Human-Computer Interaction

Development Process

Edited by

Andrew Sears
Julie A. Jacko

Human Factors and Ergonomics

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Human-Computer Interaction

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For Beth, Nicole, Kristen, François, and Nicolas.

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CONTRIBUTORS

Tamara Adlin
adlin inc., USA

Michel Beaudouin-Lafon
Université Paris—Sud, France

Jeanette Blomberg
IBM Almaden Research Center, USA

Mark Burrell
Microsoft, USA

Gaëlle Calvary
Université Joseph Fourier, France

John M. Carroll
College of Information Sciences and Technology, The Pennsylvania State University, USA

Gilbert Cockton
School of Computing and Technology, University of Sunderland, UK

Catherine Courage
salesforce.com, USA

Joëlle Coutaz
Université Joseph Fourier, France

Joseph S. Dumas
Bentley College, USA

Jean E. Fox
Bureau of Labor Statistics, USA

Karen Holtzblatt
InContext Enterprises, Inc., USA

David Kieras
Electrical Engineering and Computer Science Department, University of Michigan, USA

Amy Kruse
Defense Advanced Research Projects Agency, USA

Mike Kuniavsky
ThingM, USA

Darryn Lavery
Microsoft Corporation, USA

Wendy E. Mackay
INRIA, France

Deborah J. Mayhew
Deborah J. Mayhew and Associates, USA

Michael J. Muller
IBM Research, USA

A. Ant Ozok
Department of Information Systems, UMBC, USA

John Pruitt
Microsoft Corporation, USA

Janice (Ginny) Redish
Redish & Associates, Inc., USA

Mary Beth Rosson
College of Information Sciences and Technology, The Pennsylvania State University, USA

Anthony Savidis
Institute of Computer Science, Foundation for Research and Technology—Hellas (ICS-FORTH), Greece

Constantine Stephanidis
Institute of Computer Science, Foundation for Research and Technology—Hellas (ICS-FORTH), and Department of Computer Science, University of Crete, Greece

Dennis Wixon
Microsoft Game Studios, Microsoft Corporation, USA

Alan Woolrych
School of Computing and Technology, University of Sunderland, UK

ADVISORY BOARD

Noëlle Carbonell
University Henri Poincaré–Nancy 1, LORIA, CNRS & INRIA, France

Stuart Card
User Interface Research Group, Palo Alto Research Center (PARC), USA

John M. Carroll
College of Information Sciences and Technology, The Pennsylvania State University, USA

Jim Foley
Georgia Institute of Technology, USA

Ephraim P. Glinert
National Science Foundation, USA

Vicki L. Hanson
IBM T.J. Watson Research Center, USA

John Karat
IBM T.J. Watson Research Center, USA

Waldemar Karwowski
Center for Industrial Ergonomics, University of Louisville, USA

Sara Kiesler
HCI Institute, Carnegie Mellon University, USA

Arnold Lund
Mobile Platforms Division, Microsoft, USA

Aaron Marcus
Aaron Marcus and Associates, Inc., USA

Dianne Murray
Independent Consultant, UK

Jakob Nielsen
Nielsen Norman Group, USA

Gary M. Olson
School of Information, University of Michigan, USA

Judith S. Olson
School of Information, Ross School of Business, and Department of Psychology, University of Michigan, USA

Sharon Oviatt
Department of Computer Science and Engineering, Oregon Health and Science University, USA

Fabio Paternò
Laboratory on Human Interfaces in Information Systems, ISTI–C.N.R., Italy

Richard Pew
BBN Technologies, USA

Dylan Schmorrow
Office of Naval Research (ONR), USA

Michael Smith
Department of Industrial and Systems Engineering, University of Wisconsin–Madison, USA

Kay Stanney
Industrial Engineering and Management Systems, University of Central Florida, USA

Constantine Stephanidis
Institute of Computer Science, Foundation for Research and Technology-Hellas (ICS-FORTH) Department of Computer Science, University of Crete, Greece

Peter Thomas
Carey Thomas Pty Ltd., Australia

Susan Wiedenbeck
College of Information Science and Technology, Drexel University, USA

Hidekazu Yoshikawa
Department of Socio-Environmental Energy Science, Kyoto University, Japan

PREFACE

We are pleased to offer access to a select set of chapters from the second edition of *The Human–Computer Interaction Handbook*. Each of the four books in the set comprises select chapters that focus on specific issues including fundamentals which serve as the foundation for human–computer interactions, design issues, issues involved in designing solutions for diverse users, and the development process.

While human–computer interaction (HCI) may have emerged from within computing, significant contributions have come from a variety of fields including industrial engineering, psychology, education, and graphic design. The resulting interdisciplinary research has produced important outcomes including an improved understanding of the relationship between people and technology as well as more effective processes for utilizing this knowledge in the design and development of solutions that can increase productivity, quality of life, and competitiveness. HCI now has a home in every application, environment, and device, and is routinely used as a tool for inclusion. HCI is no longer just an area of specialization within more traditional academic disciplines, but has developed such that both undergraduate and graduate degrees are available that focus explicitly on the subject.

The HCI Handbook provides practitioners, researchers, students, and academicians with access to 67 chapters and nearly 2000 pages covering a vast array of issues that are important to the HCI community. Through four smaller books, readers can access select chapters from the Handbook. The first book, *Human–Computer Interaction: Fundamentals,* comprises 16 chapters that discuss fundamental issues about the technology involved in human–computer interactions as well as the users themselves. Examples include human information processing, motivation, emotion in HCI, sensor-based input solutions, and wearable computing. The second book, *Human–Computer Interaction: Design Issues,* also includes 16 chapters that address a variety of issues involved when designing the interactions between users and computing technologies. Example topics include adaptive interfaces, tangible interfaces, information visualization, designing for the web, and computer-supported cooperative work. The third book, *Human–Computer Interaction: Designing for Diverse Users and Domains,* includes eight chapters that address issues involved in designing solutions for diverse users including children, older adults, and individuals with physical, cognitive, visual, or hearing impairments. Five additional chapters discuss HCI in the context of specific domains including health care, games, and the aerospace industry. The final book, *Human–Computer Interaction: The Development Process,* includes fifteen chapters that address requirements specification, design and development, and testing and evaluation activities. Sample chapters address task analysis, contextual design, personas, scenario-based design, participatory design, and a variety of evaluation techniques including usability testing, inspection-based techniques, and survey design.

Andrew Sears and Julie A. Jacko

March 2008

ABOUT THE EDITORS

Andrew Sears is a Professor of Information Systems and the Chair of the Information Systems Department at UMBC. He is also the director of UMBC's Interactive Systems Research Center. Dr. Sears' research explores issues related to human-centered computing with an emphasis on accessibility. His current projects focus on accessibility, broadly defined, including the needs of individuals with physical disabilities and older users of information technologies as well as mobile computing, speech recognition, and the difficulties information technology users experience as a result of the environment in which they are working or the tasks in which they are engaged. His research projects have been supported by numerous corporations (e.g., IBM Corporation, Intel Corporation, Microsoft Corporation, Motorola), foundations (e.g., the Verizon Foundation), and government agencies (e.g., NASA, the National Institute on Disability and Rehabilitation Research, the National Science Foundation, and the State of Maryland). Dr. Sears is the author or co-author of numerous research publications including journal articles, books, book chapters, and conference proceedings. He is the Founding Co-Editor-in-Chief of the *ACM Transactions on Accessible Computing,* and serves on the editorial boards of the *International Journal of Human–Computer Studies*, the *International Journal of Human–Computer Interaction,* the *International Journal of Mobil Human–Computer Interaction,* and *Universal Access in the Information Society*, and the advisory board of the upcoming *Universal Access Handbook*. He has served on a variety of conference committees including as Conference and Technical Program Co-Chair of the Association for Computing Machinery's Conference on Human Factors in Computing Systems (CHI 2001), Conference Chair of the ACM Conference on Accessible Computing (Assets 2005), and Program Chair for Asset 2004. He is currently Vice Chair of the ACM Special Interest Group on Accessible Computing. He earned his BS in Computer Science from Rensselaer Polytechnic Institute and his Ph.D. in Computer Science with an emphasis on Human–Computer Interaction from the University of Maryland—College Park.

