Shapeshifting
Convergence and Multidevice Experiences

Shapeshifting—a theme common in fairy tales and folklore—is an idea that has held my imagination since childhood. Whether it was the Wonder Twins transforming into their appropriate animal/water duo that would save the day or the regular guy who turned into a savage werewolf at the sight of a full moon, the idea that a person or a thing could actually transform into something entirely different still remains both compelling and mysterious to me (see Figures 4.1–4.3).

When I think of the topic of convergence and designing for multidevice experiences, I automatically think of shapeshifting. In my mind, *convergence* is what allows digital experiences to change shape and form in order to accommodate the multitude of devices that have become commonplace in our lives.
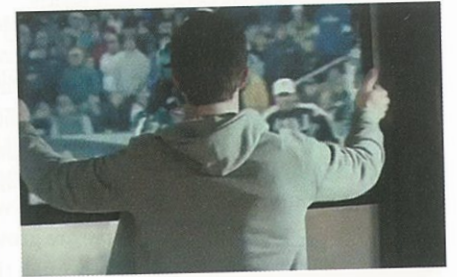

FIGURES 4.1–4.3
Wonder Twins, Mystique, and werewolves are examples of shapeshifters—a being (usually human) who has the ability to change its shape into that of another person, creature, or entity.

What Is Convergence?

Convergence is what enables experiences to shapeshift between different devices and environments. Instead of a user interacting with his mobile device as one isolated experience and then interacting with another device (such as a personal computer) as a totally separate, isolated experience, convergence allows these experiences to be connected *and* have continuity. Instead of experiences being trapped on a device, they can move fluidly through multiple devices. There is a growing expectation among users that our digital content will follow us seamlessly from device to device. Convergence is enabling that to happen.

The best example of a truly convergent experience that I've found is from a Super Bowl commercial for NFL Mobile Television, as shown in Figures 4.4–4.11. The commercial depicts a guy watching the same football game from multiple devices in multiple environments throughout game day.

FIGURES 4.4–4.11
These stills from an NFL Mobile television commercial depict a great example of convergent experiences. Instead of camping out in his living room all day, the main character can be mobile and follow the big game from any device in his ecosystem.

Convergence and Mobility

One aspect of the NFL Mobile Television convergence example that I love is that it underscores why convergence is an important and timely mobile UX topic. Instead of camping out in his living room all day watching the game, the central character in the commercial can be both mobile—walking around and participating in the world—*and* connected to the content that's important to him. People are growing to expect their digital content to follow them seamlessly through the world, and mobile devices are enabling this to happen.

Mobile Devices Are Enabling Convergence

In addition to enabling these seamless, multidevice experiences, convergence is a timely and important mobile UX topic at this time because of two other, equally significant reasons:

- **What constitutes a "mobile device" is rapidly evolving.**

  Today, the character in the convergence commercial can watch his football game from two mobile devices in his ecosystem—his smartphone and his tablet. On what mobile devices will he watch the game six months from now? Or two years from now? While there may be great cognitive comfort in defining mobile devices as pocketable, handheld devices predominantly used for voice calls and data consumption, that notion is changing. In reality, the definition of a mobile device is expanding to encompass devices that are much larger (tablets), much smaller (FitBits), and objects that are questionably devices at all (smartcards such as Hong Kong's Octopus card) at a rate must faster than any technology prior to this time. As the definition of "mobility" rapidly expands, designers must work outside the contours of their typical comfort zones. They must learn to step up to the challenge of working with new and experimental form factors, hardware configurations, and interface paradigms with the spirit of creativity and discovery—or they will get left behind.

- **UX professionals must now design for ecosystems.**

  Gone (or at least rare) are the days when UX professionals could design for single, siloed experiences (such as a desktop Web site or an app mobile phone) with little regard for the other devices a user might possess. As Moore's law charges forward and computational power becomes less and less expensive, people are acquiring more and more devices. Users are no longer interested in single, siloed experiences. Instead, they have grown to expect experiences that traverse multiple devices and contexts seamlessly. Users insist that their experiences

be integrated and accessible in a wide variety of environments, screen sizes, and network connections. They want their devices to be aware of and talk to each other. This significant shift in user expectation means that designers can no longer focus on single device experiences and expect to meet or exceed user expectation. Designers must now account for the interconnectedness of information and subsequently design for ecosystems.

Three Levels of Convergence

One of the key challenges in creating seamless, multidevice experiences is adjusting our own deeply ingrained ideas and expectations about devices. A long-held belief has been that everything we know about devices—from the technology used to create them, to the activities undertaken on them, to the media consumed on them—was intrinsically tied to the device, when in fact it was not. Devices are merely conduits for experiences. The needs, activities, and media are actually often independent of the device.

Our perceptions are changing, though. As mobile devices become more prevalent, Internet access becomes more widespread, and media gets prismed through a variety of technology channels, users are getting introduced to the notion of convergence on three key levels that are separate but interrelated, as shown in Figure 4.12.

- Technology convergence

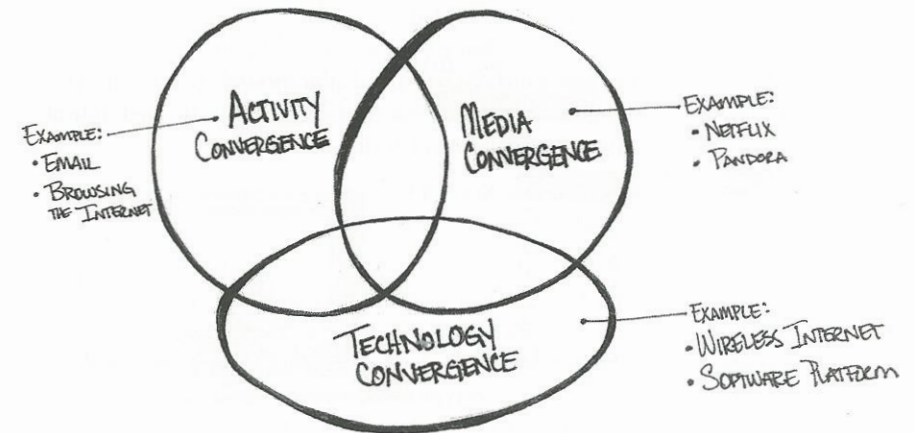- Media convergence

- Activity convergence

FIGURE 4.12
Levels of convergence.

Technology Convergence

When a user buys an Android tablet so that it will work with his Android phone, he is orchestrating *technology convergence*. Technology convergence occurs when a set of devices contain a similar technology and "play well" with each other (see Figure 4.13). In this type of convergence, the underlying technology enables experiences to move seamlessly across multiple devices.

Examples: Wireless Internet, Bluetooth, or a software platform like Android.

FIGURE 4.13
While interacting with a tablet, a smartphone, and a television are vastly different experiences, the Android operating system is used to create all three.

Media Convergence

When a user watches a reality television show, follows along on the show's Twitter stream, and downloads the TV network's iPad app, he is experiencing *media convergence*. Media convergence occurs when content is prismed through multiple devices or touchpoints (see Figure 4.14). The content and interactions often respond appropriately to the context (smartphone vs. big screen TV, etc.), but the focus is on the through-line of the content through the ecosystem of devices.

