

What Are UX and UX Design?

Fine art and pizza delivery, what we do falls neatly in between.

– David Letterman

Highlights

- Definition and scope of UX.
- UX design.
- The components of user experience:
 - Usability.
 - Usefulness.
 - Emotional impact.
 - Meaningfulness.
- What UX is not.
- Kinds of interaction and UX.
- A business case for user experience.

1.1 THE EXPANDING CONCEPT OF INTERACTION

In the first edition of this book, interaction was just starting to be more than how people used computers. The notion of interaction in the context of UX has continued to evolve, from a human and computer working together to accomplish a goal to being, as in [Fig. 1-1](#), *a very broad term referring to a wide variety of communication and collaboration between a human and an artifact in an ecology*.

Interaction artifact. So, what is an *interaction artifact*? It's a *system, device, service, instrument, mechanism, object, or environment that can communicate with a human, in either or both directions*. Artifacts, then, may include the building or room you are in, the chair you may be sitting in, kitchens, an ATM, an elevator, appliances like refrigerators, cars and other vehicles, most kinds of signage, homes, the workflow of the DMV, and voting machines.

Ecology

In the setting of UX design, the ecology is the entire set of surrounding parts of the world, including networks, other users, devices, and information structures, with which a user, product, or system interacts. [Section 16.2.1](#).

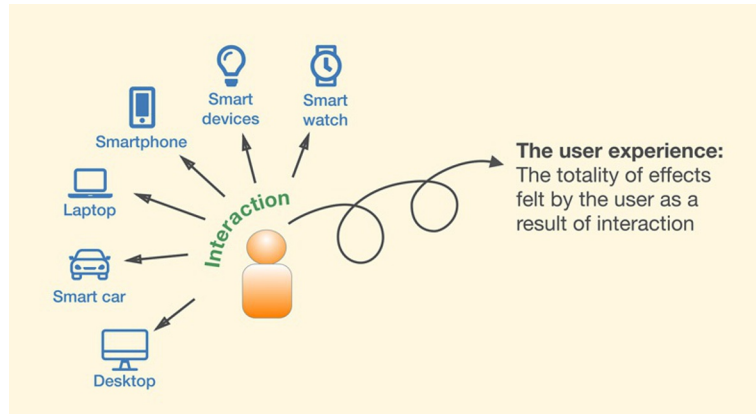


Fig. 1-1

Human-artifact interaction and the resulting experience.

Expanding concept of interaction. It is not just the variations of devices (artifacts) that have changed but the nature of interaction itself. For example, 25 years ago, interaction primarily happened on desktops which were either at home or work. The nature of interaction was primarily with a keyboard, mouse, and a monitor. Then, interaction extended to handheld devices like mobile phones and pagers. The former made it possible to do rudimentary tasks using highly modal interaction. The latter made it possible for an interrupt-driven interaction when someone was paged. That then evolved to using a stylus with the advent of PDAs. The interaction required learning a new input format with the PDA glyph language or using an on-screen tiny keyboard that could be touched with the stylus. Then came touch smartphones and tablets which made the stylus redundant. Now, there is a smart watch that changes the nature of interaction to a combination of touch and scroll wheel. Then there are smart glasses, VR (virtual reality goggles), and smart living environments that let users interact using yet other modalities.

Because interaction is so broad and pervasive in our world, good UX design will necessarily have a substantial positive impact on our lives.

1.2 DEFINITION OF UX

1.2.1 Distinction From “UI”

In times past, people talked about “UI,” referring to the user interface and usually referring to the user interface software. This idea of the UI is, in broad terms, the software medium underlying interaction and not of much interest in our context. UX design includes the design of the interaction and much more (e.g., the conceptual design, the ecology, etc.), but not of the UI software.

We have read some literature referring to UI design as visual design and UX design as more about interaction design. Perhaps you could say that UI is one of the portals through which users interact, and that designing it involves various subdisciplines. In the literature, the look, feel, and emotional aspects of a given UI are often seen as the responsibility of a visual designer. The structure of tasks on the UI and how those are supported in relation to the other tasks supported by the UIs of other devices in the ecology is the responsibility of an interaction designer. And the software of implementing those specifications is the responsibility of software engineers. In other words, UIs are various portals in the ecology.

In the general public, however, the terms UI, HCI, and UX are used somewhat interchangeably.

1.2.2 Distinction from “HCI”

Along these lines, there is also the term “HCI,” which stands for “human-computer interaction” and refers to the whole field of study. This term is mostly used now in reference to the academic side, including research and development, whereas “UX” is the more popular term for the practice of HCI in the field.

1.2.3 What Does “UX” Mean?

Because it’s clear that this whole book is about UX, we need to get right to the point about what UX is. As we said in the Preface, the two letters “UX” are a popular acronym that stands for “user experience.” Those two letters stand for the whole practice, all the work that is done in this field, and the final user experience that comes out of that work.

In September 2010, an international group met at the Schloss Dagstuhl (*Demarcating User eXperience Seminar*) to tease out the nature of user experience and to help define its limits. In their follow-up report ([Roto, Law, Vermeeren, & Hoonhout, 2011](#)), they point out that the multidisciplinary character of UX has led to multiple definitions from multiple perspectives, including UX as theory, UX as a phenomenon, UX as a field of study, and UX as a practice. In this book, we take the latter point of view, the perspective of UX design in practice.

