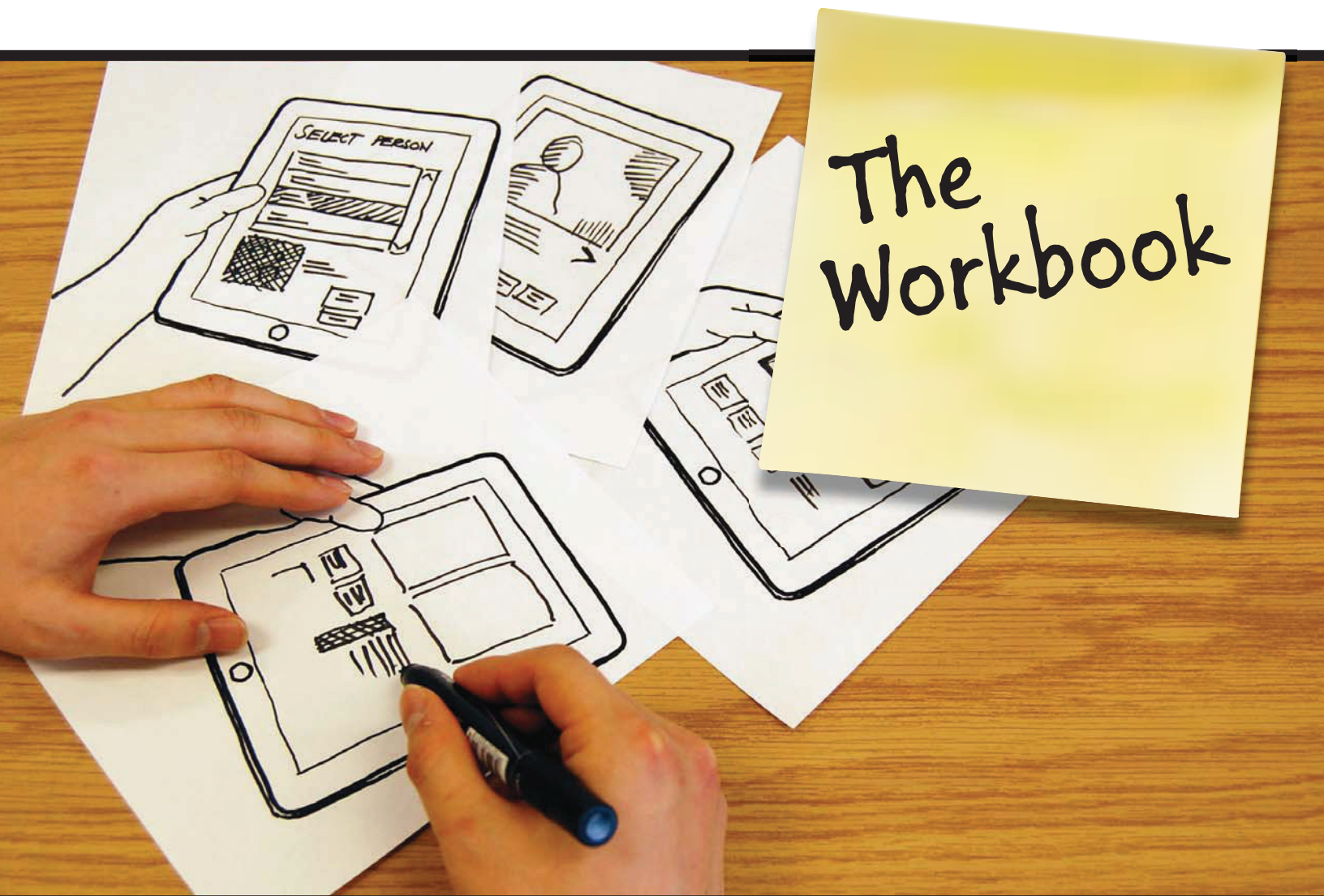


# Sketching USER EXPERIENCES



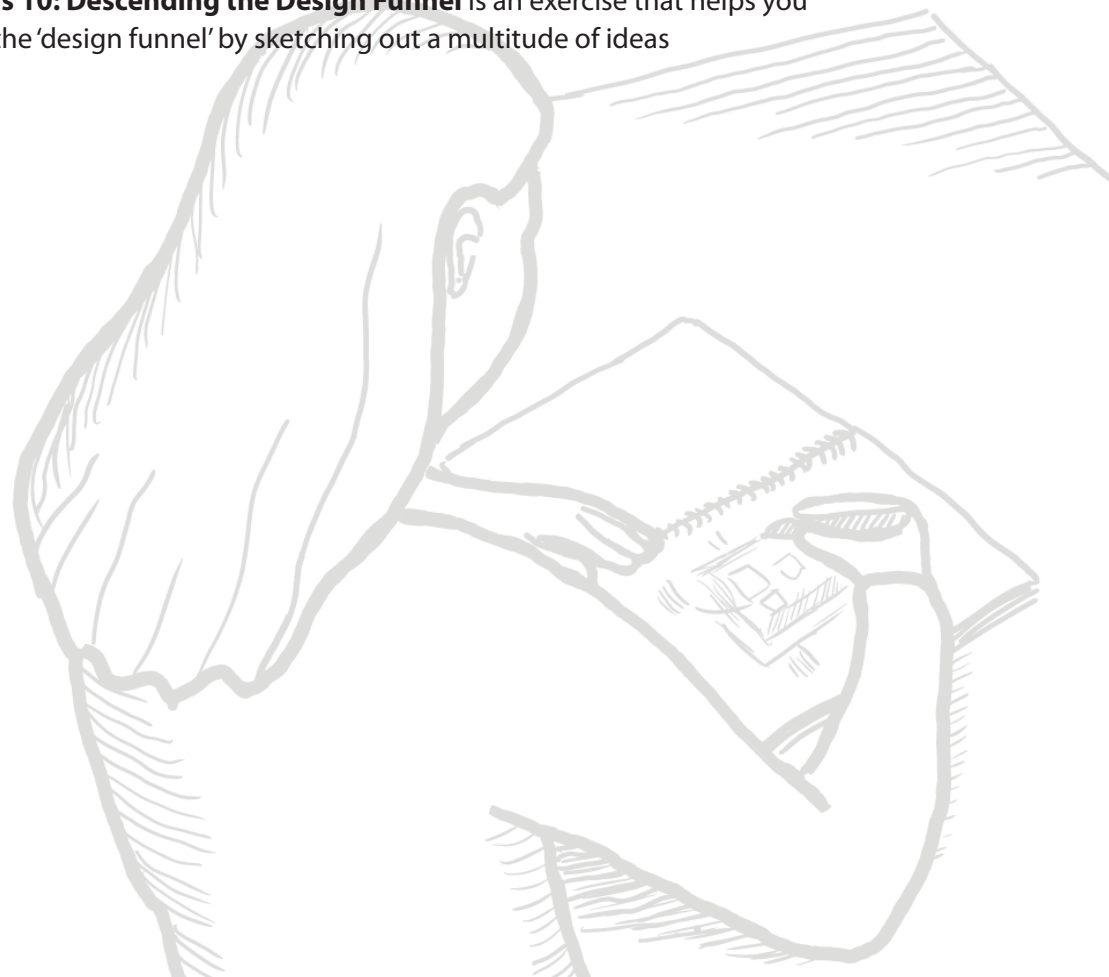
Saul Greenberg  
Sheelagh Carpendale  
Nicolai Marquardt  
Bill Buxton

# Section 1

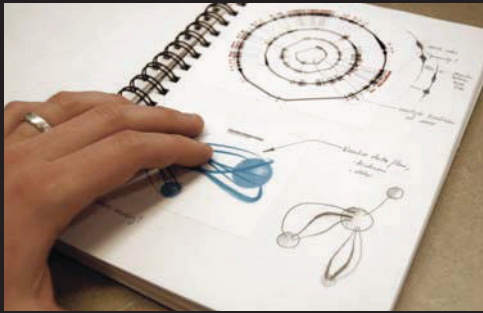
## Getting in the Mood

Let's get into the sketching mood. What is a user experience? Why is sketching a good way for you to think about and generate user experiences? Why do so many designers carry a sketchbook, and why should you join them? How can you begin sketching to brainstorm and refine your design ideas?

- 1.1 Introduction** introduces why user experience designers need to consider sketching, and how sketching user experiences differs from normal sketching
- 1.2 Why Should I Sketch?** motivates and describes sketching as a design process, where sketching becomes part of the way you think as a designer
- 1.3 The Sketchbook** details the function of your sketchbook: its uses, best practices, and its properties
- 1.4 10 Plus 10: Descending the Design Funnel** is an exercise that helps you enter the 'design funnel' by sketching out a multitude of ideas







# Introduction

1.1

sketching the user experience

## MISSION

To give you, the novice to intermediate user experience designer, step-by-step instructions on a variety of sketching techniques.

## WHAT THIS BOOK IS ABOUT

Sketching has long been a best practice for designers. Through sketches, designers follow a generative process of developing, honing, and choosing ideas. Designers also use sketches to discuss, exchange and critique ideas with others.