Julie A. Jacko is Director of the Institute for Health Informatics at the University of Minnesota as well as a Professor in the School of Public Health and the School of Nursing. She is the author or co-author of over 120 research publications including journal articles, books, book chapters, and conference proceedings. Dr. Jacko's research activities focus on human–computer interaction, human aspects of computing, universal access to electronic information technologies, and health informatics. Her externally funded research has been supported by the Intel Corporation, Microsoft Corporation, the National Science Foundation, NASA, the Agency for Health Care Research and Quality (AHRQ), and the National Institute on Disability and Rehabilitation Research. Dr. Jacko received a National Science Foundation CAREER Award for her research titled, "Universal Access to the Graphical User interface: Design For The Partially Sighted," and the National Science Foundation's Presidential Early Career Award for Scientists and Engineers, which is the highest honor bestowed on young scientists and engineers by the US government. She is Editor-in-Chief of the *International Journal of Human–Computer Interaction* and she is Associate Editor for the *International Journal of Human Computer Studies*. In 2001 she served as Conference and Technical Program Co-Chair for the ACM Conference on Human Factors in Computing Systems (CHI 2001). She also served as Program Chair for the Fifth ACM SIGCAPH Conference on Assistive Technologies (ASSETS 2002), and as General Conference Chair of ASSETS 2004. In 2006, Dr. Jacko was elected to serve a three-year term as President of SIGCHI. Dr. Jacko routinely provides expert consultancy for organizations and corporations on systems usability and accessibility, emphasizing human aspects of interactive systems design. She earned her Ph.D. in Industrial Engineering from Purdue University.

Section

I

REQUIREMENTS SPECIFICATION

1

USER EXPERIENCE AND HCI

Mike Kuniavsky
ThingM Corporation

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INTRODUCTION

The goal for this chapter is to introduce concepts and techniques that help structure the application of HCI in a real-world environment by examining the larger context in which HCI happens and by using that context as the basis for the design of user experiences.

Understanding the broader factors that influence the user experience is as important for creating successful HCI systems as thoroughly understanding the cognitive science behind the user's actions. Company goals, economic relationships, emotional responses, and social interactions can overwhelm behavioral and perceptual responses of consumers. Although intensive research is currently investigating some of these ideas, the majority of firsthand experience of and thinking about designing experiences under such pressures has happened in the consumer marketplace as documented in popular business and marketing literature. In bringing these ideas and experiences to this volume, I hope to introduce the process of HCI as part of a broader activity: specifically, the development and creation of user experience in a consumer economy.

THE BOUNDARIES OF USER EXPERIENCE

The definition of user experience (UX) and its relationship to HCI is complex. Both fields share boundaries with a number of other fields, and each other. On one hand, either field can resemble anthropology, cognitive psychology, industrial design, or computer science in practice. On the other, customer relationship management and marketing play a large role in actual day-to-day experiences with products and services. Consulting for a broad range of organizations on projects ranging from consumer products for broad audiences to highly focused products for internal use has shaped thinking about the definition of the term. User experience is a set of broader considerations than HCI. It aggregates and contextualizes HCI by incorporating the concerns of both end users and organizations. In other words, the user experience consists of all of the factors that influence the relationship between the end user and an organization, especially when a product[1] mediates that relationship.

UX Is Context

From the users' perspective, their experiences are continuous. The products, their immediate environments, and their lives all interact and feed back on one another. On the most basic level, what someone understands about a product affects what he or she finds attractive about the product, and what is attractive affects his or her willingness to understand it. How much depends on the rest of the context, but it is a mistake to think that only the look or the functionality matters. It all matters, and research and iterative design determine to what degree.

TABLE 1.1. Organizations Involved in End-User Relationships

Product	Organizations Involved
Traditional technology product	Sales/Repair
Traditional desktop software	Sales, Support
Website Provider	Internet Service Provider, Website
Mobile	Handset manufacturer, Network provider, Application provider, Content provider

Many seemingly stand-alone products now are merely ways to access services provided by organizations. End users' relationships to an experience and the organizations creating the experience intertwine more than ever (see Table 1.1). In the days of traditional industrial manufacturing (roughly before 1970), end users of a product may have only had one interaction with an organization: the store from which they bought it, which may have also provided support and repair services. Packaged software included three or more: the store that sold the hardware, the store that sold the software, and the providers of technical support. With the introduction of web-based software interactions, the number of organizations increased, with the addition of an ISP and website provider. Modern mobile phone based applications may involve even more: a handset manufacturer, an operating system developer, a network provider, an application developer, and a content provider. All of these organizations contribute to the end-user experience, often without a lot of coordination between them.

HCI is part of a technology creation process. Like any technology creation process, doing it right requires not only automating a certain set of tasks, but also inventing tools that introduce new possibilities for both the people using them and the organizations creating them. In such a multilayered environment, product development can go in many directions, and research can be conducted almost ad infinitum. However, in the end, limited resources require choosing one promising direction.

User experience design and research is a pragmatic pursuit. Its goal should be the understanding of the experience of technology users and technology-producing organizations to manage the risks of technology creation and increase the chances of success.

Garrett's Elements

Garrett (2000, 2002) developed a model (see Fig. 1.1) for understanding how various aspects of product design interact to create a whole user experience.

Garrett (2000, 2002) focused on web design, but his model extended to most other kinds of user experience. It described

[1]I define *product* broadly. A product represents the interface between an organization and end users. It could be a physical object, a service, a system, software, or a combination of these. For example, an ATM consists of three elements: the machine itself, the card used to access it, and the service that it enables access to. However, it is a single product, especially from the perspective of the end user. More often, it is a single definable entity, but seemingly, stand-alone artifacts regularly turn out to belong to a system of interlocking, interdependent elements.