1.2.4 The Rise of UX

Early large mainframe computers of the preconsumer era were used to run large enterprise software systems, and users were trained to use a system for specific business purposes. “Interaction” was via punch cards, paper tape, and paper printouts, so there really were no system-development considerations of usability or UX.

Enterprise System

A large information system used within an organization, typical of those developed and used within IT departments in organizations ([Sections 3.2.2.4 and 3.4.2](#)).

Paradigm

A model, pattern, template, or intellectual perception or view guiding a way of thinking and doing. Historically, with respect to a field of thought and work, it is thought of as coming in waves over time (Section 6.3).

Then the personal computer put computing on a business user's desk, and the consumer movement put computing in people's houses. Customer service and support was the first to discover that expanding the marketplace to "mere mortals" without an adequate understanding of how the product was being used had a major impact on support costs.

Smart devices and the Internet put computing in everyone's hands and made it possible for business to interface directly with the consumer. The paradigm shifted from users needing training to use a system to requiring the system to fit user expectations and, thus, the path to usability, HCI, and UX was inevitable. Digital natives now think of computing as something that is there—it is transparent to them that there is a design behind the product. They simply expect it will work.

For more background on the history and roots of UX, see [Section 6.2](#). Also see [Section 6.3](#), on shifting paradigms in HCI and UX.

1.2.5 What Is User Experience?

User experience, of course, is a kind of experience and "experience is a very dynamic, complex, and subjective phenomenon" (Buchenau & Suri, 2000), depending heavily on context of the associated activity.

User experience is the totality of the effects felt by the user before, during, and after interaction with a product or system in an ecology.

Our job, as UX designers, is to design that interaction to create a user experience that is productive, fulfilling, satisfying, and even joyful.

Key characteristics of a user experience reflected in the definition above are:

1. It is a result of interaction, whether direct or indirect.
2. It is about the totality of the effects.
3. It is felt internally by a user.
4. It includes usage context and ecology.

1.2.5.1 Interaction, direct or indirect

Interaction between a human and a designed artifact can be direct (e.g., operating on a device and getting feedback) or indirect (e.g., feeling the effect of seeing and thinking about an artifact).

1.2.5.2 Totality of effects

Following up on the second characteristic of a user experience, as the Dagstuhl report (Demarcating User eXperience Seminar, 2010) says, the effects of interaction include the user's entire "stream of perceptions, interpretations of those perceptions, and resulting emotions during an encounter with a system."

That totality of effects of interaction includes:

- The influence of usability, usefulness, and emotional impact during physical interaction.
- The full unfolding of effects over time.

As an example of effects felt over time, consider a potential user researching a product or system, seeing advertising and reviews, and anticipating ownership. Once the product is bought, the effects include product packaging and the “out of the box” experience; seeing, touching, and thinking about the product; admiring the product, using it, and retaining and savoring (or not) the pleasure of usage.

Finally, the user experience can include the individual’s feeling about the company that produced the product or system and its reputation and branding, as well as the pride of ownership and how the product has acquired meaning in the user’s lifestyle, extending into a broad cultural and personal experience.

1.2.5.3 User experience is felt internally by the user

Clearly, it is the user who has the experience. Therefore, user experiences from interaction under the same conditions can vary across individual users.

1.2.5.4 Context and ecology are crucial to user experience

An ecology is the complete usage context including all parts of the world the user comes in contact with related to the interaction. The user can be part of multiple ecologies (e.g., work versus home). Within an ecology, there could be multiple specific usage contexts (e.g., stressful work conditions or pleasurable play conditions). And each such context affects the user experience.

1.3 UX DESIGN

1.3.1 Can a User Experience Be Designed?

The perceptive reader may have already spotted a small inconsistency. We have used phrases “UX design” and others talk about “designing a user experience.” But you can’t design something that occurs internally in a user. So, phrases like “UX design” really don’t quite make sense, but we trust you will understand that this means designing *for* the user experience.

1.3.2 Importance of UX Design

The importance of UX is becoming more widely recognized and UX design has taken center stage. As a senior VP of IBM said, “There’s no longer any real distinction between business strategy and the design of the user experience” (Kolko, 2015a, p. 70). Knemeyer (2015, p. 66) agrees, by saying, “user experience

(UX) has become a mission-critical consideration for companies in every industry, and of every shape and size.”

One way to highlight the importance of good UX design is by examples of the high cost of bad UX design. As an example, poor UX design in the architecture of buildings and living spaces can impose costs that persist for a long time. “Too often, the people who design and construct buildings and parks don’t worry about whether they will work properly or what will they cost to run. Once the project is complete, they can move on to the next job. But the public has to live with badly built, poorly designed buildings and spaces; and taxpayers often have to foot the bill for putting them right again.”¹

Bad UI/UX design costs an enormous amount of money and more importantly, lives. Distractions due to bad UX designs for operating cars can lead to traffic accidents, injuries, and even death.

The same caution applies to UX design for operating aircraft and ships at sea. For example, the crash of EgyptAir Flight 990 in 1999 (Section 32.6.3.3) was determined to be caused by poor usability in the design of cockpit controls. And the collision of the USS McCain² is said to be the result of bad UX design of the navigation console.

In the medical domain, the need for good UX design is perhaps even more compelling with respect to the effects of safety in everyday operation. As Nielsen³ reports, “A field study identified 22 ways that automated hospital systems can result in the wrong medication being dispensed to patients. Most of these flaws are classic usability problems that have been understood for decades.”