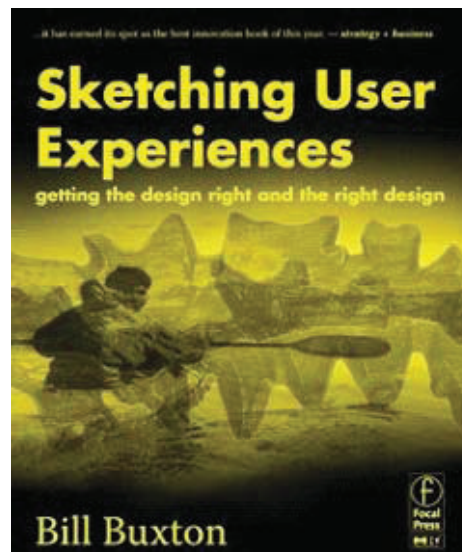
**User experience designers** are a special breed of designer, for they focus on creating a user experience that unfolds over time. Thus their design sketches need to incorporate the actions, interactions, and changes of this experience across time. In this workbook, we use step-by-step instructions to teach various sketching methods that capture this time element. Collectively, these methods will be your sketching repertoire: a toolkit where you can choose the method most appropriate for expressing your design idea.

Our hope is that you, the user experience designer, will learn these methods with other workmates, which in turn will help you cultivate a culture of experience-based design in your workplace.

## COMPANION BOOK

You can use this workbook as is. However, you will get even more out of it if you read Bill Buxton's book: ***Sketching User Experiences: Getting the Design Right and the Right Design***, Morgan Kaufmann (2007). That book is somewhat more theoretical, and will get you thinking about *why* you should sketch, while this workbook serves as a how-to guide to actual sketching methods.

You don't have to read Buxton's book, as we summarize his main points in Chapter 1.2. While we still recommend his book for its deeper background and discussions (and because it is also fun to read!), our summary should get you into the right frame of mind.



## WHY SKETCH?

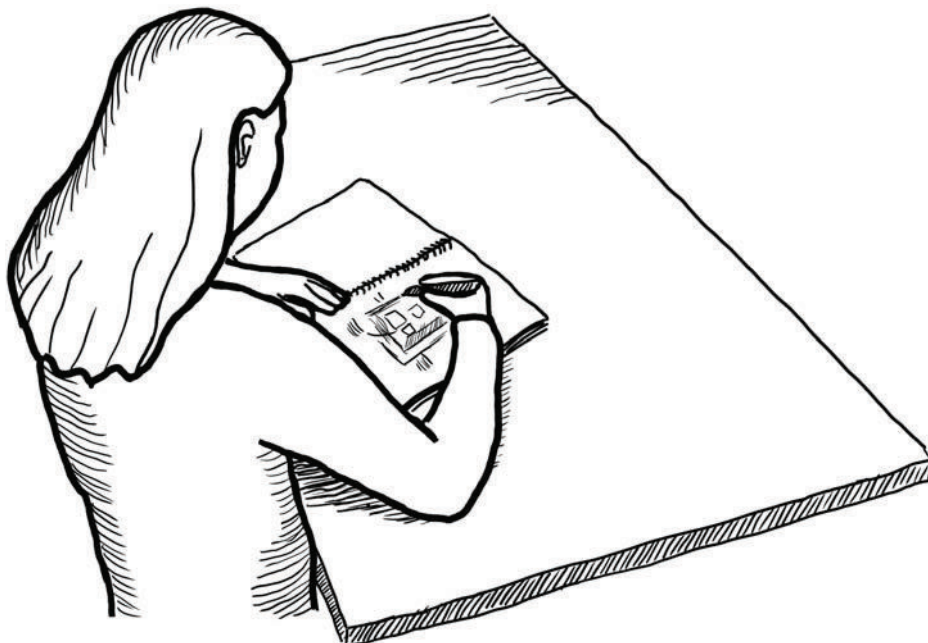
When you learn and apply these sketching techniques to your daily design practice, the act of sketching will help you:

- think more openly and creatively about your ideas;
- create abundant ideas without worrying about their quality;
- invent and explore concepts by being able to record ideas quickly;
- record ideas that you come across;
- discuss, critique, and share ideas with each others;
- choose ideas worth pursuing;
- archive your ideas for later reflection;
- have fun creating while designing.

## Doing Rather Than Reading

Reading about a sketching technique is different from actually doing the technique. In this workbook, we choose examples that encourage you to do these sketching techniques as you read about them.

- The examples we use to illustrate the sketch method are deliberately trivial, so that the focus is on the sketching technique rather than on the interface being created.
- The sketched examples are designed to be easy to reproduce.
- The instructions are supported with rich graphical layouts and photographic images to provide visual references and to make the steps more memorable.
- The chosen sketching techniques are inexpensive. The materials and tools required to do a particular technique are commonly available, well documented, and have a reasonably low learning curve.





# AUDIENCE

## You, The Reader

You are likely a person who wants to learn, understand, practice and even teach experience design. This includes all professionals, amateurs, and students with interests in user experience design, interaction design, interface design and information architecture, but who have not been trained within a conventional design discipline. It also includes designers who do have such training, but who have not specifically practiced the time element that is so critical to interactive interfaces. Regardless of your background, little prior experience is required: anyone can learn these methods.

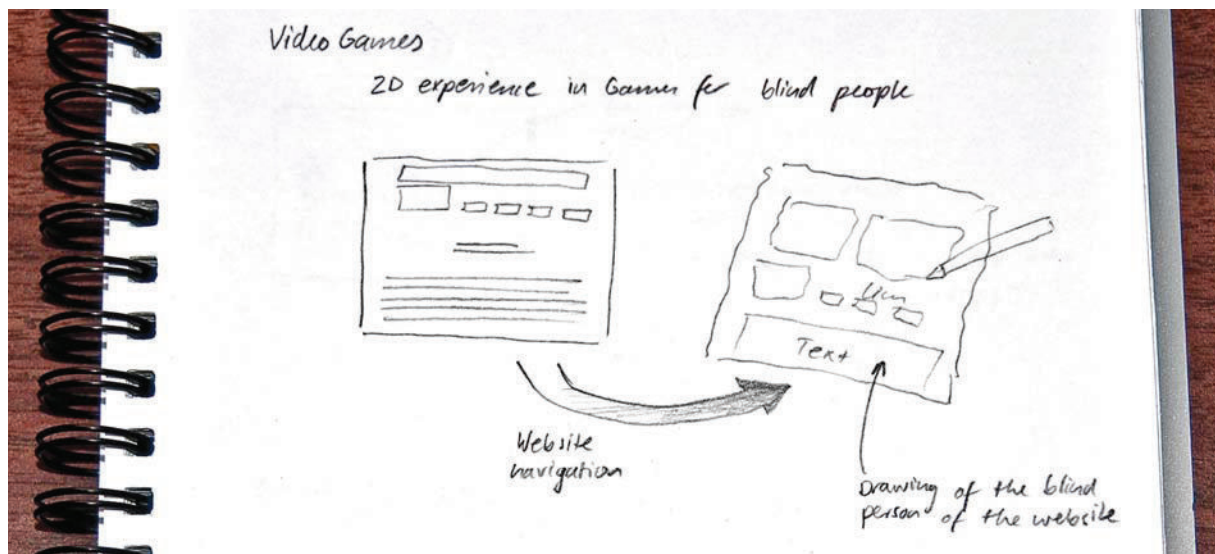
## You, The Learner

Your community will affect how you learn and practice these sketching methods. You may be:

- an individual practitioner of interaction design, where you are developing and/or supplementing your own skills;
- a group of people (e.g., an interface design team) who are self-teaching and acquiring experience methods collectively, perhaps over one or more informal-bag lunch sessions;
- an attendee of a formal professional training program, e.g., put on by a company to promote ongoing skill acquisition, and perhaps to help create a design-oriented culture within that company;
- a student in a university, college or high school class on interaction design, where your instructor is mixing theoretical lectures with practical sketching assignments.

## You, The Bad Artist

The methods in this book do not require high or even intermediate levels of artistic skills. As you will see, the very best sketches are sometimes just rough line drawings.



## STRUCTURE OF THIS BOOK

We categorize different sketching techniques into sections. We begin with some motivation on why you should sketch, and introduce the sketchbook as your most basic resource. We then introduce methods that let you gather ideas from the real world, where these ideas can inspire how you think as a designer. We continue with sections devoted to sketching methods. These are ordered primarily by the temporal characteristic of a sketch: from sketching a single moment in time, to illustrating snapshots of interactive activities over time, to animating continuous sequences. We end by showing you several ways that you can involve others in your sketching process, where their reactions and feedback can provide valuable insight into how your ideas could be improved. Sections are progressive, where we layer and build upon concepts presented in previous sections.

Sections contain chapter modules that in turn contain a particular idea or sketching method. In each module, we explain how the idea or method should be used, and describe, illustrate, and annotate all its key steps. Each module describes what special materials and tools are needed (if any), steps on how to set up the sketch, and how to do the sketch. The how-to instructions are also supported with tips and hints.

The workbook also practices what we preach. Each chapter is richly illustrated with many sketches, all which we created using the various sketch methods introduced in this book. Look at them for further inspiration.

Enjoy!



# Why Should I Sketch?

1.2

a synopsis of Buxton's Sketching User Experiences: Getting the Design Right and the Right Design

Why sketch? Why should you care? Why should you even bother to learn sketching skills? Bill Buxton, one of the authors of this workbook, answered these question in his 2007 /book: ***Sketching User Experiences: Getting the Design Right and the Right Design***. We do recommend you read that book – its engaging, fun, and chock-full of good advice.

This chapter is for those who haven't read the book, or who need a reminder of what that book is about. It is a synopsis of Bill's argument about why you and your organization should care about sketching.