Examples: Pandora, Netflix, Bravo TV.

Activity Convergence

When a user undertakes the same activity, such as email, on multiple devices in his ecosystem, he is engaged in *activity convergence*. Activity convergence enables the user to perform an activity, regardless of the device (see Figure 4.15). The key to this type of convergence is figuring out how to allow users to complete a task or achieve their goal in a way that is intuitive, given the high degree of variance between types of devices and the vast number of use contexts.

Examples: Email, browsing the Internet, looking up a restaurant on Yelp.

FIGURE 4.14
Bravo is a cable television channel. Media convergence enables users to consume Bravo content from a variety of outlets: TV, Web sites, mobile applications, and through social media points like Facebook and Twitter.

FIGURE 4.15
Apple's email application is an example of activity convergence. Users can engage in the activity of reading and responding to emails from a variety of devices. Apple's email application keeps all the experiences up to date and in sync.

The key to these three types of convergence is the notion of a through-line. The through-line is what enables continuity of an experience, regardless of the device. It's the user's mental cue that allows the experiences to transcend devices. Through-lines are the hook that allows the technology to fall away and enables people to focus on what matters to them. Technology platforms are the through-line for technical convergence, media is the through-line for media convergence, and tasks/goals are the through-lines for activity convergence.

These are preliminary examples of current converged experiences. As our perceptions about device experiences shift and a future of seamless experiences between devices unfolds, there will likely be many more. The important idea is that convergence is no longer a lofty, abstract word used to describe a future that few people could imagine. Convergence is actually happening. It's something users are growing to expect.

How do designers steeped in a tradition of designing for a single device begin designing for this new, interconnected device landscape? If convergent experiences are the goal, then ecosystems are the means of production. Ecosystems are the pieces and parts designers can use to craft new multidevice experiences.

Ecosystems are the medium of the new converged digital landscape.

What Is a Device Ecosystem?

FIGURE 4.16
Coral reefs are considered to be complex marine ecosystems because the plant life supports the animal life and vice versa.

Similar to the term "convergence," a digital ecosystem is yet another abstract and ill-defined term that has been used and abused by many. What exactly does the term *digital ecosystem* mean and why does it matter to mobile UX?

In the world of biological sciences and ecology, an ecosystem is a term used to describe the interactions between a community of living organisms and their nonliving environment in a geographically bound area (see Figure 4.16). Instead of focusing on one aspect of a geographic area—such as the plants or the animals—ecosystems account for all the organisms (large and small), as well as nonliving components of the environment with which organisms interact (such as air, soil, and sunlight). The study of biological ecosystems entails understanding relationships: How different life forms help sustain one another.

Just like a biological ecosystem, a digital ecosystem is the term used to describe the interactions between

the pieces, services, systems, and processes of a digital environment. An ecosystem is all the stuff that makes an experience work. It includes all of the relevant digital touchpoints (hardware, content providers, Web sites, mobile applications, and so on), the people that interact with them, and the business processes and technology environments that support them (see Figure 4.17)
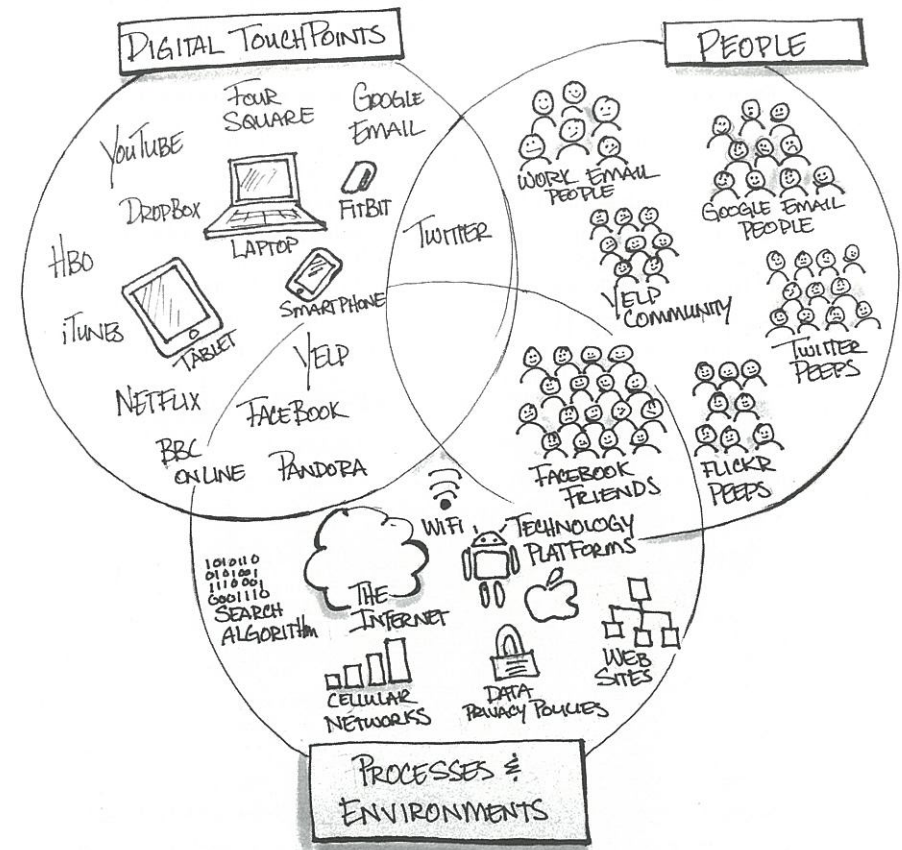

FIGURE 4.17
An ecosystem includes the digital touchpoints, the people that interact with them, and the business processes and technology environments that support them.

- **Touchpoints:** Touchpoints in a digital ecosystem include everything that people within a system come in contact with—hardware, software, Web sites, and services.

- **People:** The "people" part of an ecosystem includes all the users who interact with a system, encompassing everyone from the users and developers of a system to the people within an organization who build and maintain a system.

- **Processes and Environments:** The stuff that's categorized as "processes and environments" within a digital ecosystem can generally be described as the stuff that makes the ecosystem run efficiently. It includes underlying technology, such as wireless Internet or cellular networks, as well as processes, such as membership features or privacy policies.

Generally speaking, touchpoints are what designers and UX professionals are privy to because it's what they can create and design. Whether it's designing the pages of a Web site or the interface for a mobile application, most designers feel more comfortable designing digital touchpoints.

But the people, processes, and environments are what make experiences happen for a user—and understanding and designing the interactions with these processes and environments is essential to creating good ecosystem experiences for users. Unfortunately, our current working processes aren't tailored for designers to give much consideration to anything that's not a touchpoint. Device ecosystems are changing that.

Why Ecosystems Matter

In the past, designers were often responsible for creating one instantiation of an experience—such as a Web site—and they could assume that users would interact with that Web site through a browser on a personal computer. Creating an attractive, well-organized Web site optimized for a PC was the scope of their responsibility.

Today, that no longer holds true.

