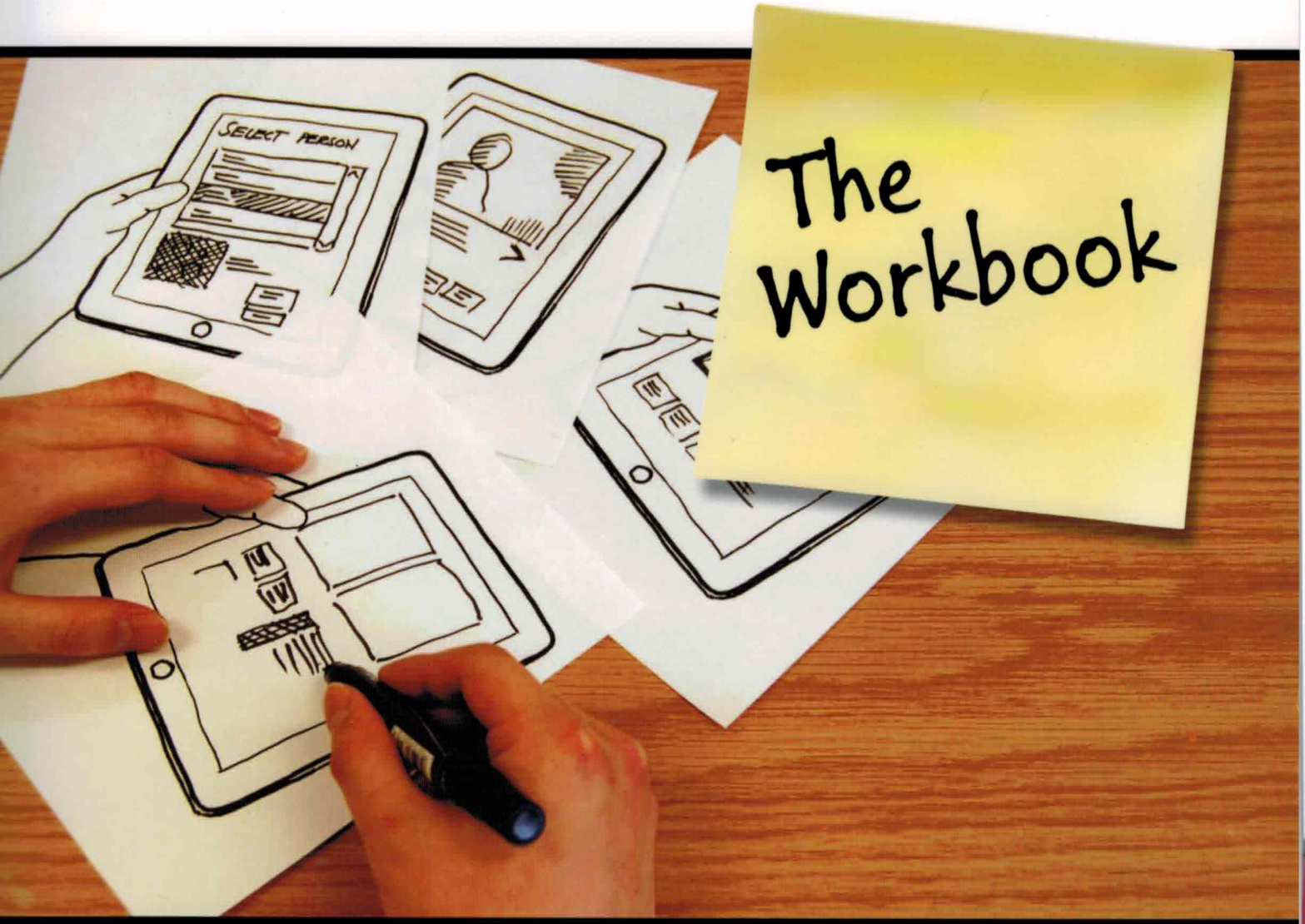
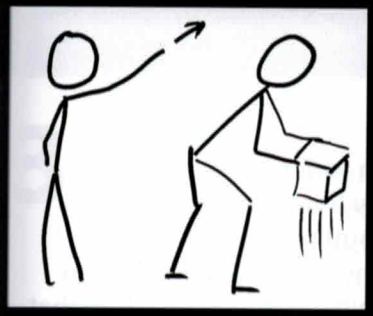
Sketching USER EXPERIENCES



The Workbook

Saul Greenberg
Sheelagh Carpendale
Nicolai Marquardt
Bill Buxton

MK
MORGAN KAUFMANN



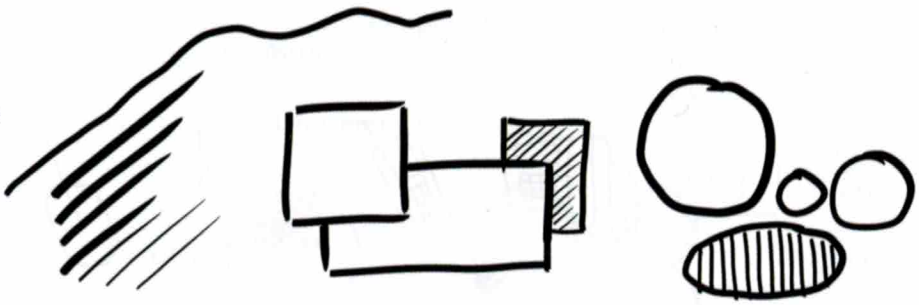
Sketching Vocabulary 3.3

drawing objects, people, and their activities

Many of your sketches will contain quite similar things – a **sketching vocabulary** of shapes. This sketching vocabulary serves as the basic elements of most sketches. If you practice creating this vocabulary, you will be able to rapidly compose your sketches. This chapter reviews several elements in the basic sketching vocabulary: objects, people, activities, emotions, and posture.

1 Basic Sketch Elements

Lines, rectangles, triangles, and circles will be essential visual elements of many of your sketches. Sketching and drawing tutorials often begin with 'warming up' exercises of filling a page with a random collection of these basic shapes. Become familiar with this variety of shapes. Play with line thickness and hatching styles.



Tip

People Who Sketch on Computers

Libraries of Sketch Elements

Designers sometimes use tablets instead of paper to compose sketches. If this is something you want to do, take advantage of software that lets you save and reuse your sketch elements as a library. For example, and similar to clipart, you can create a variety of elements and save them on a slide in PowerPoint. You can then copy, reuse and maybe even alter them later for use in particular sketches.

Objects

Most drawing software includes a range of drawing primitives: rectangles, circles, arrows, callouts, etc. When choosing software to support your sketching, consider if the range of drawing primitives available suffices to help you in your sketching process.

Clipart

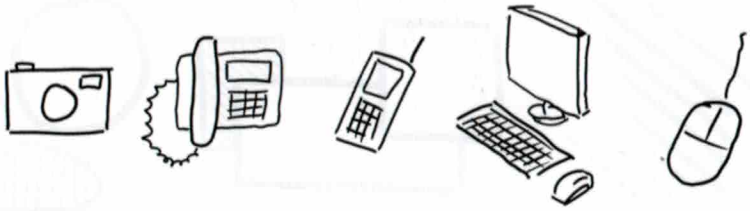
If you use computers for your sketches, you can also take advantage of the many clipart or equivalent libraries of images out there. For example, if you search for 'stick men' on the web, you will likely find many images that fit your purposes.

2 Composing Objects

By combining these basic sketch elements you can compose a variety of shapes and objects that will form part of your sketching vocabulary. Below is a collection of such composed objects – some drawn as simple two dimensional outlines, others in a perspective side view. Remember that simplicity is key: in many sketches it is better to draw objects as simple shapes rather than as detailed and fine grained objects. Note that many of the examples below are in fact very simple combinations of a few rectangles, circles, and lines, but that the level of detail is sufficient to clearly identify the object's function (e.g., the mobile phone, or the photo).

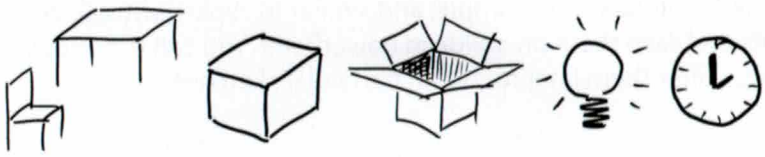
Tools
(pencil, pen, magnifying glass, wrench, scissors)

Digital Devices
(camera, phone, cell phone, computer, mouse)

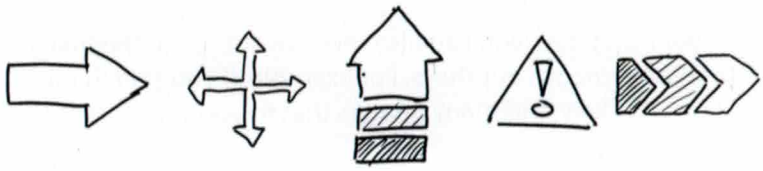


Documents
(paper, books, photos, piles)

Physical Objects
(tables, chair, boxes, light bulb, clock)

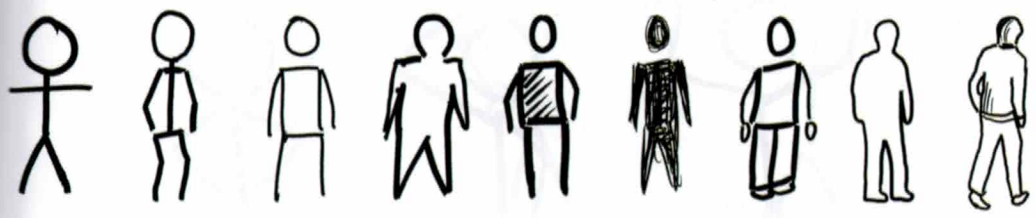


Abstract Shapes
(arrows, signs)

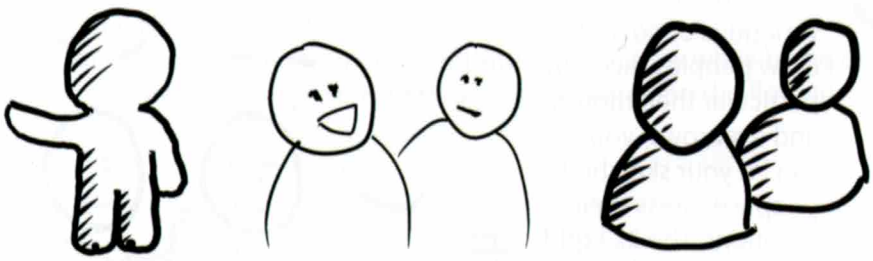


3 People

Many sketches in interaction design include people performing their actions, motions, and activities while interacting with information technology. There are many different techniques to draw people: from simple stick figures to detailed and realistic outlines of a person. Often, simple stick figures are preferable to detailed drawings of people: they are expressive enough to illustrate people and their actions in a variety of situations.

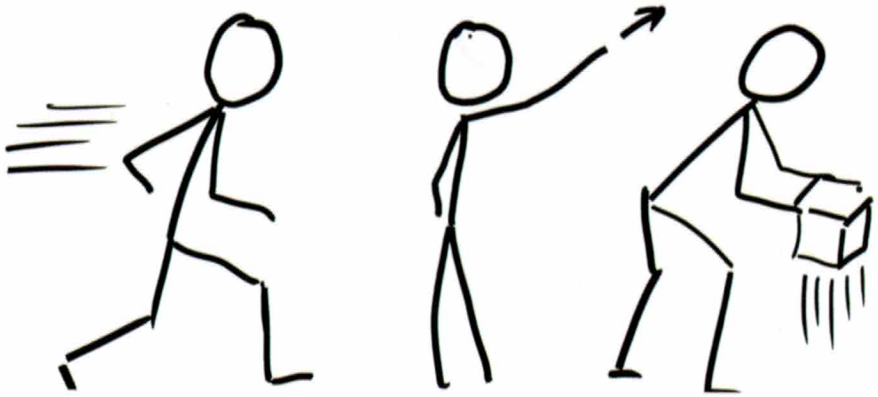


Alternatively, even comic-like sketches or abstract shapes can represent people in your sketches. The choice of drawing style depends on your preferences, but also on the type of sketch you create. For example, in a drawing that just suggests the presence of people, abstract shapes can be sufficient. But in a sketch of (say) a multi-user tabletop interaction, details about people's postures might be important to portray the interaction techniques.



4 Activities

By varying people's poses you can express a variety of different activities. For example, the sketches below show a person's activities, e.g., running, pointing, lifting a box. Notice how two of the sketches use action lines (also called motion lines) to illustrate the movements of the person's activity (also see Scott McCloud's ***Understanding Comics***).



Tips

Learning How to Sketch

This chapter introduces but does not teach you all the different techniques of how to draw. Many books and tutorials are available if you want to improve your drawing skills.

For example, Betty Edward's ***Drawing on the Right Side of the Brain*** or Kurt Hanks and Larry Belliston's ***Rapid Viz*** books are excellent primers of drawing and sketching techniques.

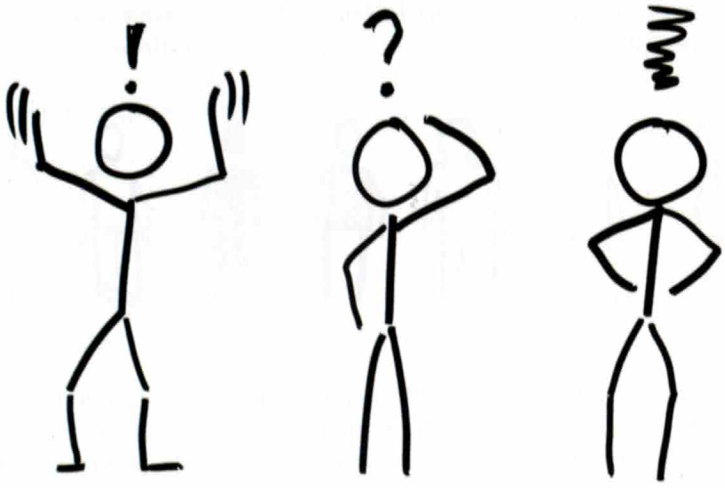
Tip

Comic Storytelling
Comic artists use these and many other techniques for their expressive sketches to tell stories. Scott McCloud's books ***Understanding Comics*** (1993) and ***Making Comics*** (2006) can give you more insight about story telling in comics.

As well, look for the many books – especially those oriented to kids – that teach specific methods on how to actually draw comics.

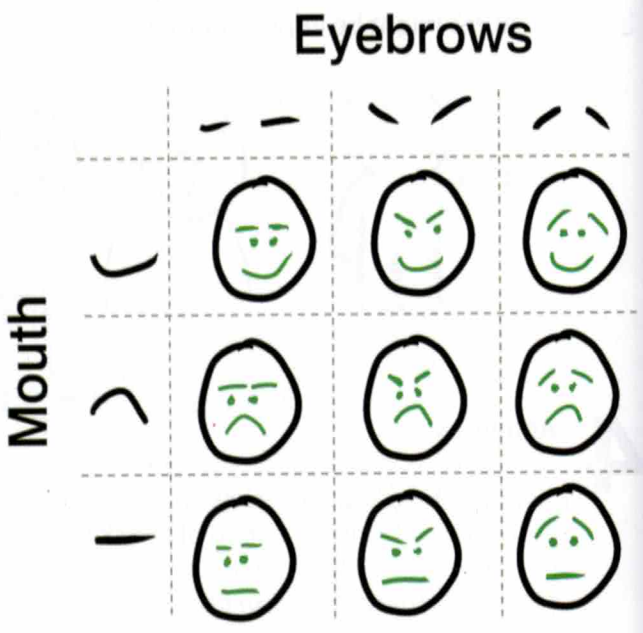
5

Bodies and Emotions
Different postures can also show the state of the person: surprised, puzzled, disgruntled. Here, we also used symbols above the head of the person (in addition to posture) as an additional indicator of a person's state.



6

Faces and Emotions
Through simple variations of how you draw people's faces (in particular their mouth and eyebrows) you can let your sketched people express their emotions. The 3x3 grid illustrates 9 different combinations of how to draw people's faces, simpy by the way you remix 6 eyebrow and mouth shapes. The result is expressions such as: happy, relieved, sad, angry, confused, or surprised.



7 Combining Postures and Faces

Adding a body posture matching the person's facial expression can amplify how you communicate the person's current emotional state. For example, this sketch shows a person in three different moods: happy and waving the hand, angry and raising the arms, and scratching the head while being confused.

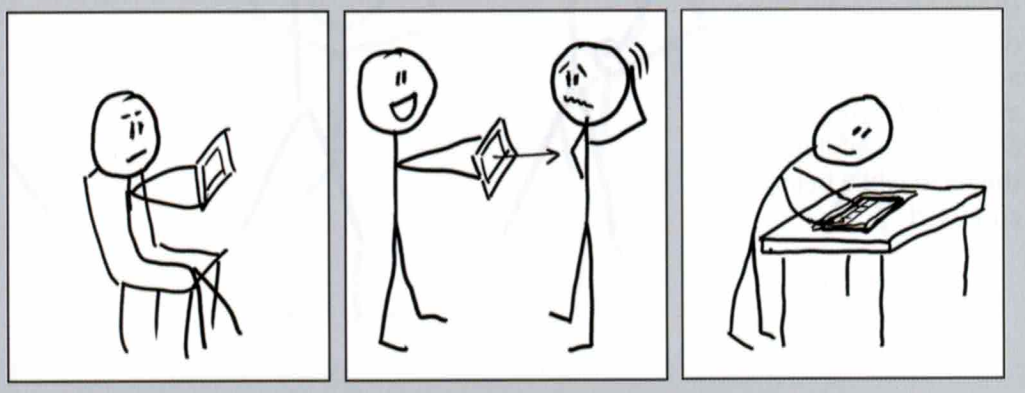
8 Combining Different Sketch Elements to Illustrate Situations

You can combine these postures of people and the simple objects to compose simple sketches that illustrate specific situations and actions. For example, the sketches below illustrate a person in different moods and situations: happy while being on the phone, confused while deciphering a map, and sad while searching the floor for a lost item.

Exercise

Draw a person interacting with a tablet computer in three different situations. For example, you can draw the person while sitting on a chair and reading a book, while showing a document on a tablet to a second person, and while placing the tablet on a table to write a text. Try to vary people's poses and facial expressions.

Our Solution:



References

Edwards , B. (1999) *The New Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence*. Tarcher.

Hanks, K. and Belliston, L. (2006) *Rapid Viz: A New Method for the Rapid Visualization of Ideas*. 3rd Edition, Course Technology PTR.

McCloud, S. (1993) *Understanding Comics. The Invisible Art*. Harper.

McCloud, S. (2006) *Making Comics: Storytelling Secrets of Comics*. Manga and Graphic Novels. Harper.

YOU NOW KNOW

You learned how to build up a sketching vocabulary of simple shapes, objects, and people. By varying postures and facial expressions you can illustrate people in different situations. The sketching vocabulary functions as a starting point for many of your sketches about people's interaction with technology.

But don't stop here! Look for the many primers that teach people how to sketch, especially those oriented toward kids and comic books. As we keep on repeating, you don't have to be a superb artist to sketch. But you will find that knowing and practicing a few of the basics will help you immensely over time.