1.4 THE COMPONENTS OF UX

As illustrated in Fig. 1-2, user experience is a combination that includes these factors:

1. Usability.
2. Usefulness.
3. Emotional impact.
4. Meaningfulness.

¹John Sorrell, 2006. The cost of bad design, *Report of the Commission for Architecture and the Built Environment*, <http://webarchive.nationalarchives.gov.uk/20110118134605/http://www.cabe.org.uk/files/the-cost-of-bad-design.pdf>.

²<https://arstechnica.com/information-technology/2017/11/uss-mccain-collision-ultimately-caused-by-ui-confusion/>

³Jakob Nielsen, April 11, 2005, *Medical Usability: How to Kill Patients Through Bad Design*, <https://www.nngroup.com/articles/medical-usability/>

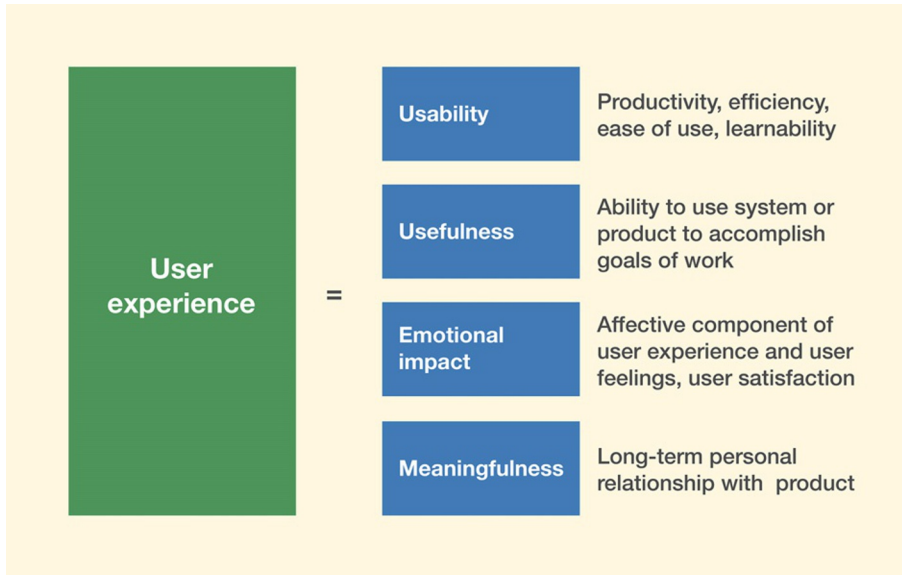


Fig. 1-2
The components of UX.

1.4.1 An Analogy With Fine Dining

To illustrate the possible components of user experience, we borrow from the domain of fine dining. The usefulness of a meal can be reckoned in terms of nutritional effectiveness, perhaps felt in terms of health values.

Usability in a dining experience can also be reckoned, to some extent, by practical considerations. For example, if the food served is tough and difficult to cut or chew, or it takes too long to prepare and serve, that will certainly impact the usability component of the dining experience. Lack of the necessary eating utensils will also count against dining usability.

For many of us, though, eating is a largely emotional experience. Perhaps it starts with the pleasure of anticipation. The diners will also experience a perception of, and emotional response to, the dining ambiance, lighting, background music, and décor, as well as the quality of service, aesthetics of food presentation, friendliness of the staff, and how good the food tasted.

1.4.2 Usability

Long ago, the field of Human-Computer Interaction (HCI), the umbrella academic discipline for UX, was pretty much just about usability, which includes (ISO 9241-11, 1997):

- Ease of use.
- User performance and productivity.

Affordance

A feature in a user's environment, for example, in a UX design, that helps the user do something (Section 30.1.2).

- Efficiency.
- Error avoidance.
- Learnability.
- Retainability (ease of remembering).

Even now, usability is still a very important part of UX. As the field has focused on more glamorous parts of the user experience, sometimes the foundational component, usability, has been forgotten. For example, the so-called flat design style popular these days looks and feels visually attractive but lacks an important affordance that reveals which elements on the screen are clickable and which are not. Without good usability, it is rare that the other components of the user experience will even be considered.

1.4.3 Usefulness

The second component is usefulness, perhaps the forgotten stepchild of the user experience. Usefulness is utility. Usefulness is about the power and functionality of the backend software that gives you the ability to get work (or play) done. It's the real underlying reason for a product or system.

Hassenzahl and Roto (2007) characterize usability and usefulness as serving a user's *do* goals, such as checking one's email or posting a comment on Facebook.

1.4.4 Emotional Impact

The third component is emotional impact, an affective part of user experience. As the term implies, emotional impact embraces how users feel emotionally about an interaction (Norman, 2004), including user satisfaction.

Although there were earlier academic papers about emotion in the user experience, Norman (2002) was one of the first to bring the topic to light on a broad scale, relating it to his theme of everyday things. Now there are conferences dedicated specifically to the topic, including the biennial Conference on Design & Emotion,⁴ the goal of which is to foster a cross-disciplinary approach to design and emotion.

While technically all of the user experience is emotional because it is all experienced internally by the user, there are some user experience factors that are more purely emotional, factors that are felt up close and personal during the usage of technology (whether high technology or low), factors that take

⁴<http://www.designandemotion.org/en/conferences/>

the user beyond simple satisfaction to fun, enjoyment, and self-expression, with sometimes strong emotional consequences.