## SKETCHING IS ABOUT DESIGN

Sketching is not about drawing. Rather, it is about design. Primarily, it is:

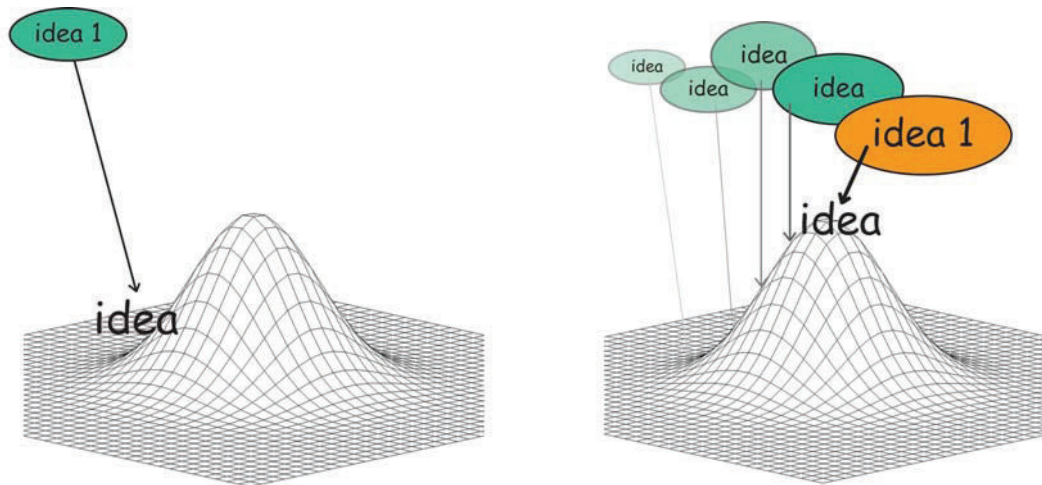
- a fundamental tool that helps designers express, develop and communicate design ideas;
- a critical part of a process that begins with idea generation, to design elaboration, to design choices, and ultimately to engineering.



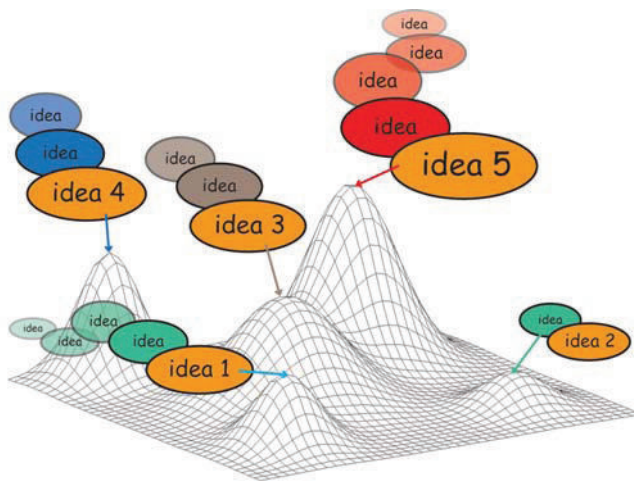


## GETTING THE DESIGN RIGHT

**Getting the design right** is about starting with a single design idea – usually the first idea you generate (left figure), and then continually evolving, improving, and developing it (right figure). As seen in the figure, we can think of the design space of an idea as a 3D hill. The best possible design of the idea is at the hill's peak, and other lesser designs are below. The goal is to discover the optimal design solution for that idea, ie. to get as close to the peak as possible. This is iterative design, and how most engineers and software developers are trained to think about design.



### The Problem



The problem is that the above design can only be as good as that particular idea. If the idea is not a good one, then the 'best' design solution will only be so-so. Consider the figure on the right, which envisages how other design ideas may have fared in the design space.

No matter how hard you work on that first idea, you won't get to other potentially better ideas. The point is that if you consider many ideas rather than a single one, you may find a better overall solution. Computer Scientists even have a name for this problem: **local hill climbing**, where the local maxima is potentially much less than the optimal (the global) maxima.

To illustrate, consider cell phone design. For years, cell phones were based on the design idea of a physical keyboard and screen. They evolved considerably. Yet it was a different idea – the cell phone with a touch display and no physical keyboard – that radically moved cell phone design into a new direction and created a new market.

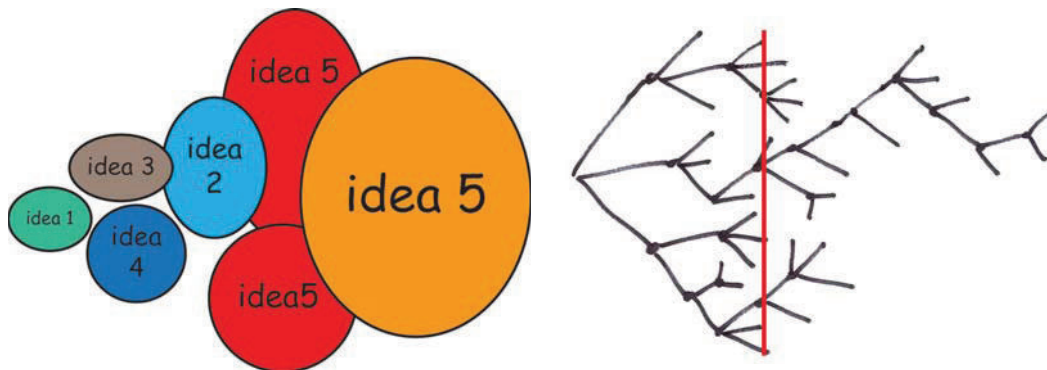


## GETTING THE RIGHT DESIGN

**Getting the Right Design** is about considering many other ideas and then choosing between them (see figure below, left). That is:

- generate many ideas, e.g., inspired by brainstorming, discussions, lateral thinking, client discussions, observations of end users, etc;
- reflect on all your ideas;
- choose the ones that look most promising and develop those in parallel;
- add in new ideas as they come up.

The right figure illustrates this process as a tree, where *multiple solutions* are developed, and choices made about which of the one or more branches - ideas - are worth following.

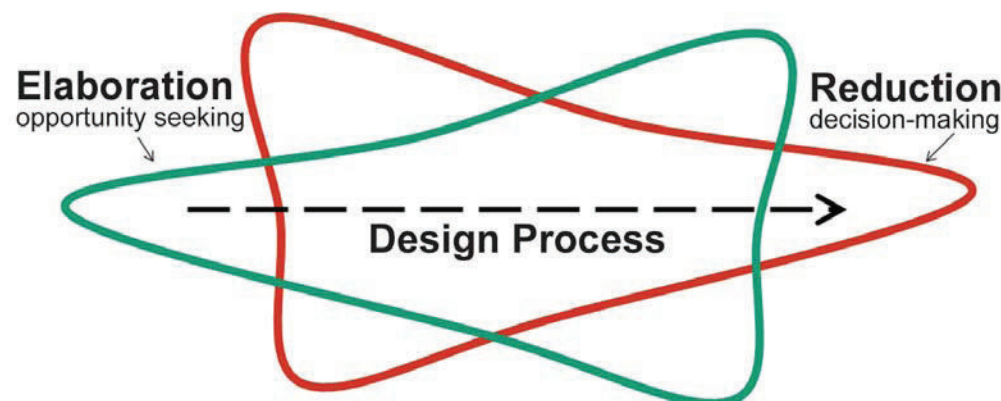


## ELABORATION AND REDUCTION

Paul Laseau (1980) had another way to look at this, where he described the design process as a symbiotic relationship between idea *elaboration* and idea *reduction*.

- **Elaboration:** generate solutions. These are the opportunities.
- **Reduction:** decide on the ones worth pursuing, and then elaborate on those solutions.

As a designer, you elaborate to expand your repertoire of ideas, while at the same time reducing the number of ideas – ultimately to the one that is most promising.



### Tips

Design as the process of elaboration and reduction implies that design has two places where there is room for creativity:

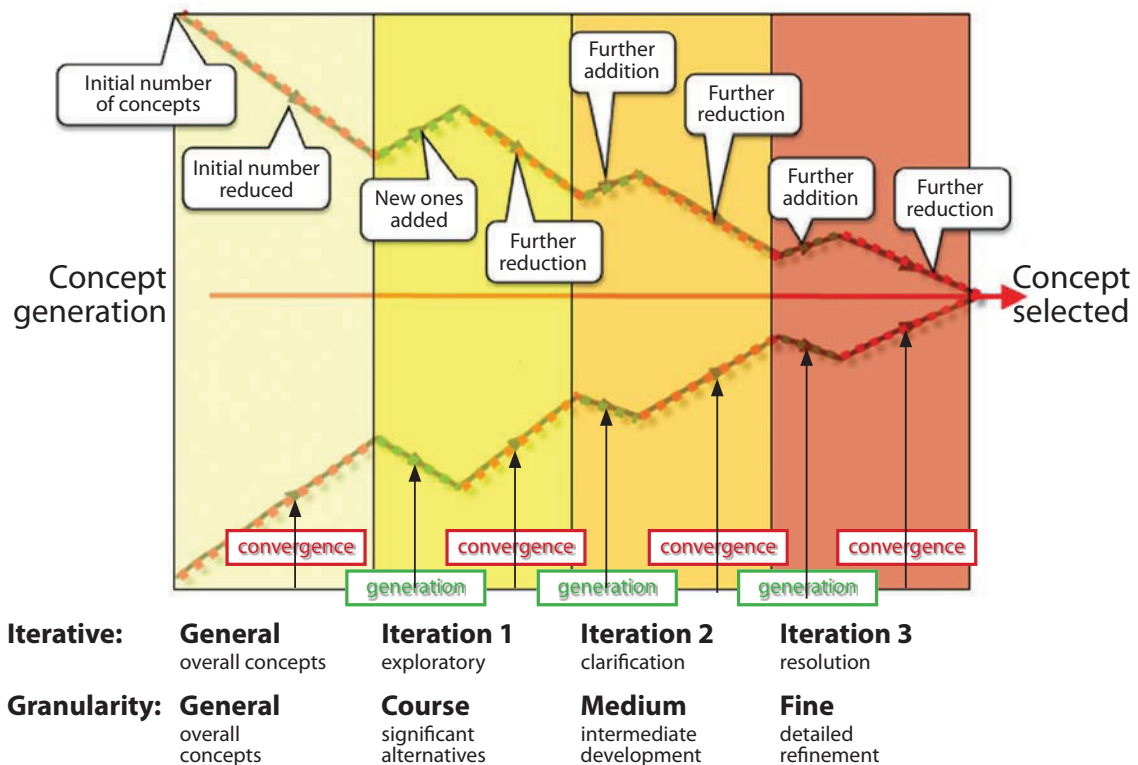
1. the creativity that you bring to enumerating meaningfully distinct options from which to choose
2. the creativity that you bring to defining the criteria, or heuristics, that you apply to help make your choices