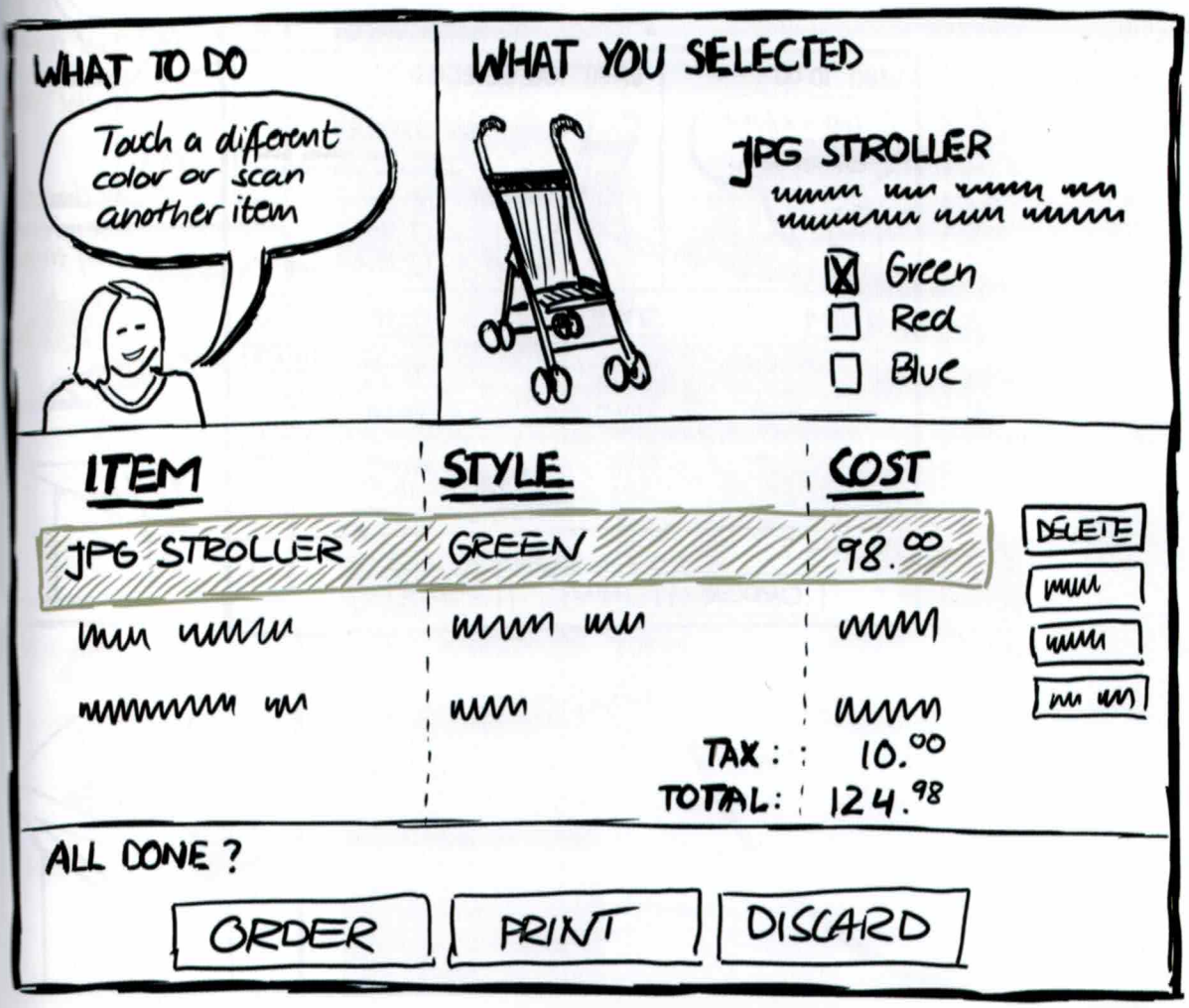
The Vanilla Sketch 3.4

basic elements of a sketch:
drawing, annotations, arrows and notes

There are an infinite number of ways you can create a single sketch. However, most simple sketches will comprise the drawing along with optional annotations and notes.

THE DRAWING

The drawing is what most people think of as the result of a sketching activity. For example, the figure below is a sketch of the main screen of an interactive shopping system, expressed solely as a drawing.



Tip

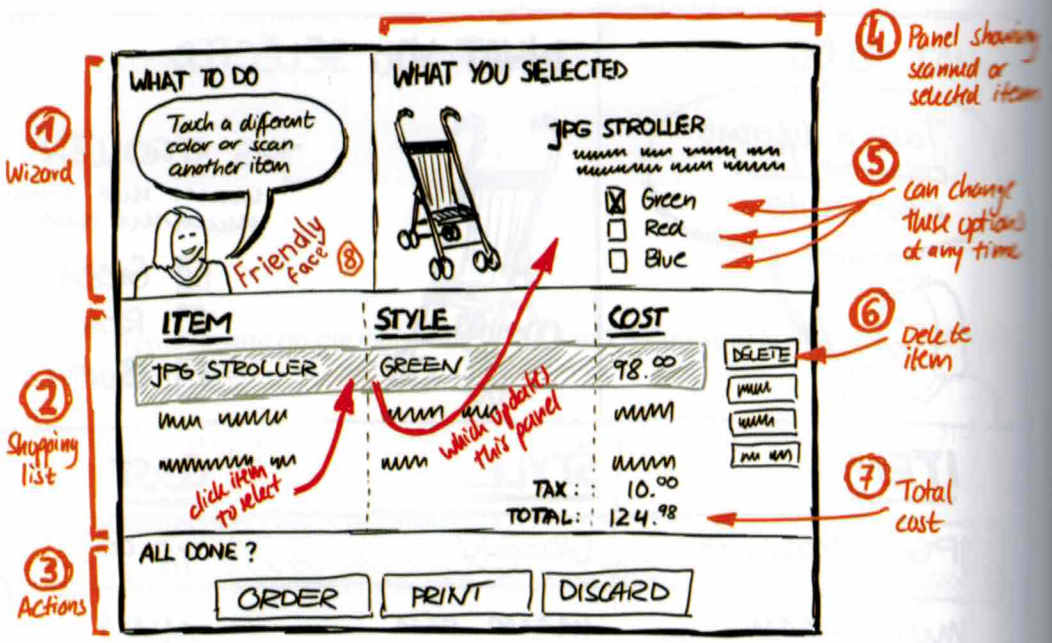
Some people are entirely visual, where their drawing will rarely use notes or annotations. Others (especially those brought up in non-design or non-arts disciplines) are entirely textual, where drawings are rare. If you are one of these extreme cases, make a point of producing sketches that balance drawing, annotations and notes.

ANNOTATIONS

Annotations are names, labels and explanatory notes whose spatial location identifies the part(s) of the sketch they refer to. That is, annotations are graphical marks that are incorporated into the drawing itself.

Sometimes, their location relative to a part of the drawing is enough to connect the annotation with a particular sketch element. Other times, arrows, lines or braces may clarify that spatial relation. For example, the sketch below now includes annotations. This particular sketch shows various labels and explanatory notes that:

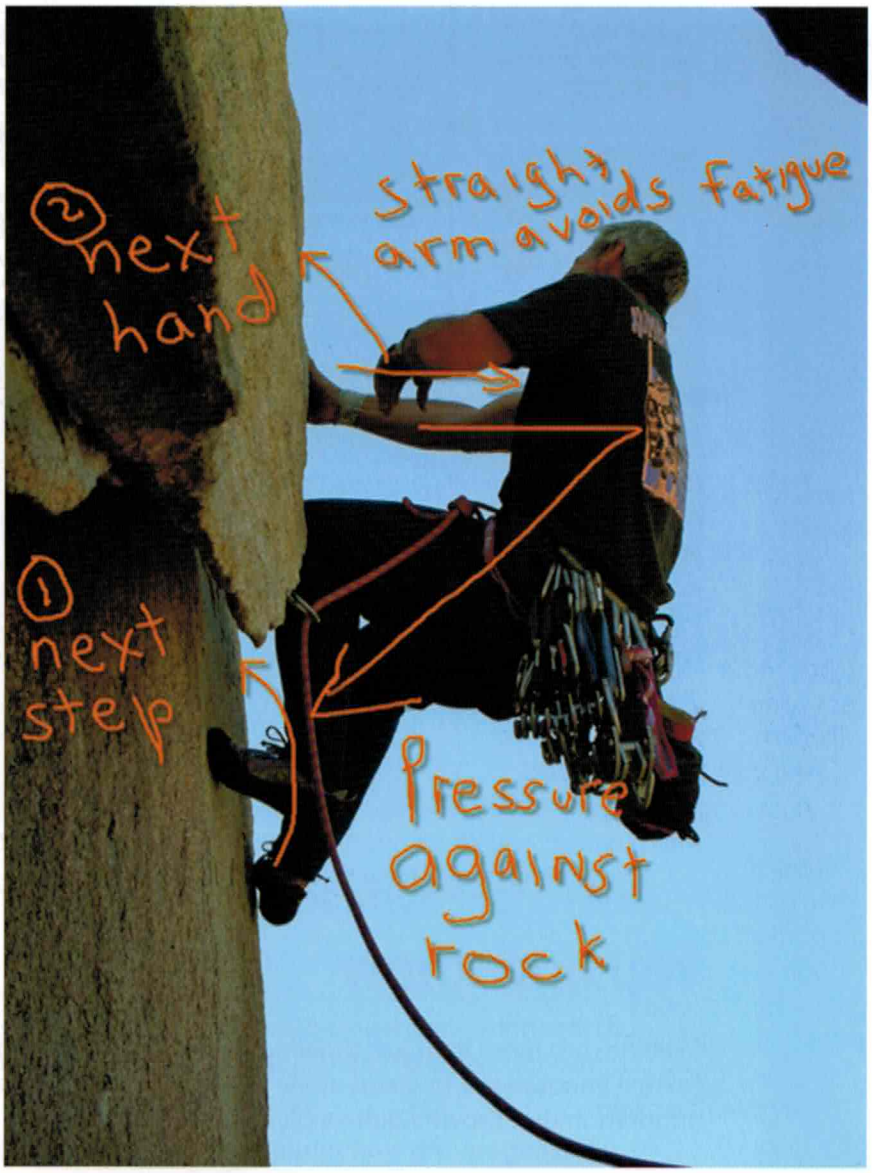
- indicate particular areas of the sketch via braces (e.g., those numbered 1–4 and 7),
- point to specific elements via one or more arrows (numbers 5 and 6),
- are associated by only their spatial placement, such as the label explaining the caricature (number 8),
- indicate dynamics of elements or interactions over time (labeled arrows in the middle of the figure).



Arrows as Annotations

Arrows deserve special mention as part of an annotation. We already saw in the previous sketch how they can be used to point to one or more areas of the drawing. Arrows can also be used to relate different parts of a drawing, to indicate direction, to show movement, to indicate a sequence of events, to indicate interaction flow.

For example, the set of images on the left below are directions in opening a box, where arrows eloquently indicate the interaction flow and movement (taken from Mijksenaar and Westendorp, 1999). The image on the right is another example, where in this case the person has annotated a photograph of a rock climber to indicate numbered sequences of events, where arrows and labels indicate directions, force, and movement.



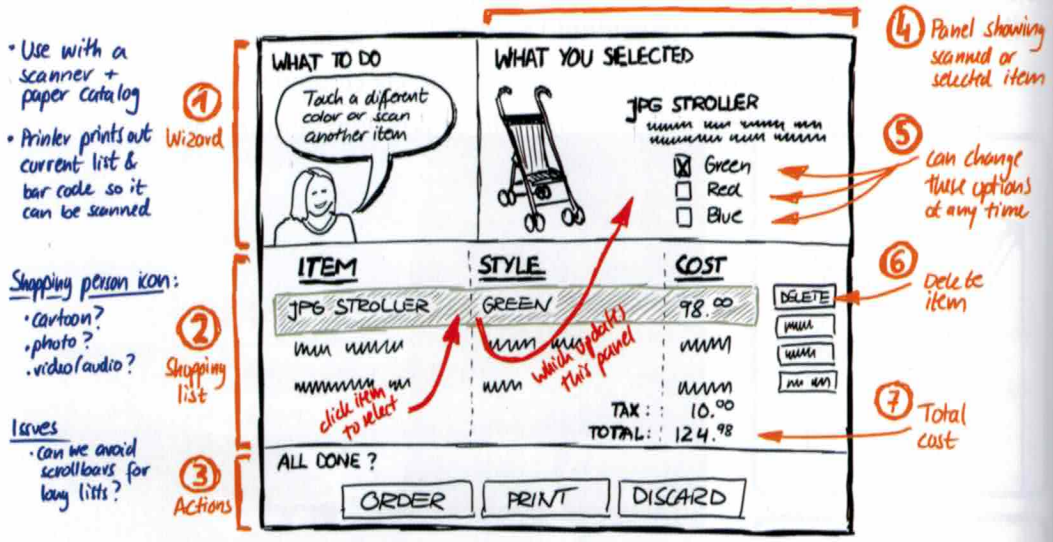
Note

Further inspiration can be found in Mijksenaar and Westendorp's book ***Open Here***. It collects myriad example images used to instruct people, including the opening of the box sequence reproduced here on the previous page. Arrows predominate in many of them. Also, many of its graphical designs incorporate annotations.

Start your own collection by gathering the ones that stand out for you, where you place them in your found objects collection (Chapter 2.3).

NOTES

Notes are any text incorporated in the sketch where its spatial location relative to parts of the drawing is not important. For example, this 3rd version of the sketch has several notes included on its left side. Notes can be anything: ideas about design elements not included in the drawing (top note), alternate design options of elements within the sketch (middle note), a set of issues (bottom note), explanations, alternate ideas not yet sketched out, outstanding questions, and so on. They can be paragraphs, words, sentence fragments and lists.



Both annotations and notes are there to help you elaborate your ideas about your drawing, especially so you can recall them later. Freely use annotations to elaborate your drawing, especially if a few words will help you explain various (possibly obscure) drawing elements, e.g., what they are, how they behave, the abstract concept it represents. Freely use notes to capture thoughts about the drawing as a whole. Don't worry if your sketch is text-heavy; if it helps you , then the sketch is serving its purpose.

References

Mijksenaar, P. and Westendorp, P. (1999) *Open Here. The Art of Instructional Design.* Joost Elffers Books, New York.

YOU NOW KNOW

Sketches are more than just drawings. They can incorporate spatially relevant textual annotations, or stand-alone textual notes. Arrows are a special kind of annotation that provide quite a bit of illustrative power.

The Collaborative Sketch 3.5

sketching to brainstorm, express ideas and mediate interaction

Sketching is not only something you do by yourself but, as mentioned in the previous chapter, is something you can do with others. As you will see shortly, the collaborative sketch you create serves a somewhat different purpose than sketches you do by yourself.

Before reading on, try this exercise. Get together with one or two others, and sit around a table with large sheets of paper on it. The paper should be large enough and the table small enough so that all can reach into the drawing area easily while still having room to do their sketching without interfering with each other. Now work together on the following design problem with your team for about 10–15 minutes. As you do this, try to observe yourselves: how you sketch as a team, and how you interact over the sketch. Now try continuing this exercise for another 10 minutes, but this time tape the paper to a wall (or use a whiteboard).

Materials

- three to five people
- table
- large pieces of paper
- pencils and whiteboard pens for everyone
- whiteboard
- tape

Exercise

The Interactive Fridge

An appliance vendor is producing a refrigerator with a touch monitor and camera embedded in its front. The vendor wants you to design an interface where a person can create a shopping list on this monitor. The interface will allow that person to modify this list, print this list, email this list to others, and use the list as the basis for navigating to (and ordering from) web-based on-line shopping systems. The system will have software that can recognize product bar codes (although not perfectly), a database that you can populate with standard shopping items, and a touch sensitive display where menus and buttons can be selected.

ACTIONS AND FUNCTIONS OF COLLABORATIVE SKETCHING

From the above experience, you may have noticed that collaborative sketching is as much about group interaction around the sketch (e.g., brainstorming and commenting on each other's ideas) as it is about producing a sketch. Indeed, the sketch itself as produced may have been less valuable than the conversations around it.

Let us relate your experiences with what we know about how groups generally collaborate while sketching.

GESTURES: SKETCHING WITH OTHERS

In 1991, John Tang studied small groups of people designing together – sketching – over large sheets of paper. He categorized every person's activity according to what action and function it accomplished, as listed below.

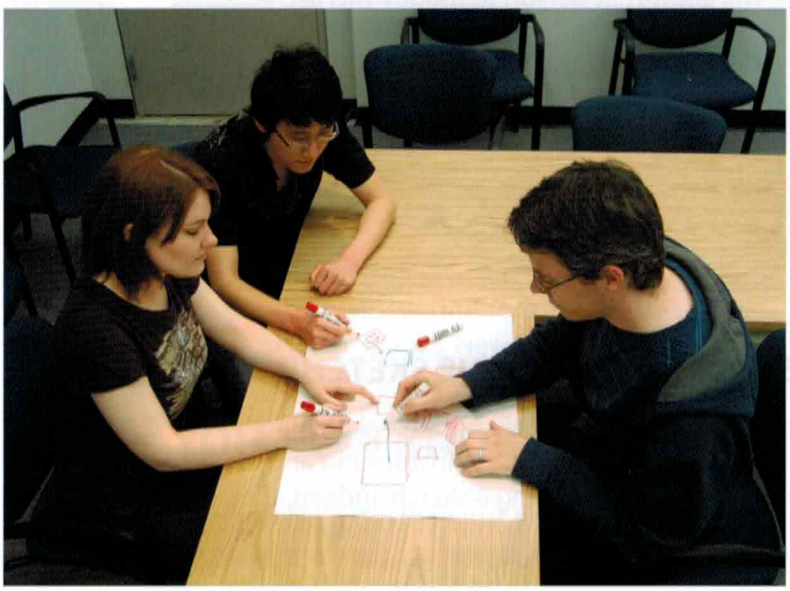
Actions:

- *listing* produces alpha-numeric notes that are spatially independent of the drawing;
- *drawing* produces graphical objects, typically a 2-dimensional sketch with *textual annotations* that are attached to the graphic;
- *gesturing* is a purposeful body movement that communicates specific information, e.g., pointing to an existing drawing.

Functions:

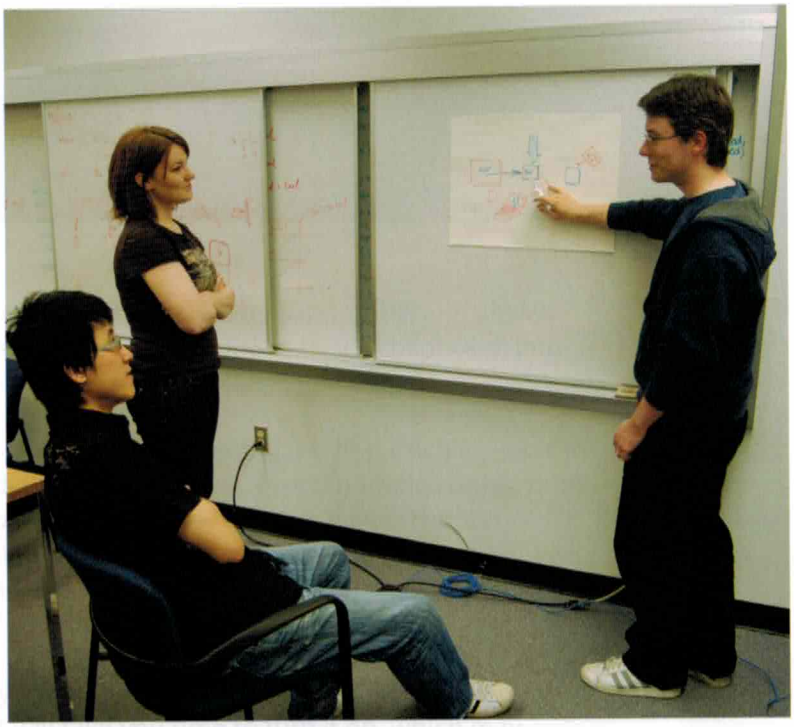
- *storing information* refers to preserving group information in some form for later recall;
- *expressing ideas* involves interactively creating representations of ideas in some tangible form, usually to encourage a group response;
- *mediating interaction* facilitates the collaboration of the group, and includes turn-taking and focusing attention.

As seen above, Tang saw that collaborative sketching involves the drawing sketch, annotations and notes that are common with individual sketches, where its primary function is to produce a sketch that can be stored and retrieved later. However, Tang also saw a third basic element: gesturing. Gesturing, which is often overlooked as a collaborative sketching activity, comprised ~35% of all actions, and was used by participants to express and enact ideas, to signal turn-taking, to mediate interaction, and to focus the attention of the group.



The reason this is important is that the sketching medium and how it is located in the group's working area may or may not be conducive to gesturing or mediating their interactions.

For example, recall how you worked around the table. Tang noticed that people sitting around a large piece of paper on a table (e.g., as in the figure) tended to work, sketch and gesture simultaneously around it, as they can all reach into the sketch comfortably.



However, if the paper is taped to a whiteboard, bodies get in the way. As a result, one person may 'lead' the sketch with the other people observing and commenting on it from a distance. Some people may even sit away from the whiteboard. Instead of simultaneous interaction, turn-taking or even only one person acting as the 'scribe' is more likely. While seemingly small, these differences matter in collaborative sketching, as it will affect how people communicate and interact.

Other configurations will affect how people work together. For example, and as will be discussed in Chapter 3.6, using drawing software instead of pencil and paper can negatively affect engagement and simultaneous interaction. This is due to the single input device (the mouse), people's unequal knowledge of the software tool, and time spent on those parts of the interface that are secondary to drawing (e.g., navigating screens, dialog boxes, selecting from menus and pallettes).

References

Tang, J. C. (1991) *Findings from observational studies of collaborative work.* International Journal of Man Machine Studies, 34(2), pp. 143–160, February. Republished in Greenberg, S. (1991) Computer Supported Cooperative Work and Groupware, Academic Press.

YOU NOW KNOW

When sketches are done corroboratively, thought must be given on how participants can reach into the sketching space and add marks to it (preferably simultaneously), all while being able to talk and gesture over the drawing.