Emotional impact can be experienced in many ways, including:

- Joy of usage.
- Pleasure.
- Excitement.
- Fun.
- Curiosity.
- Aesthetics.
- Novelty.
- Surprise.
- Delight.
- Play.
- Exploration.
- Coolness.
- Appeal.
- A sense of identity.
- Happiness.
- Enthusiasm.
- Enticement.
- Engagement.
- Pride of ownership.
- Affinity, attractiveness, identifying with a product.
- “Wow” in UX design.

For a discussion of fun interaction at work, see [Section 6.4](#).

1.4.4.1 Why include emotional impact?

Hassenzahl, Beu, and Burmester (2001, p. 71) and Shih and Liu (2007) put it this way: users are no longer satisfied with just the efficiency and effectiveness of usability; they are also looking for emotional satisfaction. Norman (2004) uses more practical terms: “attractive things make people feel good.” Users now seek pleasure in product use and aesthetics (Hassenzahl, 2012; Norman, 2002; Zhang, 2009) in product design, and the products we own and use can arouse strong feelings of importance and social status, especially if it is a high-tech, esoteric product.

Emotional impact in interaction can have positive impact on economics and job performance; beneficial emotions can lead to better job satisfaction,

decision making, and other behavior (Zhang & Li, 2005). As Norman (2004) shows us, positive emotions can have great impact on learning, curiosity, and creative thought.

1.4.4.2 Deeper emotions

While most of the emotional impact factors are about pleasure, they can be about other kinds of feelings, too, including affective qualities such as love, hate, fear, mourning, and reminiscing over shared memories. Applications in which emotional impact is important include social interaction (Dubberly & Pangaro, 2009; Rhee & Lee, 2009; Winchester III, 2009) and interaction for cultural problem solving (Ann, 2009; Costabile, Ardito, & Lanzilotti, 2010; Jones, Winegarden, & Rogers, 2009; Radoll, 2009; Savio, 2010).

Social and cultural interactions entail emotional aspects such as trustworthiness (especially important in e-commerce) and credibility (believability). Design for emotional impact can also be about supporting human compassion—for example, in sites like CaringBridge⁵ and CarePages.⁶

1.4.4.3 Joy, excitement, and fun

The most basic reason for considering joy of use is the humanistic view that enjoyment is fundamental to life.

(Hassenzahl et al., 2001)

We have adapted an example from Bill Buxton's book on sketching user experiences (Buxton, 2007b) that illustrates the difference when emotional impact is a factor. In Fig. 1-3, we have a picture (like that of Buxton's Fig. 32) of a mountain bike (Buxton, 2007b, pp. 98–99).

This bike is standing there ready for you to hop on and ride away on great adventure. But this image doesn't show the adventure, and that adventure is the user experience.

Now contrast that with the next picture in Fig. 1-4 (like Buxton's Fig. 33) that doesn't even show the whole user (rider) or even the whole bike (Buxton, 2007b, pp. 100–101).

What it does do, though, is capture the excitement of the user experience. The dynamic spray of water conveys the fun and excitement (and maybe a little danger). The blood and adrenaline are pumping as you careen over the bumpy

⁵<https://www.caringbridge.org>

⁶<https://www.carepages.com>



Fig. 1-3

A beautiful mountain bike just waiting for you to ride it.



Fig. 1-4

The true mountain bike experience.

rocks, and the scenery rushes by madly in a blur of motion. That is what you are buying—the breathtaking thrill of the experience of using the bike.

1.4.4.4 Attractive designs somehow work better

For many users, an attractive design just seems to work better and make people feel good (Norman, 2002, 2004). It's kind of like when you get your new car washed and cleaned up—it seems to run better.

Meaningfulness

A personal relationship that develops and endures over time between human users and a product that has become a part of the user's lifestyle (Section 1.4.5).

1.4.4.5 Engagement and enticement

Churchill (2010) characterizes engagement in terms of flow, fascination, attention held, and being “lost in time.” The psychological concept of flow entails full involvement, energized focus, and exclusion of all but the central activity (Churchill, 2010, p. 82). Engagement can span usage episodes to the point it contributes to long-term meaningfulness. Enticement, a quality that draws the user in, is closely related (Churchill, 2010; Siegel, 2012).

1.4.4.6 Coolness and “wow” in UX design

These days, consumers are used to, and even expect, products that are really cool (Holtzblatt, 2011). Coolness and “wow” in the design are becoming “required” elements of emotional impact in the user experience (Hudson & Viswanadha, 2009).

Example: A Convincing Anecdote About the Importance of Emotional Impact

David Pogue makes a convincing case for the role of emotional impact in user experience using the example of the iPad. In his *New York Times* story (Pogue, 2011), he explains why the iPad turned the personal devices industry upside down and created a whole new class of devices. But when the iPad came out, the critics dubbed it “underwhelming,” “a disappointment,” and “a failure.” Why would anyone want or need it?

Pogue admits that the critics were right from a utilitarian or rational standpoint: “The iPad was superfluous. It filled no obvious need. If you already had a touch screen phone and a laptop, why on earth would you need an iPad? It did seem like just a big iPod Touch.” Yet as Pogue claimed, the iPad at that time was the most successful personal electronic device ever, selling 15 million in the first months. Why? It has little to do with rational, functional, and utility appeal and has everything to do with emotional allure. It is about the personal experience of holding it in your hand and manipulating finely crafted objects on the screen. Once you have one, you find ways to make it useful.