## THE DESIGN FUNNEL

Stuart Pugh (1990) illustrated elaboration and reduction as a **design funnel**. Of importance is that the generation of ideas and the convergence of ideas alternate, with the process gradually converging to the final concept. As a funnel:

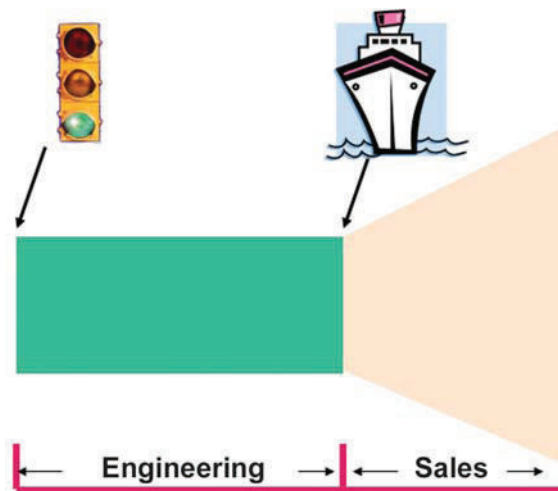
- each stage is iterative, where one constantly generates and reduces ideas until resolution;
- the granularity of idea exploration and development is (usually) finer as these iterations progress.

Initial ideas may explore extremely different concept designs at a very high and course level. The next stage may explore significant variations of these ideas. Further stages may try to clarify design issues where ideas are explored at finer granularity, until resolution is reached. Of course new radically different ideas may emerge at any time, and should be incorporated.

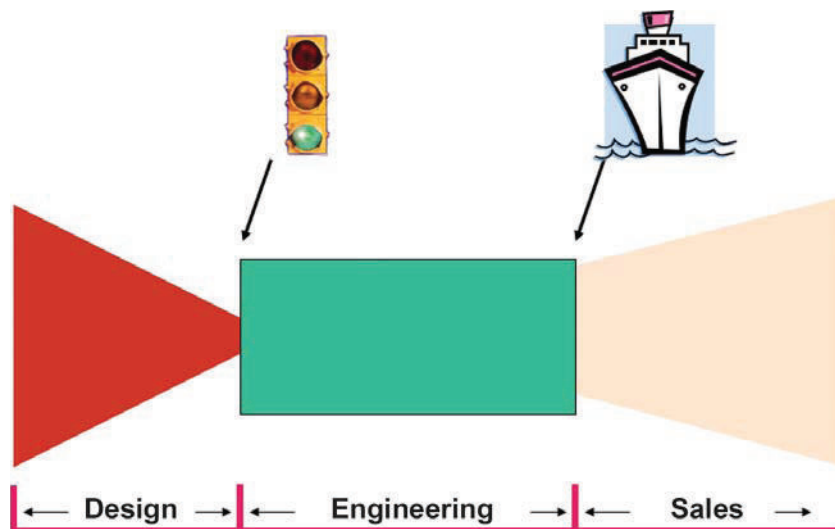


## THE PRODUCT VIEW

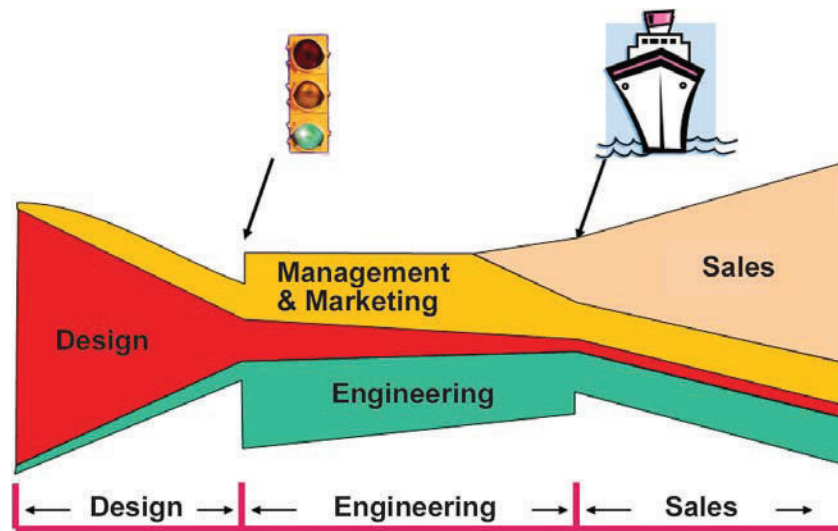
Let us now consider the importance of design in the software product life cycle. The 'status quo' is that product ideas are judged right at the start, where they are stopped (**red light**) or given the go-ahead (**green light**). If a green light, they go directly to engineering where the product is built. The next phase is when it ships – usually late, with bugs, over budget, and missing functionality.



By inserting an explicit design process prior to the green light, many designs can be considered before any commitment is made. The design funnel generates and develops ideas in parallel, where it filters and eliminates designs until convergence. At that point one or more designs can be considered for green light.



Perhaps a more accurate picture is shown below, as it shows the interplay between design, engineering, management and sales throughout the entire product cycle. That is, engineers, managers and marketers will work with designers on the early stage, while designers still keep a hand in the process during engineering and sales (perhaps to fix some problems as they occur, or to spark the next generation of this product).



## References

- Buxton, B. (2007) *Sketching User Experiences: Getting the Design Right and the Right Design*. Morgan Kaufmann.
- Laseau, P. (1980) *Graphic Thinking for Architects & Designers*. John Wiley and Sons.
- Pugh, S. (1990) *Total Design: Integrated Methods for Successful Products Engineering*. Addison-Wesley. p. 75.

## YOU NOW KNOW

Why sketch? Why should you care? Why should you even bother to learn sketching skills? You now know the answers.

1. Sketching is about design, not just drawing.
2. The design process is about getting the right design, and then getting that design right.
3. The design funnel describes this as an interplay between elaboration and reduction
  - generating and elaborating designs;
  - choosing and reducing between designs.
4. Design in product development is about
  - using the design funnel to develop ideas;
  - then considering the best one for green/red light appraisal.





# The Sketchbook 1.3

your basic resource for recording, developing, showing and archiving ideas

The regular use of a **sketchbook** is perhaps the most prevalent best practice found across all design disciplines. Many designers keep a sketchbook with them at all times. They use it to record and elaborate their ideas as they come to mind, to gather ideas, notes or artifacts of interest as they see them (especially those that may inspire future ideas), to 'doodle' half-formed thoughts, and to share ideas with others by showing particular sketches.

The sketchbook is particularly valuable as it encourages its owners to collect and develop a multitude of ideas and choose between them, rather than to fixate on a single idea. As explained previously this process of distilling between many ideas is **getting the right design**, whereas the process of developing a particular idea (e.g., through iterative refinement or usability engineering) is **getting the design right**. The former emphasizes design that chooses between idea alternatives, while the later is the creative engineering that refines a particular idea.

## WHY A SKETCHBOOK?

Real progress in developing yourself as an interaction designer will depend on you frequently and habitually sketching out your ideas and their variations, recording other people's ideas you may see, reflecting and choosing between these ideas, and then further developing those ideas that seem promising. The sketchbook records all these. Carrying the sketchbook with you at all times will help you incorporate sketching and reflection into your daily routines.

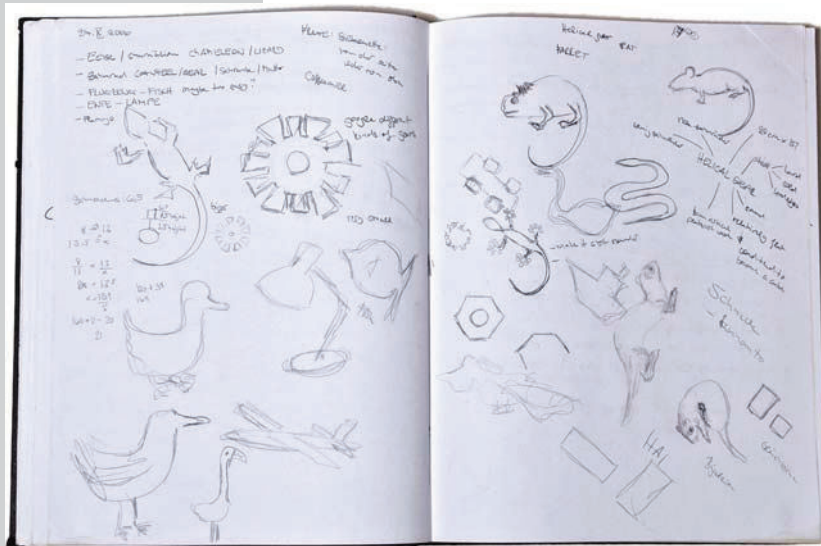
## USES OF A SKETCHBOOK

Sketchbooks are useful in many ways. It is a place where you should:

- Jot down and annotate your own initial ideas - and there is no such thing as a bad idea!
- Explore and refine ideas both in the large and in the small.
- Develop variations, alternatives and details.
- Refer back to your ideas and reflect on how your thought processes have changed over time.
- Record other good ideas you see elsewhere e.g., in other systems, in your readings, and in your colleagues' work.
- Collect existing material (e.g., pictures from magazines, screen snapshots) and tape them into the sketchbook.