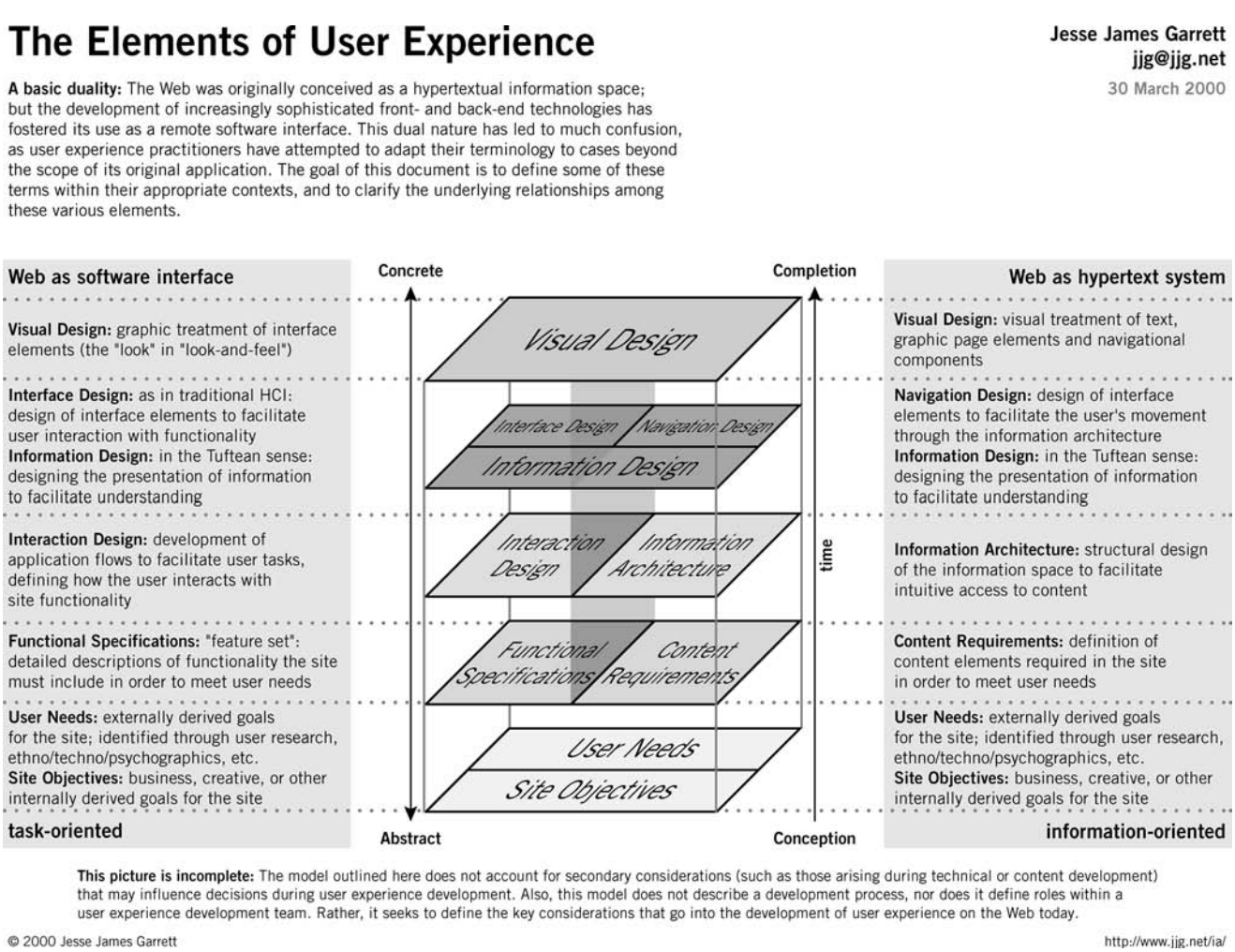

FIGURE 1.1. Garrett's elements of user experience diagram (Garrett, 2000).

the dependencies connecting abstract business and user goals to visual design through a set of intermediate steps. These steps describe the information that a product provides and describe how people interact with that information. Productivity products (the left-hand column, defined as "web as software interface") emphasize the content less than the interaction, while information products ("web as hypertext system") emphasize the content more than the interaction.

The diagram defines stages in understanding and managing this process, and emphasizes that factors that are unrelated to ergonomics or functionality constrain end-user experience. It implies that good HCI is a subset of good product development, and inseparable from the larger context. The outer layers in Garrett's diagram hide the inner ones from both users and from the organization at large. Users only see the visual design layer, while organizations only see the website objectives layer.

However, the user experience depends on a cascading sequence of assumptions and decisions. These are constrained by economic factors imposed by the organization and psychological or sociological factors imposed by users and society. These economic, psychological, and sociological factors tell at least half of the story of the complete user experience. They define the context in which decisions are made and the product actually experienced, and they should be the ones in which it is designed.

THE ORGANIZATIONAL EXPERIENCE

End users are not the only customers of a given piece of technology. Technology creation solves two sets of problems: one for the people using it, and another for the organization creating it. HCI research and design often assumes that an organization's goal is to provide optimal end-user experiences, but many other factors drive organizational motivations. Organizations' needs and desires[2] frame and prioritize product research and

[2]Hassenzahl (2003) used *pragmatic* and *hedonic* product attributes to discuss roughly these same concepts. His terms refer to individuals' perspectives in the abstract, but I prefer to use *needs* and *desires* because these terms better frame discussions from users' perspectives and work better when discussing the parallel between an organization's perspective and that of the user of its product.

development as much as users' abilities and goals, which are the traditional realm of HCI.

An organization creates a product because it desires something from a user base. The difficulty is that the user base often desires something different. The resolution of these two disjunctive desires deeply affects the final user experience. For this reason, user-experience design and research starts with organizational strategy.

This example from industrial design foreshadows many of today's HCI and user experience issues 80 years earlier.

The 1927 Ford Model T

The Ford Model T was an incredibly successful car, and the first killer app of the 20th century. Throughout the 19 years it was manufactured, its design remained unchanged, except for one thing: Every year, it was cheaper than the year before. From the perspective of Model T users, it was a great vehicle: reliable, predictable, and inexpensive. However, by the mid-1920s, it was not selling well relative to many of its competitors, and Ford discontinued it in 1927 (Wikipedia, 2005a). Henry Ford refused to value anything but efficiency (for his company and its customers) in his products. However, by the mid-1920s Ford's competitors were selling more cars by evolving the look and feel every year (*styling* in automotive terminology). The goal went beyond making cars more efficient or cheaper to making them look different. Having realized that people treated cars as expressions of identity, the competitors included styling as a key part of the user experience.

Ford had many options they could have pursued in response to the economic pressure put on them by the profits lost to competitors. They could have restructured their manufacturing processes to make Model Ts even cheaper. They could have lowered the quality of their product to increase their margins; they could have embarked on a research and development program to merge their car, tractor, and airplane products, so they would only produce one product. They could have laid-off workers and decreased the number of cars they were producing and so on. Each plan would have differently affected the driver experience. Ford's decision was to stop making the Model T and introduce the 1928 Model A, a car with competitive styling (available in four colors, none of them the black of the Model T; Wikipedia, 2005b). Ford's industrial designers then updated the styling of their cars on a regular basis as their competitors did.

Beginning user experience evaluation by analyzing the sponsoring organization's motivations regularly reveals the issues that pervade the assumptions behind the product. Introducing subtle changes in core assumptions, as Henry Ford's son Edsel (then the President of Ford) did in 1927, can change the experience of the entire product without having to rethink the whole user interface (because the problem may not be in the interface at all).

A Children's Art Product Manufacturer Website

A maker of children's art products wants a new information architecture for their website. The website has three audiences (children, educators, and parents and grandparents), and more than 200 different kinds of content. With such a depth of information and such a broad audience, there is no obviously canonical way to structure the content. The historical function of the website as a sales channel directed toward parents and educators guided all of the initial architecture choices. However, interviews with company executives responsible for the website revealed that these assumptions were either inaccurate or inappropriately emphasized. Most mistaken was the belief that the site had to be a revenue source. In fact, the Chief Financial Officer (CFO) flatly stated that the website's goal is to spread the company's brand identity as broadly as possible among its primary audience. In its incarnation, the website met neither the goals of the original development team nor its actual goal as a brand vehicle.

Throughout the product's development lifecycle, internal expectations and assumptions guide the experience it creates in subtle ways. In this example, the information architecture for a website was distorted by the explicitly stated goal of revenue production, even though the organization's leaders had changed their goals. When expectations contain internal conflicts, they produce contradictory and confusing interactions.

Organizations have to put themselves first, even when creating products for end users. For example, Southwest Airlines policy allows customers to apply the price of an unused ticket to another ticket. However, the company profits if people do not take them up on the offer. Thus, it is not in the best interest of the company to make it easy to perform the transaction. As of October 2005, Southwest.com allows the user to transfer funds from an unused ticket only if they have the exact confirmation number of the unused ticket and the exact spelling of the name associated with it—even if they have an account on the Southwest website and the system database can pull up all of the other account information. The Web-site interface makes transferring funds difficult because the interface ultimately serves the company's financial interests, not those of the customer.

User experience defines the boundaries of product development through stakeholder needs and end-user goals. These needs and goals are not just management requests or customer complaints. They represent the core of how the organization defines success and what end users expect the product will do for them.

Applying the tools of user experience research and design to the organization is tricky. Looking closely at organizational assumptions and expectations steps right into in-house politics—that aspect of collaborative work that everyone would prefer did not exist—and can create interpersonal tension. However, unstated internal priorities often inhibit successful user experience design more than any external factor, so they are important to investigate. Fixing office politics is outside this chapter's scope and most readers' job descriptions, but explicitly clarifying an organization's priorities is well within the capability of an HCI professional. In fact, it is critical. As we have seen, confusing, conflicting, and ambiguous organizational agendas produce conflicting product requirements, which in turn produce difficult to use interfaces. Knowing organizational needs helps balance the needs of users and organizations in design.

THE USER VIEW

As stated above, factors that affect an end user's experience are not just those that determine the efficiency of the interface in enabling task completion. Functionality is, of course, critical to the continued product viability—it needs actually to do something—but viability is more than functionality. We all willingly enter into experiences (buy products, use services, etc.) that are far from functionally optimal, and yet we leave satisfied. Agarwal and Karahanna (2000) defined the concept of "cognitive absorption," which seems like a good way to describe the main goal of product designers and developers, as "A state of deep involvement . . . exhibited through temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity."