Slideware for Drawing 3.6

exploiting commonly available digital presentation tools for sketch drawing

Paper and pen are fantastic sketching tools. They are cheap, portable, and always on. Best yet, you and your colleagues have years of training (since childhood) and experience using a pencil.

However, digital tools have powers that paper and pencil lack. In particular, you can easily modify sketches made with digital drawing tools, make multiple copies, print them repeatedly, use them as templates, and – as we will see in later chapters – create interactive sequences via animations and linking if the tool allows it. As well, if your pencil drawing skills are poor, the digital drawing tool will likely help you produce better looking sketches (if warranted).

In contrast to a paper sketchbook, you will incur some costs when using a digital drawing tool over pen and paper. It will take you time to turn it on, which may inhibit you from capturing ideas on the fly. Unless you have a pen-based computer or equivalent, doing freehand sketching with a mouse is painful. You will have to learn how to use (and remember) the tool's advanced features. You will have to manage your sketches as files rather than as a sequence of pages. You will find it harder to review your sketches, as you now have to find, open, and close these files.

There are many digital drawing tools on the market, and some are even specialized for sketching. In this chapter, we deliberately concentrate on **slideware**, i.e., software used to make slide presentations. We use this software because they have valuable sketching features above and beyond their digital drawing capabilities, and because almost everyone already has one installed on his or her computer and knows how to use it.

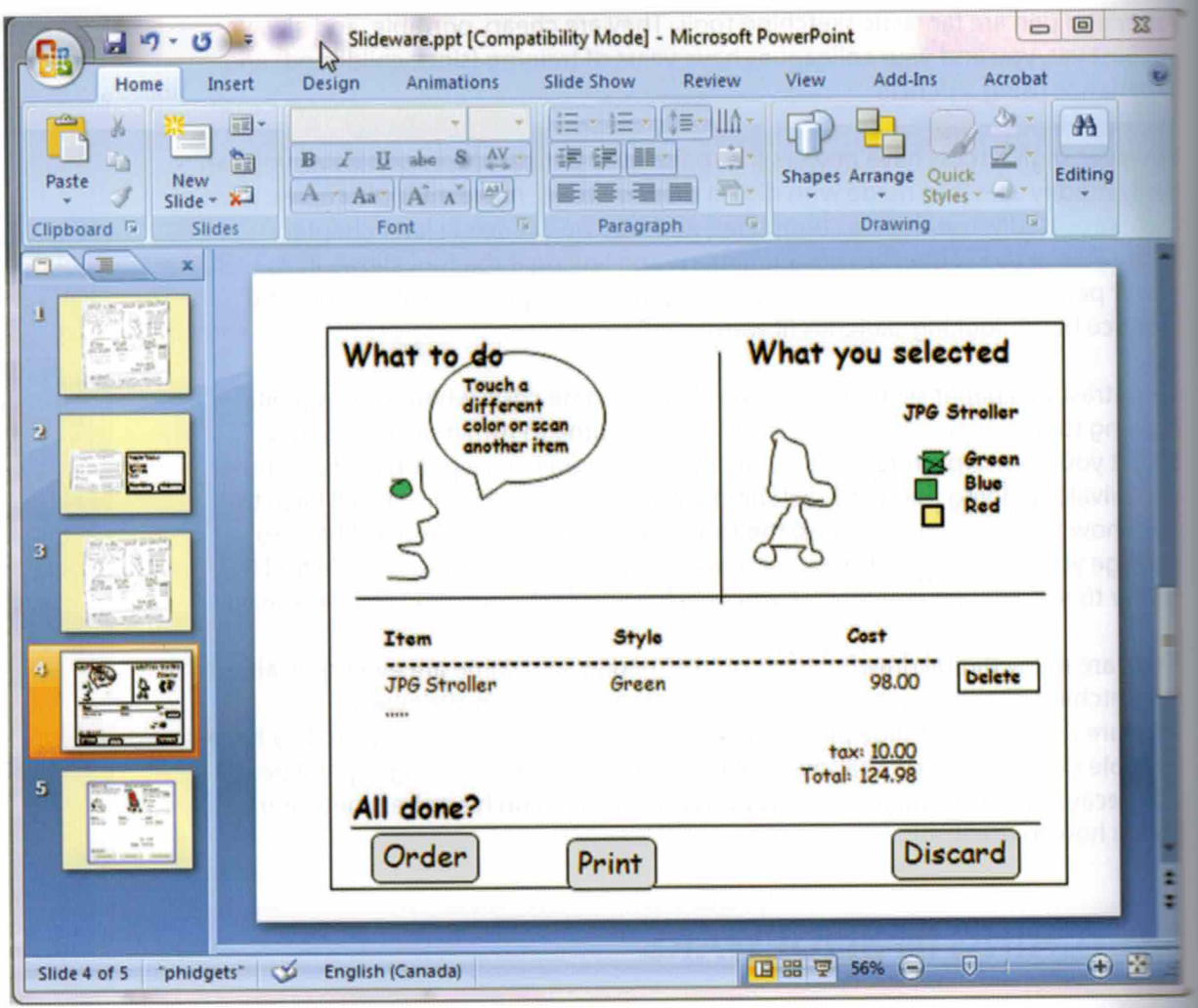
Materials

- PowerPoint or equivalent slideware system
- a watch for timing yourself
- large sheet of paper, table, and pencils

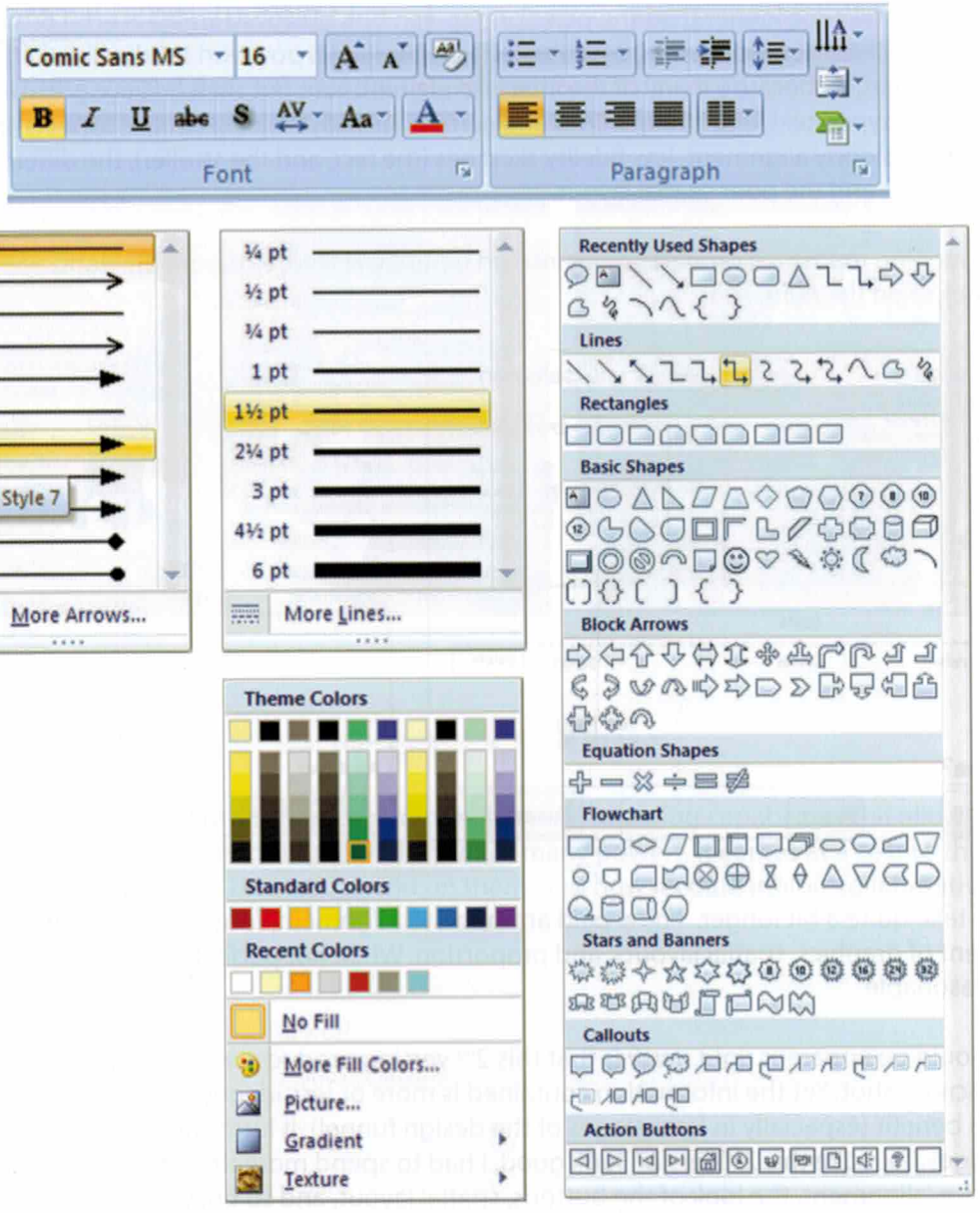
SKETCHING IN SLIDEWARE

Software for creating presentations is fairly ubiquitous, with the two most commonly available ones at the time of writing being Microsoft PowerPoint and Apple's Keynote. They have powerful drawing and manipulation tools, as well as access to stock images. We will concentrate on these drawing features in this chapter. In addition, these tools also let you do play sequences as slide shows, and allow for animations and hyperlinking; we will discuss the power of those functions in later chapters.

We will primarily use Microsoft's PowerPoint, illustrated below, as our example slideware tool; other presentation systems are similar. We will just quickly review PowerPoint's basic drawing building blocks, where you draw by creating, moving, copying and manipulating the objects and their properties. You probably know how to do this already. The main point of this chapter, as we will see, is to contrast the powers and weaknesses of using a digital vs. paper-based tool.

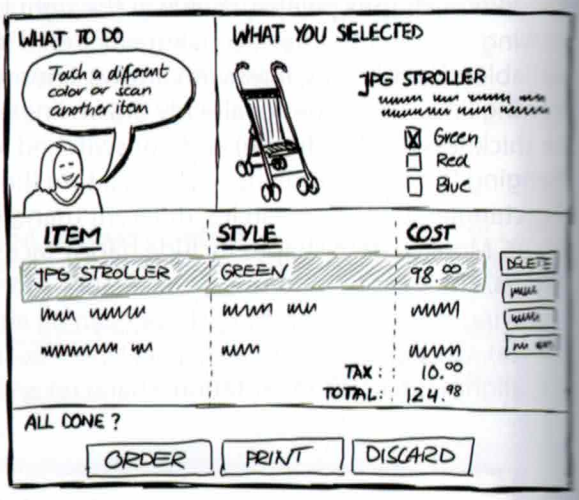


Slideware packages usually have a large variety of pre-defined shapes with many adjustable properties. They also usually include many custom shapes and variations. For example, the PowerPoint **shapes** palette, shown at the right below, illustrates the rich set of pre-defined drawing shapes. The **line** sub-palette included in the shapes palette shows the various types of lines available: straight lines, lines with arrows, lines with corners, curves, splines, and even free-form drawing lines. Properties of already drawn lines can be further altered, for example by changing the thickness (middle figure) and / or switched into one of the many forms of arrows (left), or by changing the color, gradient or even texture (bottom left). **Basic shapes** range from different styles of rectangles, textboxes, circles, different triangles, parallelograms, different kinds of braces, and others. More custom shapes include happy faces, lightning bolts, **flowchart** symbols, various **block arrows**, and **buttons**. There are even various forms of **callouts**, which are excellent for annotating a drawing. Properties of these shapes can be altered at will, e.g., how it is filled or outlined (bottom palette). Of course, presentation packages also include myriad options for text, including font type, size, alignment, color, indentation, character and line spacing, and others (top palettes).



DIGITAL VS PAPER-BASED SKETCHING

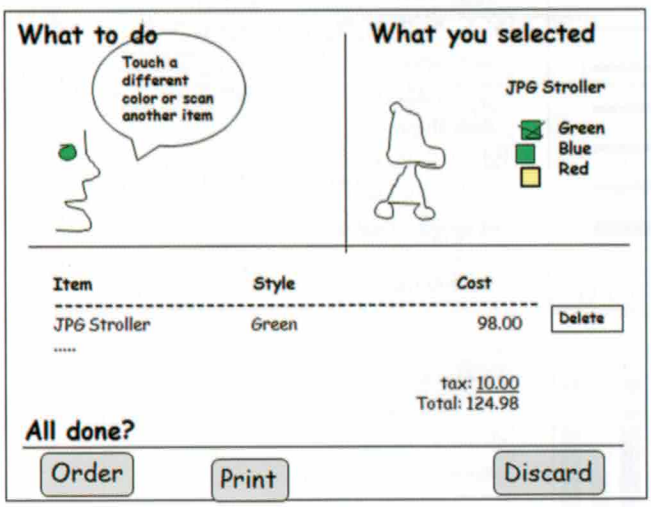
To get into the spirit of things, try the following. Time yourself. First, using paper and pencil, quickly reproduce a rough sketch of the shopping system on the right. How long did it take you?



Next, as quickly as possible, try to reconstruct your own version of this same shopping system as a single slide in your own slideware software. How long did that take you?

The version I created, done in PowerPoint, is on the left below. It didn't take that long to do, although it did take me longer than the pencil version. But unlike the pencil sketch, it just looks wrong. This is largely because many of the interface elements are not sketch-like, e.g., their nicely shaped boxes, typed text, and straight lines and corners jar with their sketch-like aspects, including irregular lines, sloppy alignment, low fidelity sketches (the face and the stroller), the differences between sizing, and the poor spatial layout.

Now try redoing the sketch on the left, but instead try to make it look reasonably 'right'. My version is shown below on the right.



This did take quite a bit longer. I now paid attention to alignment, fonts, color, shading, the placement of graphics, spatial layouts, and proportion. While not perfect, that is why it looks reasonable.

What should be apparent right away is that this 2nd version produces what looks like a high fidelity screen shot. Yet the information contained is more or less identical. While its good looks can be a benefit (especially in later stages of the design funnel), it introduces a problem if done in early stages. To make this 2nd version look good, I had to spend more time deciding on issues such as text size, alignment, the look of the buttons, spatial layout, and so on, which have little to do – and indeed can interfere – with capturing the basic design idea as a quick sketch.

DIGITAL COLLABORATION

Chapter 3.5 already talked about collaborative sketching in detail; for now, what is important to remember is that collaborative sketching on a computer with software is quite different from collaborative sketching with paper and pencil.

Repeat the above exercise, except this time work with another person to (a) create a pencil sketch over a large sheet of paper while seated at a table, and then (b) create the digital sketch while seated in front of a workstation. You will notice that the dynamics will have changed, as in the two figures below that differ only in the sketching technology used. With the computer, one of you may know the software a bit better, and will thus become the 'scribe', perhaps with the other person offering suggestions and directions as you sketch. You may also get in each other's way (especially if three or more people are involved), as seating multiple people in front of the small display becomes crowded. The single mouse and keyboard disallows simultaneous interaction, and forces turn-taking behavior instead (e.g., one person being 'in charge' at a time). You'll also find much of the time is spent choosing and navigating to your interface controls rather than sketching, which will inhibit how you all talk about the sketch as you do it. Participants may also feel somewhat disengaged if the other is doing all the actions.

YOU NOW KNOW

Commonly available slideware applications contain powerful drawing capabilites that allow you to create digital sketches. While going digital provides many powers, it comes at a cost to the look of the sketches you create, the time you spend on them, and how it could inhibit collaborative sketching activities.

Sketching with Office Supplies 3.7

using commonly available office supplies to create editable sketches

While paper and pencil is the best way to create rapid sketches, you can also use other common office supplies to create designs that are easily altered on the fly. The basic idea, advocated in Rettig's 1994 article ***Prototyping for Tiny Fingers***, is this. You use sticky notes of various types and sizes as graphical user interface elements, where you assemble these elements onto a poster board to create your layout. You write atop these sticky notes to bring your interface to life. If you change your mind about something, you just peel off that sticky note and replace it with a new one, or move it to a new position to experiment with different layouts. It gives you some of the flexibility of digital tools, while still letting you work with traditional media.

The side bar shows a sampling of office supplies that you will find handy. The most useful are: the sticky notes of various sizes; a sticky-note glue stick that will let you transform any piece of plain, colored or transparent paper into a sticky note; scissors to cut paper and notes into different sizes; and a reasonably stiff and sufficiently large poster board where you can assemble your interface. Of course, there are many other office supplies that you can exploit that aren't included on this list. Visit an office supply store to look for opportunities. Both Marc Rettig and Michael Muller, in their articles listed at the end of this chapter, suggest other places where you can find supplies, or other supplies you can exploit for sketching.

THE VERSATILE STICKY NOTE

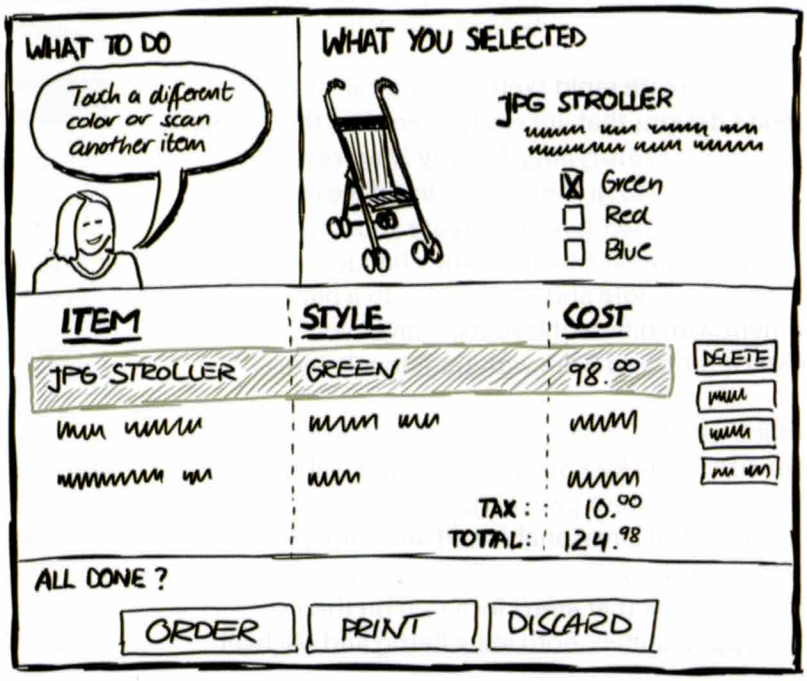
Sticky notes come in various sizes. You can also, of course, cut them down to any size. This means you can rapidly use sticky notes as buttons, dialog boxes, menus, icons, tooltips, as individual input fields in a form, as containers of labels and other fixed text, and so on. Samplings of stickies used in this way, along with other office supplies, are shown in the figure to the right.

Materials

- sticky notes of various sizes
- poster boards of various sizes
- 'sticky-note' glue stick
- scissors
- transparencies/ acetate sheets
- sheets of white and colored paper
- water-soluble markers
- pencil
- normal and colored pencils
- sharpener
- good quality eraser
- stapler
- a case to hold these supplies

Try It Yourself

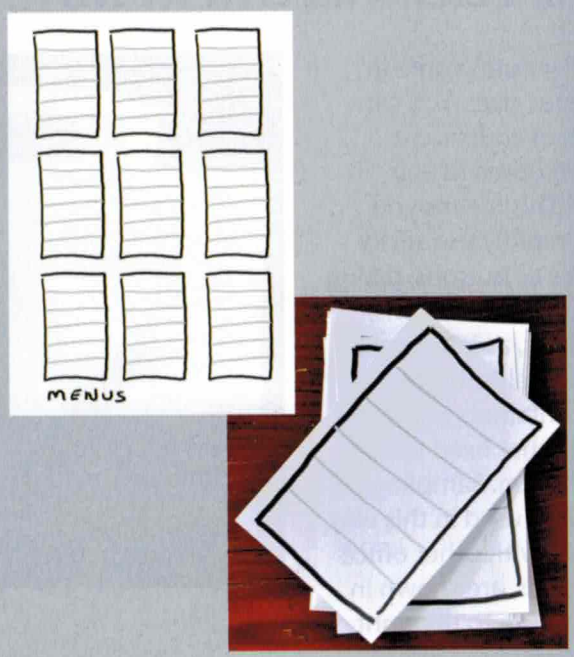
As an exercise, reconstruct one or more pencil sketches that appeared in previous chapters using these (and other) office supplies (try the one shown here of the online shopping system, without looking at my own solution).