Now, in addition to a PC, users might view that very same Web site through a mobile browser on a smartphone or a tablet. In addition to a Web site, they may expect the company to have a custom mobile application that provides a tailored experience for a mobile phone or tablet phone and tablet computer. They may even browse the Internet on their television and expect the Web site experience to be navigable from their TV's remote control. They will also likely expect all these experience to interrelate to one another and have continuity. Gone are the days of designing simple Web sites solely for a PC. Users now have an ecosystem of devices for consuming and interacting with content. Instead of designing sites or single experiences, designers must design entire systems.

You may think, "Yeah, but my job is just the mobile part. I'm only responsible for the mobile Web site." However, what you are designing is part of a bigger picture. If you don't have a sense of the bigger picture, the mobile experience you create will suffer.

Even if, as a designer, you are only responsible for creating a mobile experience, a user's engagement with an experience is no longer isolated to one device. Designers are no longer designing "screens" or "pages." Instead, they are designing flexible systems that must accommodate multiple content relationships. Today, designers must get out of the "screen" or "page" mindset and start designing for systems.

Just like runners in a relay team similar to those pictured in Figure 4.18, you have to know what the other experiences are in order to catch and hand off the baton. Understanding not only the device experience you're designing, but also the other devices in a user's ecosystem will enable you to identify and design for attributes that are unique to the mobile experience and create a mobile experience that will scale and play well with other devices.


FIGURE 4.18
Just like runners in a relay team, designers must be conscious of and understand the role of other devices in a user's ecosystem in order to catch and hand off the baton, thereby enabling seamless multidevice experiences.

Designing for Ecosystems: Where to Start?

Where does a designer steeped in the tradition of creating "screens" or Web "pages" begin to design for these flexible content systems? My recommendation is to start with your users. Recruit some people who use your product or service and ask them to make a map of their device ecosystem. It's a great contextual research exercise that will help you get a handle on the touchpoints, people, processes, and environments they interact with everyday. When it comes to ecosystems, one of the best ways to get the lay of the land is to ask your users for a map (see Figures 4.19 through 4.21).
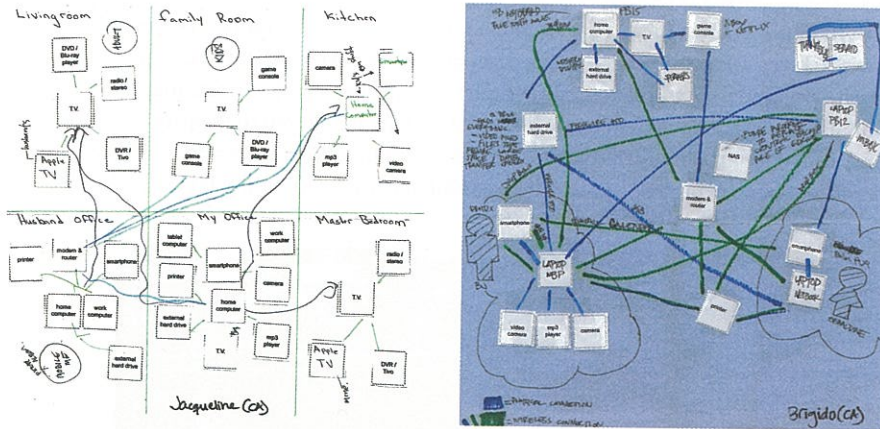
FIGURES 4.19–4.21
These images represent device ecosystem maps drawn by users of mobile devices.

Diagram Your Ecosystem

1. Provide participants with a large sheet of paper.

2. Ask them to draw images that represent all devices they own or interact with in a given day.

3. Next, ask the participants to list five things they do (activities, tasks, etc.) with each device.

4. Ask them to list what sites, services, or communities they use to accomplish their tasks. This part of the exercise should answer, "How does that work?" "What site, application, or service do you use to make that happen?"

5. Next, ask your participants about the infrastructure they use to make those experiences happen. Do they have an account with a network provider for their smartphone? Do they have a WiFi connection in their home? Ask them to indicate the underlying infrastructure that makes those devices run.

6. Finally, ask your participants if they had to select the five most important or personally significant things they do (within the context of all the devices in their ecosystem), what would those five things be?

The benefit of this exercise is twofold:

1. It's a great "lay of the land" exercise. It will help you get a sense of the depth and breadth of your typical user's digital ecosystem. Knowing this information will help you focus your design efforts.

2. This exercise will provide you with a sense of the different mental models that people currently have for their digital ecosystems. As illustrated in the examples shown in Figures 4.22–4.24, some people naturally communicate their ecosystem based on rooms in their homes, while others choose to communicate their digital ecologies based on the relationships between devices or services. Understanding and building on the natural organizing principles people use for their ecosystems can help you create an intuitive multidevice experience.
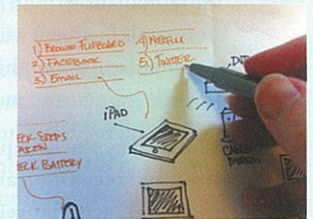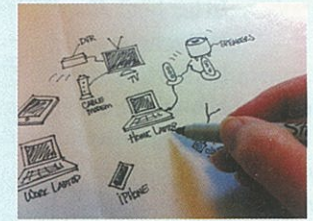
FIGURES 4.22–4.24
Images from an ecosystem drawing exercise with research participants.

Mutual Reconfiguration and Multidevice Experiences

In her book *Human-Machine Reconfiguration: Plans and Situated Actions*, HCI scholar and professor of Anthropology of Science and Technology at Lancaster University, Lucy Suchman challenged common assumptions behind the design of interactive systems by offering a very different way of looking at the fundamental issues of agency and interaction.

Much of the current thought and discourse around human–computer interaction today assumes a very static model between users and their devices. The human (user) is an agent with goals, plans, and intentions who achieves these goals (actions) with messages (interactions) conveyed through interfaces to computers. Under this assumption, the aim of HCI is to narrow the distance between human and machine to make the interface more transparent.[1]

Informed by the discipline of social studies of technology, Suchman's theory of mutual reconfiguration suggests that a person's capacity to act (their agency) is reconfigured when it comes into contact with another thing or person—that human action is constantly constructed and reconstructed from dynamic interactions with the material and social worlds.

As the boundaries between devices and interfaces continue to shift, this idea of mutual reconfiguration has great relevance to the design of mobile and multidevice experiences. Instead of viewing interaction as a static model between a person and device through an unfluctuating interface assigned to a single device, it supports the need for a more fluid interaction model. Suchman's theory reflects the need for interfaces that are dynamic and have the ability to change and reform depending on the environment and social circumstances of the user.

I experienced the phenomenon of mutual reconfiguration firsthand while researching how people use tablet computers. During a research study on iPad usage, my colleague Jofish Kaye and I spoke with over 20 iPad users in the summer of 2011. What we found was that while tablets are widely considered to be "mobile devices," the primary environment where participants reported using their iPad was in their home. However, unlike a PC or laptop computer that lends itself to a seated stance on flat surfaces, participants reported using an iPad while curled up, like they would with a book. Participants found their iPads especially well suited for "comfortable computing": using their tablets in "soft surface" environments that could easily support casual content consumption with some lightweight interactivity (see Figure 4.25).

