

Chapter 7

People and Design

What is design? It's where you stand with a foot in two worlds – the world of technology and the world of people and human purposes – and you try to bring the two together.

– (Mitch Kapor, A Software Design Manifesto, 1990).

Information technology design is by no means simple. Most real-world problems are not simple and they often have no correct solution. The challenges that everyday designers' face is to handle trade-offs. It is the conscious choice among many alternatives each of which places constraints on utility and resources. As Mitch Kapor suggests above, a designer stands with one foot in the technology and one foot in the domain of human concerns, and these two worlds are not easily commensurable (Winograd 1996).

David Liddle who was head of Xerox PARC's Star project says “*Software design is the act of determining the user's experience with a piece of software. It has nothing to do with how the code works inside, or how big or small the code is. The designer's task is to specify completely and unambiguously the user's whole experience. The most important thing to design properly is the user's conceptual model. Everything else should be subordinated to making that model clear, obvious, and substantial.*”

Software design is a social process in which people design things to be used by people and the entire process (should) use people. While design is primarily a result of the qualities and activities of the creative individual, the designer operates in a larger social setting. Interaction with other people and things, the organization and workplace aspects often lead to complex and controversial design considerations. In this chapter, we start by looking at designing for consumers. That is then followed by a brief discussion of the practice of ethnographic principles in design involving people, community, and society. We then discuss Schon's ideas on reflective stance in design. We finally end this chapter with a look at how to design for scale, with Google as an example.

7.1 Designing for Consumers

In the last 30 years or so, we have learned a great deal about how software artifacts are created in the labs and how eventually they find their way to the marketplace and become consumer goods. But the evolution and adaptability are subtle. David Liddle, lead designer of Xerox Star, gives the best example of how technology is adopted in three phases – the *enthusiast* phase, the *professional* phase, and the *consumer* phase. “The maturity of a technology has profound implications for designing interactions, as the nature of design process changes as each phase is reached” (Moggridge 2007).

The first phase is the enthusiast phase in which the early adopters use the technology for its newness and aesthetic appeal. The geeks and the nerds enjoy the fact that it is rather difficult to use. The enthusiasts push the capabilities and limits of the artifact much beyond the wildest expectations of its original inventors or designers. A classic example is the creation of the World Wide Web by Tim Berners Lee and much of the excitement in the mid-1990s with dot com technologies. The web had been transformed to many things beyond Lee’s original intended scope and use.

The second phase is when professionals bring the technology into the work place and professionals find clever ways of using it to do something practical. The focus immediately is on value, reliability, and how much should it cost? With time, there is standardization of controls, making it reliable and reasonably priced becomes important.

The last stage is success with consumers. In some way it is the measure of ultimate success. We humans are a frighteningly adaptable species. A good tool should adjust itself to the user, but good tools are hard to find, and so we have learned to adapt ourselves to the plethora of gadgets and gizmos that are thrown our way. Of course, sometimes we are frustrated and throw in the towel when the computer expects us to do things to which we are reluctant. We are slowly but surely expecting user-friendliness to convert to user experience. “We use tools to accomplish tasks, and we abandon tools when the efforts required to make the tool deliver exceeds our threshold of indignation” (Winograd 1996). Consumer level products must have an element of delight and enjoyment. That is something every designer must strive for.

If designers want to attract and delight consumers (or customers) for their work, they need to fully understand the people for whom they design. It was much easier in the past when the USA was a mass market. One design fits all. They bought similar things, liked similar food, and enjoyed similar activities and goods. But the USA today is a highly fragmented market with diverse people of many ethnic background and the growth trend is toward diversity (Laurel 2003). Today people spend their time and money on their individual beliefs, their personal desires, and their specific needs (Laurel 2003). People now control big business. The power has shifted and with the rapid emergence of e-commerce and the Internet-based retail, big business is scrambling to understand what

consumers need and how they can serve them. Businesses across the globe are vying for people's attention and their pocket books. "How these customers choose can make or break a company, an institution or an individual artisan" (Laurel 2003).