1.4.4.7 Role of branding, marketing, and corporate culture

In some cases, the user experience transcends the effects felt due to usability, usefulness, and joy of use. Users can get wrapped up in the whole milieu of what the manufacturer stands for, their political affiliations, how the product is marketed, and so on. What image does the brand of a product stand for? Is it a brand that uses environmentally sustainable manufacturing practices? Do they

recycle? Consequently, what does the fact that someone is using a product of that particular brand say about them? These factors are difficult to define in the abstract and more difficult to identify in the concrete.

Consider the case of Apple in the late 2000s and early 2010s. The culture of designing for user experience was so deeply engrained in their corporate culture that everything they produced had a stamp of tasteful elegance and spectacular design. This kind of fanatic emphasis on quality user experience at Apple extended beyond the products they produced and even seeped into other areas of their company. When they made an employment offer to a new employee, for example, the package came in a meticulously designed envelope that set the stage for what the company stood for (Slivka, 2009).

And that aura also pervaded Apple retail stores. A *New York Times* article (Hafner, 2007) extolled the enchanting aura of Apple stores: “Not only has the company made many of its stores feel like gathering places, but the bright lights and equally bright acoustics create a buzz that makes customers feel more like they are at an event than a retail store.” The goal of one new store in Manhattan was to make it “the most personal store ever created.” This carefully designed user experience has been very successful in generating sales, return visits, and even tourist pilgrimages.

Example: Branding and Passion for the Pontiac Car

There is an interesting story from General Motors about valuing (or not) branding and product passion. In October 2010, the board of directors quietly discontinued the Pontiac car from the GM line of brands. Of course, the direct cause was the transition through bankruptcy, but the beginning of the end for Pontiac started 26 years earlier.

Before that, Pontiac had its own separate facilities for design and production. Owners (and wannabe owners) were passionate about Pontiac cars, and Pontiac employees had been devoted to the brand. The brand had its own identity, personality, and cachet, not to mention the notoriety from custom muscle cars such as the GTO and the Firebird TransAm, as seen in the movie, *Smokey and the Bandit*.

In 1984, however, in its great corporate wisdom, GM lumped the Pontiac works in with its other GM facilities. The economically based decision to merge facilities meant no separate ideas for Pontiac design and no special attention to production. After that, there was really nothing special to be devoted to, and the passion was lost. Many believe that decision led to the decline and eventual demise of the brand.

1.4.5 Meaningfulness

While usability, and often even emotional impact, is usually about a single usage occurrence, meaningfulness is, as it says in [Fig. 1-2](#), about how a product or artifact becomes meaningful in the life of a user. *Meaningfulness comes out of a personal relationship of the product with its human user that endures over time.* It is epitomized by the feelings of companionship many have for their smartphones, to the point that some users become physically uncomfortable if they become separated from their phones. Meaningfulness is exemplified by the feeling of comfort and safety felt by a hiker in response to a hand held GPS.

Meaningfulness is closely related to the more academic concept of phenomenology.

1.5 WHAT UX IS NOT

While UX is becoming more and more an established part of the technology world, some misconceptions and mischaracterizations still linger.

1.5.1 Not Dummy Proofing or User Friendliness

Usability and UX are not dummy proofing or idiot proofing. While it might have been mildly cute the first time people who didn't know much about usability used these terms; they are insulting and demeaning to users and designers alike.

Similarly, usability and UX are not about being “user-friendly.” This is a misdirected term that trivializes UX design. Users are not looking for amiability; they need an efficient, effective, safe, and maybe aesthetic and fun tool that helps them reach their goals.

1.5.2 Not Just About Dressing Things Up in a Pretty Skin

Another prevalent misconception about the early usability and human factors people was that they were the ones you send the design to at the end to dress it up and “make it pretty.” As Steve Jobs has put it, “In most people's vocabularies, design means veneer. It's interior decorating. It's the fabric of the curtains and the sofa. But to me, nothing could be further from the meaning of design. Design is the fundamental soul of a man-made creation that ends up expressing itself in successive outer layers of the product or service (Steve, 2000),” as cited by [Dubberly \(2012\)](#). Kolko agrees: “Design doesn't just make things beautiful, it makes them work” ([Kolko, 2015a, p. 70](#)).

Human Factors

An engineering discipline dedicated to bringing science and technology together with human behavior and biological characteristics for design and maintenance of products and systems for safe, effective, and satisfying use ([Section 6.2.4](#)).

Adding UX design as a “spread-on” layer at the end is what we call the “peanut butter theory”⁷ of UX, because it seems to be based on the premise that, after the product is developed, you can spread this nice thin layer of UX all over the top of it. You don’t have to know much about UX or software these days to know that can’t work.

1.5.3 Not Just a Diagnostic View

In the early days of usability, many companies had large software engineering teams, along with a small pool of human factors experts, who would get loaned out briefly to a project team, usually at the end of the project, at which time they were expected to perform “usability testing.” This led many to think of “doing usability” as equivalent to usability testing, a view we call the “priest in a parachute”⁸ approach.

After the team had pretty much committed to the design, the human factors people were to drop down into the project, give it their blessing, and go away! There’s no time left to fix noncosmetic problems found at this stage. There are no resources left to invest in the product before it must be shipped.

Example: The Black & Decker Snakelight and How Evaluation Can’t Do It All

Fig. 1-5 shows a Black & Decker Snakelight in the context of usage. It’s very flexible and even looks a little bit like a snake.

You can change its shape so it stands by itself on a workbench or anywhere you need, such as under the kitchen sink. To come up with this concept, Black & Decker did usage research before doing any design. They observed large numbers of flashlight users to see what they used flashlights for and how they used them.