FIGURE 4.25
Participants used their iPads predominantly in "soft surface" environments. These environments supported "comfortable computing"—casual content consumption with some lightweight interactivity.

At the simplest level, "comfortable computing" was an observation of how the environment currently shapes the way people use tablets. In our iPad study, people used their iPads while curled up in bed or sprawled on the couch. These soft-surface environments configured the users' bodies into comfortable positions—and this in turn influenced/configured how people used the device. While in these "comfortable configurations," users did not want to use their iPads for writing emails, balancing spreadsheets, or other "task-focused" computing activities. Instead, they desired a sense of comfort in the primary uses of their iPads: reaching out to social connectedness on Facebook or Twitter, the storytelling of movies and TV shows on Netflix, and conversations with loved ones on FaceTime.

> More than a conversation at the interface, creative assemblages like these explore and elaborate the particular dynamic capacities that digital media afford and the ways that through them humans and machines can perform interesting new effects. Not only do these experiments provide innovations in our thinking about machines, but they open up as well the equally exciting prospect of alternate conceptualizations of what it means to be human. The person figured is not an autonomous rational actor but an unfolding, shifting biography of culturally and materially specified experiences, relations, and possibilities, inflected by each next encounter—including the most normative and familiar—in uniquely particular ways.
>
> —Lucy Suchman
> **Human-Machine Reconfigurations: Plans and Situated Actions**[2]

1   Peter Wright, "Reconsidering the H, the C, and the I: Some thoughts on reading Suchman's Human-Machine Reconfigurations" (*Interactions Magazine*, Volume 18, Issue 5, September + October 2011) p. 29.

2   *Human-Machine Reconfigurations: Plans and Situated Actions (Learning in Doing: Social, Cognitive and Computational Perspectives)*, Cambridge University Press; 2nd edition (December 4, 2006).

What underlies Suchman's theory is the notion of situated cognition—that knowing is inseparable from doing—and that how people understand and interact with the world is situated in activities that are bound to social, cultural, and physical contexts.

Suchman's theory of situated action is especially relevant to the design of convergent multidevice experiences because:

1. **Mental models for ecosystems don't exist yet.**

    Unlike the PC/desktop experience with a relatively known and predictable mental model, most users don't yet have a mental map of how pieces and parts of their digital ecosystems fit together and interact with each other. Subsequently, convergent, multidevice experiences are often achieved through trial and error. Users learn through doing instead of building on existing knowledge.

2. **Ecosystems are growing rapidly.**

    The rate at which new devices and digital services are being added to a user's ecosystem is growing exponentially, creating scale issues for systems that are not flexible enough to accommodate the user's burgeoning ecosystems.

3. **Context matters.**

    Context has a huge impact on the ways that people use mobile devices, and mobile devices are a huge piece of the ecosystem "pie." Suchman's theory is sympathetic to context—it seeks to understand how the environment and social context affect how people interact with technology and design experiences appropriately.

While ecosystems are a growing trend in the digital landscape, designers and UX professionals presently have few design methods, heuristics, or conceptual models to lean on when designing multidevice experiences. Suchman's theory and subsequent design recommendation to employ participatory design methods can help. Instead of thinking of a multidevice experience as a predetermined set of interactions that must be followed, the theory of situated action supports the idea that people learn and acquire knowledge about device ecosystems by thinking on the fly and through trial and error. This approach requires designers to create interactive systems that are less "mapped out" and bound by logic and instead opt for systems that are intuitive, invite exploration, and progressively reveal their nature. The best way to create such a system is to invite users into your design process through participatory design methods.

Identifying Ecosystem Relationships Through Participatory Design

After having a group of users draw a map of their current ecosystem, it's easy to get overwhelmed. While the maps are helpful in providing a "lay of the land" view of the users' digital landscape, they don't communicate or emphasize the most important element of multidevice experiences: relationships.

Similar to a biological ecosystem, a key part of understanding a digital ecosystem entails understanding relationships—the interdependencies between different elements within a system—and how the different parts of the system help relate to and sustain each other. For example, the experience of a digital touchpoint such as Twitter would fail without the participation of your friends and the Internet. The relationship between the touchpoint, friends, and the Internet is a significant relationship for the Twitter experience (see Figure 4.26). Using a digital touchpoint like an iPad would be a lot less fun without iPad applications, the iTune store, and the millions of applications developers who create them. The relationship between the iPad device, the iTunes store, and applications is a significant relationship for the iPad experience (see Figure 4.27). Instead of being overwhelmed by all the pieces and parts of a digital ecosystem, identifying and understanding the critical relationships within an ecosystem will allow you to focus your design efforts.

FIGURE 4.26
The Twitter/Twitter Community Relationship: Another important interdependent ecosystem relationship exists between Twitter and Twitter users. Making it easy to identify and interact with people in the Twitter community should be a key design consideration for any experience that integrates Twitter data.

FIGURE 4.27
The iTunes/iPad Relationship: There's an important interdependent ecosystem relationship between the iPad, the iTunes store, and iPad applications. Identifying and prioritizing relationships in a device ecosystem will help you design for the relationships that matter most.

It's the study of these relationships and interdependencies that is key to multidevice experiences. When these relationships are not supported by good, thoughtful design, multidevice experiences fall flat. Identifying relationships is critical. The best way to distinguish and understand these relationships is to watch users identify and enact them through participatory design.

Participatory Design

Unlike other approaches to design, participatory design assumes that users should play an active role in the creative process. The theory behind participatory design methodologies assumes the following:

- All people are creative.

- All people have dreams.

- People can project their needs onto ambiguous stimuli.

- People are driven to make meaning and will fill in what is unsaid or unseen.

Participatory design presupposes that in the right context, users can envision the future by identifying *defining moments*. In the context of designing for digital ecosystems, defining moments are the interactions that unearth the critical relationships between touchpoints, people, processes, and environments within an ecosystem. Defining moments unearth these relationships and provide an understanding of the nature of the relationship for users.

Role Play and Participatory Design

The stories that users share and the role playing that occurs during participatory design sessions will help you uncover defining moments within a user's multidevice experience. A key challenge to integrating participatory design methods into your creative process is to create a space in which users feel comfortable telling stories about their experiences and can engage in role playing with props. This makes thoughtfulness around the stimuli, props, and environments where the participatory design sessions occur quite possibly the most important part of using this type of method in your design work.

Environments

As referenced earlier in Suchman's theory of situated action, environment and social circumstances deeply affect the way that people engage with a digital experience. This is why it's important to identify the types of environments your users will likely engage in with the experience you're creating and conduct participatory design sessions in those environments. These may include a living room, a crowded bus, or even inside a car. Conduct your participatory design sessions in a variety of environments in order to explore how different social and environmental conditions affect the relationships between elements in an ecosystem. A variety of environments will also help you capture how users communicate with experiences differently depending on the environment (see Figures 4.28–4.31).
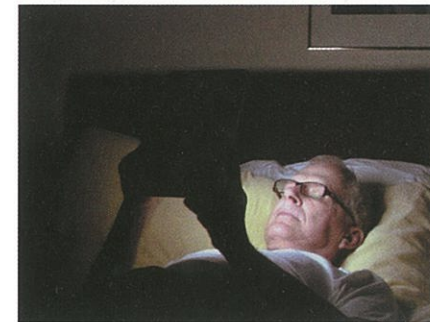
FIGURES 4.28–4.31
Identify the types of environments that users may engage with the experience you're creating and conduct participatory design sessions in those environments.