### Materials

- sketchbook of your choice
- pencil
- eraser



- Develop your skills, your accuracy and your confidence in sketching out your ideas through regular use.
- Be ready to explain them. Sketches do not have to be pretty, beautiful, or even immediately understandable by others. However, you should be able to explain your sketches and ideas when anyone asks about them.
- Use it as an archive. Designers often keep their filled-in sketchbooks for years. You never know when an 'old' idea will come in handy.

## Tips

Always carry your pencil and your sketchbook with you. If you have a coiled sketchbook, you can store the pencil in the coil, which safeguards the nib. You may have to plug the ends of the coil to stop the pencil from falling out (some crumpled paper works).

## BEST PRACTICES

- Always carry your sketchbook with you everywhere (a 2<sup>nd</sup> small sketchbook is helpful). Jot down ideas as you think about them.
- Always have a pencil handy.
- Sketch frequently, e.g., at least several times a day.
- Fill pages with a series of related drawings about a design idea, or with a single well-composed design idea.
- Consider alternatives (getting the right design). A series of sketches related to the same interaction problem might explore different aspects of the interface. These could include different interface representations, different interaction details, different screens, different levels of details, different contexts of use, and so on. Each page can become a series of studies that will help you develop and reflect on the many ideas you will have.
- Consider details (getting the design right). Follow through on a sketch that captures the essence of a design with more detailed sketches that elaborate on its nuances.
- Annotate drawings appropriately, including information such as descriptions for ideas that you cannot draw out well; textual addendum; sources of your ideas (e.g., books, magazines, collaborators, classmates), creation date, and any other relevant information.
- Do not erase ideas because they are messy or because you no longer like them. Your sketchbook is a record of all your developing ideas, good and bad, not just of your final work.
- The sketchbook is for design only - do not use it for other things just because you do not have any paper.

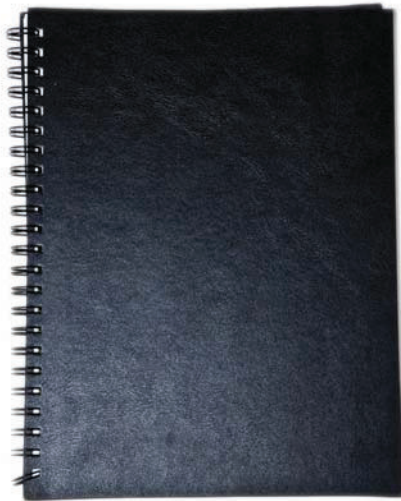
## PROPERTIES OF GOOD SKETCHBOOKS

There are myriads of sketchbooks available, most at reasonable cost. While the choice of sketchbook is personal, there are some properties that make some sketchbook preferable to others.

Buy a nice sketchbook so you can take pride in it. Many designers consider the sketchbook as the 'badge' of their profession! Hard covers are far more durable than soft covers, but are somewhat thicker and heavier. Sketchbooks come in either coiled or sewn bound and there are advantages and disadvantages to both. Pages can rip out of cheaper coil bindings. However, coil bindings will let you completely fold over your sketch book so that only one page is in view, which is handy when space is tight. A sewn bound book is more durable, but most do not let you fold it over.

### Tip

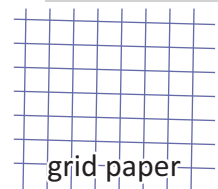
The paper style (grid, textured, plain) is very much a personal preference. As you use your sketchbook, you will discover what paper style works best for you.



**Coiled Binding**  
Semi-Hard Cardboard Cover



**Sewn Binding**  
Hard Cover



grid paper

plain paper



textured paper

Sketchbooks also come in various size.. 8½" x 11" or 9" x 12" are typical, and well-suited for most sketches you may make. However, a large sketchbook is of little use to you if you don't have it with you at all times. Thus you may want to keep several sketchbooks of different sizes: a larger one to keep in your pack or briefcase, and a smaller one that fits in your handbag or pocket. Paper thickness also affects portability. Better sketchbooks have thicker paper (which is nicer to draw on), but adds bulk. If you are uncertain about these trade-offs, the key to your choice is to choose at least one sketchbook with a form factor that guarantees you will always have it with you.





**Note**

Pencils come in different darkness, and felt pens come in different nib thickness. Both are often purchasable as a set. Having a set available can help you emphasize or mute different parts of your drawing, perhaps to show what parts of your idea are more certain versus those that are more speculative.



pencil set



felt pen set

**DRAWING MATERIALS**

A sketchbook is of little use without something you can draw with. While there are many drawing tools available, you should – at the very least – always carry a pencil or two with you. Pencil leads vary considerably, with 3B being the most popular (see sidebar). Pens should be avoided unless you are practiced with them: they don't allow you to vary the thickness or blackness of your sketching marks. Other drawing tools can help you add richness and accuracy to your sketches: erasers,



pencil sets, coloured pencils, markers, paints, charcoal, rulers, compasses, French curves, and so on. Glue and tape will let you paste in material you generated or gathered elsewhere. These are all less portable, but you can always keep them at your normal place of work.

However, remember that a sketch is primarily about recording and elaborating an idea – you can easily get carried away with making a sketch too pretty or accurate. This is why the pencil is your most important sketching tool. Think about keeping a few basic tools with you at all times, and a richer collection of tools in your usual work space. Experiment! Try different tools and see how they influence your idea sketches.

**YOU NOW KNOW**

A sketchbook is a designer's most fundamental tool. Through it, you can capture and elaborate ideas as they come to you, and review and reflect on them later. Yet a sketchbook can only help you if you carry it with you, and get in the habit of using it. Make it one of your 'best practices'.



# 10 Plus 10: Descending the Design Funnel

1.4

developing 10 different ideas and refinements of selected ideas

The **design funnel** describes a process that you, as an interaction designer, need to habitually apply whenever you think about design problems. This won't happen if you just read about it. You need to do it. As a warm-up to this book, this chapter introduces the **10 plus 10 method** to help you descend into the design funnel. It is more than just an exercise: you should repeat this method as much as possible over design problems that you encounter.

We include three design challenges below as a starting point for you to apply this method, where we provide a worked 'solution' to the first challenge. We deliberately chose challenges that demand novel solutions: it is sometimes harder to generate ideas when existing solutions exist, as they tend to limit how we think about the possible solution space.

## THE 10 PLUS 10 METHOD

### 1. State your design challenge.

It may be framed as a particular problem you want to solve, or around a need stated by a client, or even just as a desire to build a novel system that takes advantage of a new technology.

### 2. Generate 10 or more different design concepts of a system that addresses this challenge.

This is akin to brainstorming. Your goal is to be as creative and diverse as possible, where you generate many initial concepts. Don't try to judge the merits of these concepts; the important thing is to quickly generate as many as possible. While we will describe sketching methods in later chapters, just do the best you can for now. Try to sketch your concepts as quick drawings, but feel free to annotate them or to accompany them with descriptive text as needed. Your sketches can be quite crude: don't worry about how beautiful or ugly your sketch is.

### 3. Reduce the number of design concepts.

Review your concepts, where you discard those that don't seem to have much merit. For those that remain, use your sketchbook to show and explain your design(s) to others. Of course, feel free to go back to step 1, where you generate and more ideas, and reduce them as needed.

### 4. Choose the most promising design concept(s) as a starting point.

You will know which concept (or handful of concepts) are the most exciting and promising by how you think about them, how you present them to others, and how others react.



**5. Produce 10 details and/or variations of a particular design concept.**

Using your sketchbook, explore the concept. First, try to generate different ways of realizing that particular concept. Second, go a bit deeper into a particular concept, where you try to flesh out details of your idea.

**6. Present your best idea(s) to a group.**

For example, offer to buy your colleagues coffee and donuts during a coffee break, where the cost of admission is to hear you present your idea. Solicit feedback from them. At this early stage, tell your audience that the best feedback they can give will be suggestions about possible redesigns.

**7. As your ideas change, sketch them out.**

Continue to refine and generate your concept as needed.

## DESIGN CHALLENGE 1: CONNECTING TWO SMART PHONES

### 1

**The Design Challenge**

There are many cases when you may want to connect your mobile smart phone to a nearby person's smart phone, for example, to exchange information such as photos and contacts. While the network infrastructure is there for one phone to detect and connect to other nearby phones (e.g., via Bluetooth), security requires that people somehow authenticate that connection through some initial sequence as there may be many people with smart phones within range. This usually involves dialog boxes, cryptic requests, and other demands on people that make this both tedious and difficult.

For this exercise, brainstorm 10 novel ways that two people can connect two mobile devices together that does not demand these painful dialogues.

**Assumptions**

- Your mobile device detects all phones in nearby range and can communicate to them in a limited manner.
- You and the person you want to connect can perform some action that both phones recognize as a 'handshake' affirming that a full connection can be established. That is, it exploits social convention where you both agree to do something.

**Hint**

Think outside of the box. Actions can be captured by typing, by sensors, and by any input/output mechanisms on your mobile device (accelerometer, strobe light, screen, touch, microphone, camera, etc.).

**Credit to others**

This exercise and some of the solutions were inspired by Ken Hinkley's paper listed in the references section, as well as the Bump! app produced by Bump Technologies.