They quickly discovered that people who use the flashlight to see better while they were doing tasks usually needed their hands free to do the task. If they had instead taken a purely diagnostic view, they would have looked at a typical flashlight and they would’ve fixed all of the problems they could find with that design, but they never would’ve thought of something totally new like the Snakelight.

⁷Thanks to Clayton Lewis for this metaphor.

⁸This one is also due to Clayton Lewis, if we recall correctly.

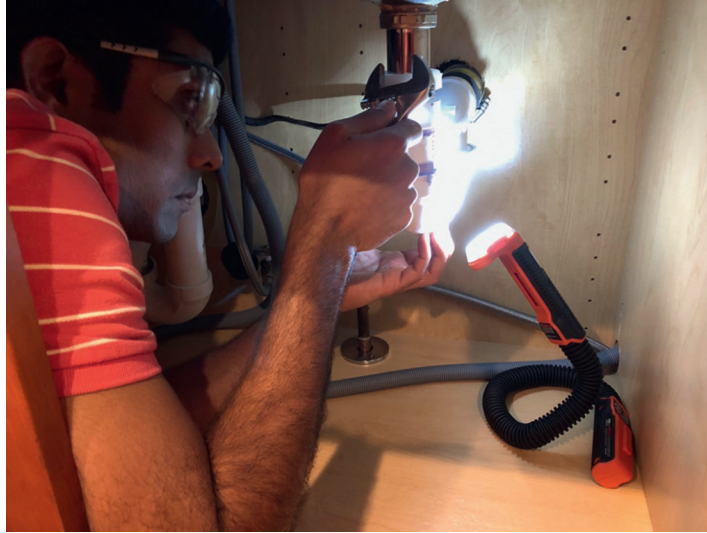


Fig. 1-5

A Black & Decker Snakelight.

Interaction

A broad term referring to a wide variety of communication and collaboration between a human and a device, product, or system in an ecology (Section 1.2).

1.6 KINDS OF INTERACTION AND UX

Not all interaction is for a particular task between a user and a GUI for something like adding an item to a calendar. Some interactions continue through lots of different states in time and space and through different environments. Instead of just a one-off exchange, an interaction can be about a transaction that spans a system and expands into a series of exchanges and encounters over a long span of time.

We have identified a few different kinds of interaction that we can correlate with different kinds of user experiences.

1. Localized interaction.
2. Activity-based interaction.
3. System-spanning interaction.

1.6.1 Localized Interaction

Localized interaction is localized with respect to both time and system. It is simple interaction with a single “product,” one device in the user’s ecology (the world of devices, systems, communications, etc.) surrounding the user. It’s task-oriented, bounded, and limited, and it occurs in a very short time within one interaction environment and with one single goal, such as using your laptop to check your email or using an ATM to make a withdrawal of cash. Therefore, design is focused on interaction.

1.6.2 Activity-Based Interaction

Norman introduced activity-based design (Norman, 2005) as a way to describe interactions that go beyond simple tasks. An activity is one or more task thread(s), a set of (or possibly sequences of) multiple, overlapping, and related tasks. It can involve:

- Interaction with one device to do a set of related tasks.
- Interaction across devices in the user's ecology.

Interaction with one device to do a set of related tasks. As an example, suppose you are searching for a compact digital camera online. You might follow links to reviews, decide on one, and put it in the “cart” and then follow links to other, similar products. You can also follow other links to accessories you might want (e.g., SD memory card, camera case, wrist strap, USB cable for downloading), and so on. Even though this involves multiple different tasks, users think of it as doing one activity.

Norman (2005) describes “mobile phones that combine appointment books, diaries, and calendars, note-taking facilities, text messaging, and cameras” as devices to support communication activities. “This one single device integrates several tasks: looking up numbers, dialing, talking, note taking, checking one’s diary or calendar, and exchanging photographs, text messages, and emails.” The many tasks can then be combined together in usage within one overall activity.

Example: iTunes Ecology

As an example, consider how people use iTunes. Although this example involves multiple devices and tasks, to the user, it is about managing personal music. iTunes is designed to have its own surrounding ecology to support several related activities. For example, I might use iTunes to update my iPod. Suppose I want to remove some music and one audio book and then create some playlists. Then, I want to buy some new music and add it to my mobile devices. When iTunes opens, I see that there is a newer version of iOS for my iPod, so I download and install that, and restart the iPod. Then, I buy and download the music into my iTunes library and synchronize the iPod with iTunes to get the new music set up. The best UX design (not really what you get with iTunes as it is today) will be one that seamlessly supports moving from one of these tasks to another.

Activity-Based Interaction

Interaction in the context of one or more task thread(s), a set of, or possibly sequences of, multiple, overlapping, and related tasks, often involving more than one device in an ecology. Sections 1.6.2 and 14.2.6.4.

1.6.3 System-Spanning Interaction

Interaction across devices in the user's ecology. System-spanning interaction is a kind of activity-based interaction, often involving multiple parties in multiple work/play roles, multiple devices, and multiple locations.

Example: Power Lines Are Down

Here is an example of a transaction with a relatively simple goal of getting electric power service restored to a user who finds the power is out in his house. This example and our Fig. 1-6 are borrowed and adapted from Muller, Wildman, and White (1993a).