Props

In participatory design sessions, props are the physical representations of intended form factors. Like a blank canvas, they should have a physical form that constrains their function, but the props should be stripped of detail in order to allow participants to discover and determine the crucial design elements throughout the design session. The role of props is to provide a mechanism for participants to enact their ideas, goals, and opinions in a given context. Good props inspire compelling stories and make it easy for users to fill in important design details (see Figures 4.32–4.34).

FIGURES 4.32–4.34
Good props inspire compelling stories and make it easy for users to fill in important design details.

Stimuli

Participants in participatory design sessions have to be the authors of their own experience. However, participatory design sessions have a theatrical aspect to them and not all participants will feel completely comfortable improvising on cue. Stimuli—verbal cues (such as questions or describing the context of use) or nonverbal cues (such as images or words on paper)— can help get the ball rolling for participants and direct the flow of the session and allow designers to get deeper insights on a particular idea. Being thoughtful about which stimuli to use and when to introduce them within the process is crucial for getting the most out of your participatory design session (see Figures 4.35–4.37).

FIGURE 4.35–4.37
Stimuli can help get the ball rolling for participants and direct the flow of the participatory design session.

Creating Experiences That Scale

Once you've identified the key relationships in a user's ecosystem and the important experiential handoffs, you can start creating digital experiences that scale across devices. While creating a seamless experience is the goal, there are multiple ways to deliver a seamless experience. Part of orchestrating an experience across multiple screens is to understand how the different screens in a device ecosystem can relate to each other.

Until recently, the heart of a typical user's device ecosystem was likely his personal computer. A PC was the center of the experience, and all the other experiences radiated off the PC like a hub and spoke. The common and widespread practice of "synching" a tablet or smartphone to a PC reinforced the assumption that a personal computer was the hub of any family of devices. That notion is rapidly changing. While PCs still play a dominant role in most users' device ecosystems, they aren't always the heart. As mobile devices become more prevalent, new, more distributed relationship patterns between devices are emerging.

The talented folks at Precious Design in Hamburg, Germany identified the following six relationship patterns for screen ecosystems:

- Coherence

- Synchronization

- Screen Sharing

- Device Shifting

- Complementary

- Simultaneity

The following section references and builds on their ideas outlined in their "Patterns for Multi-Screen Strategies" presentation on Slideshare (http://www.slideshare.net/preciousforever/patterns-for-multiscreen-strategies). This section should give you a sense of the different types of relationships you can create between devices in an ecosystem.

Coherence

The coherence convergence pattern is about optimizing digital experiences for specific device characteristics and usage scenarios while simultaneously ensuring there is a sense of continuity of the experience across all the devices. Essentially, experiences are tailored to each device but have some sense of consistency (see Figures 4.38–4.39). The three keys to creating a coherent experience are:

- Identifying the primary use cases for each device.

- Optimizing the design of each experience to map to those use cases.

- Maintaining a unified design language (visual and interaction) that scales across a variety of devices.
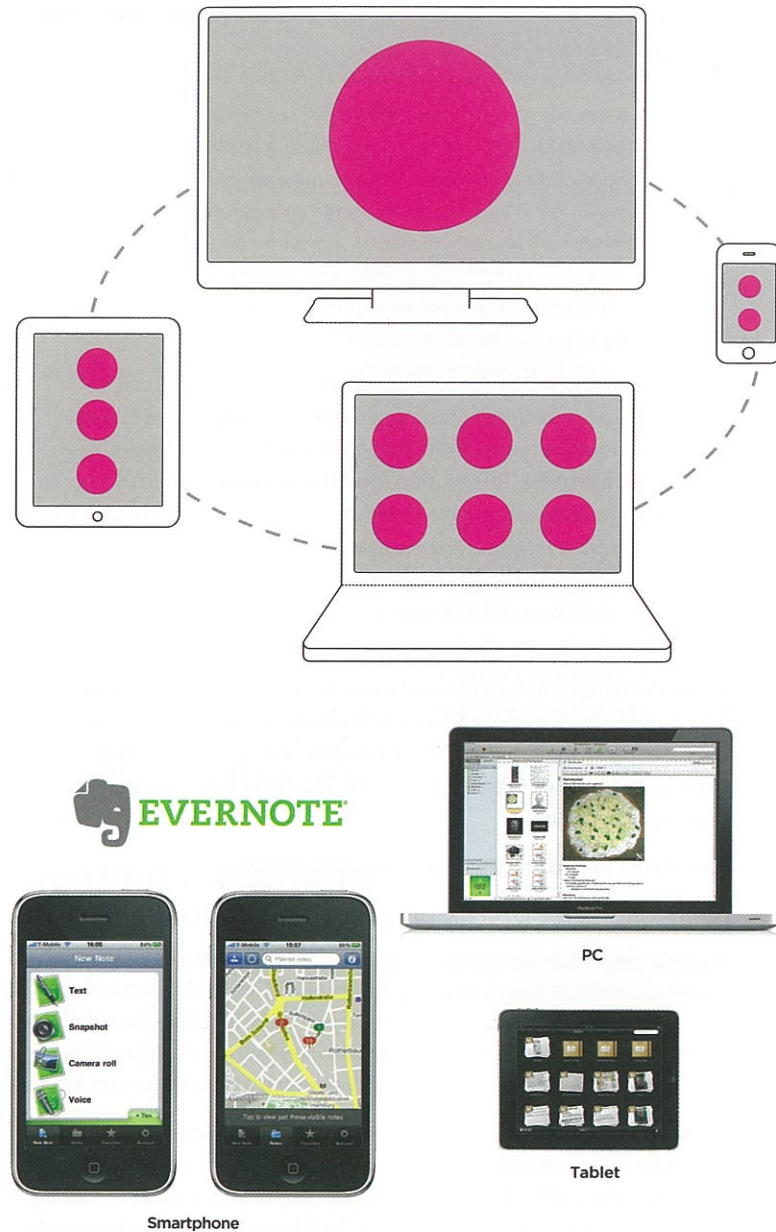
FIGURES 4.38–4.39
Evernote, a digital to-do list and notebook application, is available on numerous platforms and devices. The smartphone apps are optimized for photo and audio input and notes are location tagged.