Few products regularly produce cognitive absorption. In order to understand why, it is valuable to define some other terms describing important aspects of the user experience from the user's perspective.

Ortony, Norman, and Revelle (2005, p. 174) proposed a model that describes "an organism's" (e.g., a person's) psychological function in the world. The model's four (continually interrelating) parts are:

- Affect—what the organism feels
- Motivation—what the organism needs and wants
- Cognition—what the organism knows, thinks, and believes
- Behavior—what the organism does

Product design implicitly takes all of these factors[3] into consideration, but explicit examination of them is rare. Marketing researchers investigate motivation; interaction designers use their knowledge of cognition; usability research focuses on behavior; and visual or identity designers and advertising agencies try to influence motivation through affect. However, that is an ideal situation. In reality, the practice of understanding and structuring a unified experience is so new that design generally runs on gut-level intuition, and everyone is guessing at everything. Gut-level decision making is not necessarily bad. Humans are often good at predicting other humans' reactions—except when intuition totally fails.

The User Experience of Products

Affect. According to Ortony et al. (2005), emotional response, or affect, is a complex interaction of immediate reactions modulated by experience with previous situations and cognitive predictions of future states, all of which happens rapidly and simultaneously. Immediate feelings, emotions, and moods are different states operating at different levels of granularity. They are also critical to people's experiences of a product. When people fall in love at first sight with a product or a place, their successive experiences will not be moderate. The emotions may lead them to overlook interaction problems or poor functionality. Later, the emotional state may wear off, the honeymoon ends, and the inadequacies of the product turn joy into disillusionment.

Davis (1989, p. 320) showed that "both *perceived usefulness* and *perceived ease of use* were significantly correlated with self-reported indicants of system use." People's emotional relationships to products before they had the opportunities to use them affected how they used them later. Zhang and Li (2005, p. 106) extended Davis' research by applying a more primal concept, affective quality. They investigated the perceived affective quality of software products and concluded, "a user's immediate and reflexive affective reaction to [information technology] has a positive impact on his or her consequent cognition-oriented evaluations of the [technology]."

Furthermore, Nass and Reeves (1996) described in detail how people exhibited many of the same emotional responses to computers, televisions, and films as they did to other humans, significantly changing their expectations and behaviors toward the technology as a result.

What constitutes affective quality (which is measured in terms of valence and activation; e.g., the direction and magnitude of the emotional response) in terms of technological products is still under investigation. However, evaluating and designing the complete user experience clearly requires close consideration of the experience's affective aspects.

Value. People act for a reason. They engage with products or experiences for some reason (or reasons), they keep using them for other reasons, and they stop for others still. In the largest context, Maslow's (1943) hierarchy of needs serves as one model of how what people value in their lives motivates their actions. Norman et al. (2005) described how one kind of motivation, curiosity, could arise from an emotional response to an environment. "Animals' motivation systems [let] the resting point of affect be slightly positive so that when there is nothing that needs to be done, the animal is led to explore the environment" (Ortony et al., 2005, p. 194).

However, pure curiosity rarely leads people to have new experiences or to continue well-known experiences. When using a household appliance, for example, curiosity rarely drives people's behavior. From a product developer's perspective, a good approximation of motivation is what creates value for the end user. Value consists of two elements:

- The product's perceived potential for changing a customer/user's life
- How well it satisfies that potential

Perceived potential consists of three elements: functional, economic, and psychological (Sawhney, 2003). The functional aspect is the prospective user's expectation about whether the product will be able to solve a real-world problem the person

[3]These terms are a framework for the subsequent discussion. They are not defined in the same rigorous, technical way that Norman et al. (2005) defined them in their work. The definitions provided here are the more common dictionary definitions, which are a superset of how Norman et al. defined them.

is having. "Will the disk utility program recover my thesis?" or "Will the personal video recorder let me watch *The Simpsons* at 3 A.M.?"

The economic aspect consists of the cost-benefit analysis that a prospective buyer of a product does when considering whether purchasing the product will be worth the opportunity cost of spending money on it. This is the literal, most traditional, definition of *value*. "Will this CRM system let me shave 25% off of my expenses?"

The psychological aspect contains all of the hopes that someone has for how owning or using a thing will change his or her life and is both the most difficult to understand and the potentially most important. It holds all of the emotional attachment, all of the social pressure, and all of the personal desires that make up someone's self-image, as they are contemplating buying, and then using, a product. Some consumer objects, such as the Nokia 7280 phone (see Fig. 1.2), evoke much more about their values than they communicate about their functionalities. Designed as fashion items, much of their functionalities are the same as that for garments: They explicitly project an image of their users to both others and the users.

However, these same ideas apply to ostensibly purely functional products. Every underused enterprise software product is the result of a perceived value that did not match the reality of the situation on the ground, often for reasons that were neither functional nor economic.

The design of the user experience is the practice of creating products that satisfy perceived value.

What brings people value changes with context is that, at different places and times, people will have different values. There is a lifecycle to expectations dictated by habituation. As same people grow accustomed to a product's functionality, its novelty wears off. For a long time, the Model T satisfied what consumers wanted in a car. For 19 years, Henry Ford thought only the price of the car had to change, but consumers clearly thought differently. As the automobile's functionality became commonplace, people's relationship to it changed. They began to focus on the psychological needs it satisfied and to see it less as a tool they were using and more as part of who they were. People desire variety (Postrel, 2003), and the black Model T no longer satisfied. Car buyers were willing to pay extra for a different user experience, but Ford did not recognize this until it was almost too late.

FIGURE 1.2. Nokia 7280 phone.

Blindness to the larger user experience also exists in the development of software products. The business press regularly describes the struggle between well-established companies and their younger competitors. Such stories typically describe a company with an older product whose target audience no longer wants sees value in the user experience their product provides. The older company clearly produced good user value at one point, or else they would not have had the success that allowed them to be in a threatened leadership position. Their products changed their audience's expectations, but then the company failed to notice when expectations moved on. For example, Yahoo! search technology was lagging in the early 2000s when compared to Google's. At one point, Yahoo! was a dominant player in the search market, but by 2005, they got to the point where, "The company is doing everything that the fertile imaginations of their software engineers can muster in order to persuade people to search with them first" (Andelman, 2005).

Likewise, organizations also often produce products for which the market is not yet ready. In 2005, a number of large organizations invested in entertainment PCs, which look like stereo equipment, and associated products, such as media servers, but, to the puzzlement of the companies making these services, there was a lack of widespread adoption of such services in the past (Buckman, 2002). These products' unpopularity may have had nothing to do with the feature set or its presentation. The makers of these products should not necessarily have been doing any more usability testing or focus groups. The interface for the TiVo (2005) personal video recorder was widely praised by both interaction designers and users, but it took the company eight years to achieve profitability. It may be that patience is an ingredient in the user experience of these products before they appear worthwhile to a broad audience.

As Sawhney (2003) described, the process of creating customer value in technology products requires understanding the interaction of all the elements that make the product desirable:

> According to HP, the benefits of the iPaq are its powerful processor, bright screen, expandability and flexibility—a statement of functional value. But to close a sale, HP must also demonstrate economic value with quantified estimates of improved productivity for end users as well as application developers. And HP must convince customers of the emotional benefits of choosing a device platform that is backed by reputable and financially solid companies such as HP and Microsoft. (Sawhney, 2003)

Creating a user experience requires understanding this entanglement of ideas as well as HP did in creating the iPaq.

The User Experience of Organizations

Brand. Brand identity generally refers to the combination of all the implicit values an organization communicates about itself, as understood by the consumers of that organization's products or services. Symbols such as logos and slogans evoke brand identity, but the actual identity is the set of values that people project onto an organization, and by extension, onto its products based on personal experiences with that organization and its advertising. In terms of the user experience, brand identity creates expectations for the value that an organization's products will provide to the

end user. As such, it is an important component in setting people's expectations for how to approach a product and what the product will do for them economically, functionally, or psychologically.