## 2 Generate at least 10 competing (very different) design concepts

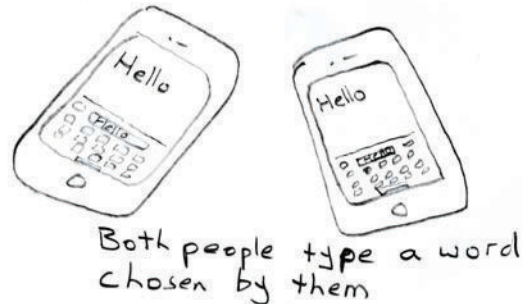
Before reading on, try it yourself. If you are unsure, take a look at one or two concepts below to get into the right mood, and then continue on your own.

A variety of quickly sketched concepts I came up with are illustrated below. Note that while the sketches are quite simple and crude, they suffice to capture the basic concept. Also note that there is no attempt here to differentiate between good and bad ideas – we are still at the brainstorming stage!

### a

#### Entering an agreed upon keyword.

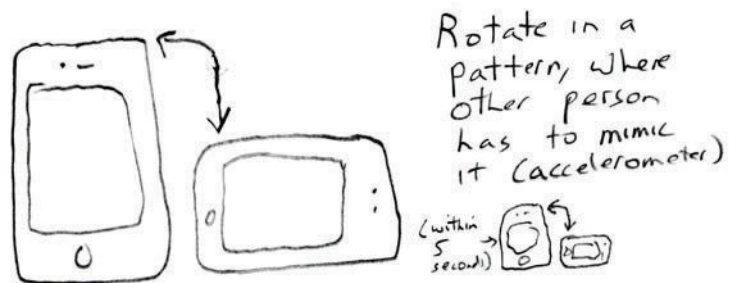
Both people start an 'authentication' program, which merely asks them to type in a word. They decide on a word, and type it in. Because the word matches on both phones, the connection is authenticated.



### b

#### Mimicking a rotation pattern.

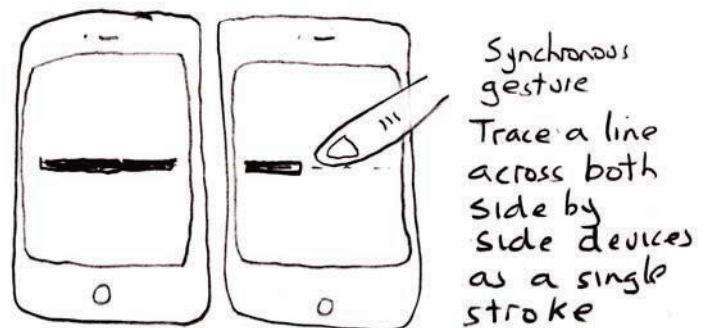
A person rotates the phone in a certain pattern. The other person watches and does the same pattern within a certain amount of time. The accelerometer data on both phones are checked; if they are similar, the connection is authenticated.



### c

#### Tracing across displays.

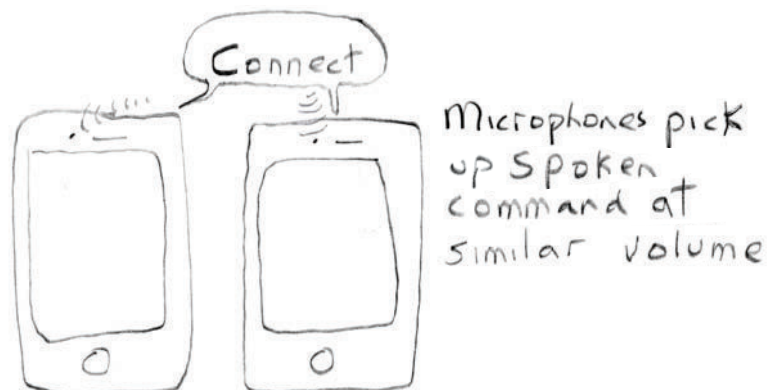
The two phones are held side by side and a line appears on the same place on each of them. One person uses their finger to draw the line across both displays as a single stroke. The touch screens on the phones capture and analyze the timing of the stroke and use that to authenticate the connection.



### d

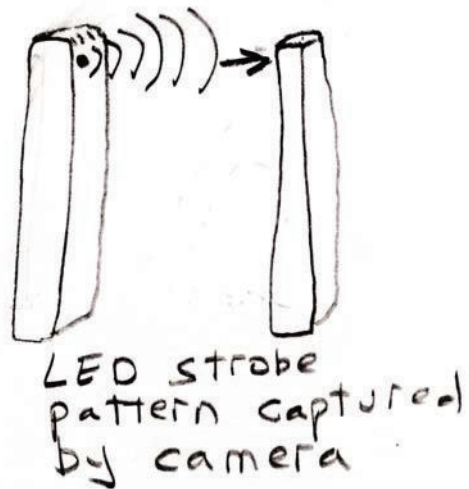
#### Speak a command.

Two phones are held side by side and the word 'connect' is spoken into their microphones. The word is recognized and the volume levels are checked across both phones; if they are similar, then the connection is authenticated.



## e Recognize a phone's flash strobe pattern.

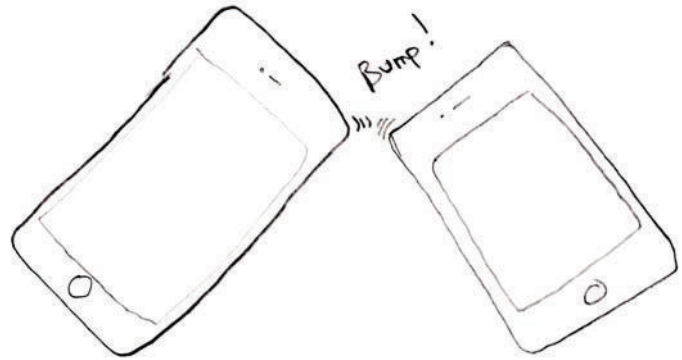
The flash on one phone is turned on as a strobe pattern. The other phone's camera is pointed directly at it. The intensity is checked to make sure that the other phone is very close to the camera, and then the pattern is detected and analyzed to see if it matches.



## f Bump two phones together.

The accelerometer data is compared to see if the same bump pattern occurs at the same time.

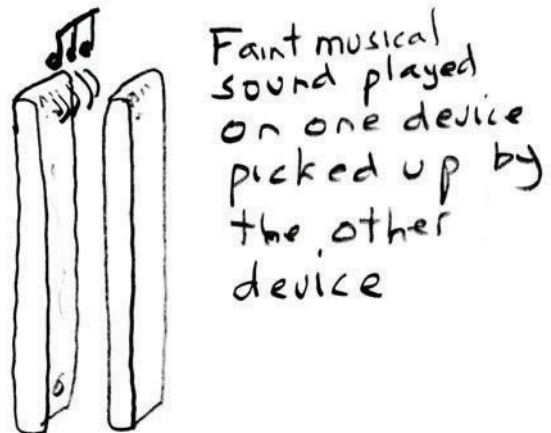
*Credit:* this concept is realized by the Bump Technologies App for the iPhone and the Android.



Bump. Accelerometer matches bump vibrations

## g Musical Sequence.

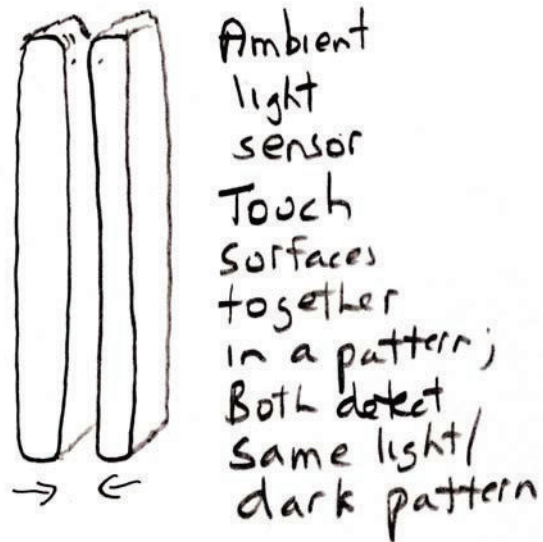
A musical sequence is played on one phone at low volume so it can only be heard by another phone held very close to it. As with other examples, the patterns are compared across phones and if they match, the connection is established.



h

**Light / dark patterns.**

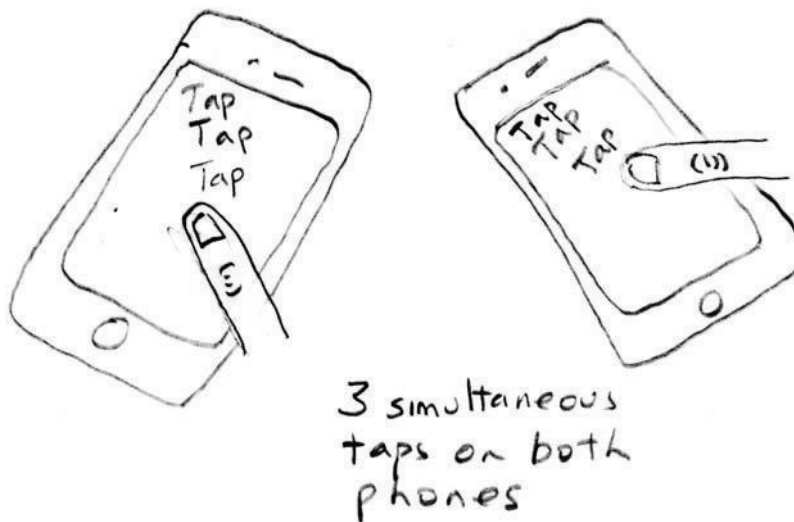
Some phones are equipped with light sensors. The idea is to touch the surface of two phones directly together in a random back and forth pattern. Because light sensors on both are simultaneously covered, the phones can look for matches in their light/dark patterns and connect them when that match occurs.