Synchronization

Similar to keeping devices in sync with your computer, the synchronization screen pattern is all about keeping content in sync, regardless of the device for the sake of task continuation (see Figures 4.40–4.41). If a user starts watching a streaming Netflix movie on his networked TV, this approach allows him to pick up the movie where he left off on any device in his ecosystem.
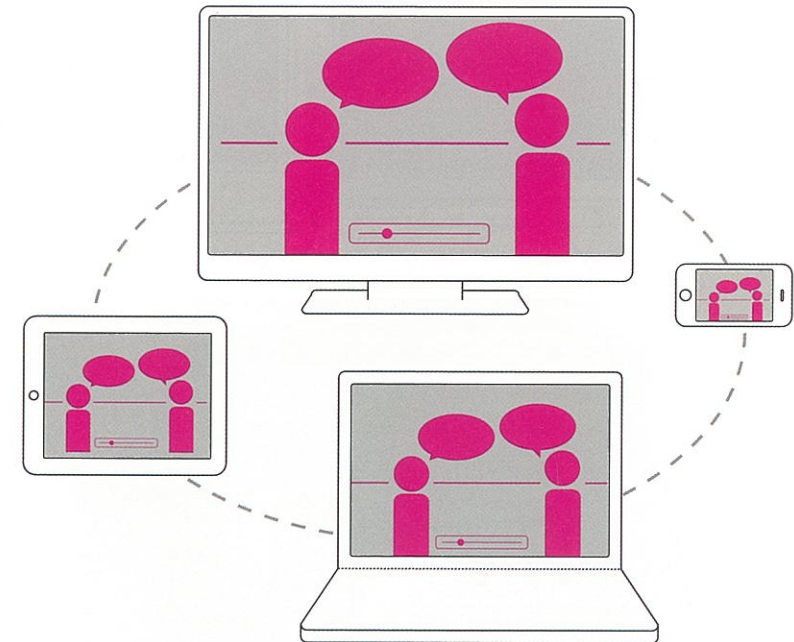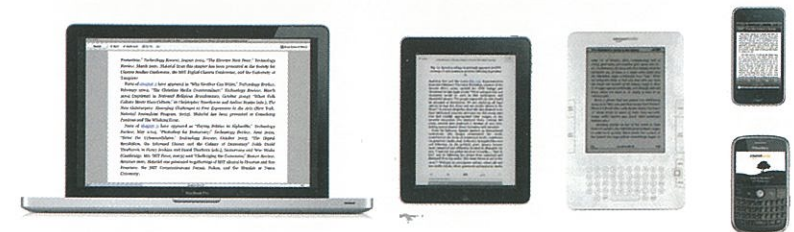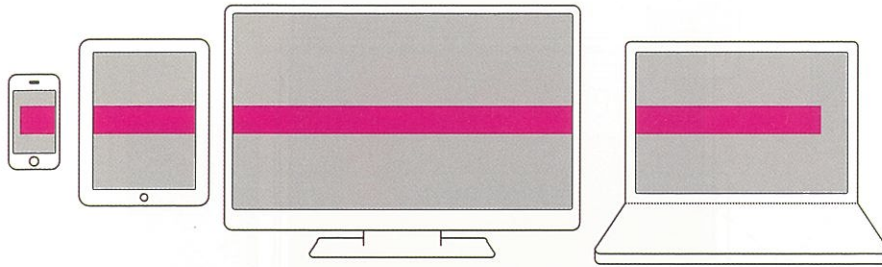

FIGURES 4.40–4.41
Users of Amazon Kindle's ebook can pick up where they left off, regardless of the device.

Screen Sharing

This pattern is about multiple devices sharing the same content source. Similar to a patchwork quilt, each device in the ecosystem displays parts of the whole. Only when all the devices are together can the complete picture emerge, as shown in Figures 4.42–4.43.
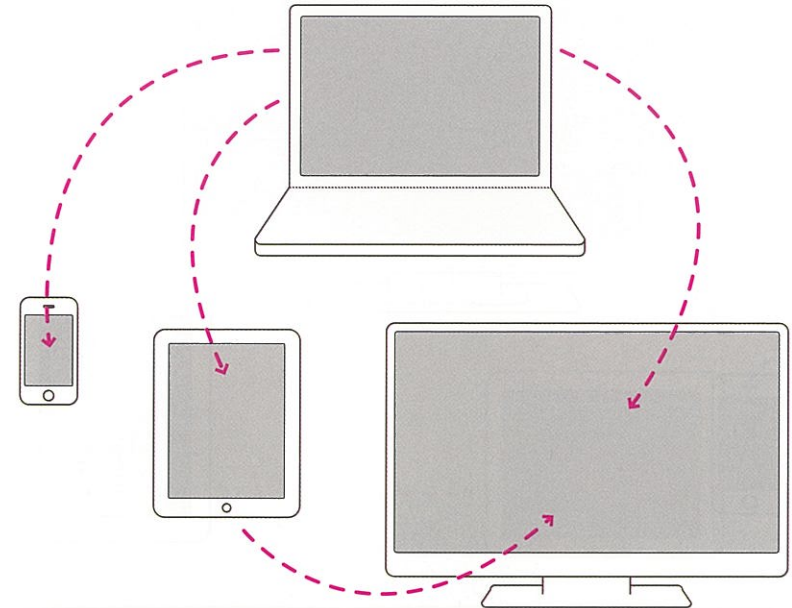

FIGURES 4.42-4.43
Junkyard Jumbotron allows users to combine random devices into one large virtual display. The research project explores how sharing screens affects social interaction.

Device Shifting

This pattern is all about shifting an experience from one device to another or seamlessly and intuitively moving data from one device to another. The pattern plays on the notion that a user can physically "move" content between devices that are in close proximity. Imagine physically "flicking" or "tossing" an image from your phone to your tablet without email or a cable. See Figures 4.44–4.45 for an example.

FIGURES 4.44-4.45
With Apple's Airplay technology, a video can be shifted from an iPhone or an iPad to a television.