Brands live in the minds and expectations of the buyers and users of an organization's products and services. A logo can evoke a set of feelings and expectations for the value that a product will give someone, but it is not the actual value. The product still has to provide the value, although often that value is not in terms of the actual functionality, but rather in the emotional satisfaction that owning, using, or being seen with a product brings. This aspirational component of a brand is the emotional value the audience perceives the product will deliver. In that sense, it is the perceived affective quality of all of the products produced by an organization.

Products that do not meet brand expectations can either disappoint or confuse users. During the dot-com boom of the late 1990s, many companies attempted business models that took their brands well outside of people's existing expectations for them.

For example, when Intel, a chipmaker, partnered with toy manufacturer Mattel, it seemed like a good way to merge cutting edge technology with toy manufacturing. The partnership produced several products under the Intel Play brand (Fig. 1.4). However, sales of the toys did not meet expectations, and the partnership was dissolved. As with any enterprise, the circumstances were complex, but one of the potential problems may have been that the Intel brand strongly connoted an entirely different set of values than was appropriate for the sale of toys. As manufactured and sold by Digital Blue (Fig. 1.3), an educational toy company founded to market and develop the products from the failed venture, the products developed by Intel Play are seeing financial success. This shows that the entire hierarchy of Garrett's (2000) Elements can be satisfied on a functional level, but if the total user experience does not fulfill the user's larger expectations, products can still fail.

Good experiences while using a product will affect people's perceptions of the organization that produced it, which in turn affects their expectations for the functionality of other products that the company produces. Bad experiences with a service, such as documented in Rafaeli and Vilnai-Yavetz (2004), can lead to a wholesale dissatisfaction with other products that the organization produces, irrespective of those products' immediate user experience.

From an HCI perspective, understanding and incorporating brand identity into the experience is important. As Saffer (2002) said, "Navigation, nomenclature, and content presentation must also reflect the company's brand. The most elegant visual design in the world isn't going to overcome inappropriate interaction design."

For example, knowing the children's art product manufacturer (previously mentioned) was more interested in communicating the company brand than producing revenue changed the direction of the user experience dramatically. Websites intended to efficiently sell products that are designed to be purely functional, whereas one intended to evoke a sense of playfulness, whimsy, and creativity (the psychological values the company in question tried to communicate) is much different. Compare the McMaster-Carr website, which has been a very successful sales website (Spool, 2005), to the site for the Lego toy company (see Fig. 1.5 and Fig. 1.6).

The interaction design, the organization of the content, the kind of content presented, and the visual design of individual interface elements of the two websites differ not just because the audience differs or the products differ (though those differences are undeniably important) but also because the message they want to communicate differs. Compare the Carhartt clothing company's websites in the United States to that in Europe (see Fig. 1.7 and Fig. 1.8). In the United States, Carhartt is branded primarily as a work wear manufacturer, while in Europe, it is a fashion brand for urban youth.

FIGURE 1.3. The Digital Blue Digital Movie Creator, II.

FIGURE 1.4. The Intel Play Digital Movie Creator.

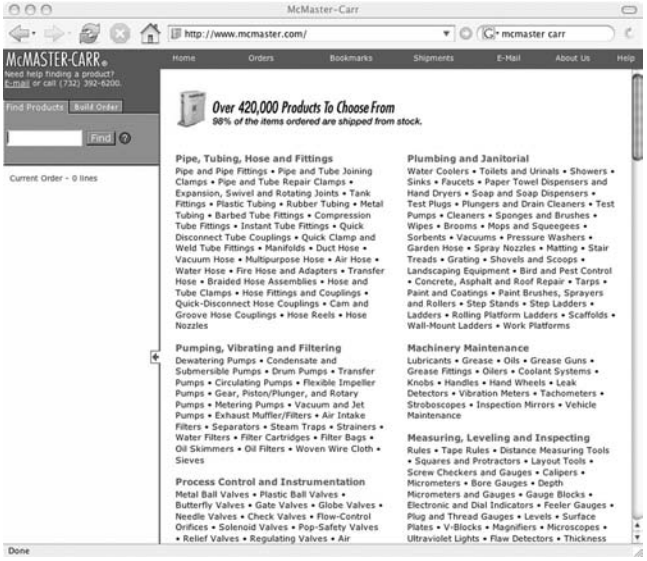

FIGURE 1.5. McMaster-Carr website homepages.

FIGURE 1.6. Lego website hompages.

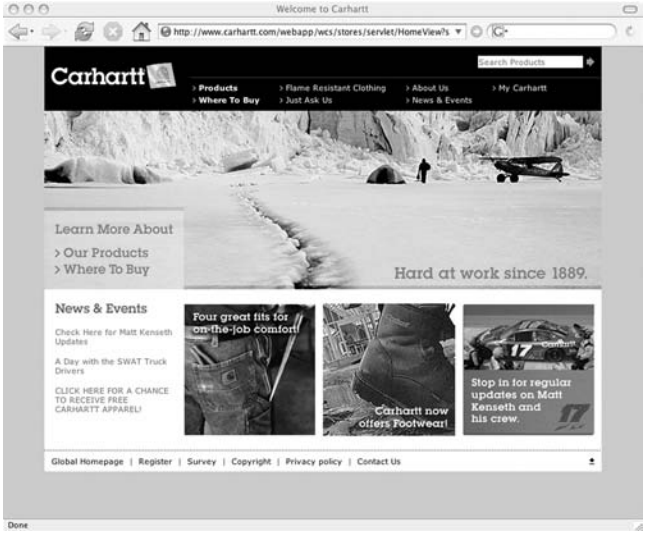

FIGURE 1.7. Carhartt U.S. website homepages.

FIGURE 1.8. Carhartt Europe website homepages.

Relationships. In today's world, we rarely interact with an organization only once. The process of buying, owning, using, and maintaining a product, whether software or an appliance, consists of many interactions with an organization. Customer relationship management (Wikipedia, 2005c) and customer experience management (Wikipedia, 2005d) practices define these interactions as contact points or touch points (Schmitt, 2003). These practices aim to analyze and design positive experiences during these interactions. In fact, some theories (Pine & Gilmore, 1999) claim these interactions are even more important than the products that spark them.

The mobile phone is an example of the numerous customer relationships involved in owning and using a contemporary product. Although technically a computer, a mobile phone is not just a computational tool. Its functionality as a tool and as a communication medium completely depends on the services accessible through a handset. In a sense, it is the physical manifestation of a set of virtual, continually shifting services (as evidenced by the complexity of subscription plans). Without the services, a phone handset is useless. However, the network does not just provide transparent connectivity; the ecology of organizations involved in delivering the mobile user experience is fragmented (Fig. 1.9), and none of the players is wholly responsible for the HCI.

Mobile user-experience design processes require an understanding of the relationship between various organizations and the way in which users will interact with them. Knowing these contact points can focus and prioritize the HCI research and design. Arnall (2001) cited constraints imposed network

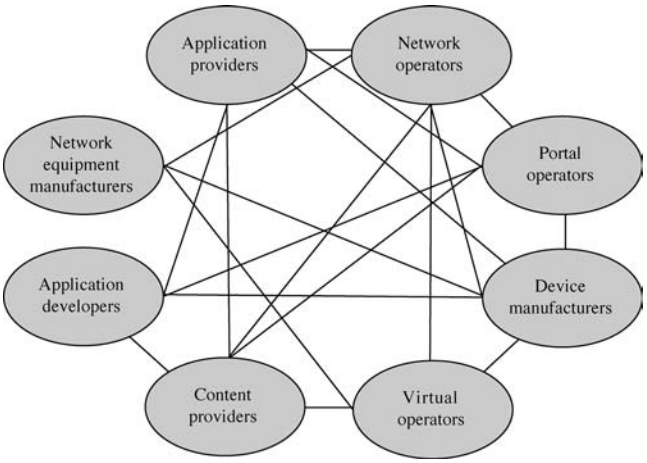

FIGURE 1.9. The mobile data value web (European Information Technology Observatory, 2002).

performance, billing, and hardware limitations in creating an SMS-based service. Creating a satisfying user experience required determining both user's experience with each of those contact points and the integration of all of them. For example, the design of the service had to include both interaction and financial incentives for people to sign up for the service (the signup process was made to be quick and the service was initially free).