7.2 Practice of Ethnography in Design

To design products that consumers want, it is important to deeply understand them through their values, cultures, and environment. A research technique called ethnography that originated in anthropology has become a central practice in design research. Anthropology is the study of human behavior, how people experience and make sense of what they themselves and others do. Culture involves the practices, artifacts, sensibilities, and ideas that constitute and inform our everyday lives. Tim Plowman (Laurel 2003) describes "As a working concept, culture includes phenomena ranging from how we tie our shoes to religious beliefs, flirting, the categories we use to parse the world, body piercing, and how we navigate an interface. Typically, we don't realize how and to what extent we are participating in and therefore shaping culture." Whether we are using a PC with the latest operating system or surfing the web over the Internet, these designed artifacts engage humans through their utility as well as their cultural location – the "situatedness" through which design artifacts recursively derive their meaning and are simultaneously the object of interpretation (Laurel 2003).

Social scientists have typically used ethnographic method for studying and learning about a person or small group of people in order to theorize about culture at a more general level. In order to understand how design influences us and the relationship between design research and social science, we must study a research method called ethnography – a practice increasingly central to design research. Ethnography is scientifically descriptive and interpretive. It requires analytic rigor and process as well as inductive analysis (applies to inductive step for theory).

The key idea embodied in ethnographic studies draws from the seminal work of Bronislaw Malinowski whose famous term "the imponderabilia of actual life" revealed that one could truly understand a culture or its people by being one of them, living with indigenous people for long periods of time (Young 2004). Instead of drawing conclusions from second-hand information, use first-hand data as much as possible. Since that time, many different types of ethnographic techniques have surfaced.

Designers have adopted qualitative design research methods in order to understand customers. It is all about learning about them from listening, watching them, or experiencing their lives first hand. While focus groups have received traditional attention, it has morphed into a family of related methods.

Traditional focus group is a gathering of 10–12 consumers who are led in a tightly scripted discussion by a trained moderator, usually for about two hours.

It can be for any topic or purpose, but are recommended primarily when you want to generate ideas and/or expand understanding without needing to reach consensus. Also popular are *mini-focus groups* that typically have six to eight consumers. *1-on-1 interviews* are very helpful also in which one person is interviewed by researcher who is following either a tightly scripted guide or a loose outline. Typical duration can be from half an hour to more hours if necessary. *Dyads* include two friends interviewed as a pair by a moderator following an outline or lightly scripted guide for at least one hour. *Super groups* have 50–100 people gathered in a large auditorium to view products, designs, or other exhibits presented on a large screen. *Triads* have three or more people. They may run the risk of group influence. *Party groups* spend two or three hours in one person's home in a more informal setting and casual stress-free environment.

A newer technique is *online discussion groups* which are still in its infancy. A huge advantage of this technique is the easy access to diverse customers who may be located anywhere in the world through the use of the Internet.

Much early work done at Xerox Parc (GUI, HCI, CSCW, and networking) in the early 1980s used ethnography in the design process. Xerox had hired a number of anthropologists. The same spirit has been continued by several Silicon Valley design firms such as IDEO, Apple, Microsoft, Google, Intel, Herman Miller, and others. These commercial firms also conduct ethnography studies of their consumers. Like academic studies, these businesses also require a well-defined set of hypothesis and research objectives to test those hypotheses. But in academia these research objectives tend to be complex and grounded in a body of previous research. It often takes years or a career to address them. Designers and developers on the other hand have to do things fast. Research objectives that designers have to deal with typically need to be defined in a matter of weeks or days (Laurel 2003). Hence commercial ethnographers quickly summarize relevant information, synthesize data, and draw conclusions. Experience definitely matters.