Complementary

Similar to the relationship between a TV and a remote control, the complementary screen strategy occurs when two screens work together in concert to elevate an experience. Each device plays a specific role, but the roles support each other in a complementary fashion (see Figures 4.46–4.47).
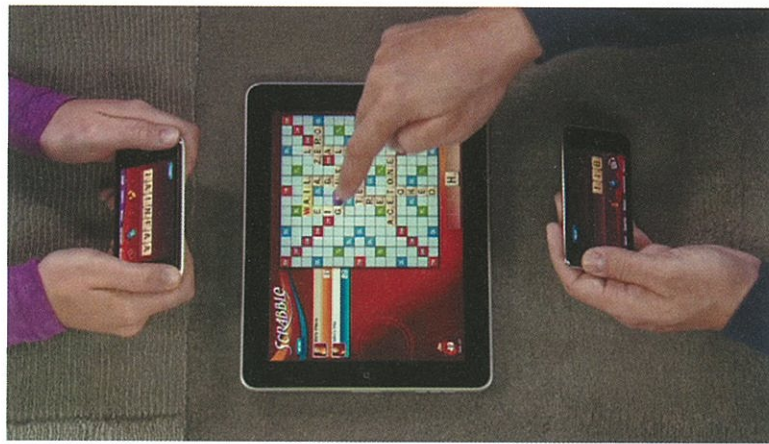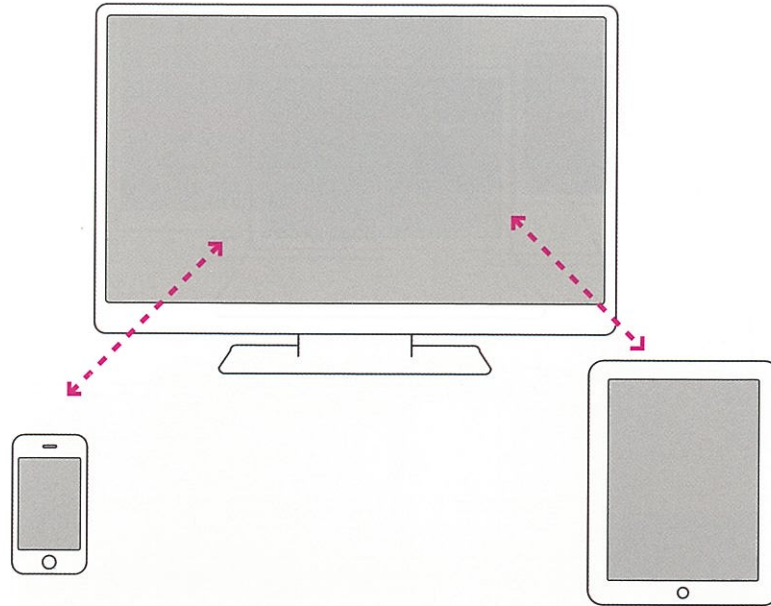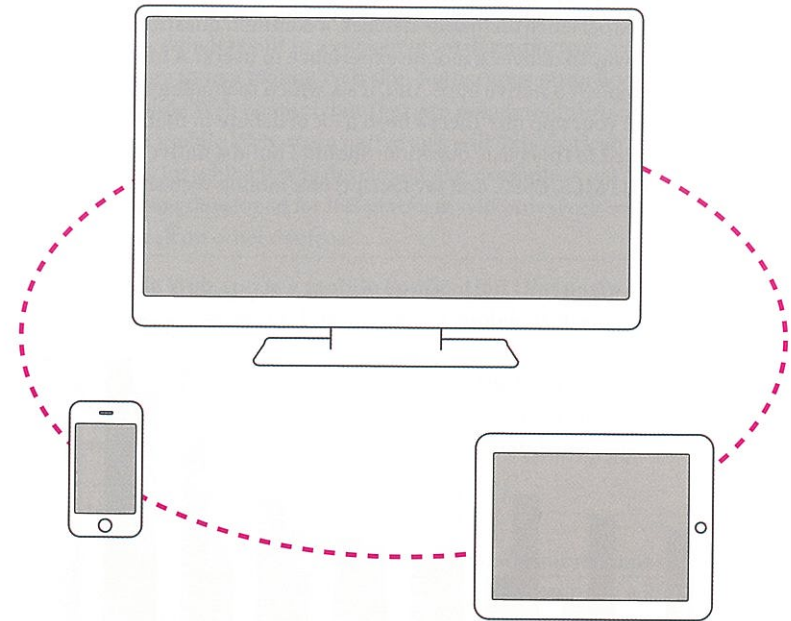

FIGURES 4.46–4.47
The iPad serves as a Scrabble board while the iPhones store an individual player's Scrabble tiles.

Simultaneity

Have you ever used the Internet via a laptop to look up a factoid while watching TV? If so, you've experienced first-hand what has been coined a "simultaneity" screen experience. This pattern is about providing users with two separate but connected experiences that can occur simultaneously (see Figures 4.48–4.49).

FIGURES 4.48–4.49
During a live football broadcast, users take guesses about the outcome of match situations.

Mobile Web Site, Web App, or Native App?

More people are accessing content on mobile devices than ever before, and that trend shows no sign of slowing down. Analysts predict that in the future, more people will access information through a mobile device than the PC (see Figure 4.50). As designers clamor to "mobilize" information and make it easy to experience on mobile devices, a common question arises: What's the best way to deliver a mobile experience to users? A mobile Web site? A mobile app? Or a native app? And, if so, which technology platform should you build your app on? There's been a lot of debate in mobile UX circles with regard to this basic question: Should I build a native app or a Web app (with HTML5, CSS3, and JavaScript) or a mobile Web site?
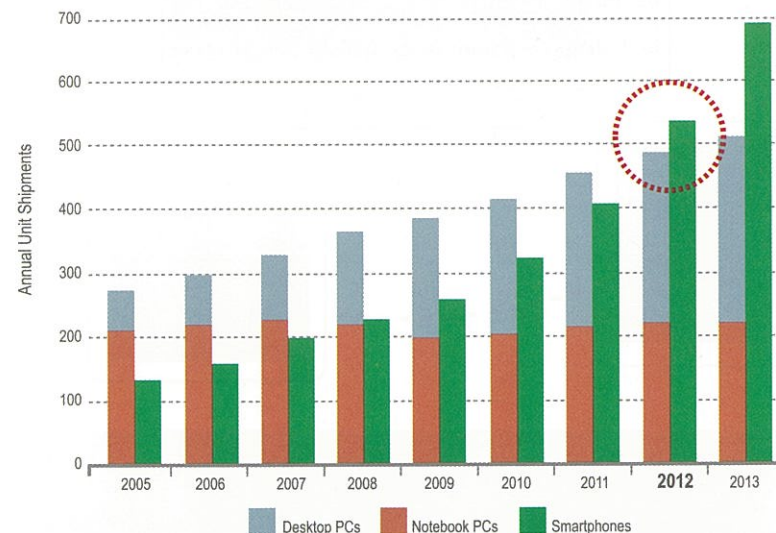

FIGURE 4.50
This chart from Morgan Stanley published on the Web site *Online Marketing Trends* shows the incredible global mobile sales growth. The estimated growth of mobile smartphones is increasing almost exponentially, with 2012 as the inflection year, when there are more smartphones than PCs around the world.

First, you may wonder... What are the differences?

- **A mobile-optimized Web site is an iteration of your PC Web site that has been optimized for the mobile context.** Built using standard Web programming (HTML) and viewed through a mobile device's browser, good mobile Web sites are designed to emphasize the content and features of your Web site that have the most relevance for users in a mobile context. Since most mobile devices come preloaded with a browser, a mobile-optimized Web site is the most accessible way to provide users with Internet content on a mobile device.

- **A native app is a custom-made application users can download onto their mobile phone for frequent use.** Native apps are created using platform-specific software (for example, Android, Apple iOS, Windows, Symbian, and so on), and they often provide more interactive features, which result in a slicker, more dynamic user experience for your users than a mobile Web site. Native apps often hook into the Web and provide Web content, but they are not viewed through a browser. Unlike a mobile Web site, a native app will only work on the software platform for which it was developed. For example, a native mobile application developed for iOS platform will only work on an iPhone. It won't work on other devices.

- **A mobile Web app is a mobile application that users can access via a mobile browser.** It is not a static mobile Web site. It is designed to work like a native app, but it is not accessible via the App store or Android marketplace. You access it from the browser. Some parts of the software are downloaded from the Web each time it is used. It can usually be accessed from all Web-capable mobile devices.