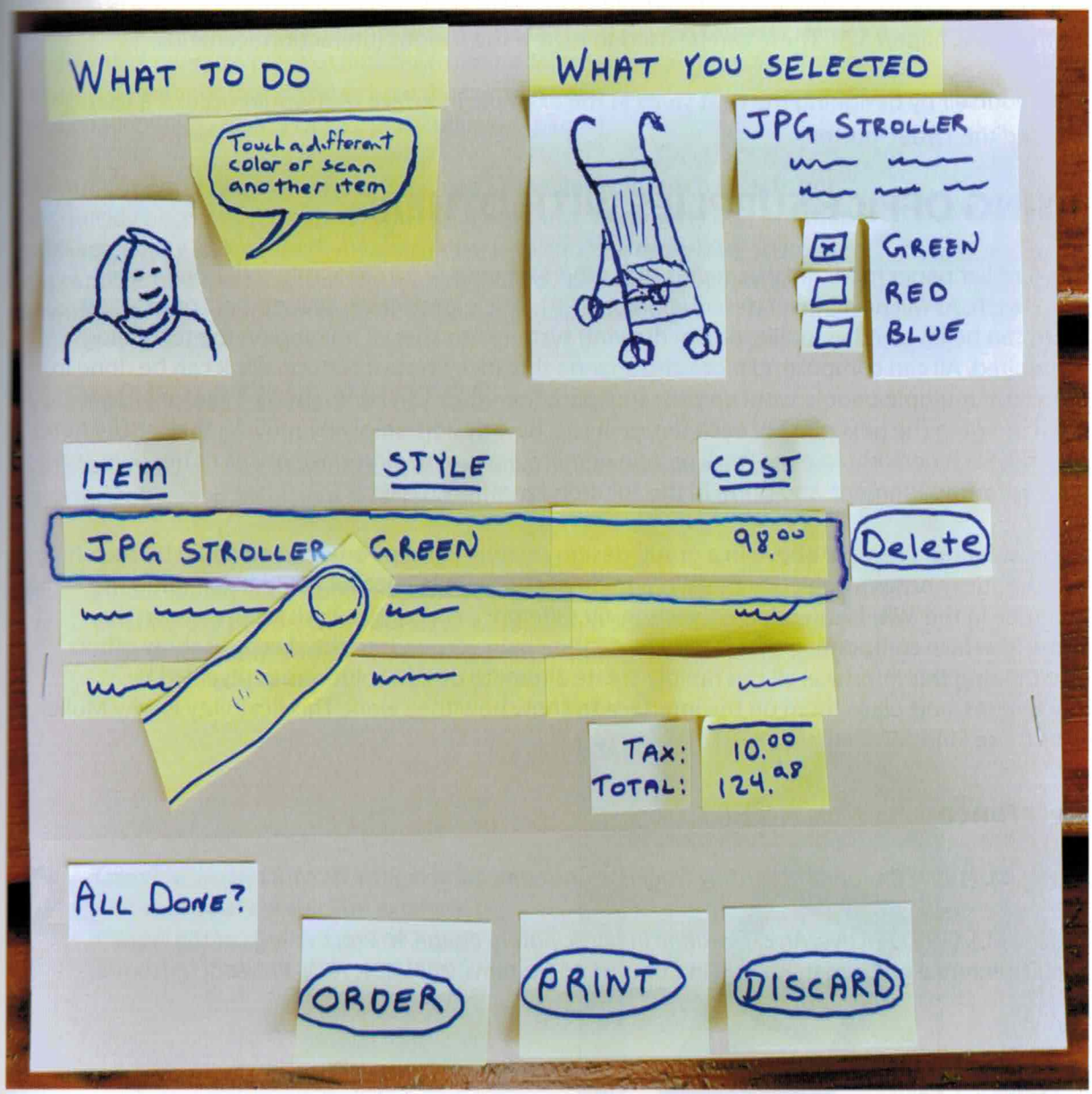
You will quickly discover that you will be making decisions on how much should be put on a single sticky. To help you make these decisions, ask yourself what would serve as the best 'unit' to use as a building block? This will depend on how likely it is that you will be changing the contents or location of a particular graphical element, and how that element matches standard graphical elements of an interface.

Tips

If you know you are going to repeatedly use many graphical elements of a particular type, you can premake sticky notes as that type. For example, let's say you are going to be creating many menus. Instead of doing them one-by-one, you can creat a sheet of menus (like the one on the top right) and make copies of that sheet. You can then cut out these menus, glue them on their backs with sticky note glue, and make your own 'menu pad' (as shown on the bottom right). You can, of course, do the same thing with other graphical items, such as pad of buttons, dialog boxes, and so on. These pads can help speed up your construction of sketches.



The figure below is my reconstruction of the pencil sketch of the online shopping system using office supplies. My decisions regarding sticky note 'units' relate to what I thought I may change as I explore this sketch: the text of the labels, the images used, the contents of the instructions, the item(s) used as examples, the kinds of buttons I wanted, and so on. If you look closely, you will also notice two more 'unusual' things in this sketch. First, one of the sticky notes is of a person's finger, where that finger has selected the first item in the shopping list. Second, the highlight around that first item (invoked when a person selects it) is 'implemented' as a strip of acetate transparency, where an outline was drawn on its edges. I dabbed some sticky note glue onto this transparency, which means I can replace the finger repeatedly atop of the sketch (this is important when the sketch is placed on a wall, so no bits fall off).



Admittedly, this sketch took me longer to do than the pencil sketch. Yet the advantage is that I can now alter this sketch, For example, I can replace certain sticky notes without having to completely redraw the sketch.

INTERACTING WITH OFFICE SUPPLIES OVER TIME

The real power of this method, however, comes from animating the interaction over time, where people can 'play out' an interaction sequence to explore design possibilities. For our example, we could animate what happens when the 'Delete' button is pressed. We would perhaps remove the sticky containing the JPG Stroller item, create a new sticky showing a different tax and total figure, and have the 'clerk' icon provide feedback of that action by changing the text in the speech bubble to say what was deleted. This can continue through many interactions.

The problem is that the designer would just be left with memories and a mess of paper. To solve this, the process could be captured as a storyboard via a camera (Chapter 4.4), or as a video animation (Chapter 5.5). These can be used to review the various interaction scenarios.

Try it yourself by designing the next steps in the example interface that would occur if a user pressed the 'Order' button.

USING OFFICE SUPPLIES WITH OTHERS

The familiar paper medium also means that others on your team can easily collaborate over this sketch. As Michael Muller describes in his 1991 article on ***Pictive***, all members of a design team can be involved as, unlike digital drawing systems, no special training on the technology is required. All can compose, explore and change this sticky-note interface. Work can be done in parallel. If multiple people work on the same part, then they can compare their designs, perhaps even merging the best parts of each design into a new design simply by moving their sticky notes around. Each person can even work on one or more parts of the interface on his or her own as a 'homework assignment' and bring in the solution for others to see.

Reconsider our example above in a group design session. Perhaps one person could be sketching out the sticky notes involved in the 'What to do' section, while another could be creating the example in the 'What you selected' section. Or different people may work separately on the same interface component, where they place their own version into the sketch to show others. In critiquing this interface, all can rapidly create alternate design solutions as revealed by discussions, and place them on the interface to show how they work. This flexibility is why Muller calls these kinds of sketches 'plastic'.

References

Rettig, M. (1994) *Prototyping for Tiny Fingers.* Communications of the ACM, 37(4), ACM Press.

Muller, M.J. (1991) *Pictive: An exploration in participatory design.* In Proceedings of the ACM Conference on Human Factors in Computing Systems, 225–231, ACM Press.

YOU NOW KNOW

Office supplies – especially sticky notes – are very useful for crafting editable paper interfaces. By composing key interface elements onto single sticky notes, you can edit the interface by substituting another sticky, by moving it, or by altering its contents. It provides you and your collaborators with the flexibility of digital tools, while letting you all work with traditional media.

Templates 3.8

pre-draw the constant, non-changeable parts of your sketch as a template that you can use and reuse

In some situations, you will be responsible for modifying only a portion of an existing visual interface. Certain portions may be pre-determined and fixed, either because of the shape of the hardware product (e.g., a cell phone body, buttons and screen size), the application hosting the system (e.g., a web browser frame), a window that contains pre-existing controls and information (e.g., an application), or a layout/style sheet that dictates how the contents of a window must conform to a certain layout (e.g., dialog boxes, particular web pages).

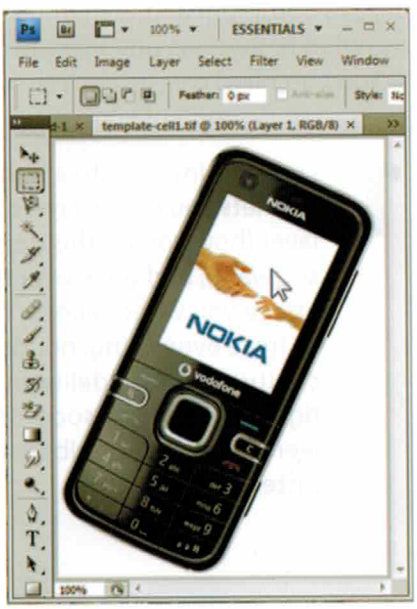
You can, of course draw out those fixed parts repeatedly for each sketch, but that quickly becomes tedious. Or you can leave those fixed parts out, but then your sketch may lack context. An alternative is to create a **template**, an image that captures the fixed parts of the system that you can easily copy, while leaving drawing space for your own creative endeavors atop this image.

APPROPRIATING PHOTOS

In this example, we will create a template of a particular cell phone body. We will leave the cell screen blank as a sketching surface.

1 Find a source image of the desired cell phone. You could take a photo of an existing cell phone. Or as done here, you could search for the image on the web. Alternately, you can find it in a print magazine or flyer, and scan it in.

2 Copy the image into an image or bitmap editor of your choice. The example to the left shows the cell phone image imported into Adobe Photoshop.



Materials

- a photo, screen grab, or found image of an existing visual
- an image or bitmap editor that allows cropping, painting and (preferably) layering
- printer

and/or

- tracing paper
- pencil
- photocopier/ scanner
- screen grabber

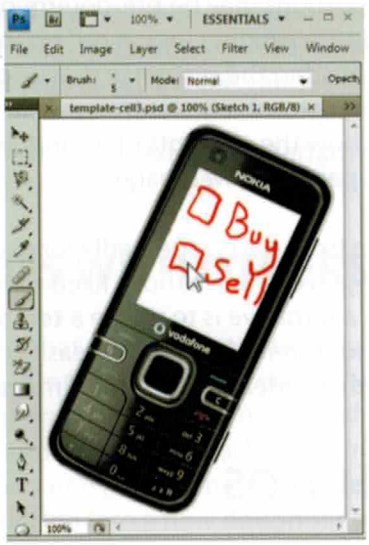
Tips

Mouse vs. Pen: Drawing with a mouse can be difficult. Instead, you may want to consider buying a pen-based tablet; these are much easier to draw with. There is a variety of modestly priced ones on the market.

If you have to use a mouse, zoom into the photo. Its larger size will make tracing easier to do. Still, it's hard to draw long curvy lines accurately. Instead, draw with short strokes, piece by piece. When continuing the stroke, always begin at the end point of the previous stroke so the result is a continuous line.

Drawing in short strokes also means undo will work better when you do make a mistake.

3 White out the screen area, which you will use as your sketching area. In the example on the left, I set Photoshop's paint brush tool to white and painted out the existing screen image.



4 Using your bitmap editor, sketch your ideas atop copies of this image (as done on the left). Alternately, print out paper copies of the images and sketch atop them with pencil.

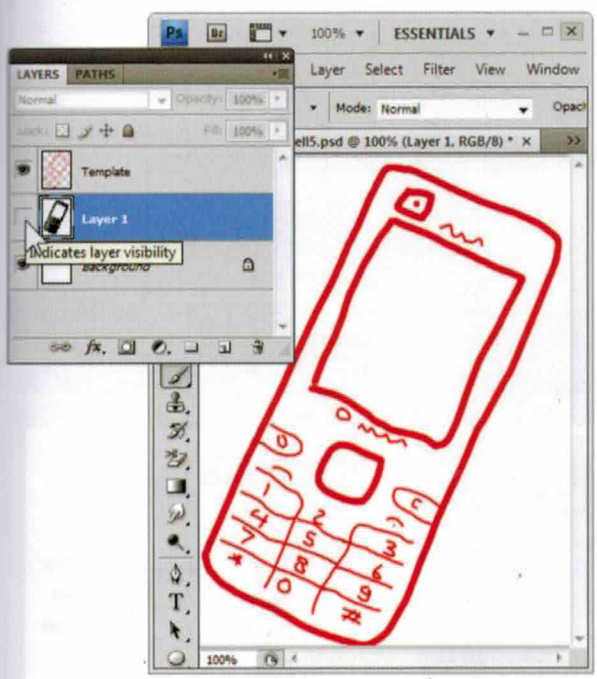
TRACING

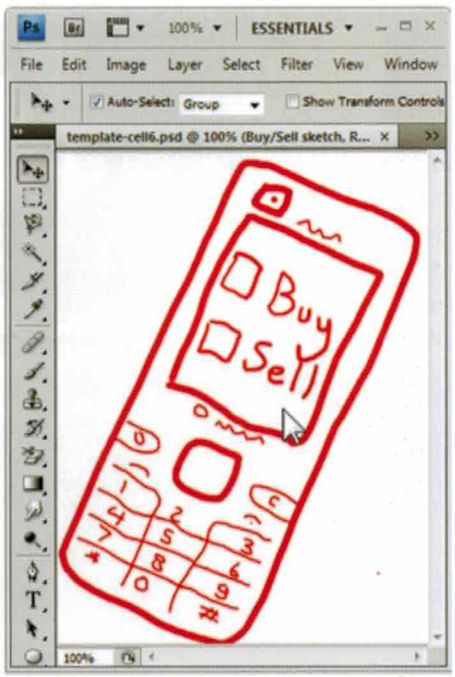
The above technique is simple, but does lead to a perhaps strange juxtaposition of a highly detailed photo and crude sketch. To keep everything at the same sketch fidelity, and perhaps to mute unneeded details, you can create a sketch of the image – the cell phone – and use that as a template. You can do this quickly by **tracing**. Here is one convenient way to do this in software.

1 Load the image into a bitmap editor that lets you create layers. Create a new layer (how you do this depends on your software), and trace over the parts of the image you want to keep. You don't have to trace everything, nor do you need to capture it in full fidelity. In the figure to the right, the letters associated with the keys were left off, and scribble text was used instead of logos.

2 Remove, cut or hide the photo layer, leaving only the trace. In Photoshop, you can do this by selecting the layer containing the original image and turning its visibility off, as done below in Layer 1.

3 As before, you can sketch your ideas atop copies of this template.





MORE ON LAYERS

Editors that allow layering will let you create and experiment with a multitude of sketches, where each sketch variation is saved as a new layer. This way, you can switch between layers (and between ideas) simply by changing that layer's visibility. You can also build up your single sketch as a series of layers. The examples below show how this is done in Photoshop.

Tips

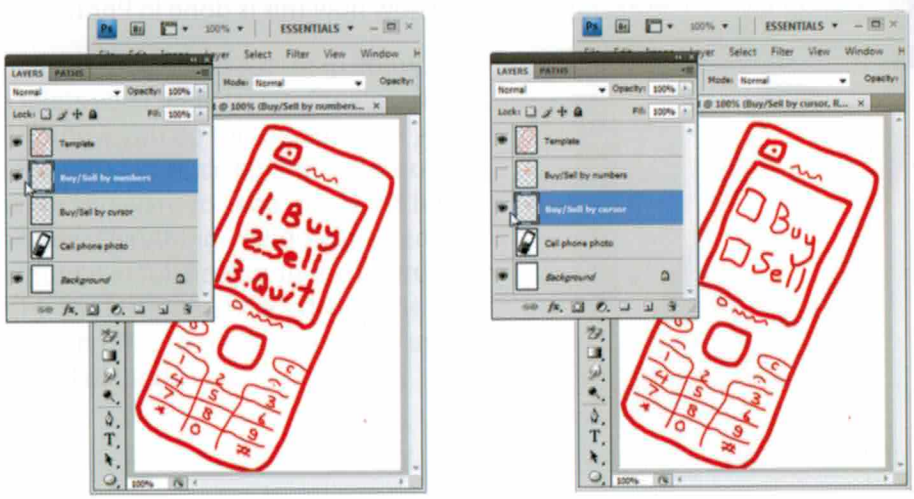
Using slideware like PowerPoint, you can use slides as a (sort of) replacement for layers.

For example, put the image onto the first slide, and make a copy of that slide as a 2nd slide. Using PowerPoint's drawing tools (see Chapter 3.6), sketch over the phone. Group the marks to make a single drawing. Then delete the image off the second slide, leaving just the template. Copy that as new slides, where you can then sketch over those as with layers.

By mixing and matching slides and visuals, you can reuse the various pictorial and sketching elements.

1 Create layers as shown. The first four images show different layers, including the original image (layer titled Cell phone photo), the sketched over template (layer Template), and two different sketches of the screen contents (layers Buy/Sell by cursor, and Buy/Sell by numbers). The visibility of layers was adjusted to hide and reveal particular layers.

2 Compose the layers together to achieve different sketches. In Photoshop, this is done by adjusting the layer visibility. These images both use two composite layers. Both make the Template layer visible (to show the sketched phone). The first makes the Buy/Sell by numbers layer visible, while the second uses the Buy/Sell by cursor layer. While we don't show this, you can use the phone image instead of the sketched template simply by making the Cell phone photo layer visible and the Template layer invisible.



BACK TO PAPER

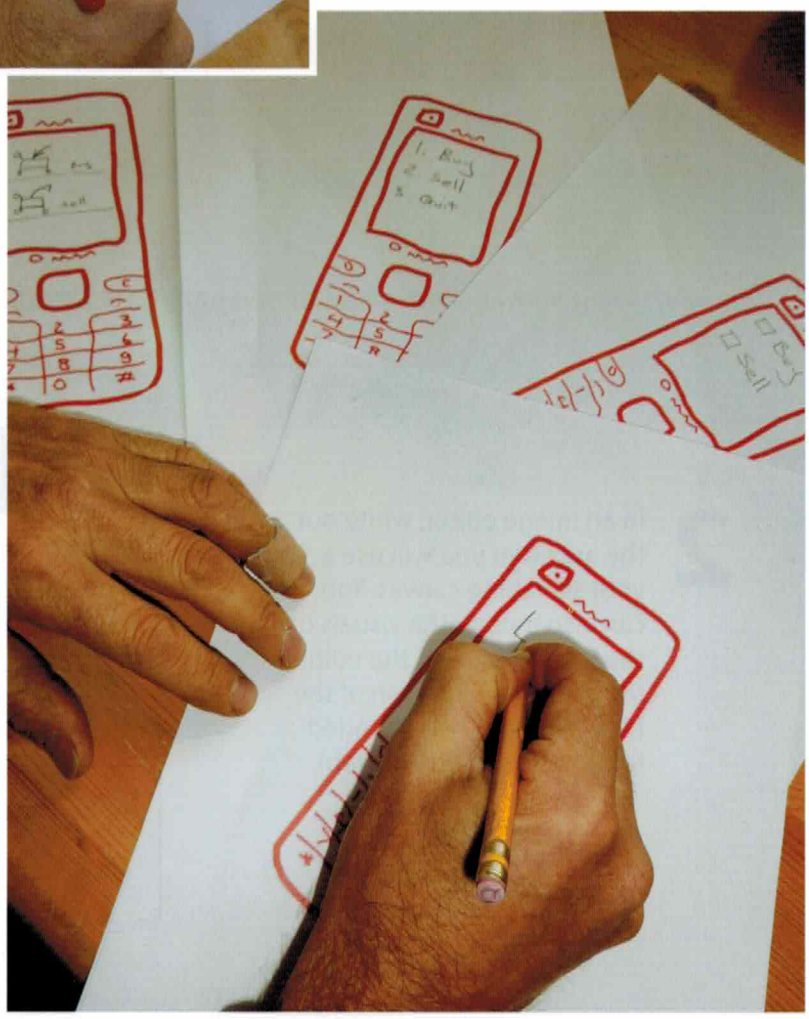
While software may help you create templates, it is not crucial. And as usual, drawing with pen or pencil is often faster and more convenient than drawing in software.

