “real” version of the system might look and feel.

ACTIVITY 5:

Design Concept

The design concept is the high-level description of your design. Instead of a ‘bottom-up’ description of how users interact at a particular moment in time, the design concept offers a more abstract, ‘top-down’ summary of the key idea. A good concept embodies the user’s needs or problem being addressed and describes how the new system handles it. Note that if the proposed solution is just a series of small features, it is not really a concept—good designs can be summarized in a simple coherent way. For now, your goal is to create an initial concept that will lead to an initial prototype. Although prototypes can take various forms, the focus here is on rapid prototyping to get an initial glimpse of the ultimate design.

BEFORE YOU START: Review the key insights gathered from the story interviews and the current scenario. Review the group’s favourite ideas from the brainstorming, and review the video brainstormed ideas.

DURING THE ACTIVITY: Clarify who your system is for and what problem or issue it should address. Discuss the pros and cons of different ideas and how they might fit together in a coherent system. Sketch different ways of representing your ideas. Choose a working name that represents your system.

CREATE A DESIGN RESOURCE: Try capture the design concept in one sentence that encompasses user needs and the new solution. Then, write a more detailed description.

ACTIVITY 6:

Future Scenario

Future scenarios explore how to enhance the current scenario with a proposed new technology. They specify both how the users will interact with the new technology in a realistic setting and illustrate how it might change their current activities. Be sure to explore potential breakdowns, not just idealized situations when everything works perfectly.

Example: Design concept

SUMMARY: PicoBaby lets nurses write coded messages on coloured sticky note pads and see and interact with the projected images on the medical charts above each infant's crib.

Detailed description: Current medical charts capture the history of events related to each infant, including feeding and diaper changes, any shots or other medical interventions, and medical status. The use of sticky notes allows nurses to remember to monitor certain conditions, such as jaundice, and to communicate with other nurses and medical staff, without alarming parents or revealing confidential medical information. The sticky notes also provide an immediate view of each infant's current status and highlight current issues, unlike the more complex medical chart. Medical charts are located next to each crib, making it difficult for the nurses and doctors to get an overall view of the infants in the room.

HARDWARE: The proposed system combines Anoto technology to capture hand-written text on paper; and miniature pico projectors, to display information on the wall or ceiling. Each medical chart includes a pad of standard medical forms printed on Anoto paper, and pads of coloured sticky notes, also printed with an Anoto dot pattern.

SOFTWARE: We capture what is written on the paper medical charts and co-located sticky note pads. Selected information, in a coded form, is projected on the ceiling or wall next to each infant's crib. Each paper medical chart acts as a record of the medical interventions with that infant. By contrast, sticky notes offer a quick view of the infant's current status. In both cases, whatever is written on paper is simultaneously recorded on the infant's digital medical chart. Selected information, such as when the infant was fed or changed, is also projected as a coloured symbol, either on the wall or the ceiling next to the crib.

INTERACTION: Nurses and doctors fill out the medical charts as usual. The nurses use sticky notes to record potential problems to check for, or to issue warnings to other nurses. This requires a code, both for medical privacy and to avoid sharing sensitive medical information by accident. The nurse chooses the colour of the sticky note pad and draws an animal or other object, which is then projected, in that colour. Some sticky notes might also accept gesture commands, which would generate and project pre-specified objects. The medical staff can see the current status of infant, with coded coloured objects to indicate sensitive information.

BEFORE YOU START: Make a copy of your current scenario and pay particular attention to the underlined interaction points. Use the voted-on list of ideas and review the video brainstormed ideas. Reread your design concept and any related drawings.

DURING THE ACTIVITY: Develop a future scenario that envisions how the personas in the current scenario will interact with your new augmented sticky note system. Create at least one *extreme character* (Djajadiningrat et al., 2000) who has unusually strong needs *that are relevant to your design problem*. For example, an ordinary persona might be a nurse who uses sticky notes from time to time, whereas an extreme character might be the receptionist, who uses sticky notes as part of a wall-sized group calendar that she updates constantly. Build upon existing brainstormed ideas but also come up with new ones. Work through each underlined interaction point in the current scenario and think about how you can improve the situation for the user with your idea.