The activity begins by our user calling his neighbor (Fig. 1-6). The neighbor says his power is out, too, and he thinks a power line is down in the neighborhood. Our hero then calls the power company customer service and asks if it can be

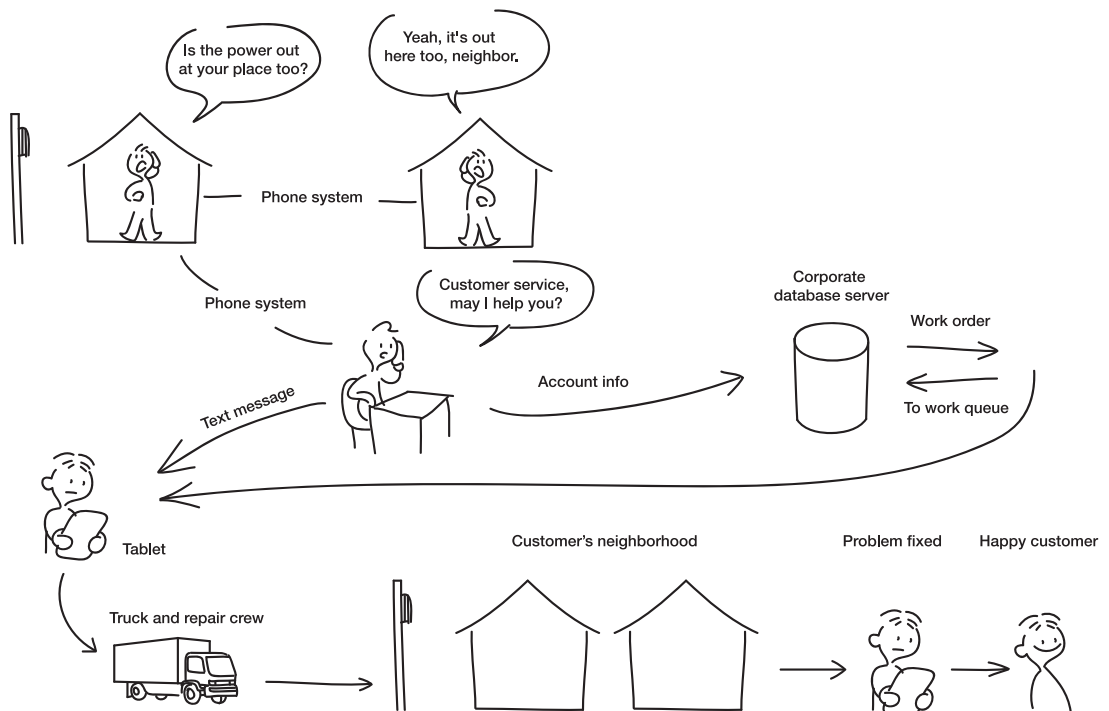


Fig. 1-6
System-spanning activity to
fix downed power lines
(adapted from Muller et al.
(1993a)).

fixed. The customer service person posts a work order in a queue in a central database, with account number, customer name, phone number, address.

Customer service also sends a text message to a technician in the field, who checks the queue on his portable tablet and picks up the work order, hops in his truck, and drives to that neighborhood. He and his crew fix the power lines, and he reports the job done on his portable tablet. The customer is happy.

From this one simple example, you can see an ecology involved in one user activity that includes the user as customer, the power company, its customer service, customer accounts, the power company's central database, a work order queue, a work order, power company field technicians, and the power lines. The ecology of this activity also includes the telephone system, the neighbor on his phone, a text message, the technician's portable tablet, the technician's crew, and a fleet of power company trucks.

The user's workflow is a continuum across the ecology, and information pervasiveness, or shareability and accessibility across the whole ecology, is the glue that ties the different subsystems within the ecology. We talk about how to design for system-spanning interaction in [Section 16.2.4](#), on designing the ecology.

1.6.4 The Dagstuhl Framework of Interaction and UX

Participants in the Dagstuhl seminar ([Roto et al., 2011, p. 8](#)) have modeled the kinds of UX (and kinds of interaction) in terms of the scope of time. Starting with the earliest, they feature:

- Before usage: Anticipated UX.
- During usage: Momentary UX, one-off encounters.
- After usage: Episodic UX, now and then periods of usage interspersed with nonusage.
- Over time: Cumulative UX, views of a system as a whole after having used it for a while.

These different kinds of UX, depending on time spans, overlap and confirm our definition of the totality of effects ([Section 1.2.5.2](#)). Anticipated UX includes feelings engendered by researching a product, reading reviews, and so on. Their momentary, episodic, and cumulative UX intersect in various ways with our localized, activity-based, system-spanning, and long-term interaction. Their cumulative UX placed importance on user opinions of systems that they use frequently, such as a laptop, desktop PC, an operating system, or a word processor. Our long-term interaction overlaps and extends beyond their cumulative UX. If the cumulative UX is positive, we call it meaningfulness ([Section 1.4.5](#)).

Meaningfulness

A personal relationship that develops and endures over time between human users and a product that has become a part of the user's lifestyle ([Section 1.4.5](#)).

1.7 SERVICE EXPERIENCE

Service experience and service design are specialized applications of UX (Forlizzi, 2010). Forlizzi says service design is UX design for a user or customer experience within a “transactional journey” (Forlizzi, 2010, p. 60). Forlizzi makes an effort to distinguish the two, but to us, her definition just confirms that service design is UX design applied to a customer journey: it’s “transactional” and helps, “a customer achieve a goal.”