The exact nature of contact points will vary based on the details of the service or product under consideration, but it typically involves

- Customer service
- Billing
- Sales
- Account management
- Marketing

To some extent, this has always been true in all HCI development, but it has not been a prime focus of the research and design process. In an ecology of many interacting services, such as described above, ignoring the other players in the environment is no longer optional. When such a service provides a solution to an end user, the solution cannot just be evaluated through the completion of a narrow set of tasks. It needs to be analyzed in the improvement it makes in the life of the person who uses it. People must find value throughout their interaction with it, whether through the out of box experience (Wikipedia, 2005e) in unpacking the product, or how they feel as they are using it, or their interactions with the product and the organization during a technical support call.

Industrial designers and architects have addressed these issues for a long time, recognizing that the evolving roles their products play in people's lives are not always possible to predict or design to the last detail. They have focused on creating user experiences that offer multiple channels of value (rarely in monetary terms, but by a combination of affective and functional ideas). Salespeople and marketers have approached the experience from the other direction. They try to identify the interactions people have with an organization, to understand the value (in monetary terms) of those interactions, and to maximize their monetary values or to minimize their expenses.

Computer interfaces straddle both sides of the equation, providing immediate value for end-users and—especially in a dynamic networked environment such as that provided by mobile phones, ubiquitous computing, or the web—value for organizations (whether monetary or, as in case of governments or nonprofit organizations, through other metrics that include social goods). Integrating an analysis of the relationship between people and organizations as mediated by the interface is a key component to providing value to both groups.

EXAMINING THE USER EXPERIENCE

Approaching the investigation of such difficult to quantify ideas as affect and value is no small task. Organizations may be unable to articulate their intentions or values. Differentiating end users' needs from their desires and their actual behavior from hopeful visions is difficult. Further, the ambiguous nature of the collected data makes interpretations vary across interpreters. Extracting quantitative information about a broad group of people takes an investment of extraordinary resources.

However, the difficulty of collecting this information should not discourage you from trying to collect it. In order to reduce the risk of failure (though, sadly, probably not increase the risk of success), a model of the whole user experience such as Garrett's (2000) is valuable.

This section describes in detail several techniques for understanding the organizational and user needs for the user experience. They are by no means exhaustive, but they are included as examples of how to approach a user-experience research project, rather than focusing on fragmented tasks, and how to pragmatically apply the theory of the previous sections.

Identifying Organizational Goals

There are three steps to understanding organizational goals for a product:

1. Identifying stakeholders
2. Collecting stakeholder goals
3. Prioritizing among the goals

Identify stakeholders. Start by identifying groups who most often own the product (or who most often care about the product). Make a list of all of the departments affected by the product's success or failure and of who in each department is most responsible for it. If there is not a single person who is responsible for the product in a given department, find the person who dealt with it most recently. Odds are that this person regularly deals with it or can tell you who does. Product managers generally know which groups and

individuals have the biggest stake in the project and the list will likely contain:

- Engineering[4]
- Design
- Marketing

Other groups can have stakes in the process, depending on the size/structure of the organization in the product's success. A significant managerial presence in a product could be a major moneymaker (or loser) or if it is brand new. Each of these groups has a different perspective on the product.

For example, a fictitious list of stakeholders (Table 1.2) for a web-based data warehousing application contains representatives from identity design and marketing in addition to the people who actually build the product.

TABLE 1.2. List of Potential Stakeholders of a Fictitious Data Warehousing Application

Alison, VP of Product Development
Erik, Interaction Design
Michel, Marketing
Claire, Database Administration
Ed, Customer Support
Leif, QA
Joan, Identity Design

Collect stakeholder goals. Once you have your list of stakeholders, find out what they consider the most important issues. You can do this either by getting all of the stakeholders together and spending an afternoon setting organization-wide priorities for the product or by speaking to each person independently. Individual interviews are often necessary with executives, and it is critical that they are involved in this process. Ask each person (or department)

1. In terms of what you do on a day-to-day basis, what are the goals of this product?
2. Are there ways that it is not meeting those goals? If so, what are they?
3. Are there questions you want to have answered about it? If so, what are they?

TABLE 1.3. A List of Goals and Questions of a Fictitious Data Warehousing Application

Who	Goals and Questions
Alison, VP Product Development	Fewer complaints from major clients
	Match data retrieval features offered by competitor
Erik, Interaction Design	Help construct more sophisticated reports, since the current interface does not reveal full report engine
	Why do so many people start and then abandon the query wizard?
Michel, Marketing	To show tight integration of the new report generator with the query system
Claire, Database Administration	Is there a way to keep people from clicking the search all button? It hammers the database every time.
Ed, Customer Support	Reduce support calls about report generator
	Shift more support from the phone to email
Leif, QA	Identify query wizard JavaScript errors to address user complaints
Joan, Identity Design	Make the look and feel of the acquired report generator match that of the query interface

Every group will have different goals and will measure success differently. Programmers may measure success by the number of bugs per thousand lines of code. Identity design may have internal reviews that evaluate how well the product integrates with the corporate brand. Customer support will want to minimize the number of questions they have to field. Sales will always want to bring in more revenue.

Once you have spoken to the departmental representatives, make a list of the goals and desires. At this point, you will probably see that some of the goals are contradictory. It is too early to attempt to resolve the contradictions, but investigating the relationship between them may be an important near-term goal for the project.

Prioritize organizational goals. Based on your interviews, you will have some idea of the corporate priorities with respect to the goals you have defined. Some things are important because the organization believes they prevent people from using a key feature. Others may be important because they differentiate the product from its competitors. Still others might be less important because they create a drain on resources or are currently a topic of debate within the company.

There are many prioritization methods. Sometimes, just making a list is sufficient, but using a technique that abstracts key factors can be useful. Table 1.4 explains one modified from the total quality management industrial manufacturing discipline.

Using this technique, the questions in Table 1.3 could be prioritized, as in Table 1.5.

Often, when prioritized systematically, it is easy to see why product development happens in the way it does. The lists show unstated company priorities come out and agendas that are orthogonal to the organization's actual needs. In retrospect, it is possible to see how decisions go against the product and organization's needs and how teams' abilities produce the conditions that generate bad user experiences. Most importantly, tables such as these allow you to prioritize what you learn about user needs.

A rapid technique: project history. It is not always possible to perform a rigorous investigation of an organization's

[4]These terms are used here broadly. *Engineering* typically consists of programmers in a software or web environment but can include electrical and mechanical engineers in a hardware-development project. Likewise, *design* can include information architects, industrial designers, interaction designers, and visual designers.

TABLE 1.4. A Prioritization Technique

1. Make a column next to your list of questions and label it "Desire." Go down the list and negotiate with the group a rating for each item on a scale of one to five. Five means the feature affected is a must have, critical to the success of the product, and one means it is nice to have, but not essential.
2. Next, make a second column and label it "Risk." This will reflect how bad the problem is. Write a number on a one to five scale here, too. Five represents bad problems (ones that either directly affect the bottom line right now or represent major malfunctions), and one refers to problems that are annoyances or information that would be good to know.
3. Finally, make a column and label it "Ease." This is how easy your team feels it will be to address the problem. Five means that it is easy to do, and one means that it is very difficult.
4. Multiply the three entries in the columns, and write the result next to them in a third column called "Priority." This combines and amplifies the factors. Ordering the list by the last column gives you a starting order in which to investigate the product's user experience.

TABLE 1.5. The Prioritization Technique from Table 1.4 Applied to the Questions in Table 1.3

Goal	Desire	Risk	Ease	Total
Match data retrieval features offered by competitor	4	3	2	24
Why do so many people start and then abandon the query wizard?	4	5	4	80
To show tight integration of the new report generator with the query system	3	3	4	36
Is there a way to keep people from clicking the search all button? It hammers the database every time.	5	5	3	75
Reduce support calls about report generator	2	4	2	16
Identify query wizard JavaScript errors to address user complaints	3	2	5	30
Make the look and feel of the report generator match the query interface	5	2	4	40

needs. A fast way to understand the organization's goals is to create a quick history of the project. The sequence of events that lead to the current situation reveals a set of problems and solutions, which in turn reveal the organization's needs and values. The process is straightforward in principle, although the answers to basic questions can reveal complexities in priority and interest that a simple narrative explanation of the current situation does not. Getting a project history can be as simple as asking the following questions of the key stakeholders responsible for a project. The goal is to encourage them to describe the sequence that led to the current situation.