Example: Future scenario

Setting:	Maternity ward, with a glassed in area for infants.		
Time:	End of night shift		
Personas:	Nurses:	Nan—Night nurse, Daisy—Day Nurse	
	Babies:	Colin—has colic, Johnny—getting jaundice, Ollie—OK	
	Parents:	Chris—Colin’s mother, Jane—Johnny’s mother	

SCENARIO: Nan checks on the babies in the infirmary. Colin is crying again, and might have colic. 1She draws a cat on PicoBaby’s pink sticky note pad and places it on Colin’s chart. 2 A pink cat appears next to Colin’s name projected on the wall. 3Nan touches the cat to see the history of Colin’s problem. She sees that Johnny’s skin is a bit yellow, so 4she draws a duck on PicoBaby’s yellow sticky note and puts it on Johnny’s paper medical chart. 5A yellow duck appears next to

Johnny’s name projected on the ceiling. 6She adds an orange flower to Ollie’s chart, since he’s ok. <scenario continues>

FUTURE SCENARIO NOTES: How does the nurse cancel a symbol? Possible breakdowns: What if the mothers write on the sticky notes as well? How does Nan change the colour of the duck, if Johnny’s condition changes?

Try different alternatives for interacting with your new system. Feel free to change the events in the original scenario to better explore an idea. Think about what users will want to do with your system: What are the most common and most important functions? Make these easiest to access. As you explore different ideas, think about potential breakdowns or problems the design might pose. Do you have enough information about your target users or do you have more questions? What problems will this system solve for your users? What problems might it create? Use real sticky notes to simulate menus or buttons, and use transparencies to show how information on the screen changes.

CREATE A DESIGN RESOURCE: Like the current scenario, the future scenario begins with the personas and their characteristics, the time, place and context, as well as the story of what happened, broken into ‘interaction points’. However, this time, each of the interaction points are numbered and modified to illustrate how the personas will interact with the new system.

ACTIVITY 7:

Storyboard

Storyboards (McCloud, 1993) were initially designed for films and comics. HCI designers use them to refine their ideas, generate ‘what if’ scenarios for alternative design approaches, and communicate with other designers or stakeholders. This storyboard illustrates the future scenario, and later serves as a guide for shooting the corresponding video prototype. It includes story title cards that tell the story, as in a silent movie, as well as sketches of what happens at each interaction point; associated dialogue; notes about how to shoot each scene; and the paper prototype (see Figure 10.5).



FIGURE 10.5.

The storyboard illustrates the future scenario, beginning with the opening title card and a persona title card. An 'establishing shot' shows the context, followed by a events that illustrate how the personas interact with the new technology in a realistic context. Story title cards tell the story, as in a silent movie.

BEFORE YOU START: Collect the future scenario, as well as the interview summary, the idea summary, the video brainstormed ideas and any other relevant information about the users.

DURING THE ACTIVITY: Examine the underlined interaction points in the future scenario and think about how you will show the corresponding interaction between the user and your augmented sticky note. The first frame is the opening title card, and should include the prototype's name, the fictional setting, date and time. You can abbreviate this in the storyboard, as long as the full title card is available, as in Figure 10.6. The second frame introduces the personas and the third frame is usually an 'establishing' shot that shows the opening setting. Create title cards at the same time you create the storyboard and shoot them before shooting the corresponding clips in the video prototype.

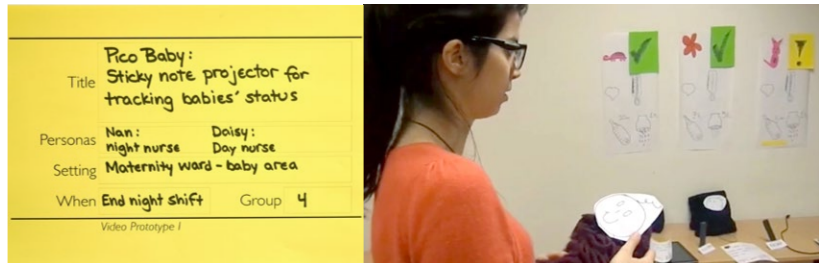
Continue through the future scenario, step by step. The rectangular frames on the left represent the clips that will appear in the video. Use sticky notes to represent title cards and action shots of the personas interacting with the prototype. The middle column explains the clip or provides dialogue. The right-hand column indicates how to shoot the clip, including framing and