i

**Three simultaneous taps.**

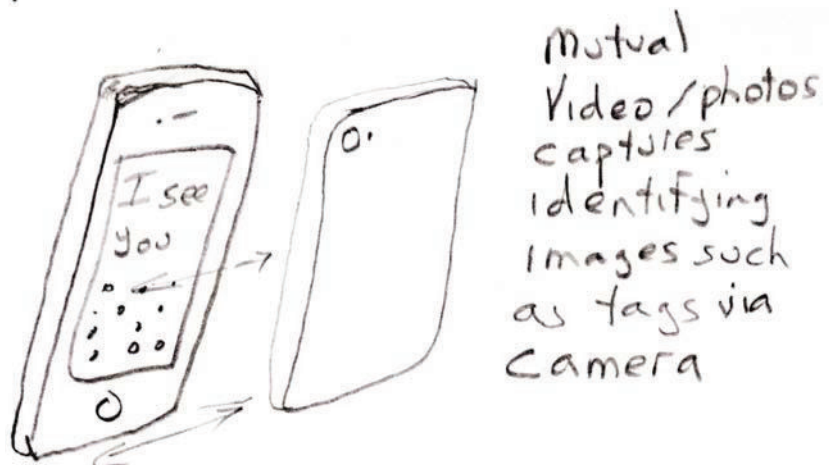
Each person has to tap their touch screens three times at the same time.



j

**Take a picture of an identifying feature on the screen of the other person phone.**

An image is displayed on one phone and captured with the camera of the other phone. The images across phones are compared and if they match the connection is established.



### 3 Reduce the number of design concepts / Repeat the above as needed.

While there are many approaches above, two themes emerge: a) both people perform an action as a pattern (either in tandem or sequentially) that can be compared, or b) an action begins on one phone and continues on another. At this point, you can generate other possibilities based on these two themes, or try to come up with yet another theme. We won't do this here, but you can try it on your own.

### 4 Choose the most promising design concept as a starting point.

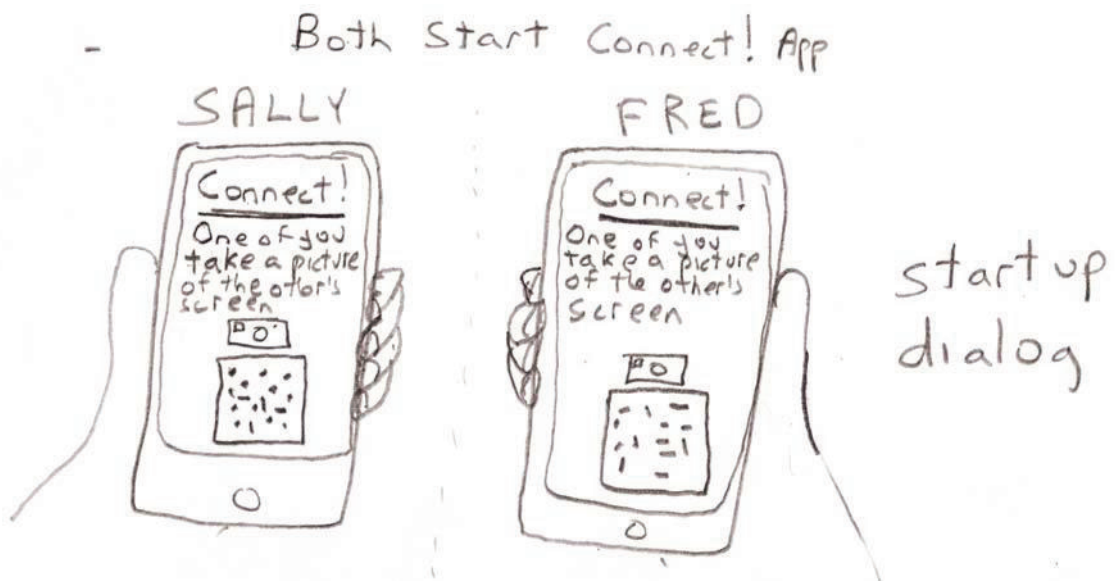
Because cameras are common on almost all smart phones, we decided to explore that concept further by considering variations of how a camera could be used. I chose the concept in the last sketch (J) above, where one person takes a picture of an identifying feature on the other person's phone.

### 5 Produce 10 details and/or variations of a particular design concept.

Try this yourself before you read on. The first sketch below is a detail describing the sequence of steps people would have to do to realize the concept in that last sketch (J) above. The other sketches are alternate ways that a camera could be used.

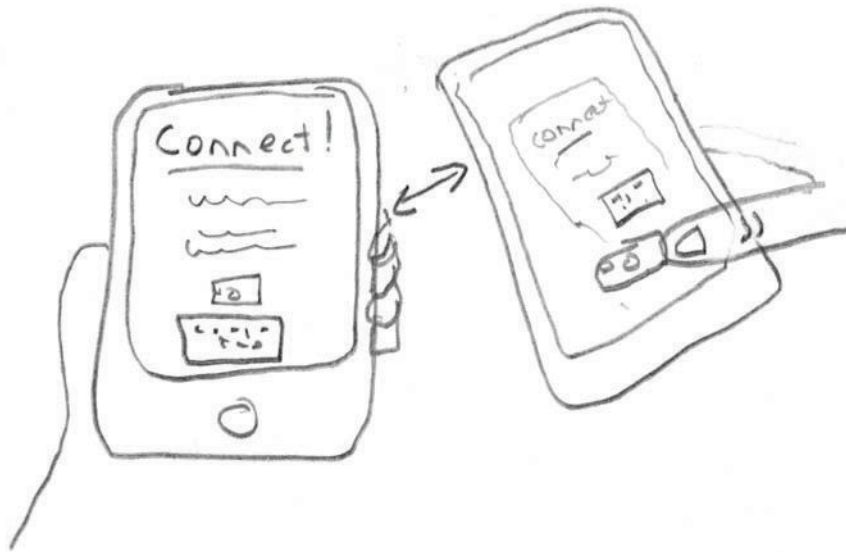
#### a Detail: What two people would have to do to connect to each other via taking pictures.

- i) Both have to start the Connect! application on the phone, which gives instructions and displays a unique image.



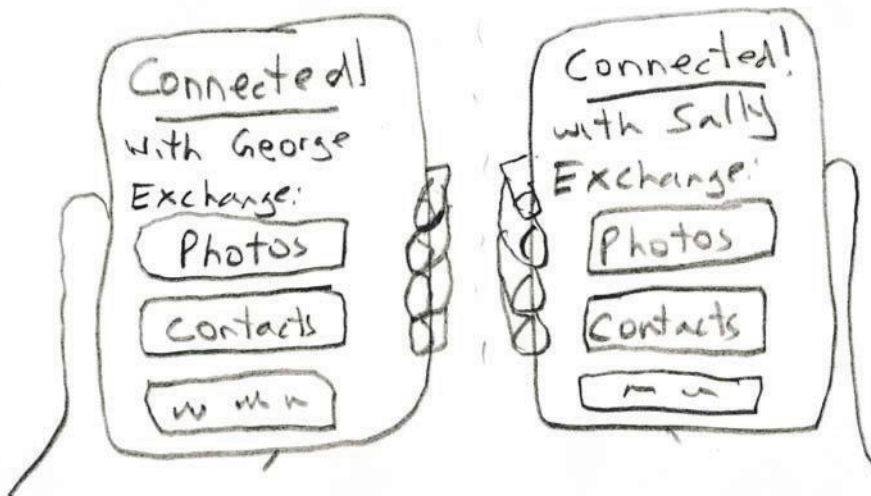


- ii) One person takes a picture of the other's screen, which captures the unique image that the phone can translate as an identifier. Under the covers, that phone checks to see which nearby phones have that matching ID.



One person  
takes  
picture of  
the other's  
screen

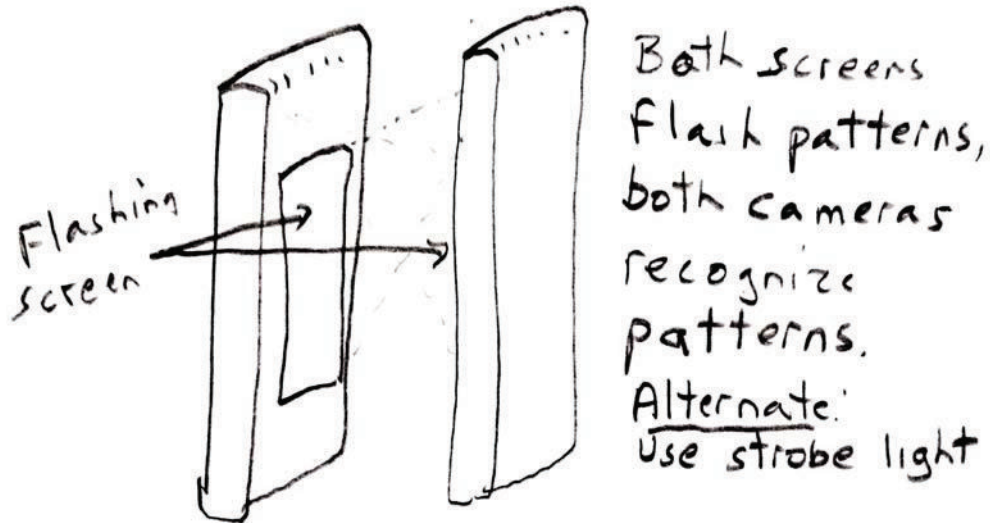
- iii) Once the connection is established, both people can then choose what they want to share (need to work out the details of this).