Designers unknowingly create the future. But it is not easy. Technology designers and consumer product designers face the daunting challenge of “crossing the chasm” by creating things that do not exist today and ensuring that there will be an eventual market and need for these products. This is a hard thing to do. Most companies (start-ups) fail and fall through the chasm (Moore 1991). But today's designers have a number of potential different methods to work with that include focus groups, expert interviews, surveys, ethnographic techniques, field research, storyboarding and use of prototypes. These techniques can not only help them create better designs but also leap through Moore's chasm. Further, designers can pursue Eric Dishman's ideas of a simple *asking, observing, and performing* cycle through different phases of a project. Asking is getting as much information about the people who will likely use a product. This may require understanding of their culture. Observing actual people in real-world setting helps to determine extreme behaviors and unusual patterns. Performing is about designers acting/testing out the future lives of their imagined end-users as well as getting those users to critique plausible future scenarios.

7.3 Reflection in Action (Schon's View)

Donald Schon has studied professionals and designers. His subject interests range from psychiatrists and social workers to architects and jazz musicians. His book *The Reflective Practitioner* (Schon 1983) explains what it means to apply expertise. Software designers can learn quite a bit from other design disciplines and in particular the notion of reflection in action as explained by Donald Schon.

In our everyday life, we go about doing things, activities that exhibit knowledge in a special way. Although we often cannot say what it is we know, we do know how to take action. We carry out many recognitions and judgments without thinking about them. Basic activities such as walking fall in this category. These actions seem normal and we do not even remember how we learned them.

Reflection in action is different in the sense that it is closely tied to the experience of surprise. Sometimes we think about what we are doing in the midst of performing an act. The surprise may be pleasant or unpleasant but based on that, we take some more action as we continue to perform. We think about what it is we are doing and in turn influence that doing. A great example is to watch a group of jazz musicians. They perform together and yet they continue to improvise and innovate on the piece. When one musician does some note combinations, it may be peculiar but it is a pleasant surprise. Another musician picks up on that event, and improvises to create more action and the whole result may come out to be beautiful. “The players keep on playing while, on occasion, noting and responding to the surprises produced by other players” (Winograd 1996).

Schon explains that this innovate, reflect, and further innovate method is germane to designers and their design process. It is rare that the designer has the entire design in her head in advance and then merely translates it. Most of the time, she makes progress incrementally. As she goes along, she is making judgments and decisions. Sometimes, the designer's judgments have the intimacy of a conversational relationship, where she is getting some response back from the medium, she is seeing what is happening – what it is that she has created – and she is making judgments about it at that level. As a designer works with a problem, she is continually in the process of developing a path into it, forming new appreciations and understandings as she makes new moves. The designer evaluates a move by asking a variety of questions, such as “Are the consequences desirable?” “Does the current state of the design conform to implications set up by earlier moves?” “What new problems or potentials have been created?” These new ideas and findings lead to new actions. Figure 7.1 shows Schon's view of the design process.

7.4 Designing for Scale – Google and People

So far in this chapter we have seen how people design things for people by studying their culture, habits, and behavior. A key property of most software application design today is scalability, i.e., the application performs well with many users. As

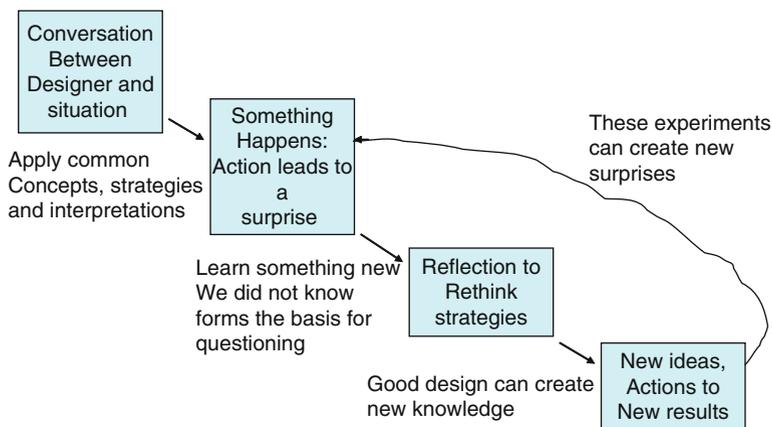


Fig. 7.1 Schon's view of the design process

the user base grows, the application remains stable and performs efficiently. One classic example is the search engine site known as Google.