camera angle. Use wide angle shots to provide overall context; medium shots to show the user and the technology; over-the-shoulder shots to capture the user's perspective; and close-ups to show the details of the interface. When you are done, paperclip the title cards, in order, to the storyboard to facilitate shooting the video prototype.

Remember that your goal is to tell a story about how the personas will interact with your new system. Be sure to include story title cards, as in a silent movie, to explain the motivation for scene changes and the personas' actions, as well as move the story forward. Sketching interaction points on sticky notes makes it easier to later rearrange them or insert new ones. Also, consider creating flipbook-style sequences of sticky notes to show dynamic activity.

FIGURE 10.6.

The video prototype illustrates the future scenario with title cards and video clips of the personas (team members) interacting with the paper prototypes. The goal is not to 'sell' the idea to outsiders, but rather to help the design team explore the details of the interaction, before building a working prototype.



CREATE A DESIGN RESOURCE: We usually use A3 or legal-size paper for storyboards. However, you can also create an ordered set of interaction points, interspersed with title cards. *Always* create a storyboard before shooting a video prototype. You may think you will save time by working out the details as you go, but this will definitely take longer. Store the title cards, the elements of the paper prototype and the storyboard together in a labelled folder for later use.

ACTIVITY 8:

Video Prototype

Video prototypes (Mackay, 1988) illustrate how users will interact with your system. Unlike video brainstorming, which focuses on individual interaction points, video prototypes show the new system in the context of a realistic story, with personas who perform multiple interactions with it over a period of time. Unlike concept or marketing videos that try to 'pitch' an idea, video prototypes help designers examine alternatives, assess design trade-offs and explore potential breakdowns, offering a lightweight way to work out the details of the interaction before actually building the system.

BEFORE YOU START: Gather the materials for making the paper prototypes, paying attention to the sizes indicated in the storyboard. Create the opening title cards and story title cards. Do not forget to create a closing title card that lists the members of the design team.

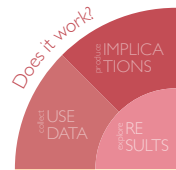
DURING THE ACTIVITY: First, decide on the following roles: director, camera person, actors, prototype manipulators. Shoot the opening title card and then shoot each scene in sequence. If you make a mistake, delete the clip and reshoot it. *Do not use editing software* to edit the story, either as you shoot or after the session, even if you are very experienced with the software. Note: You can

choose ‘Video Prototyping’ in *HCI Video Clipper* (in the Apple App store), which provides title cards suitable for a video prototype, organized as a storyboard. Then just follow your storyboard as you shoot the video prototype.

Keep scenes short, practice at least once, and try to shoot correctly the first time to minimize reshoots. Do not forget title cards: not only do they clarify your story, but they also act as easily detectable labels that help you find particular clips and reshoot them in future redesigns. Treat the video prototype as an early sketch, not a final product (see Figure 10.6). Your goal is for your group to be able to review the complete, edited prototype at the end of an hour-long session, with no need for post-hoc editing.

CREATE A DESIGN RESOURCE: The final video prototype should be 3-5 minutes long and tell a story that illustrates how real users would interact with the proposed system, including potential breakdowns to stimulate further discussion.

PHASE 4: Evaluation: Does it work?



You can get detailed feedback about your design using a *walkthrough*, where a small group of people review a design artefact, step by step. Although originally created for peer groups of programmers to review code to identify bugs (Yourdan, 1979) walkthroughs can be used to review any kind of sequential design artefact, including scenarios, storyboards and video prototypes, and also to generate new ideas (Lottridge and Mackay, 2009). Design teams should run their own internal walkthroughs first, but can also invite users, other designers, or stakeholders to participate when designs are more stable. In each case, the goal is to ‘walk through’ each individual element and offer constructive feedback about potential design problems and suggest concrete ways to improve them.