1 Print out the image.

2 With tracing paper and pencil or marker, trace over the image (left figure).

3 Generate multiple copies of the template by photocopying it, or by scanning and printing the traced image.

4 Sketch over the printed templates with pen or pencil (right figure).

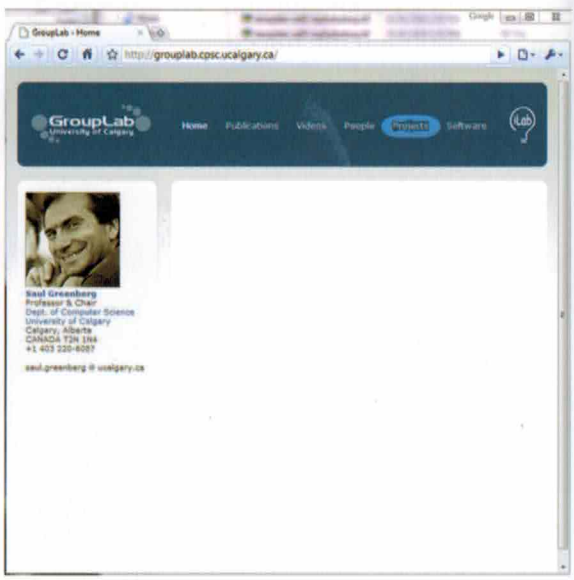


ANOTHER EXAMPLE: A WEB PAGE TEMPLATE

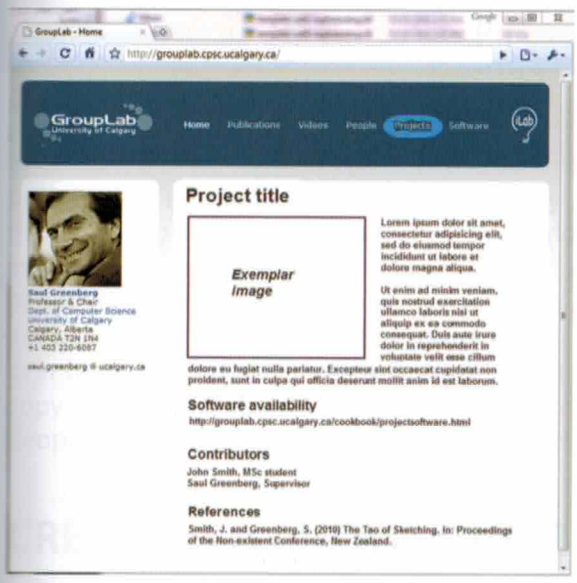
The next example shows – in abbreviated form – how the same technique is used to create a template for a web page. In this case, the designer is sketching out the general style of 'Project' pages, a new sub-site within Saul Greenberg's Grouplab web site. The style guide for this web site determined a fixed look and feel that all pages should conform to. The banner on top is always the same (although the highlights may differ), as is the sidebar. These are the steps the designer did, which you can repeat on this site or your own preferred web site.

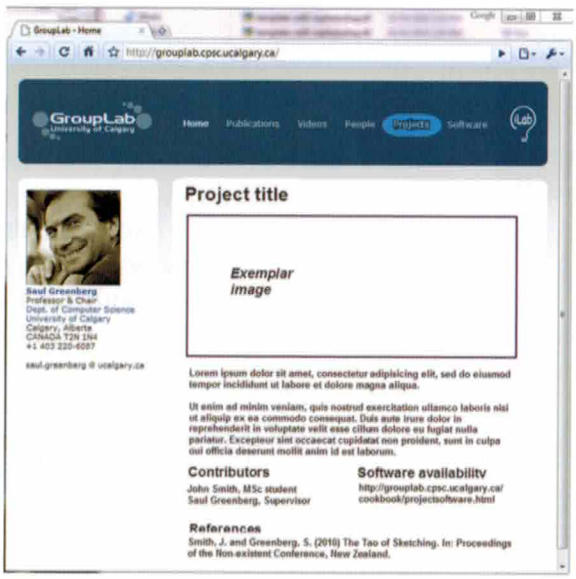
1 Using a screen-grabbing tool, grab the source image.

2 In an image editor, white out the area that you will use as your sketching canvas. You can also modify the visuals of the template using the editing tools (e.g., the location of the blue highlight was changed to be over the Projects tab).



3 Using that as your template, sketch out your ideas. The two at the bottom are two variations of layout ideas for a project page. In this case, we used the image editor tools to create the layouts.





YOU NOW KNOW

Templates are images that capture fixed parts of the system, while leaving white space for your sketched ideas. Templates can be:

- photos,
- traces,
- used in digital or paper form,
- rapidly reused and built upon via layers.

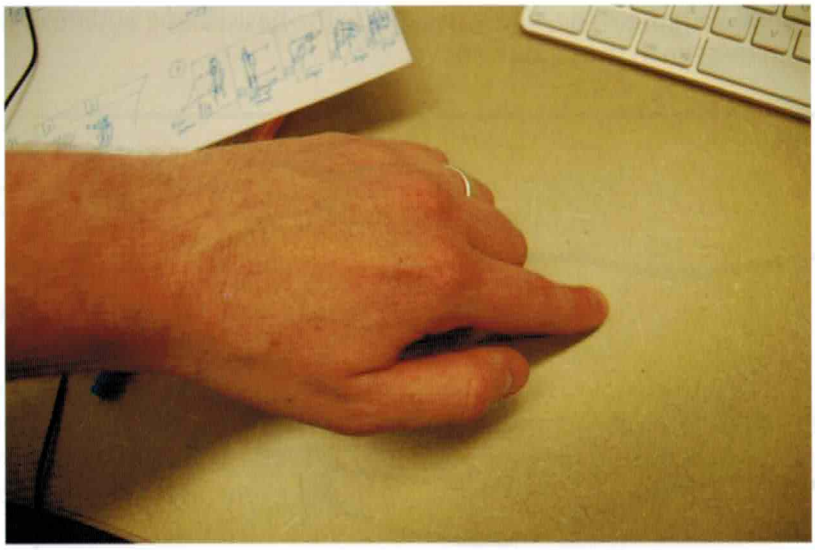
Photo Traces 3.9

create collections of sketch outlines that form the basis of composed sketches

In Chapter 3.8, we showed you how you can trace technologies – such as a cell phone – and use that as a template to frame your interface. However, you can use traces more generally to capture any real-world entity, and then use (and re-use) that as part of your sketches. This includes objects such as tables where we do our work, people doing different activities or in different poses, postures of hands, and even a physical environment such as a room. The idea is simple: take a good photo; trace over that photo to create a **photo trace**, save that trace as a sketch element, then copy and use that sketch element in your sketches. This is a powerful method, as people with no drawing skills can produce fairly good photo traces of complex things.

CREATING A PHOTO TRACE

For this example, imagine that you need to sketch out some ideas for a large vertical or horizontal display that recognizes people's hand gestures. To do this, you will create a series of sketch elements that show a person's hand in different postures.



1 Decide on the hand posture(s) you want. Using a tripod, adjust the camera's viewing angle of the scene (see Tips sidebar). Then take your photos of the hand postures you would like to sketch.

Materials

Digital camera and tripod

Digital drawing editor that lets you:

- import a photo
- set the photo transparency
- draw over the photo
- save that drawing , usually as a layer

Adobe Photoshop and Adobe Illustrator are two examples of such editors, but there are many others available that you can use.

Optional:

- a pen-based input device to simplify drawing, e.g., a pen-based computer or a digitizing tablet

Tips

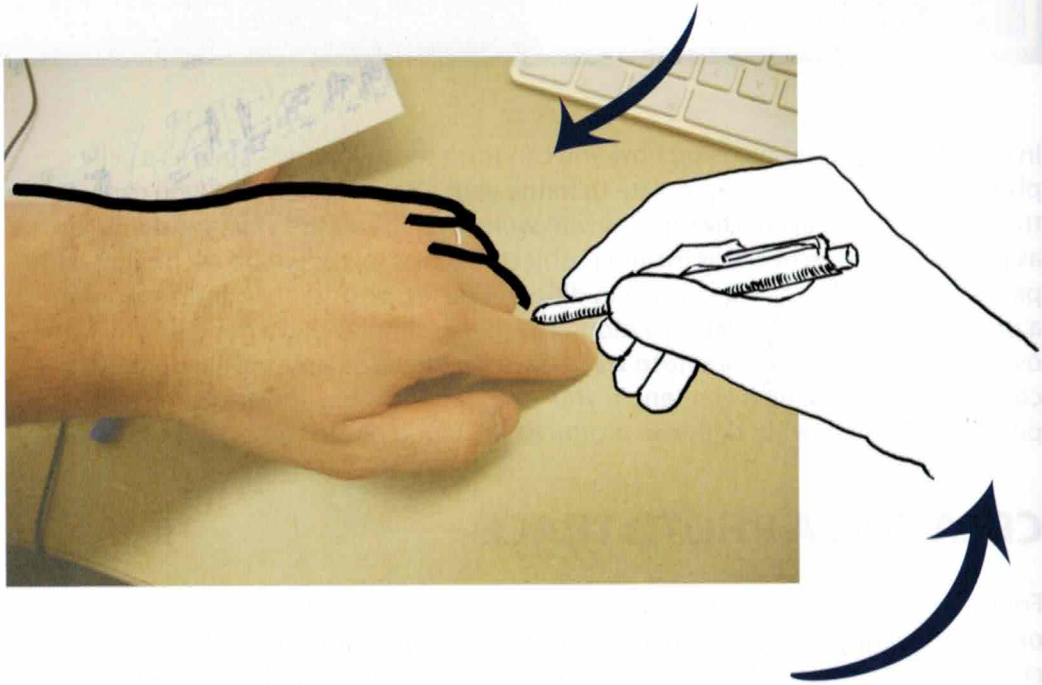
Photo Perspective: Select an appropriate perspective for shooting the photographs: from above, at an angle, or from the side. The best perspective will depend on how you want to use your sketch elements. To achieve a consistent collection of sketch elements, we take all the photos from the same perspective view by mounting the camera on a tripod.

Stroke Thickness: Most drawing systems have a very thin stroke thickness by default (e.g., 1 pixel).

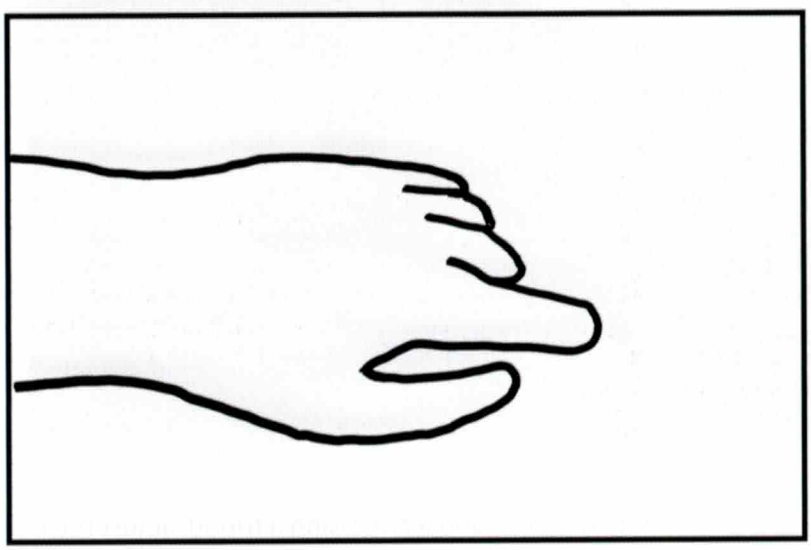
Instead, draw with a thicker stroke. You will find it easier to (a) see your trace, and (b) produce a rough sketch quickly. A thicker stroke will also make your sketch appear more sketchlike, i.e., like a cartoon.

Most editors will let you adjust your stroke thickness afterwards, which will let you fine tune your trace's appearance.

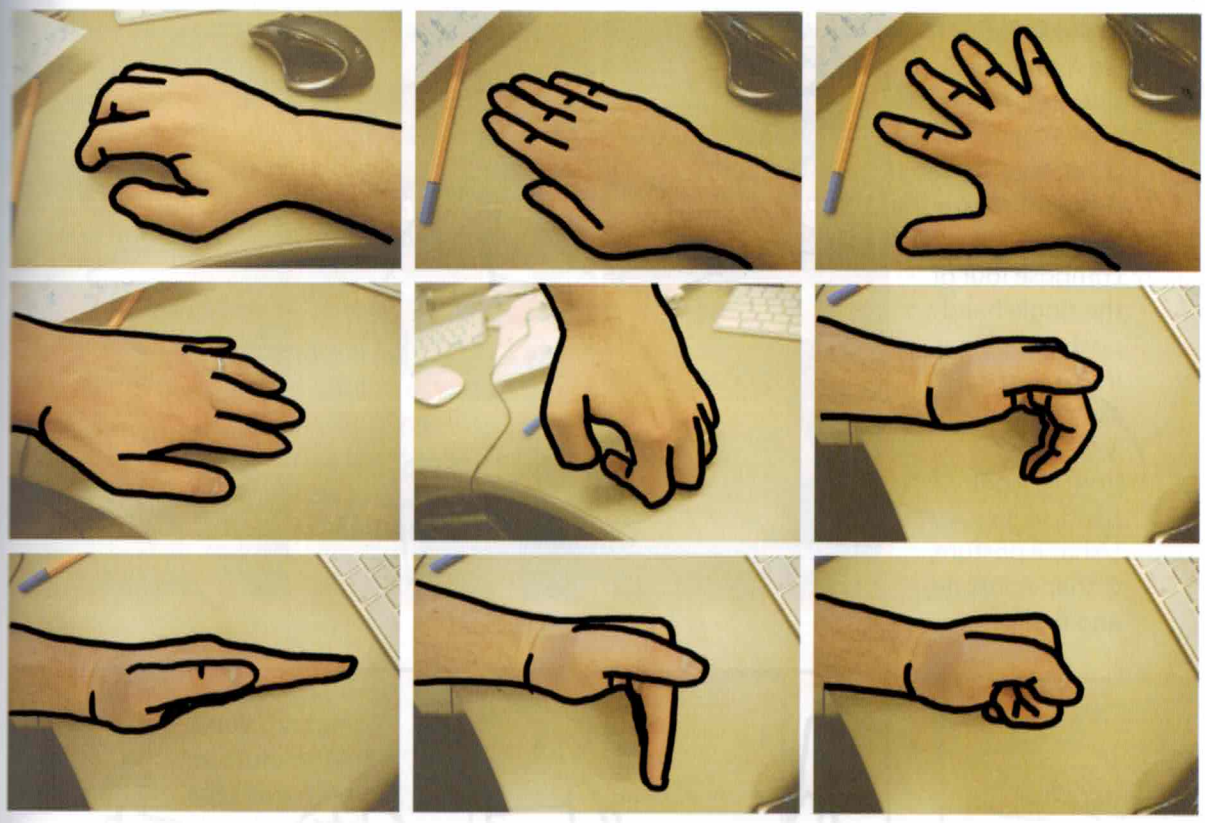
2 Import the first photo of a hand posture into your digital drawing editor. Set the opacity of this photo to 50%, which makes it easier to draw the trace outline. Also, set the stoke thickness to a modestly thick stroke (see Tips sidebar).



3 Draw a stroke path along the outline of the hand. It is not necessary to be too accurate with this – the idea is to capture the basic shape outline of the hand as can be seen in the picture above.



4 Remove the original photo from the background (or hide it if its a layer, as in Chapter 3.8). What remains on the drawing page is the outline of the hand posture that you can fine tune (e.g., to scale, to rotate, to re-adjust stroke thickness) and save for later use.



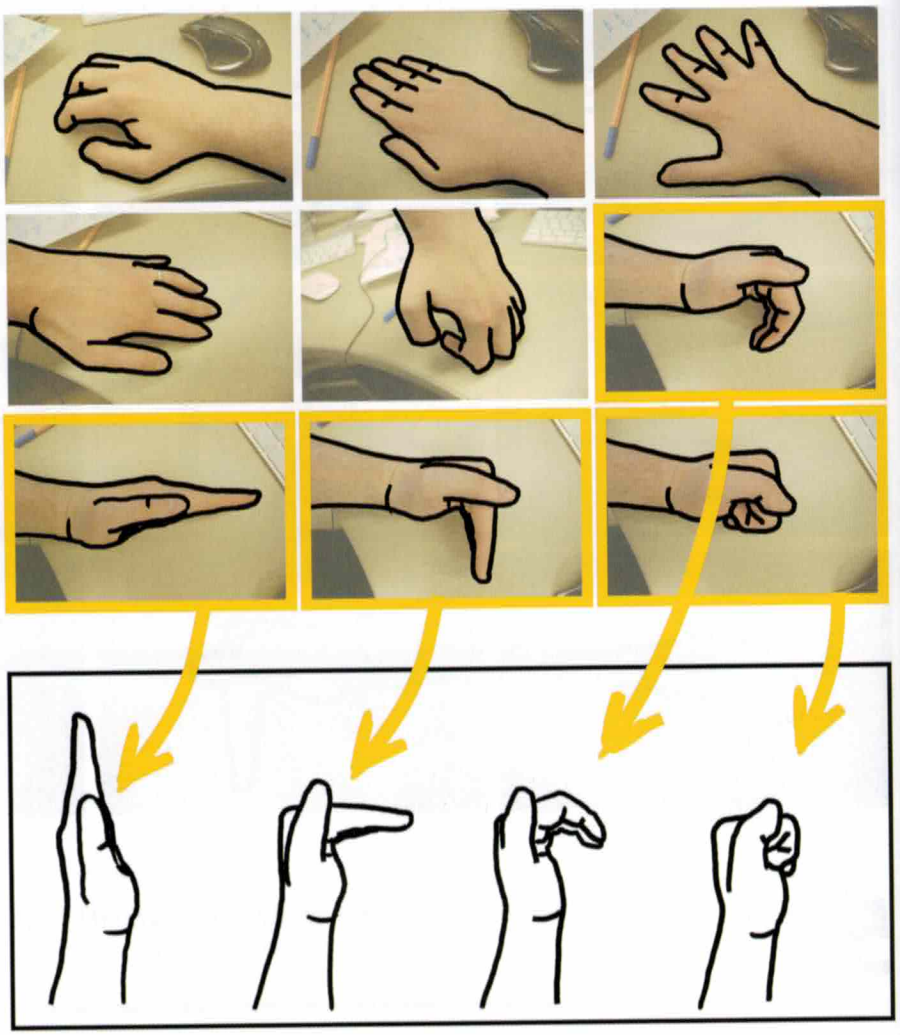
5 Repeat steps 1 to 4 for any other hand postures you would like to add to your collection.

USING THE PHOTO TRACES

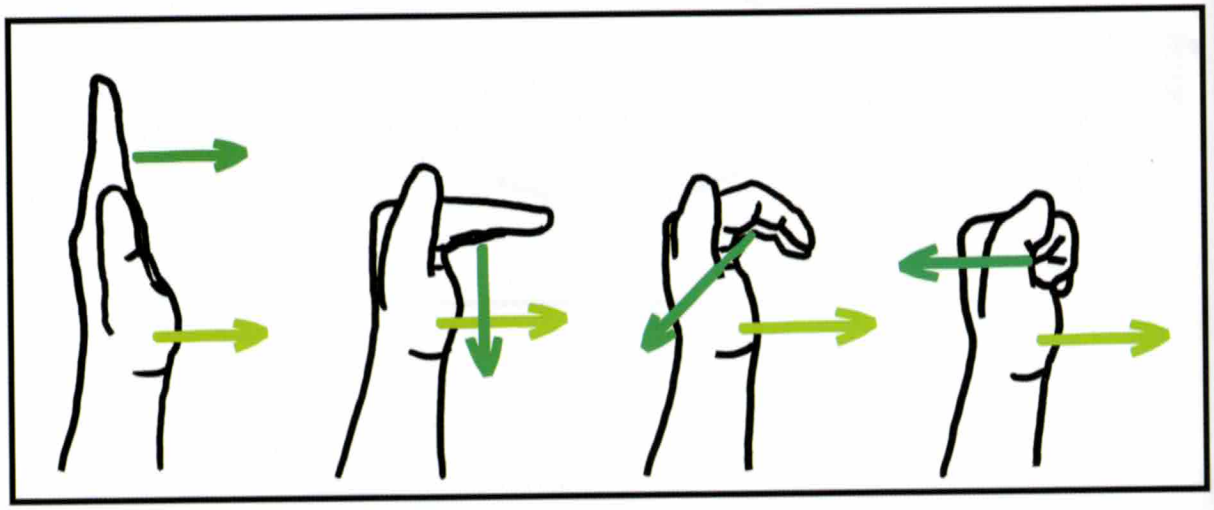
Example 1: Sequence of Hand Postures

1 Now imagine that you need to sketch out a particular gesture that a horizontal display – a digital table – will understand. To do this, select the appropriate hand sketches to create a time series that shows a person's hand in different postures over time. Our example uses an open palm forming into a fist.

2 In our solution, we rotate our drawings to present a top-down view of the postures we want. We then compose four of the single hand posture outlines into a single sketch to create a sequence: from straight hand, to an L-shape posture, C-shape posture, and the fist.