The 1990s saw a period of madness often referred to as the “dot com” days. The creation of Mosaic (later Netscape) gave rise to a tremendous period of excitement in which the IT community witnessed a revolution. This revolution brought in the information age. Entrepreneurs with ideas received unlimited venture fund; start-ups were ubiquitous and the stock market rewarded those companies that had very little actual revenue. The business models did not matter as long as banner ads were there. The infrastructure people built new networks, routers, and switches hoping that traffic would never cease. Looking back upon that time, we all wonder now why the euphoria lasted as long as it did. It lasted partly because there were some true innovation and revolution going on. Life truly was different because of the Internet.

At last the bubble burst and the crash came. Investors lost billions. Start-ups that were promising dreams folded and real estate once again became affordable in Silicon Valley. People lost their jobs, homes and the downturn was quite brutal. Amidst all these changes was born a small start-up called Google. Sergey Brin and Larry Page met as graduate students at Stanford University's Computer Science Department in fall of 1995. They collaborated to develop technology that would eventually become the foundation for the Google search engine. Google's evolution and history is an interesting example of experimentation by trial and error for designers.

Brin was interested in data mining, finding patterns, and relationships among large data sets. Larry was interested to gather all the links on the web and together they found an interesting problem to solve. Their technique was called PageRank (US Patent 6285999). It is a tool to compare one web page with another. PageRank helps you determine the importance of pages based on the links to them. PageRank does not count the links; it uses the vast link structure of the web as an organizational tool:

PageRank is a link analysis algorithm, named after Larry Page, used by the Google Internet search engine that assigns a numerical weighting to each element of a hyperlinked set of documents, such as the World Wide Web, with the purpose of “measuring” its relative importance within the set. The algorithm may be applied to any collection of entities with reciprocal quotations and references. The numerical weight that it assigns to any given element E is also called the PageRank of E and denoted by PR(E).

With little experiments, Larry and Brin figured out that PageRank could be used as an effective search tool.

Terry Winograd who had been an advisor to Larry at Stanford sums it up quite well: “I think they have been successful for a number of reasons, but largely because they have respected what it is they think users can do and what users want. I think that’s a big lesson from Google. They don’t say, “Here’s what we are going to force on you, here’s what we think we can sell you”. They really started from a point of view of, “Here’s what we hope will be useful”. Let’s find out. Let’s try it (Moggridge 2007).”

We will conclude this chapter with a brief discussion of Google’s philosophy that can be found from their web site.

1. Focus on the user and all else will follow
2. It is best to do one thing really, really well
3. Fast is better than slow
4. Democracy works on the web
5. You do not need to be at your desk to need an answer
6. You can make money without doing evil
7. There is always more information out there
8. The need for information crosses all borders
9. You can be serious without a suit
10. Great is not just good enough

While the above 10 points apply directly to Google, we believe that they are excellent guidelines for researchers doing design work.

As anyone who has used Google web site for search realizes that their interface is clear and simple. They have one bar to type in what you are looking for. People come to Google to search. There is no need to clutter that page with anything else that can distract the user. This simple and yet very effective design principle has gone a long way to the success of Google. Their revenue has been through clicks and advertisement. But advertising on the site must offer relevant content and not be a distraction. Doing one thing really well makes it fast and efficient. Hence Google has always been about the best user experience and nothing else. As of April 2006, there are 91 million searches per day on Google within the USA. That number worldwide is close to 200 million searches per day. This is a true testimony to their scalability.