- Why did you decide to do this?
- Why did you decide to do it now?
- Who initiated the project?
- What was the organizational pressure that suggested it?

The idea is to ask these questions (which are just a variant on the standard who/what/when/why interrogatives) recursively. In other words, for every answer, it is possible to ask the same questions to get an even older, and maybe deeper, set of motivations. Some techniques recommend doing a certain number of times (four seems to be common), but going deeply on a couple of key ideas is usually enough to understand the deeper motivations and constraints underlying the current situation. One variant that has proved useful is to ask to include anyone mentioned into the conversation. "Oh, so Lucie suggested that PCB designers weren't using the spec sheets, which is why we are trying to make them more prominent. Could we talk to her about how she determined that they were not using them enough?" It could be that Lucie has stacks of e-mails from customer service in which people ask for information that is readily available, or maybe she just has a hunch. In the former case, the information in the e-mail could be valuable in determining users' expectations from the service; in the latter case, understanding Lucie's motivations provides information about how she measures success or envisions the purpose of the service.

Field Observation

Norman (1998) said, "The goal is to make the people who are being observed become participants in the discovery process of learning just what their real needs are—not the artificial needs proscribed by the way they do things today, but what the goals are, what they are striving for. This is the role of rapid ethnography."

A highly effective and increasingly popular method of exploring the user experience comes from field-research techniques based on methods pioneered by anthropology, ethnography, and ethnomethodology. Examining work and life context produces a richer understanding of the relationships between preference, behavior, problems, and values. Laboratory and survey methods extract people from their environments to focus on individual tasks or perspectives or aggregate responses from many people. Field observation's goal is to gain insight into the total relationship between the elements of the user experience as experienced and understood in the context of use.

Rather than trying to validate theories in a controlled setting, these ethnography-derived methods, including contextual inquiry (Beyer & Holzblatt, 1998), derive insight through direct observation of people in their actual environment with (ideally) little presumption about their behavior and needs.

Direct observation removes much of the bias that creeps into research when people or tasks are isolated. Outside of the environment that triggers them, our explanations of desires, values, reactions and behaviors, especially in routine events, lose critical details by our tendency to simplify, idealize, and project. Exploring the context of activities can identify people's larger goals through the small details. For example, when someone leaves a note on a kitchen counter, the goal is not to just to leave the message, but rather to communicate something specific to a member of the household (even him- or herself). The message may be a to-do list, a reminder, or an alert (Elliot, Neustaedter, & Greenberg, 2005), and its location communicates how to interpret the message. When discussing domestic communications

outside the context of their daily routine, critical details such as spatial placement, time of day, materials used, or triggering event can be lost.

Direct observation identifies emotional reactions that would be otherwise difficult to capture. For example, Vrendenburg, Righi, and Isensee (2001) described a situation where a t-shirt included in the packing material of an IBM RS/6000 computer led to surprise and delight from users—signs of a good user experience—just unpacking the box:

> Users opened the product box to find a t-shirt, a mouse pad, a copy of Wired magazine, and games that showcased the 3D graphics capabilities of the system such as Quake. This approach to design worked beautifully. It became cool to have an RS/6000. One of the most common questions asked by customers in the feedback survey was "Where can I get another t-shirt"? (p. 34)

This was an unexpected observation that was not part of a focused program of focused ethnographic observation of people's experiences unpacking RS/6000 computers, but it is representative of the kinds of things such observation produces. In another instance, Berg, Taylor, and Harper (2003) observed the following relationships between UK teenagers and their mobile phones:

> [The] text messages that were exchanged were sometimes described as objects that evoked particular memories. The messages were the embodiment of something personal that could be stored, retrieved, reread and shared, becoming tangible mementos for individuals and groups. Thus, the phone appeared to provide a means to participate in social exchange in so far as it enabled particular objects to take on symbolic meaning and for the objects to be seen as meaningful between people. (p. 434)

Such insights map directly to user experience design (as the authors then proceeded to do). They allow technology to enable specific, observed behaviors in the context they occur, rather than hypothetical behaviors and assumed needs.

Field research methods for user-experience design are typically neither as detailed, data-heavy, or analytically rigorous as formal ethnography (Bentley et al., 1992). These techniques focus on pragmatic on the ground observation and interpretation within the context of a development and production process. They use standardized methods and seek to identify contact points, activity sequences, artifacts, and values in the context of work practices. Beyer and Holzblatt's (1998) contextual inquiry is probably the most prevalent of these techniques. Generalized from rapid ethnography (Millen, 2000), Table 1.6 lists a set of steps for conducting field research.

TABLE 1.6. Steps for Conducting Field Research, Adapted from Millen (2000)

1. Find key informants
2. Narrow the focus
3. Use interactive observation
4. Use multiple researchers and analyze collaboratively
5. Validate conclusions

Find key informants, schedule research. Millen (2000) recommended identifying informants and asking them to serve as guides through a field observation. He suggested that guides should be "people with access to a broad range of people and activities and be able to discuss in advance where interesting behaviors are most likely to be observed or where activities that reveal social tension are most likely to be found" (Millen, 2000, p. 282). For example, when observing technology in a hospital, it pays to talk to a nurse who works there, or if investigating hobbyist PC case modification (casemod) culture, it's valuable to have a member of a club of modders introduce you to the hobby and the players in it.

When choosing informants, you should pick at least five people or groups who resemble the people who will use your product or who will provide key insights. Overall, they should have the same profile as the eventual target audience, though fringe members of a group may be good informants and provide information or exhibit behavior that typical group members will have internalized.

The breadth and depth of research will determine the extent of the study undertaken: long-term planning generally requires deeper insight and, thus, more and longer observation than short-term problem solving, for example. A typical month-long research schedule (Table 1.7) generally involves two to five hours per observation or interview period, followed by two to three hours of group analysis per hour of observation.

Narrow the focus. The goal of traditional ethnographies is to understand as much as possible about the entire context in which a group of individuals acts, without judgment. In contrast, most commercial research projects begin with an idea about what problems need solving and an idea about how to solve them. Field observation clarifies and focuses these ideas by discovering the situations in which these problems occur and how people deal with them. In addition, unlike an evaluative technique such as usability testing, it is observational and typically uncovers unexpected directions. Thus, it is best done before the process of creating solutions has begun when there is still time to iterate on research. This is usually at the beginning of the development cycle.

However, in the interest of maximizing immediate results, the project typically concentrates on the fields of activity that will likely produce results that designers can incorporate into the user experience. Narrowing focus means identifying the important aspects of your audience's work or life practice, while leaving open the option to challenge assumptions. One technique is for researchers to familiarize themselves closely with the terminology, tools, and techniques their audiences are likely

TABLE 1.7. Typical Field Research Schedule

Timing	Activity
$t - 2$ weeks	Organize and schedule participants.
t	Begin observation. Begin analysis-scheduling process for development team.
$t + 1$ week	Complete observation. Review videotapes and notes. Complete analysis scheduling.
$t + 2$ weeks	Begin analysis.
$t + 3$ weeks	Complete analysis.

to use. An informant can walk the researchers through some concepts before formalizing the research goals. The sportscaster method, where one informant explains what another one is doing, is another useful technique. For example, walking through a shopping district with a fashion-conscious teenage commentator can reveal a lot about where to look for interesting behaviors, rather than starting from scratch.

With this information in mind, it's possible to narrowly define the aspect of the practice that you can ask questions about and observe.

User interactive observation. This is the key to the technique, and it requires going to where people are engaged in the kind of activity the experience for which you are designing and asking them to teach you about their activities. Most of the time should be spent observing what the participants are doing, what tools they are using, and how they are using them. One effective technique is to take on the role of an apprentice and ask them to give a running description of what they are doing. As in an expert-apprentice relationship, this should be enough to describe the practice to the apprentice but not enough to interrupt the flow of the work. As an apprentice, you may occasionally ask for explanations, clarifications, or walkthroughs of actions, but do not let it drive the discussion.