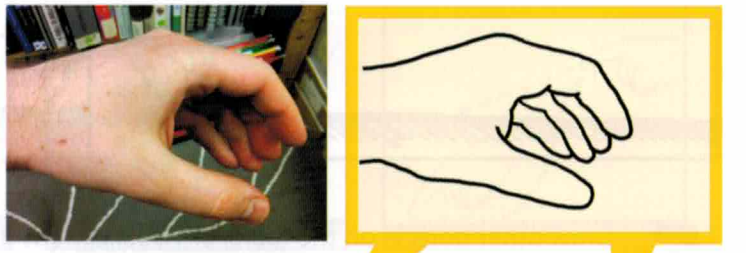
3 We then add additional parts of the sequence sketch. In this version of our sketch, arrows now indicate how the orientation of parts of the hand relative to one another are tracked to recognize postures on an interactive tabletop, as viewed from above.



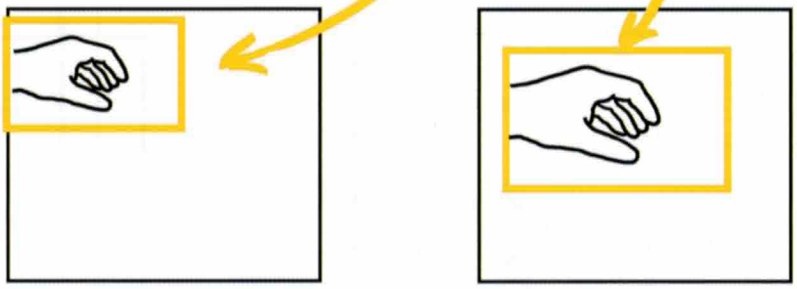
Example 2: Using a Single Sketch Element for Two Different Sketches

The two examples below are part of a series of sketches illustrating possible forms of gestural interactions above an interactive tabletop surface, where the surface recognizes objects in the person's hand. We again begin with a simple outline of a hand posture, but here we use only a single hand sketch to illustrate two different situations. The key idea is that we simplified constructing these sketches by reusing that single hand outline and drawing around it.

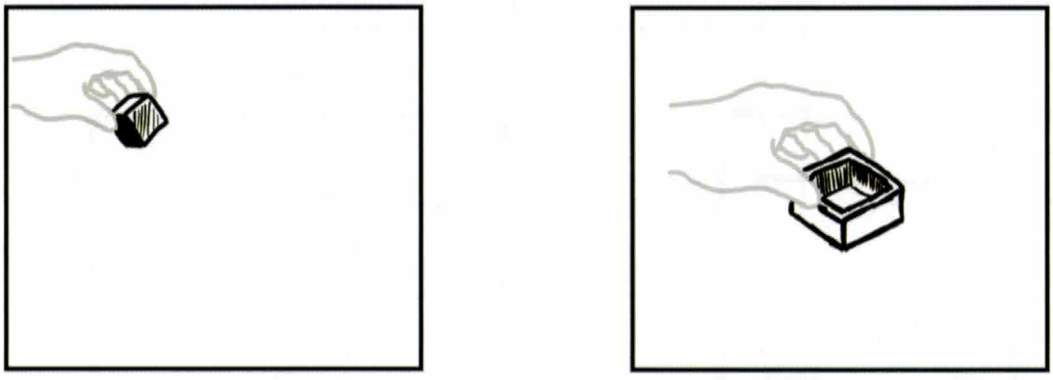
1 Using photo traces, create an outline of a grabbing/holding posture of a hand. This posture is reused in all sketches in this example.



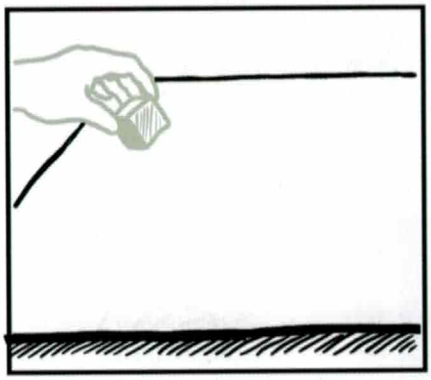
2 Copy the hand posture outline into two different drawings, and adjust the size and position.

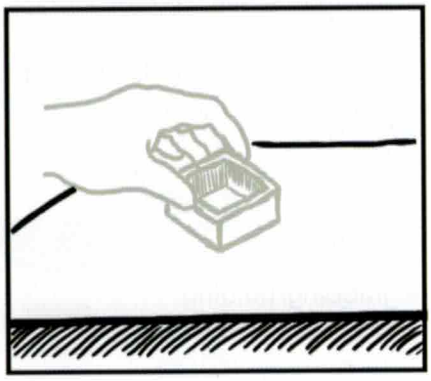


3 Sketch the physical objects the hand is holding; e.g., a little cube or box.

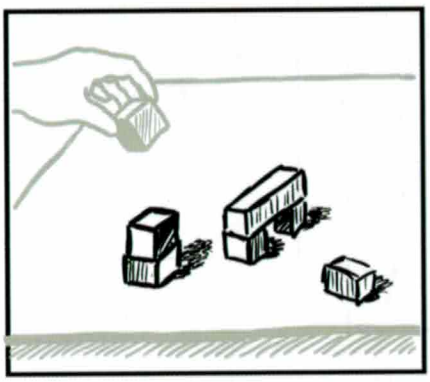


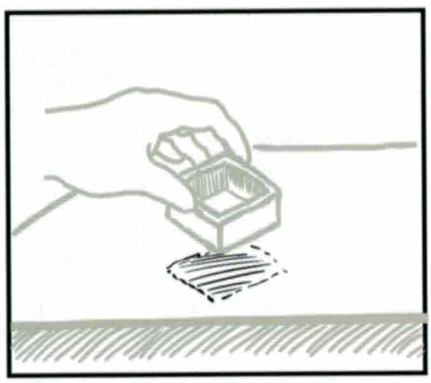
4 Next, sketch parts of the interactive tabletop surface. These are straight lines for the outline of the table, and a cross-hatched shadow at the side of the table.



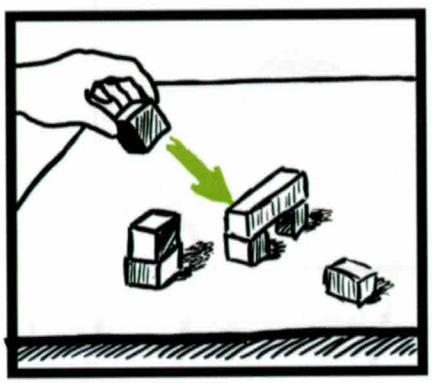


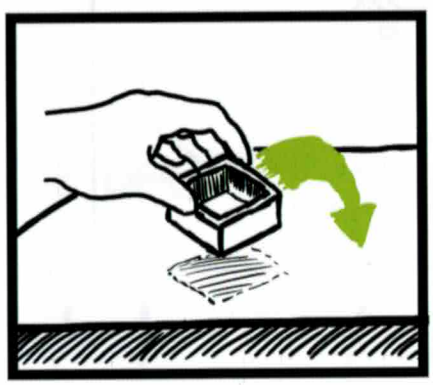
5 Draw other objects on the table, or visualizations displayed on the tabletop surface (e.g., virtual shadows).



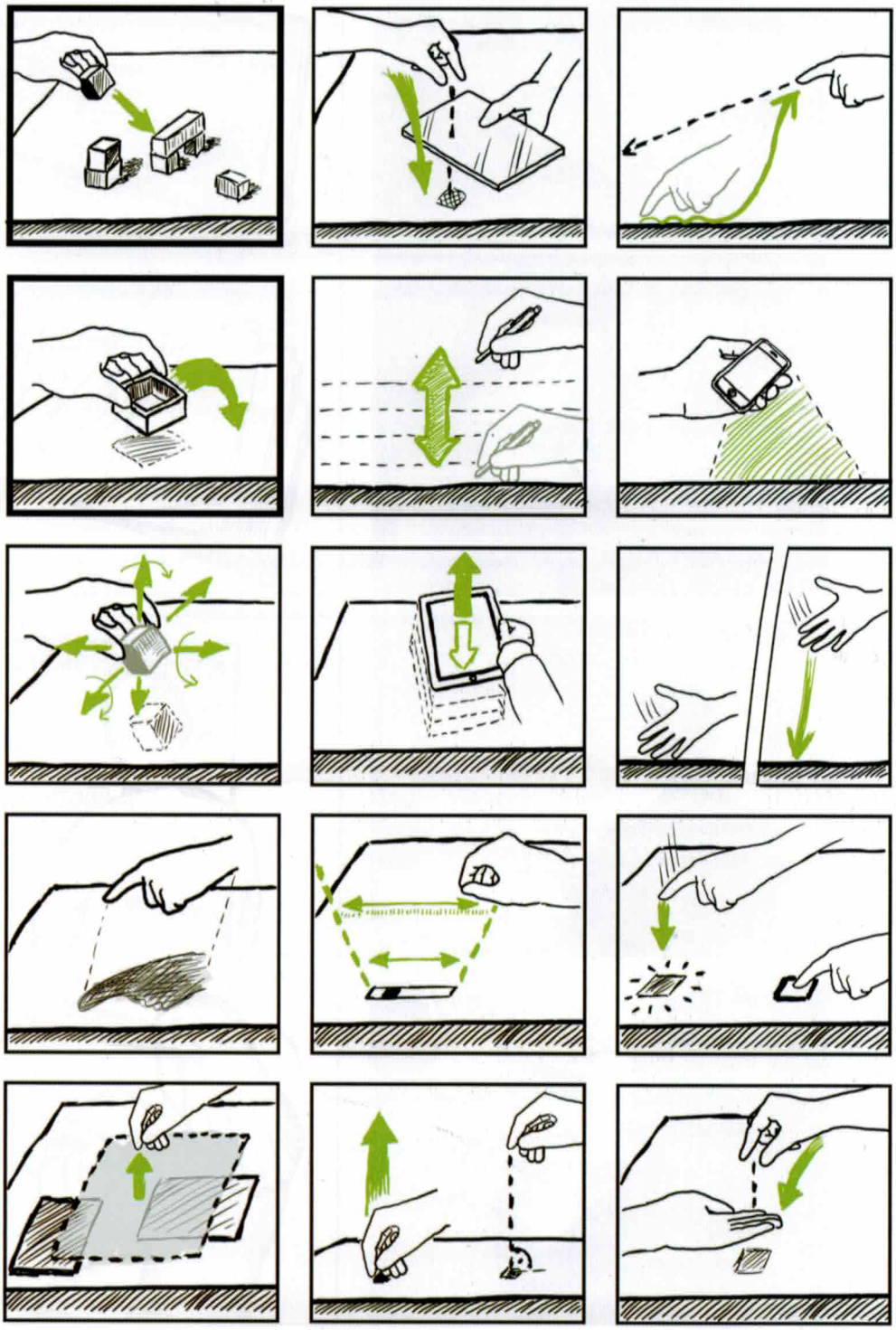


6 For the final sketches, add any annotations to the sketch, such as arrows indicating movements and gestures. Using a different color for these annotations can clarify the fact that these are not part of the actual drawing itself, but meta annotations.



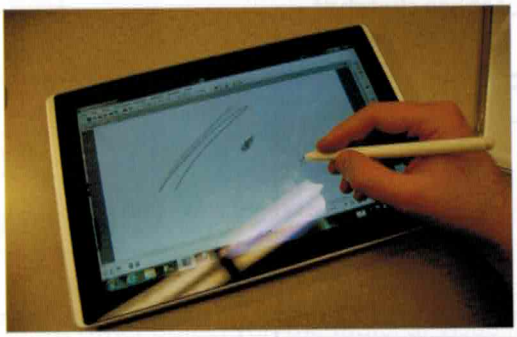


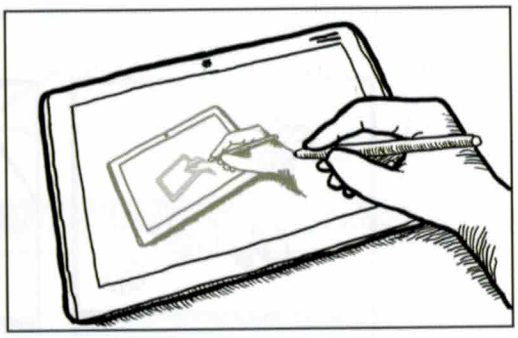
7 These two sketches were part of a larger collection of images we had developed to illustrate how a person might interact with digital content on an interactive tabletop by performing gestures above the surface (see Marquardt et. al, 2011). Below are further samples of this collection of sketches; all of them using the photo trace technique as a starting point for generating the outlines of hands. We used the same technique to generate the various devices and objects below, e.g., the cell phone, the tablet, and the transparent acrylic sheet. For practice, try using photo traces to reproduce some of these sketches.

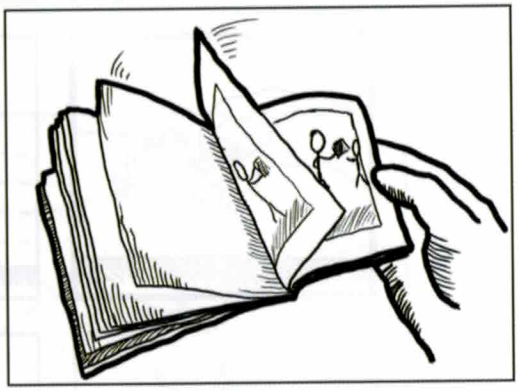


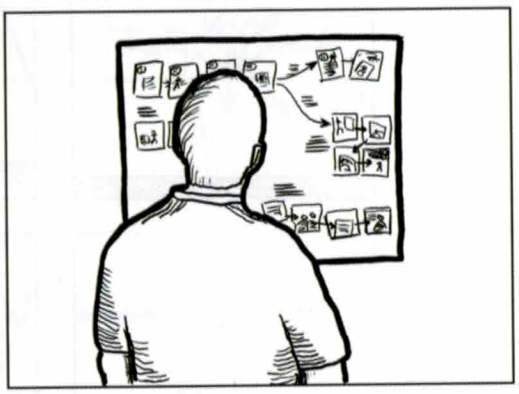
Example 3: Several Photo Traces Used in this Book

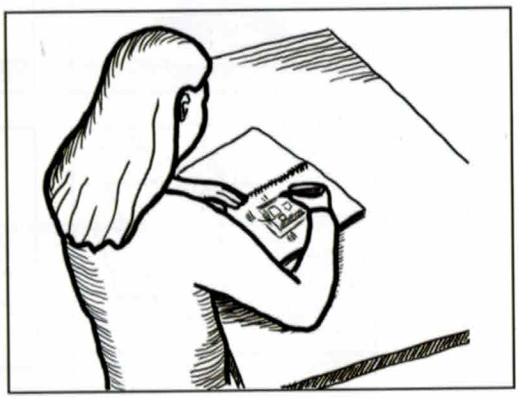
Most first pages introducing each section of this book used photo traces as a starting point. Below are the original photos we took on the left side, and the photo trace sketches we made on the right. Notice how we added features to the sketch that are not in the original photo (e.g., the images in the flipbook, or the details of notes on the poster wall).









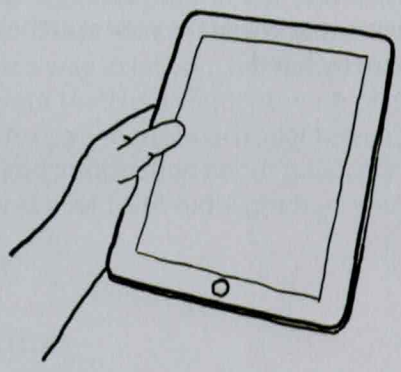


Exercise

Sketch a user interface running on a tablet computer to exchange digital data (e.g., photos) between the computers of two people. Use photo traces to sketch the tablets and how people hold them. Our solution is below, but try to create your own.

1 Take photo of person holding a tablet computer.

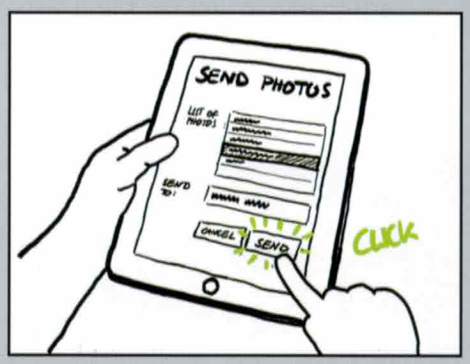
2 Create a photo trace with the techniques described earlier.



3 Duplicate this photo trace sketch to use it as a basis for your various interface sketches. You can also use additional photo traces for this sketch.

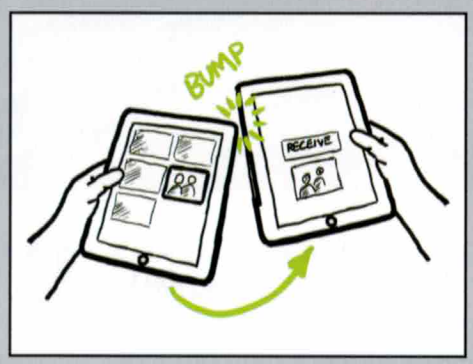
Two Variations of a Possible User Interface Sketch:

A The person selects a photo and the person to receive it, and clicks send.



We use a second photo trace of a person's hand and index finger.

B The person selects a photo thumbnail. He bumps the tablet against the other tablet to initiate the transfer.



For the second tablet computer, we flipped our previous sketch horizontally. Look closely at them – they are the same. Only the content on each tablet is different.

References

Marquardt, N., Jota, R., Greenberg, S., and Jorge, J. (2011) *The Continuous Interaction Space: Interaction Techniques Unifying Touch and Gesture On and Above a Digital Surface.* Proceedings of IFIP TCI3 Conference on Human Computer Interaction – INTERACT 2011. (Lisbon, Portugal).

YOU NOW KNOW

Some things are hard to draw. Using photo traces, you can quickly compile a variety of sketch components that will make your sketches look 'good', and will be faster than drawing each component by hand.

Hybrid Sketches 3.10

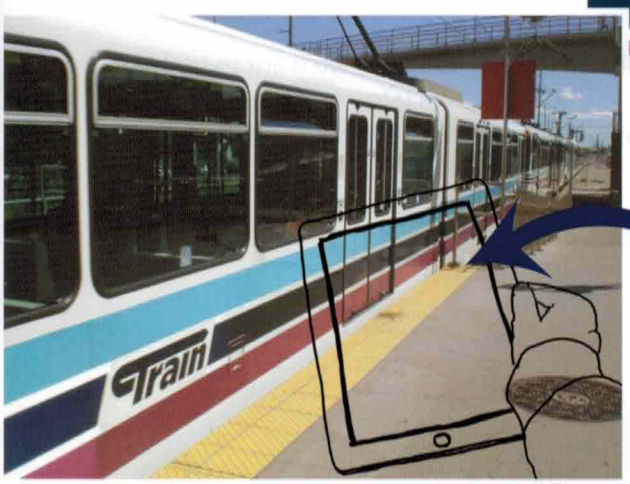
combining sketches with photos

Some designers often add details to their sketches in a way that adds 'life' to the sketched idea. These details may emphasize the context of use by showing the surrounding environment, or exaggerate interaction sequences that may be easy to miss. The problem is that this usually demands a high degree of artistic skill. **Hybrid sketches** are a way to let you, the non-artist, add considerable detail to your sketches simply by combining your sketched elements with photos. The idea is that the photos preserve information about the context of where a particular interaction takes place, while the sketched elements and annotations add information about how your actual system design fits within that context. The sketched elements could also highlight how you would alter or add to existing designs.

Case Study 1: A Transit Information Application

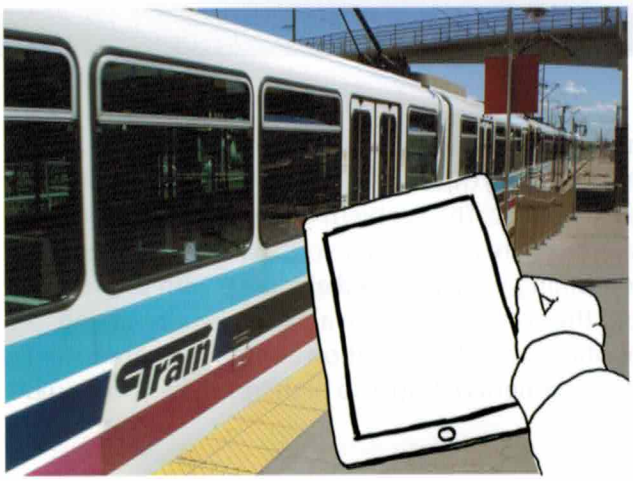
We illustrate the hybrid sketch method by example, where we want to create a sketch of a person using a transit information application on a tablet computer. The challenge is to show the person using that application in a particular context: the train station.