Once  
connected,  
people can  
then exchange  
various  
things on  
their phone

**Alternatives: Other ways of using the camera****b****Flashing patterns.**

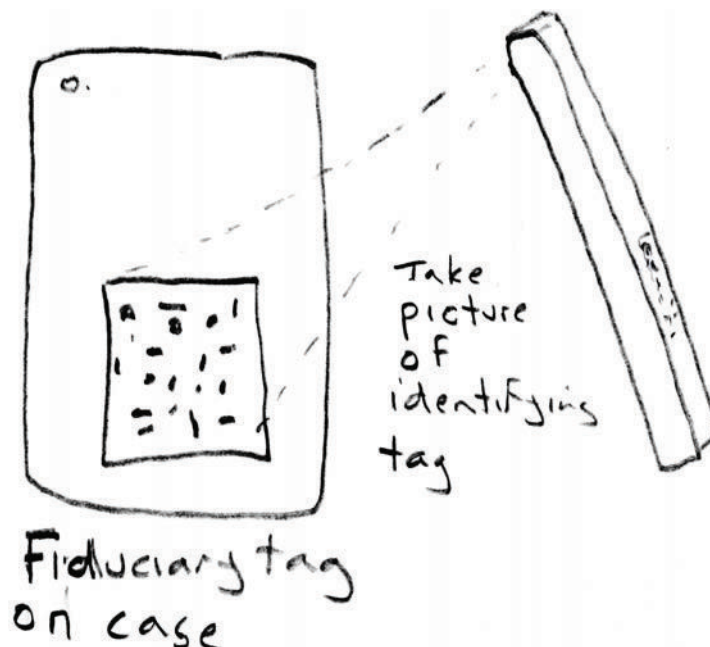
Instead of using a strobe, each screen can generate a sequence of patterns on its display, where it alternates between black and white. If the cameras and screen face each other, then that sequence can be recognized.

**c****Fiduciary tag recognition.**

Fiduciary tags are an increasingly common way to uniquely identify items. Here, we envisage that every Smart Phone will contain an embedded tag in its case. If the other phone takes a picture of it (which requires it to be very close), then a connection is established.

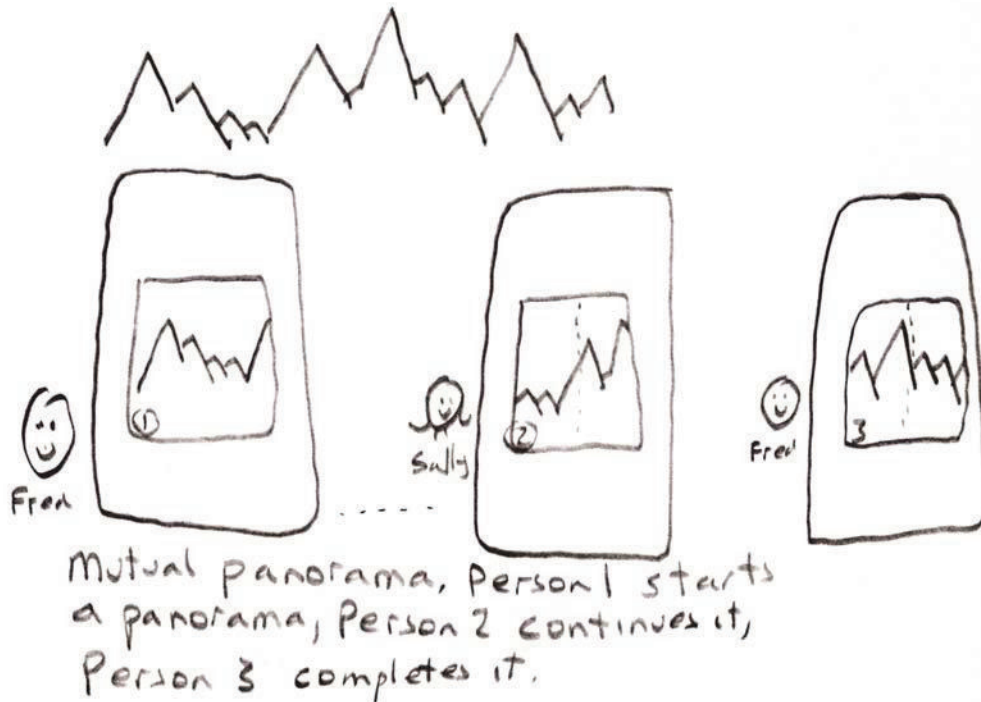
**Variation**

For added security, both phones would have to take a picture of each other's tags.



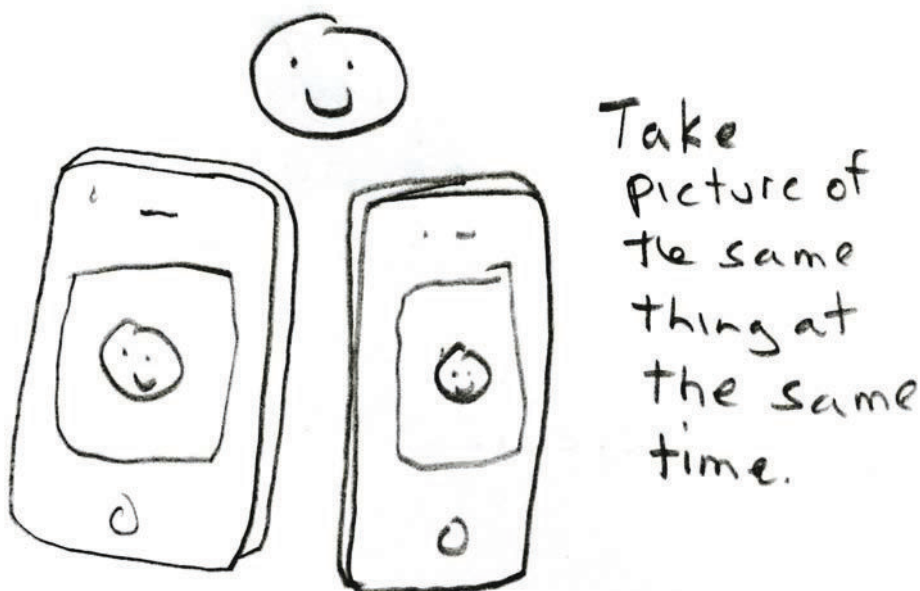
### d The cooperative panorama.

Panorama pictures are usually created by a person taking an image, where the camera then displays part of this image on the screen so that the person can overlap it correctly to take the next image in the sequence. The cooperative panorama simply does this across the phones: both people take turns taking the next image in the sequence.



### e Take a picture of the same thing at the same time.

Images are taken of exactly the same thing at the same time at approximately the same position. Images and timing information are compared across phones to see if a match occurs. Note: may fail at crowded tourist sites.



**f–j****You try.**

We stopped here, as we could fill this book much more than 5 alternatives, and eventually to designs and redesigns as we progressed down the design funnel.

If you want to continue, a good exercise is to choose one of the above (it doesn't really matter which one), and envisage the progressions of actions that a person would have to do and what the smart phone would show. You would begin at the very beginning (e.g., two people in a room wishing to establish a connection) until the very end (where a connection was established and you could actually start exchanging information). You may find that an idea that seem ok in a single sketch actually doesn't work out well when considered in detail, as it doesn't fit smoothly into an interaction sequence.

**6 & 7**

Present your best idea(s) to a group and get feedback about it, and then continue to refine and sketch out your idea(s) as your concept changes and as details get worked out.

## DESIGN CHALLENGE 2

Imagine you have a pressure-sensitive keyboard, where each key reports not only the character typed, but also its press force, ie., how hard a person was pressing the key. What could you do with this keyboard? Create 10 different ideas of what you could do (it could be something useful or playful), and then choose one or two and create 10 variations of that idea and/or refinements of that idea.

This design challenge was actually proposed as part of the ACM UIST Conference Student Innovation Contest (see <http://www.acm.org/uist/uist2009/call/contest.html>), where Microsoft provided prototypes of the hardware to contestants. The goal of that contest was to develop new interactions on unique hardware produced by a company.

Want to see what the winners did? Go to these web sites describing each winner's entry as well as other possibilities.

<http://www.acm.org/uist/uist2009/program/sicwinners.html> and  
<http://www.youtube.com/watch?v=PDI8eYIASf0>.

## DESIGN CHALLENGE 3

Most computer displays have a power save mode. Typically, a person can enter that mode through some manual action (e.g., a menu selection), or the system may do this automatically after a predetermined amount of time. The computer then ‘wakes up’ when a person moves the mouse. The problem is that if the time out period is long, screens stay on unnecessarily even when a person is away. While people can switch it off manually, they often don’t bother.

Generate alternate approaches to this strategy. If you get stuck, feel free to equip your display (or your environment) with sensors. You will find one solution to this problem in the paper by Greenberg, Marquardt, Ballendat et. al. (2011), listed below.

### 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. <http://doi.acm.org/10.1145/1897239.1897250>
- Hinkley, K. (2003) *Synchronous gestures for multiple persons and computers*. Proceedings of the 16th annual ACM symposium on User interface software and technology (UIST’03), ACM Press. <http://doi.acm.org/10.1145/964696.964713>

## YOU NOW KNOW

The 10 plus 10 strategy is an exercise to help you get started down the design funnel. It is important to try it, not just to read about it. If you do it often enough, it will become a habit. Do it not only on your work projects, but on any interaction design problem that you see.

The next time you become frustrated at something on your computer (which will likely be the next time you use a computer), try to restate that problem as a design challenge. Then apply 10 plus 10 to generate solutions and refinements to that problem.