Observations can be in the form of structured interviews, with prewritten discussion guides. This is useful in answering specific questions, but risks missing key challenges to assumptions. Other kinds of tools can elicit specific kinds of information (Beyer & Holzlbatt, 1998; Millen, 2000), or aid in constructing models later (Wixon et al., 2002). An informant can use a paper model of a shop floor, for example, to describe activity in a factory than would be possible in the loud environment of the factory itself.

Collect as much documentation of the practice as possible. Digital and video cameras, liberally used, provide both material for analysis and illustrations for presentation. Collect physical artifacts, when possible. For example, a group of researchers studying patterns of technology use in urban German areas took 400 photographs in a span of three hours and brought back posters, local handicrafts, and a pipe from a construction site.

Use multiple researchers and analyze collaboratively. Collecting and analyzing data simultaneously can provide efficiency, though it introduces more potential biases to the interpretation of the observations (Madison, 2005). Techniques for group qualitative data analysis range from traditional transcript coding methods (U.S. General Accounting Office, 1996) to contextual inquiry's formal methods (Beyer & Holzblatt, 1998) for constructing multifaceted models of users' work practices. Affinity diagrams are a particularly popular method. Table 1.8 describes the steps in the construction of an affinity diagram. It takes about one day.

This rather mechanistic process yields good first-cut results about the breadth of the user experience, and frames subsequent investigation.

TABLE 1.8. Affinity Diagram Construction, Adapted from Beyer and Holzblatt (1998)

1. Extract 50–100 notes from each interview. Notes are singular observations about tools, sequences, interactions—anything. Randomize them.
2. Get a group of people together in a room with a blank wall or a big whiteboard. Have them block out the whole day for the work.
3. Divide the group into pairs of analysts. Give each pair an equal number of notes.
4. Write one note on a Post-it and put it on the wall/window/board.
5. Tell the group to put notes that relate to that note around it one at a time. It does not matter how the notes relate as long as the group feels they relate.
6. If no more notes relate to a given note cluster, write a label summarizing and naming the cluster (use a different color so it's easy to identify the labels).
7. Repeat the process with the other notes, labeling groups as they occur.
8. Generally, it is useful to break up groups of more than four notes into smaller clusters. However, there is no upper bound on how many notes may be in a group if there is no obvious way to break it up.
9. As the groups accumulate, Beyer and Holzblatt (1998) recommended using pink notes to label groups of blue notes and green notes to label groups of pink notes.

Validation. A key part of modeling is to evaluate the quality of the model with the people whose lives it models. An immediate follow-up interview with in-depth questions can clarify a lot. Certain situations may not have been appropriate to interrupt (e.g., if you are observing a surgeon or a stock trader, that may apply to the whole observation period), whereas others may have brought up questions that would have interrupted the task flow. Conducting this interview while the participant's memory of the event is still fresh will produce best results. "You'll never understand what's really going on until you've talked to people about what they are doing. The [follow-up] interview . . . gives you the rationale to make sense of things that might otherwise seem odd or insignificant" (Bellotti, 1999).

Focus Groups[5]

People's affective responses and values are hard to observe objectively, and getting a subjective read is often all that is possible. Focus groups are structured group interviews that quickly and inexpensively reveal a target audience's desires, experiences, priorities, and values. Sometimes vilified by their associations with dishonest marketing, they do not deserve their notoriety. They are neither the panacea for curing bad products nor pseudoscientific voodoo to justify irrational decision making. When moderated well, carefully analyzed, and appropriately presented, they are an excellent technique for uncovering what people think about a given topic and, especially, how they think about it. A focus group reveals people's perceptions of their values: what they feel right now and how they see that in relation to themselves. Those are crucial in understanding how an experience will affect them.

[5]Much of this chapter is adapted from Kuniavsky, M. (2003).

In product development, focus groups are most useful early in the development cycle, when they generate ideas, prioritize features, and provide insight into people's values and expectations. They can reveal the features people value highest and why they value them, though not whether they will actually use them. As a competitive research tool, they uncover what people value in competitors' products and where those products fail. As Krueger (1988, p. 83) said, "The purpose of focus groups is not to infer, but to understand, not to generalize but to determine a range, not to make statements about the population but to provide insights about how people perceive a situation."

A focus group series is a sequence of tightly moderated group discussions among people taken from a thin slice of a product's target audience. The goal is to encourage the participants to feel comfortable revealing their thoughts and feelings by putting them in a group of people who are like them, or share an interest or an experience that directly relates to a product or an idea.

Prepare. Focus group preparation consists of having several things:

- *A schedule*. The best results come from situations where there has been enough time to examine the contingencies. A good schedule provides sufficient time for everything, especially recruiting and guide writing, and enough slop to make a mistake or two.
- *The target audience*. Who will be invited to participate? Specifically, you need to know the subset of the target audience that is likely to give you the best feedback.
- *The research scope*. Focus group series can have a few groups of a handful of people or as many as a dozen groups with ten or more participants apiece. The number of groups and people will depend on the complexity of your questions, the depth to which you want to explore the answers, and the certainty with which you want to know these answers. More than four groups per audience are rarely necessary, but two are generally not enough.
- *Specific research topics*. Not all groups feel equally comfortable talking about all subjects and not all subjects lend themselves to group discussion. Carefully chosen topics and a thought-through discussion guide yield the most information without sacrificing the depth of research or the clarity of the results.

Make a schedule. A typical schedule for a focus group series takes about three weeks from beginning to end and should provide sufficient time for recruiting and writing the discussion guide. The process is detailed in Table 1.9.

Pick an audience. From your ideal target audience, you should choose a subset or several subsets that are likely to give you the most useful feedback. The right group will vary from situation to situation. First, you need a solid profile of your target audience, complete with a thorough understanding of their demographic/technological makeup. For example, if you are just looking to find out what existing users value about your service, you want to pick the people who represent the largest subset of your actual audience. If you are looking to find whether a new audience will be interested in what you are developing, a clear specification of who are the potential users will be necessary and what factors will uniquely differentiate them from others. For example, when introducing a new product for use after a car accident, it is hard to get people to predict what they are going to need; however, talking to people who were in car accidents recently may get an evaluation of what could have been useful. A sample profile is in Table 1.10.

The perspective of the members of the subgroups defines similarity. A group of audiophiles will likely be comfortable together regardless of age, whereas 20-year-old and 35-year-old urban restaurant goers probably have perspectives that differ enough to require multiple groups. If you feel that certain groups of people would not feel comfortable with each other, then do not put them together. Income, race, sex, class, age, job, and computer experience can play roles in how people interact in a group situation and how they react to a given user experience.

TABLE 1.9. Typical Focus Group Research Schedule

Timing	Activity
$t - 2$ weeks	Determine audience and scope, start recruiting immediately
$t - 2$ weeks	Determine broad topics to be investigated, start writing guide
$t - 1$ week	Write first version of discussion guide, discuss exact topic wording with development team, check on recruiting
$t - 3$ days	Write second version of discussion guide with timing, discuss with development team, recruiting should be completed
$t - 2$ days	Complete guide, schedule run-through, set up, and check all equipment
$t - 1$ day	Run-through in the morning, check times, and adjust guide questions as appropriate
	Do final recruiting check
t	Conduct groups (usually one to three days, depending on scheduling)
	Discuss with observers, collect copies of all notes
$t + 1$ day	Relax. Do something else
$t + 3$ days	Watch all tapes, take notes
$t + 1$ week	Combine notes, write analysis

TABLE 1.10. Sample Audience Profile for Focus Groups Participant Recruiting

Age: 20 to 55
Gender: Separate groups for men and women
Income: Household income over $70,000/year
Computer use: Computer at home or work
Internet use: Internet at home or work. One or more years' experience. Five to ten hours per week for personal use (shopping, reading news, banking, etc.)
Mobile use: Own a mobile phone, used nonvoice mobile services (played a game, SMS, etc.) one or more times in previous six months
Behavior: Were in a noninjury auto accident in the previous 9–12 months, as driver