Which Should You Create?

Given the popularity and ever-growing demand for smartphones, a Web site optimized for mobile devices is something any company with a Web presence should have. Unlike native mobile applications, the Web affords you universal access to any device with a browser. Users expect Web content to follow them seamlessly from device to device, so not creating a Web site that's optimized for mobile is a big missed opportunity.

The pros of creating native apps are that they offer more in terms of design options for interaction design and user interface. Native apps are just generally... well, prettier! The big drawback of native apps is that they automatically limit your audience to the mobile phone owners of the platform you decide to design for.

The pros of creating Web apps are the inversion of native apps. Anyone who owns a smartphone with a browser can access the mobile experience you've created. The cons are that the Web doesn't offer the same design options for interaction design and user interface that apps created using native software do.

So which should you choose?

In my opinion, native apps tend to deliver better mobile experiences. From an interaction design perspective, you have more options and more control

of the experience. Native apps deliver a richer experience and allow you to access and use leading technologies within the experiences you're crafting. Native apps enable you to hook into a mobile device's capabilities (NFC, camera, GPS, and so on) much more easily than a Web app or a mobilized Web site. That said, designers are creating phenomenal Web app experiences with HTML5, CSS3, and JavaScript. Hopefully, Web app experiences will be able to compete from a design perspective with native apps in the not-too-distant future.

Mobile is changing quickly, so this could change quickly as well. For now, if you have the time and the resources, then you should do both! If not, create a Web site optimized for mobile. (This is just something everyone should do.) Then choose the mobile platform that fits the needs, personality, and demographics of your users. And build a native app that really sings for them.

Responsive Web Design

With the number of devices in a user's ecosystem rapidly increasing, so too are the number of screens affixed to those devices. All these many screens come in varying sizes, screen resolutions, and orientations. Some are in landscape, others in portrait, and some support both. Plus, new devices with new screen sizes are being developed every day, and each of these devices may be able to handle variations in size and functionality. How do you design for all these variables?

Creating a different version of a Web site for each and every device would be too time consuming to even consider.

Responsive Web design is a Web design and development approach that asserts that a site should respond to the screen size, platform, and orientation of the device. As a user moves from his laptop to an iPad or to a smartphone, the Web site should automatically reform to accommodate the screen size and functionality of the device. (In other words, the Web site should respond to the device and the user's preferences.)

The practice of creating a responsive Web site consists of using a mix of flexible grids and layouts, images, and an intelligent use of CSS media queries. Ethan Marcotte wrote a great how-to book about responsive Web design. In it, he outlines how you can craft beautiful Web experiences that are responsive to the screen size of a user's device (see Figure 4.51). It can eliminate the need for a different design and development phase for each new gadget on the market.
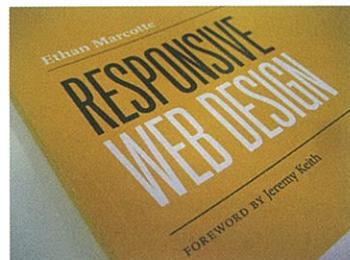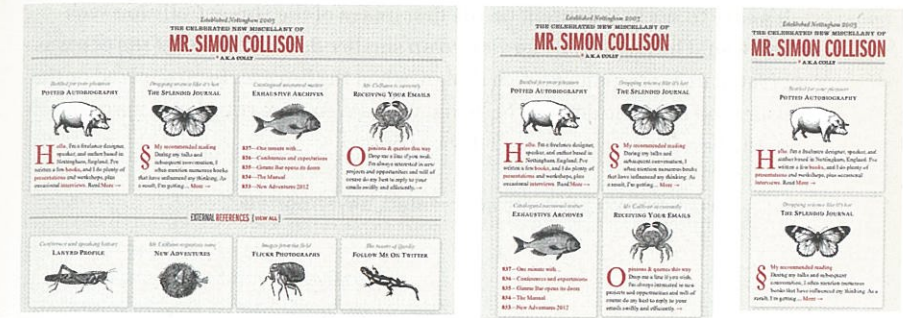
FIGURE 4.51
Ethan Marcotte's book outlines how you can craft beautiful Web experiences that are responsive to the screen size of a user's device.

FIGURES 4.52–4.54
Because this site was created using responsive Web design principles, the layout of the Web page responds appropriately to the device's screen size and device context.

Used wisely, responsive Web design is a great method that can improve the user experience of Web sites on a variety of devices. However, it's not a panacea. A Web site created using responsive Web design and development techniques does not fundamentally change the content of a Web site—it only changes the presentation of the content. Remember that mobile needs are often very different than desktop needs (see Figures 4.52–4.54). Responsive Web design doesn't allow you to fundamentally change or drastically edit or reprioritize content based on the needs of your user in a mobile context (see Figure 4.55).

FIGURE 4.55
Facebook's mobile app is tailored for mobile needs. It gives users quick access to the content and functionality that is important to them in a mobile context. Facebook's mobile Web site simply replicates many of the features from the desktop experience.

It's easy to see how content on the first image of the Simon Collision Web site would be illegible when viewed on smaller devices. Because the site was created using responsive Web design, when the browser is minimized or the user is on a mobile device, the layout of the Web page responds appropriately to the device's screen size and device context

"Great mobile products are created, never ported."

—Brian Fling
Creative Director at Pinchzoom,
author of Mobile Design & Development

Once a futuristic topic reserved for business analysts and nerdy technical researchers, convergence is no longer a lofty dream. People are growing to expect their digital content to follow them seamlessly through the world, and mobile devices are enabling this to happen. While mobile devices are an important part of any converged experience, designers can't focus solely on the mobile experience any more than Web site designers can focus solely on the PC experience. This desire for seamless experiences across devices is forcing designers to have a system-wide view of the experiences they create. Just like runners in a relay team, you have to know what the other experiences are in order to catch and hand off the baton.

While this chapter has been all about designing multidevice experiences in which mobile devices are part of a larger ecosystem of devices, the next chapter will focus specifically on what makes mobile experiences unique—mobile UX patterns.

Summary

- Convergence is a timely and important topic in the world of mobility because what constitutes a mobile device is rapidly changing and UX designers must design for ecosystem experiences. There is a growing expectation that digital content will follow the user seamlessly from device to device. Convergence enables that to happen.

- Currently, convergence is occurring on three levels: technology convergence, media convergence, and activity convergence.

- Ecosystems are the medium of the new converged digital landscape. A digital ecosystem includes all the relevant digital touchpoints, the people that interact with them, and the business processes and technology environments that support them.

- A great way to get a sense of the depth and breadth of your users' digital ecosystems is to ask them to draw you a map.

- Lucy Suchman's theory of situated action suggests a person's capacity to act (their agency) is reconfigured when it comes into contact with another thing or person—that human action is constantly constructed and reconstructed from dynamic interactions with the material world.

- There are currently six patterns for multiscreen strategies: coherence, synchronization, screen sharing, device shifting, complementary, and simultaneity.

- Currently, there exists a vigorous debate over whether designers should create a native mobile app, a Web app, or a mobile Web site. There is no right answer…yet.