ACTIVITY 9:

Design walkthrough

Design Walkthroughs work best with small groups, ideally peers, within a pre-specified period of time, usually less than an hour. Like brainstorming, the goal is to avoid discussion and concentrating on finding the maximum number of issues. Critiques should be as constructive as possible, restricted to the design at hand. Consider asking group members to take different perspectives, for example, the user’s perspective, technical feasibility, interaction design, and marketability.

BEFORE YOU START: Choose another group that did not participate in your design to walk through your video prototype. You may find it helpful to make copies of the storyboard, with numbered interaction points, to help everyone follow the story and make comments.

DURING THE WALKTHROUGH: One member of the design team first explains the design concept and the desired level of feedback. Next, the presenter shows the complete video prototype, returns to the beginning, and then proceeds through each interaction point. At each step, everyone identifies as many problems or issues with the design they can, starting with clarifications, then problems, then suggestions. Be as constructive as possible: avoid criticizing the authors, and focus on the interaction or the system. Design team members may briefly clarify things, but should not defend their design choices. Everyone should contribute and one person should collect all the identified problems.

Create a design resource: Review the list of problems and categorize them as major, minor or non-issues. Create a list of the implications for redesign.

Example: Design Walkthrough

Play the complete video prototype and then, following the storyboard, replay and discuss each interaction point (numbered below). First, identify problems or clarify what happened, including potential breakdowns, then offer suggestions.

- 1: Nan draws a cat on PicoBaby's pink sticky note pad and places it on Colin's chart.
 - What if Nan isn't good at drawing?
 - What if the sticky note falls off?
 - What if the text on the sticky note isn't captured properly?
 - Is a physical sticky note sufficient backup?
2. A pink cat appears next to Colin's name projected on the wall.
 - How does Nan learn this code?
 - Does it project Nan's duck or a pre-designed duck?
 - Should the projector dim at night, to protect the baby's eyes?
3. Nan touches the cat to see the history of Colin's problem.
 - What should be recognized?
 - What if a parent touches the cat?
4. Nan draws a duck on PicoBaby's yellow sticky note and puts it on Johnny's paper medical chart.
 - Does it make sense to have different coloured sticky note pads?
How many is enough?
 - Maybe it would be better to have scotch tape available, if needed.
5. A yellow duck appears next to Johnny's name projected on the ceiling.
 - Is there a way to change the code for colours and objects?
 - Should PicoBaby project on the wall or the ceiling?
Maybe the ceiling is more discrete.
6. She adds an orange flower to Ollie's chart.
 - Will parents notice that most infants have orange flowers
and only a few have animals? <walkthrough continues>

Design walkthrough insights. Consider how to ensure that only the nurse can update the 'real' information on the baby's status. Think about how to delete information and change it. Is there a clock that keeps track of feeding and changing schedules? Think about what the nurses and doctors see, versus what the parents see.

Conclusion

Once you finish the design walkthrough, you are ready to think about how to make your system better. Remember, always focus on *doing* rather than *arguing*—redesigning paper and video prototypes lets you explore more ideas quickly with a better result. You can gather more information about users and develop alternative scenarios that explore other needs, contexts, or possible breakdowns. You can look for critical flaws in your initial design and completely rework it, or you can systematically revisit the details and explore alternatives. In all cases, build upon the design resources you created earlier to revise, rework and reassess your design, including:

- Stories from story interviews, with highlighted breakdowns and user innovations
- Current scenario based on the stories, broken into interaction points
- List of favourite brainstormed ideas
- Series of video clips illustrating specific design ideas
- Design concept that summarizes the new design
- Future scenario that describes the new design as it is used in a particular setting
- Storyboard that illustrates how users will interact with the new design
- Video prototype (3-5 minutes) that shows the new design in use
- List of problems and suggestions for redesign, based on a design walkthrough

In other words, make it better!