1 **Take a photo, or series of photos, of a place where the interaction takes place.**
As a starting point for our sketch, we use a photo taken on the platform of a public transit train system. The position and orientation of the photo are taken from the point of view of where the user would actually be using the table application.



2 **Create or reuse a photo trace sketch of the person and/or system.**
We now add our sketched element atop this photo. In this case, we reuse the photo trace sketch we created in the previous chapter: a person's hand holding a tablet computer. Using a suitable editor (Photoshop, PowerPoint, etc.), we overlay this sketch atop the existing photo.

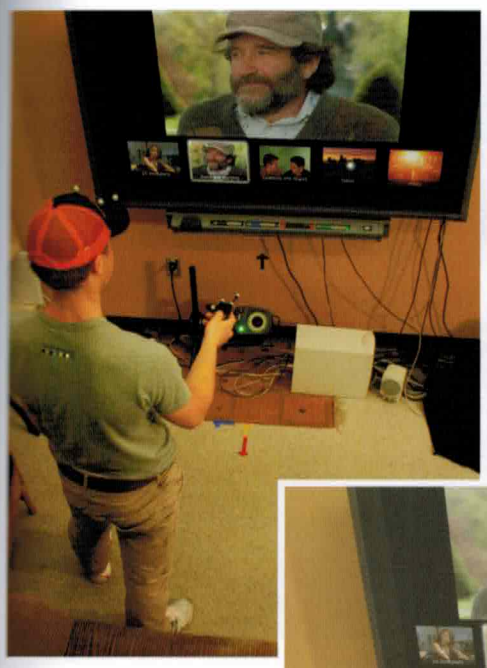
3 **Create an opaque background for our outline sketch.**
Depending on how we made the photo trace, the sketch may only show the lines. This means that the photo is visible under the sketch. To have our photo trace sketch stand out from the photo, we fill its background, usually with a solid white fill. This will also let us sketch onto the 'empty space' of the tablet. Filling the background could be done in the software used to generate the photo trace. For example, if the path of the photo trace outline is a closed shape, we could apply a FILL command to this path. If the photo trace is composed only of lines rather than shapes, we can trace a separate polygon around the outline of the shape, set its fill color to white and its outline to none. We then reorder the polygon so it appears behind the sketch (i.e., where the sketched lines are atop the white).



4 **Sketching the interface.**
We now sketch details about our visual interface of our transit application atop the tablet display.

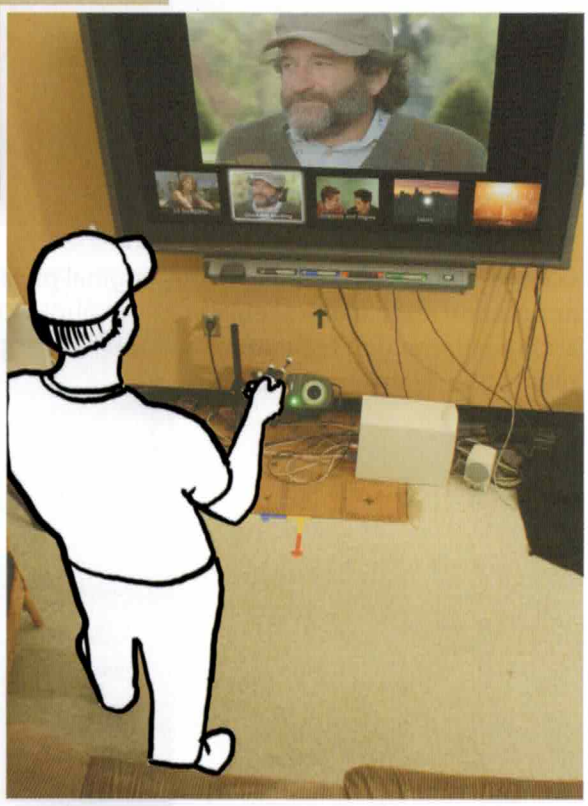
Case Study 2: Emphasizing a Person's Interaction with a Device

The next example uses identical methods for a different situation. Here we want to highlight not only the way a person is using his mobile phone to interact with a large display (the context) but the actual interaction he is using (where he is pointing at it). See Greenberg et. al. for an article that uses these hybrid sketches.

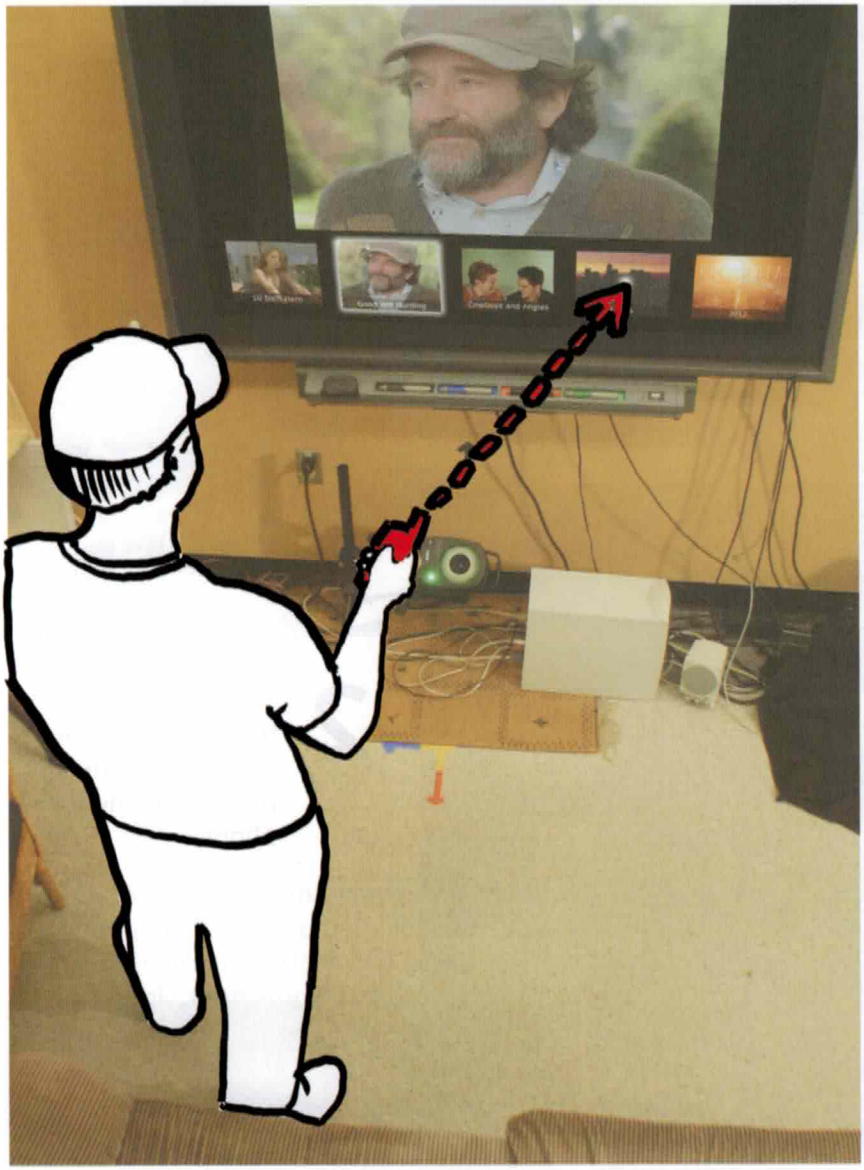


1 As before, we take a photo of the scene. In this case, the photo also includes the person and the device, i.e., the person holding the phone and pointing at the screen. The problem is that it is hard to see at a glance what is going on.

2 We create a photo trace atop this photo that outlines the person holding the phone.



3 We fill the outline of the person with a white background.

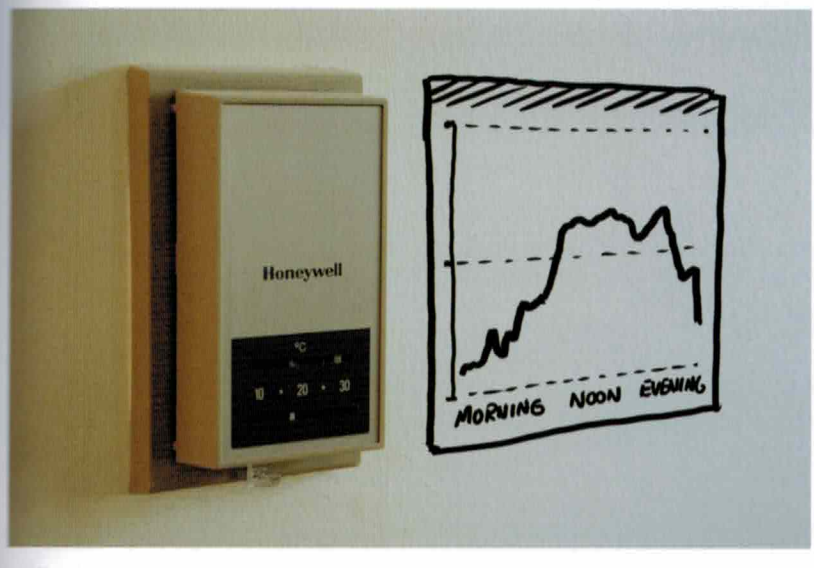


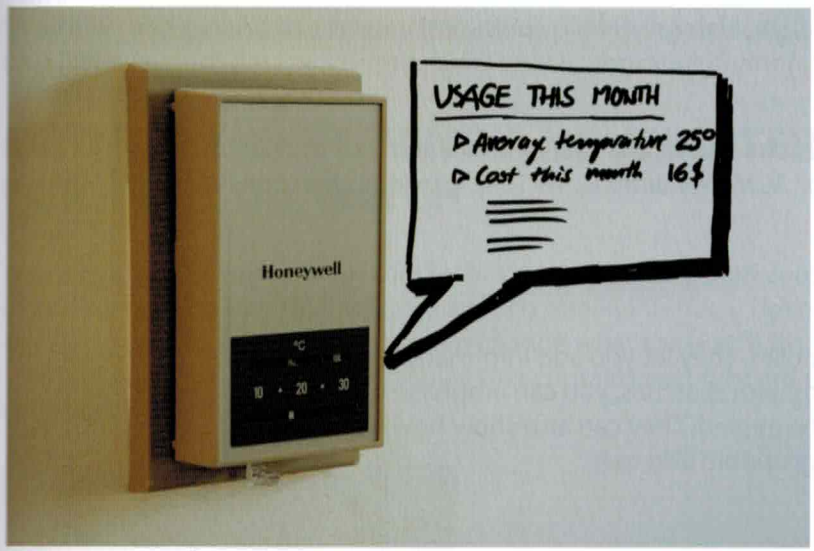
4 We now outline and fill the phone the person is holding in a different color to make it stand out visually.

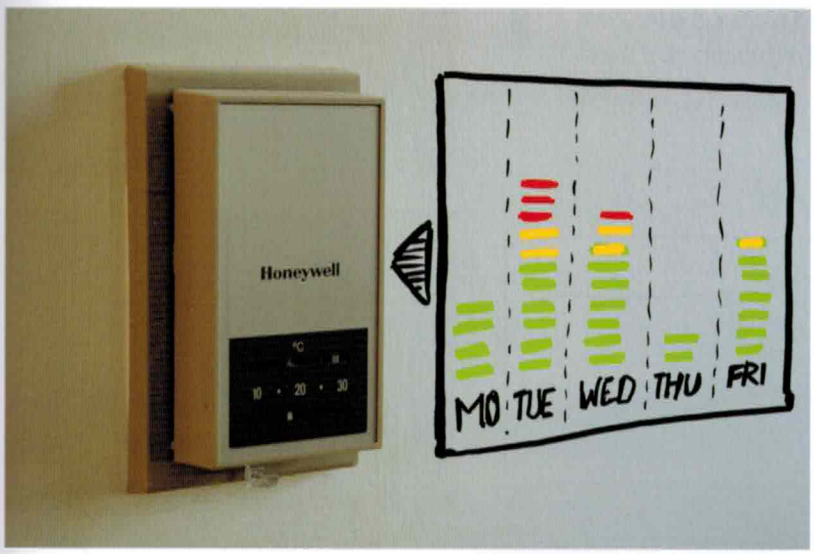
5 We annotate the image, with a bright red pointing ray that emphasizes that the phone is pointing toward the screen.

Compare this final sketch with our original photo. By making the person, the phone and the annotation appear as a sketch atop the photo, the viewer can easily grasp the context of the scene, and the interaction technique the sketch is supposed to illustrate and how the person is using the phone within the environment.

Case Study 3: Augmented-Reality Thermostat Visualization







Hybrid sketches can also help you explore and sketch out different design ideas within a given context.

In this example, we took a photo of a home thermostat control. The sketches illustrate three alternative visualizations that a micro-projector of a mobile phone could display when pointing the phone next to the thermostat. The visualizations projected to the right of the thermostat provide the viewer with information about the usage of the heating in the home (over the last day, week, or month).

Exercise

Take a photo of a control panel of any kitchen or household appliance (e.g., microwave, oven). Your challenge is to imagine that this appliance has a touch panel instead of these controls, and that you have to design an interface for that touch panel.

Create a hybrid trace of a touch screen atop the stove. Then sketch at least three different ways that illustrate how you could reproduce the functionality offered by the physical controls. Use a black marker or felt tip pen to increase visibility of the sketched portion of the hybrid sketch.

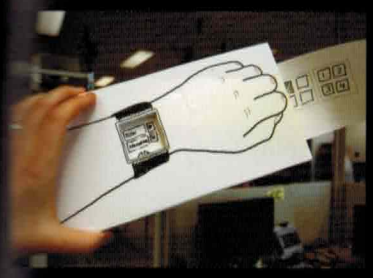
As a further exercise, stick to the physical controls, where you sketch variations of the layout and design of these physical controls over the existing photo.

References

Greenberg, S., Marquardt, N., Ballendat, T., Diaz-Marino, R., and Wang, M. (2011) *Proxemic Interactions: The New Ubicomp?* ACM Interactions, 18(1):42–50. ACM, January–February.

YOU NOW KNOW

Hybrid sketches have several purposes. They let you add information about the location's context to the sketch. By overlaying photos with sketches, you can emphasize and annotate people's interaction that could otherwise be missed. They can also show how you can vary existing designs by emphasizing what your redesign would add to it.



Sketching with Foam Core 3.11

sketching in a physical medium

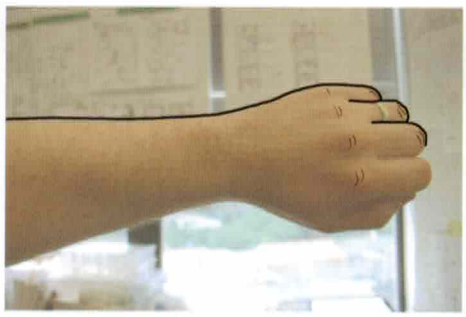
Most people think of sketching as something done with paper and pen (or digital equivalents). Yet sketching can also be done by creating physical mock-ups of devices and situations. Architects do this when they create scale models of buildings and their surrounds. Industrial designers do this by crafting models of their devices out of clay. Some interaction designers also construct interactive scale models of devices, often using foam core sheets and other everyday materials (such as cardboard) as their medium. Unlike a paper sketch that represents a device, you can have others actually 'operate' your physical device.

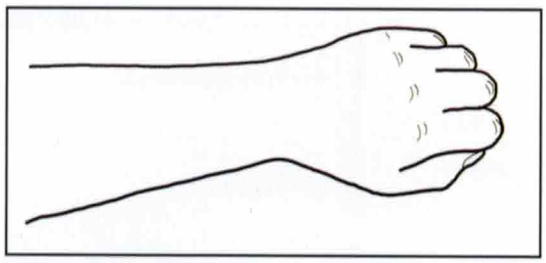
In this chapter, you will learn how to build simple mockups of physical devices by using few layers of foam core sheets. You will see that you can use this approach to rebuild and extend low fidelity imitations of existing devices, and to realize a physical design of device that may exist only in your imagination.

METHOD 1: SKETCHING A NOVEL INTERFACE FOR A DIGITAL WATCH

We will introduce you to foam core by having you build a foam core model of a digital armband watch that includes a touch screen interface. The result will be an arm wearing the watch, where one can change what the watch displays by sliding a strip of paper underneath the display that contains a storyboard of the watch's screens (see image at end).

1 Take a photo of a person's arm, and create a photo trace sketch as described in Chapter 3.9.

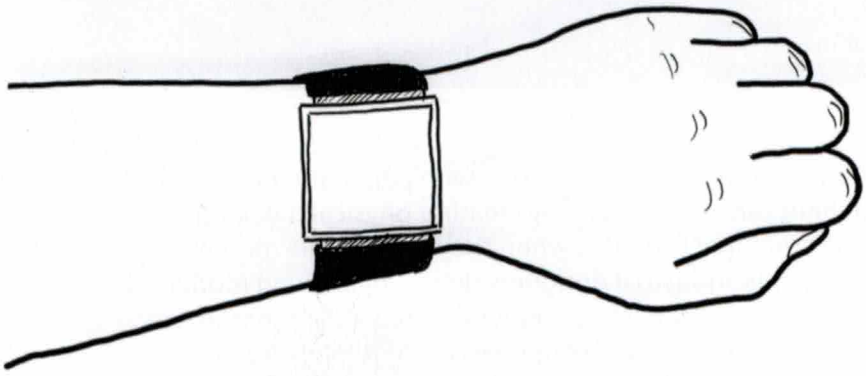




Materials

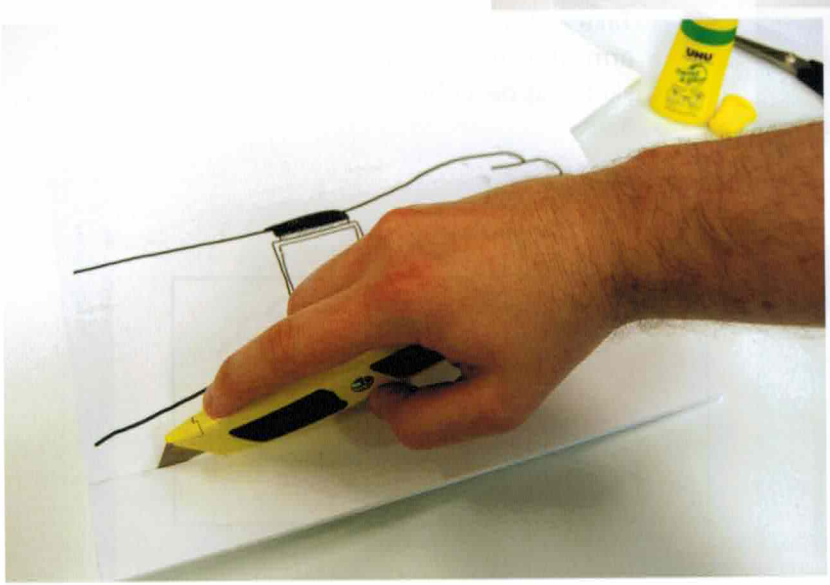
- foam core sheets, around 5 mm thick (available at most art and larger office supply stores)
- several sheets of paper and pens
- scissors
- cutting knife, e.g., an X-acto or drywall knife
- glue
- photo camera and printer

2 Sketch an armband watch over this sketch trace. Make the watch display fairly large, as you will be illustrating screens within it later.

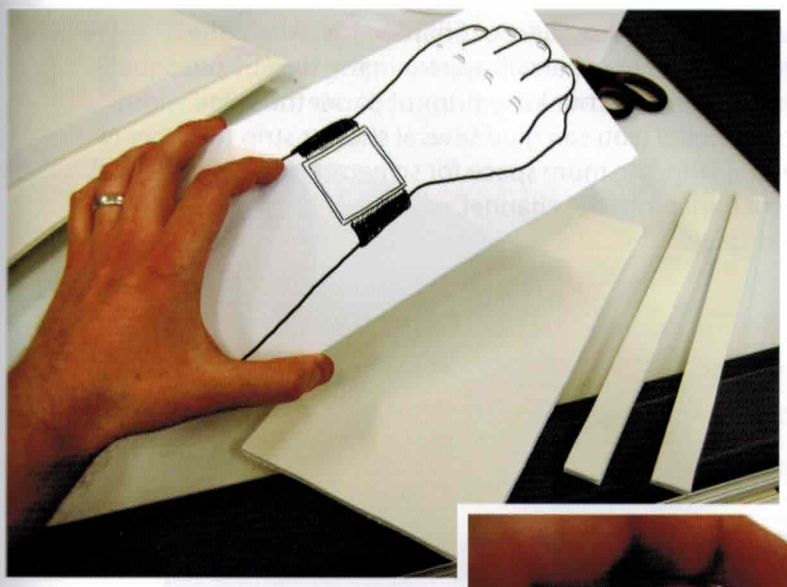


3 Print the sketch at the correct scale, i.e., so that the hand and arm are life-size. You can usually do this by manipulating the scale settings in your application's print settings or your computer's print dialog box.