Service experience is about applying the principles we are talking about in this book toward a customer’s experience of buying something or receiving some service. It’s about customer touch points in their user experience journey.

It usually involves a storytelling narrative of a UX experience distributed over time and often distributed over different locations. For example, the service experience of a patient going to a hospital for elective surgery could involve their arrival experience, checking in and going through lines, getting processed, etc.

The customer journey is an abstraction of the main path. Users also experience deviations, edge cases, breakdowns, pinch points, and problems that crop up. Much of the usage research data (Chapter 7), analysis (Chapter 8), and modeling (Chapter 9) captures the mechanical steps of this journey. Hopefully it can also capture the emotional impact felt along the way.

Example: Presurgery Hospital Visits

Consider this description of how one health organization in our area organized the workflow of its service to surgery patients.

It started with the family physician, where symptoms were explored, and a tentative diagnosis was made. The doctor decided that further tests were needed to properly diagnose the problem.

Next stop was the local hospital, where they took X-rays and performed an MRI, yielding a final diagnosis that surgery was required.

Next, the patient went to the hospital in the nearest large city, where the surgery was to occur. To get there, the patient had to use driving directions received in email. Upon arrival, there were a rather complex set of parking directions and walking and entrance directions. The patient was then processed by a series of people who specialized in various preadmission and preparation activities. And on a later date, there was a preop appointment.

Surgery was easy for the patient, no instruction necessary. Postsurgical care, however, required a sequence of prescriptions and trips to the pharmacy to fill them, and phone calls to surgical staff at the hospital with questions about recovery. Several follow-up appointments were required with the surgeon, tapering off to follow-up appointments with family physician.

1.8 WHY SHOULD WE CARE? THE BUSINESS CASE FOR UX

Ingenious by design; hassle-free connectivity

– On a Toshiba satellite receiver box

If you don't have a convincing business case for UX, you really have to conclude that, although it might be interesting, at the end of the day, UX is just an academic exercise.

1.8.1 Is the Fuss Over Usability Real?

In the past, this might have been a question usability practitioners had to face. UX is now recognized as a key job role in product development and as a key part of the development process. We don't have to defend UX and usability anymore because UX has penetrated most corporate and organizational development groups and projects. The success of “design thinking” (Brown, 2008) in business (the mindset of getting organizations to think like designers, applying design principles and practice to businesses and business processes) is one reason, and the rise of Apple is another.

1.8.2 No One Is Complaining and It Is Selling Like Hotcakes

It is easy to mistake certain positive signs as indicators that a product has no UX design problems. Managers often say, “This system has to be good; it's selling big time,” or, “I'm not hearing any complaints about the user interface.” Here it can be more difficult to make the case for UX to managers because their usual indicators of trouble with the product are not working. On closer inspection, it appears that a system might be selling well because it is the only one of its kind or the strength of its marketing department or advertising obscures the problems. And, sometimes, regardless of poor user experience, some users simply will not complain.

Here are some indicators to watch for:

- Your help desk is getting too many calls.
- Your users are accessing only a small portion of the overall functionality your system offers.

- There are a significant number of technical support calls about how to use a particular feature in the product.
- There are requests for features that already exist in the product.
- Your competitor's products are selling better even though your product has more features.
- Your developers or marketing are saying, "It might not be easy to use right off, but with training and practice, it will be a very intuitive design."

This book can help you address these issues.

1.8.3 Cost Justification

In the early days of usability, many people didn't believe in it, especially people in management. Usability engineers felt obligated to justify their existence and prove the value of their work. They did it by cost justifying usability (Bias & Mayhew, 2005; Mantei & Teorey, 1988), which involved examples of how much money a design improvement could save, given the time it took to perform a transaction involving the old design and the new design and the frequency by which the transaction occurred. That kind of cost-benefit analysis was good, as far as it went, but realistically, other factors were more compelling; customers and users were becoming more computer-sophisticated and less tolerant of poor interaction designs. And marketing people were becoming more aware of the demand for good design and getting into the act by demanding good design from their own organizations.

So, these days, the idea of cost-justifying UX design work is out of date. No one asks for cost justification on the software engineering side and the same is starting to be true on the UX side, too. Managers are realizing that it pays off in many ways to focus on getting a product or system right the first time. The result will be less total time, less money, and less negative impact on customer goodwill.

Example: An Anecdote From Consulting About the Importance of Getting the UX Right the First Time

A real-world, web-based, B2B software product company in San Francisco had a well-established customer base for their large complex suite of tools. At some point, they made major revisions to the product design as part of normal growth of functionality and market focus. Operating under at least what they perceived as extreme pressure to get it to the market in "Internet time," they released the new version too fast.

The concept was sound, but the design was not well thought through and the resulting poor usability led to a very bad user experience. Because their customers had invested heavily in their original product, they had a somewhat captive market. By and large, users were resilient and grumbled but adapted. However, the company's reputation for user experience was changing for the worse, and new customer business was lagging, finally forcing the company to go back and completely change the design for improved user experience. The immediate reaction from established customers and users was one of betrayal. They had invested the time and energy in adapting to the bad design and now the company changed it on them—again.

Although the new design was better, existing users were mostly concerned at this point about having a new learning curve blocking their productivity once again. This was a defining case of taking longer to do it right versus taking less time to do it wrong and then taking even longer to fix it. By not using an effective UX process, the company had quickly managed to alienate both their existing and future customer bases. The lesson: if you work in Internet time, you can also crash and burn in Internet time!