The techniques in this tutorial also work well with users—consider engaging them actively in the process. Users are clearly a source of inspiration who are worth observing and interviewing. But you can also invite them to participate in design workshops and use this tutorial’s video-based paper-based ideation and prototyping techniques to let them contribute. Instead of treating them as designers or evaluators, engage them as experts on the context and user needs. Sometimes, their insights can lead you to reframe the design problem to produce a radically different or significantly better result.

Over the years, I have found that sticky notes act as a critical design material throughout the design process. They not only capture ideas, but they also help represent them and, importantly, let you interact with them. Unlike static wireframes that focus on the screen layout, sticky notes can be incorporated into paper prototypes, to make them interactive, through layering, rearranging, and moving relative to other elements on the screen. When combined with video, they offer a lightweight way to ‘sketch’ dynamic ideas, simulating the experience of using a future technology and explore its potential.

Sticky notes are also an intriguing technology in their own right. They are both extremely simple, and yet, easy to use and appropriate. Everyone can understand them immediately and can easily use their various properties to solve a diverse set of problems. As a designer, watching people come up with novel uses of sticky notes provides a never-ending source of inspiration for the design of any interactive system.

References

TOOLS AND RESSOURCES

You will find useful resources and downloadable tools and templates here :

- <https://ex-situ.lri.fr>
- <https://prototips.lri.fr>
- <https://hci-museum.lri.fr>
- <https://apps.apple.com/us/app/hci-videoclipper/id1451698249>

4. Beaudouin-Lafon, M. and Mackay, W.E. (2002) Prototyping Tools and Techniques. In J.A. Jacko and A. Sears (Eds), *Handbook of Human-Computer Interaction*. New York: Lawrence Erlbaum Associates, pages 1006-1031. (Revised edition 2007).
5. Bødker, S. (1999). Scenarios in user-centred design-setting the stage for reflection and action. In *Interacting with Computers*, British Computer Society. Human Computer Interaction Specialist Group, February, 1999.
6. Djajadiningrat, J.P., Gaver, W.W. and Fres, J.W. (2000). Interaction relabeling and extreme characters: methods for exploring aesthetic interactions. In *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques (DIS '00)*, Daniel Boyarski and Wendy A. Kellogg (Eds.). ACM, New York, NY, USA, 66-71.
7. Flanagan, J. (1954). The Critical Incident Technique. *Psychological bulletin* 51(4) pp. 327-358.
8. Lottridge, D. and Mackay, W. E. (2009). Generative Walkthroughs: to support creative redesign. In *C&C '09: Proceedings of the 7th ACM SIGCHI conference on Creativity & Cognition*. ACM, pp. 175-184.
9. Mackay, W. E. (1988) Video Prototyping: A technique for developing hypermedia systems. In *CHI'88 Conference Companion, ACM/CHI Conference on Human Factors in Computing Systems*, Washington, D.C., pp.
10. Mackay, W. E. (2002). Using Video to Support Interaction Design. Video Tutorial distributed at CHI'02, Directed by C. Leininger, Produced by INRIA Multimedia Services. 83 minutes.
11. Mackay, W. E. (2003). Educating Multi-disciplinary Design Teams. In *Proc. of Tales of the Disappearing Computer*, Santorini, Greece, pp. 105-118.
12. Mackay, W. E. (2020 - to appear). *DOIT: The Design of Interactive Things*.
13. Mackay, W. E., Evans, H., Hansen, H., Dachary, L. and Gaudron, N. (2003). Weaving an Interactive Thread: An Interactive Event for Tales. In *Proc. of Tales of the Disappearing Computer*, Santorini, Greece, pp. 409-415.
14. McCloud, S. (1993). *Understanding Comics*. Tundra Publishing, USA.
15. Osborn, A.F. (1953). *Applied Imagination: Principles and Procedures of Creative Problem Solving* New York: Charles Scribner's Sons, 1953
16. Pruitt, J. and Adlin, T. (2006). *The Persona Lifecycle: Keeping People in Mind Throughout Product Design*. Morgan Kaufmann, 2006.
17. Star, S.L. and Griesemer, J.R. (1989). Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science* 19[3] pp. 387-420.
18. Yourdan, E. (1979) *Structured Walkthroughs*. NY: Prentice-Hall.