4 Glue the printed sketch onto one of the foam core sheets.

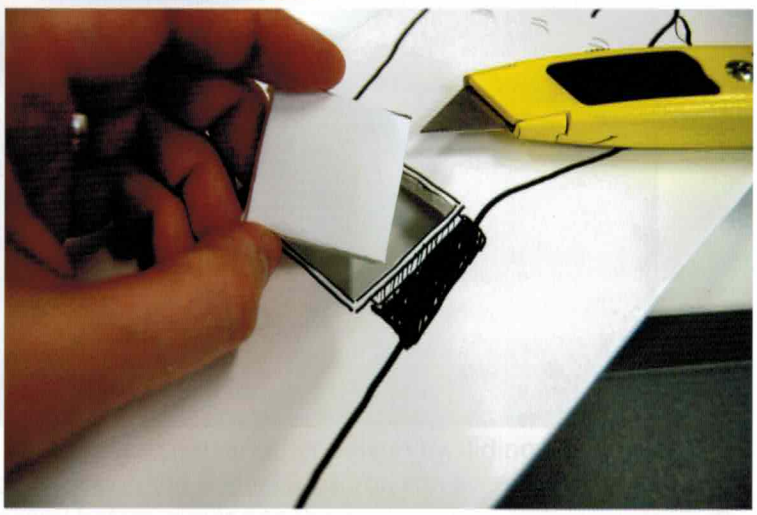


5 Cut out a rectangular area around the sketch.



6 Cut a second piece of the foam core sheet so it is the same size as the sheet containing the arm.

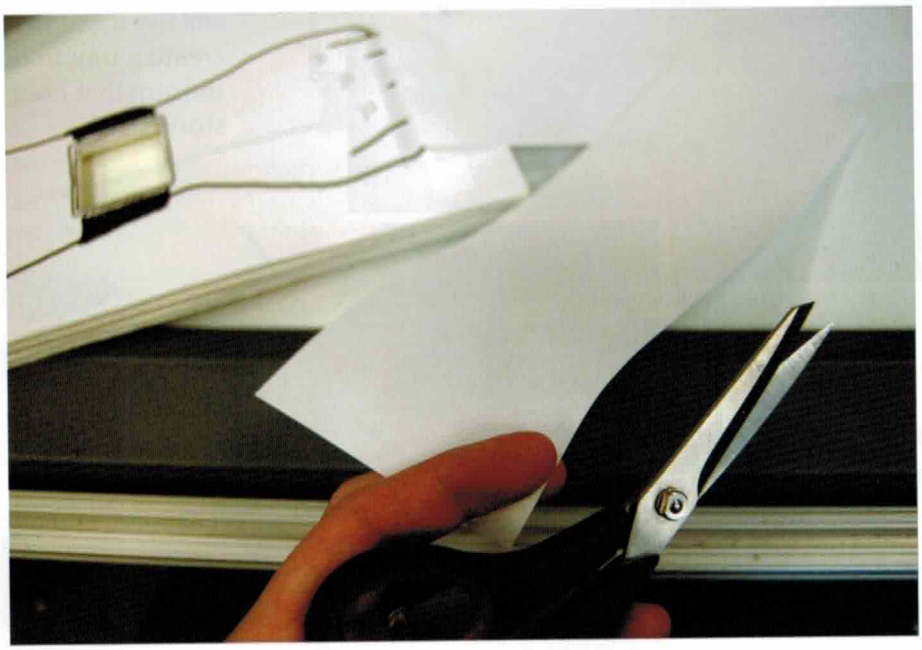
Then cut two thinner strips of the same length and set them aside. We will use these shortly to create a 'tray' underneath the arm that holds a storyboard.



7 Cut out the center area of the display.

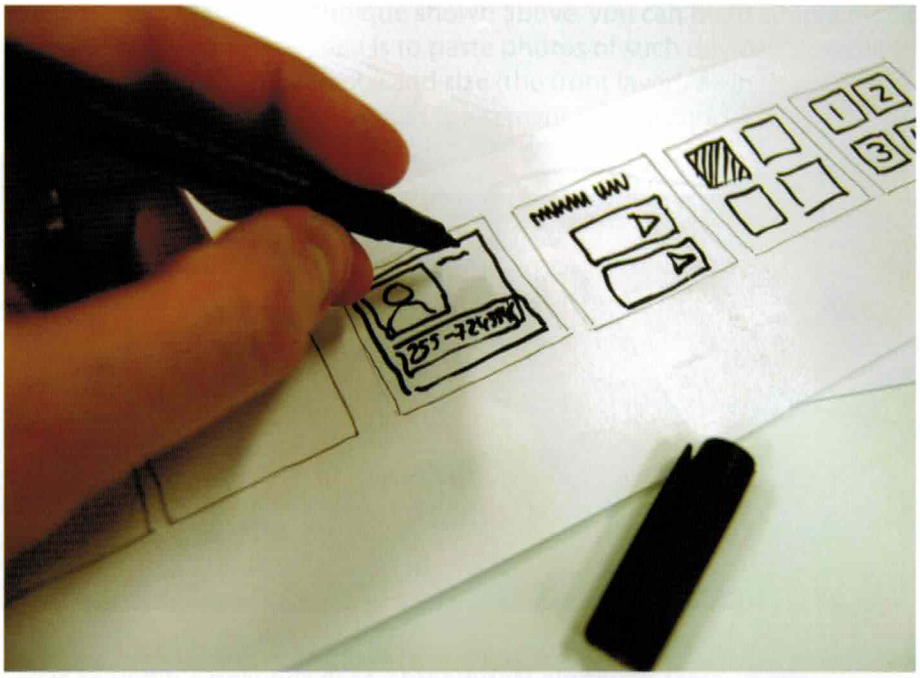
8 Create the foam core tray. This will allow you to slide a storyboard under the watch display. First, glue two strips at the sides of the rectangular cut out. Then glue that assembly to the underside of the watch. This will create a hollow channel under the arm.

9 The next step is to sketch out a storyboard sequence (Chapter 4.1), where the storyboard displays a sequence of sketches that will appear in the the cut-out square that comprises the watch display. First, cut out long strips of paper the same width as the channel in the foam core model (you can glue several shorter strip together to make a long strip; the longer the strip, the more space for screens in your storyboard). The idea is to slide this piece of paper into the channel, where each storyboard screen will appear under the watch display.

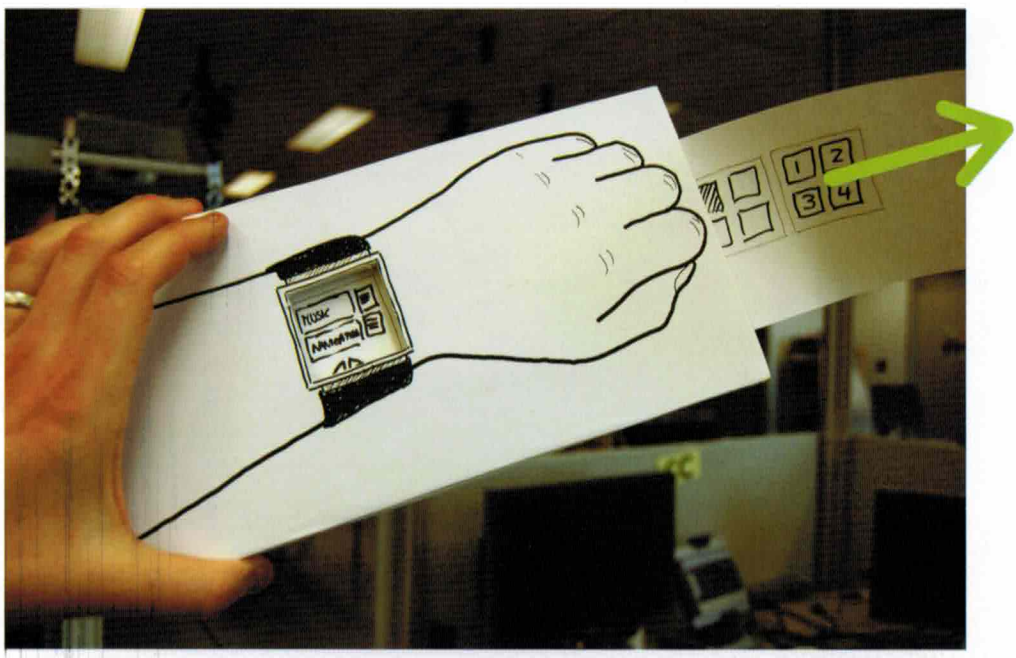


10 Slide this paper strip into the model and use a pencil to draw outlines of the display onto the paper strip. After each drawn rectangle, slide the paper strip further until the just drawn rectangle disappears. Continue until you have a series of rectangles on the paper.

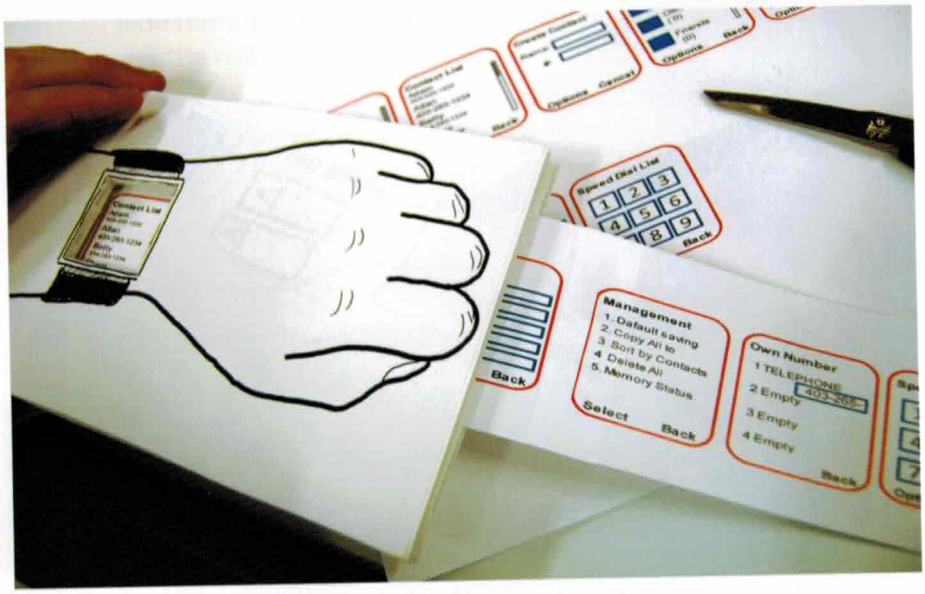
11 Using one or more of the techniques learned in earlier chapters, sketch the storyboard as a series of graphical user interface screens that fit within these boxes. Chapter 4.1 will discuss storyboards in more detail.



12 The foam core and paper prototype of our touch-screen watch is now finished. Demonstrate interaction with the watch to another person by sliding through a sequence of user interface stages on the paper strips. You can even have them 'touch' the appropriate control before moving to the next screen.



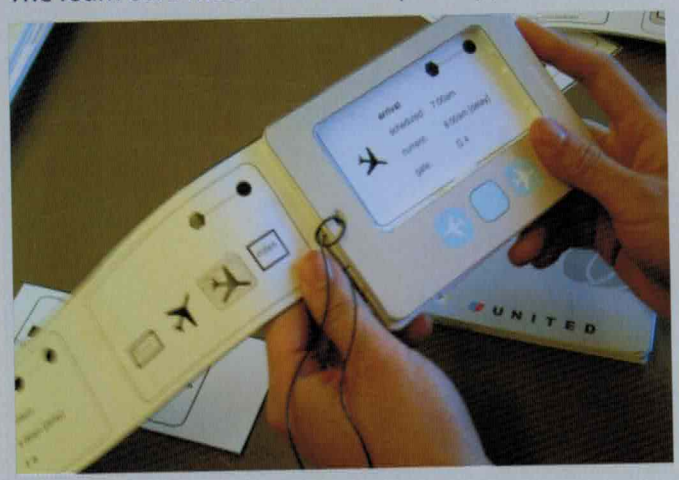
13 Instead of sketching each screen by hand, you can also print out screens created digitally; the only constraint is that the screen size must fit the size of the cut-out. For example, the image below illustrates screens created for a user interface sequence discussed in the next section of this book (Chapters 4.1 – 4.3).



14 As an exercise, create multiple storyboards, each showing a different aspect of the watch, or a different scenario of use, or perhaps even a different way of interacting with the watch. For example, use the same foam core model (but different storyboards) to create a watch that responds to single touch, to multi-touch, and to voice input.

Variation

The foam core model below is a prototype of a hand-held device. Unlike our above example that is mounted on a foam core 'arm', the device is used directly.



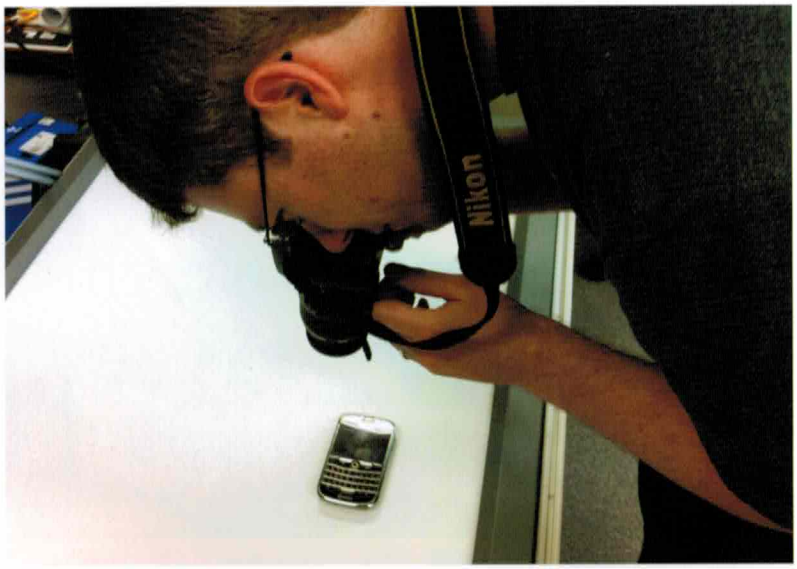
The buttons on the device as well as the sketches were produced digitally, giving the prototype a much more realistic 'final' appearance. This is appropriate for a sketch far down in the design funnel.

The image illustrates a project by Sue-Tze Tan from the Department of Industrial Design, University of Washington, and is reproduced from Bill Buxton's *Sketching The User Experience*.

METHOD 2: USING PHOTOS TO PROTOTYPE EXISTING DEVICES

Many interaction designs involve legacy devices, where the interaction designer has to build an interface that works within the constraints of an existing device, such as a smart phone or a tablet computer. Somewhat similar to the technique shown above, you can build simple mockups of existing devices out of foam core. The idea is to paste photos of such devices atop the foam core. This gives your model a realistic appearance and size (the front layer). As in the previous example, you then create a back and middle layer to hold the screens you design.

1 Begin with a front-facing photo of the device you are interested in. Our example uses a specific mobile phone. If it's a popular device, you will likely find a suitable photo by searching the web. Otherwise, take a photo of its front side, as we did below.



2 Print out the photo of the device. Make sure to use the right printing scale factor to make it life-size.

3 Glue the photo atop one of the foam core sheets.

4 Cut around the phone's outline so only the photo surface is visible.

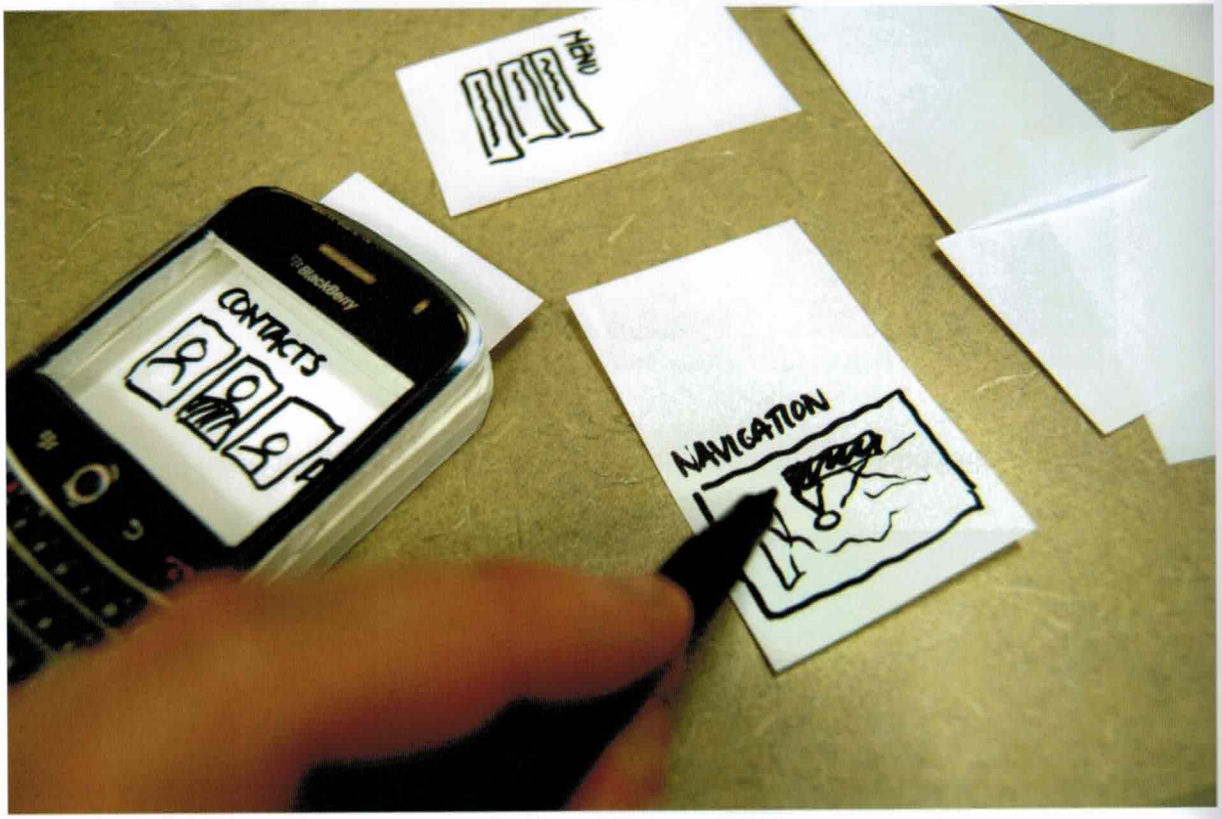
5 Cut out the opening that you want to use as displays (e.g., the center area of the phone).

6 Create the phone's back and middle layer.
For the back layer, cut some foam core the same size as the front layer.
For the middle layer, cut foam core the same size as the front layer, but also cut into it a U-shaped space that will create a 'foam core sandwich' that holds the displays.

7 Glue the foam core pieces together: back layer, middle layer, and front layer.

8 This particular foam core model only holds one screen at a time. Consequently, create sketches of each screen on small pieces of stiff paper (e.g., cut from index cards), each ordered in a sequence. Cut the sheets of paper in the same width as our opening of the foam core model. Make the height of these cards a little bit longer so that a 1–2 cm part of the paper comes out of the foam core model once we put the sketches inside. This way it is easier to grab each page and slide it out of the device once you go through your interaction sequence later.

9 To demonstrate interaction with this device, put the paper cards with the interface sketches inside the foam core model. Then take out one card after another.



10 To illustrate a sequence, slide the paper into the middle section of the foam core sandwich. Have the 'user' perform an action, then remove that sheet and replace it with the appropriate next screen.

Note

The strips in the first example are convenient and provide a smooth demonstration, as you just have to slide the strip in the tray. However, it is limited to show a strict sequential sequence (see Chapter 4.1). The individual cards in the second example are less convenient to show and display, but are far more flexible. The next screen can be one of several available, where the one chosen and slid into the foam core model depends on the user's action (see branching storyboards, Chapter 4.3). As well, alternate screens can be sketched at any point and slid into the model. For example, a discussion with the user of your prototype may inspire a new screen design, which can be sketched and tried out immediately.

Note

There are many other materials available that can be used to create physical props and models. Some are easily used and formed, such as with clay and wire. Others require special tools, such as wood, but the result will be a more robust and durable model. Still others require specialized equipment and knowledge, such as using 3D printers to create highly detailed and still durable models.

YOU NOW KNOW

You can now create sketches out of physical materials such as foam core sheets. By simply cutting the boards and gluing them together you can quickly create physical props and models imitating the form factor of your end device. Paper-pencil storyboards and sketches can then be used in conjunction with your model to simulate the interaction with that device.