PART 2

Heuristics
BUILD-A-BEAR

Copenhagen, Denmark, is famous all over the world for its high quality of life, its parks, and last but not least for H. C. Andersen’s *Little Mermaid*. Denmark being Denmark and Danes being Danes, after all, it also sports a lively club and bar scene, and if you are into beers, you can tour a couple of very respectable breweries, learn more than you want to know about malt, and enjoy ales aplenty.

But the city has something for everyone, and it can be the unexpected: for example, if you are into plushes, you are in for a real treat at the Build-A-Bear plush store.¹ Now, you find plushes almost everywhere, and you also have specialized shops. Some of these offer limited-availability brands and some go mainstream with the usual armies of cutesy animals or cartoon characters. Build-A-Bear, just

¹ Build-A-Bear is an international franchise with headquarters in Saint Louis, Missouri, and you can find their workshops all over the United States, Europe, South Africa, and Thailand.
on the side of the main entrance of the famous Tivoli Gardens on Vesterbrogade, is different. If you walk in, you have to work. Build-A-Bear does not sell you a premade product (a plush), but an experience, a service where children (supposedly, but the shop is quite liberal on this) are the main actors, together with their parents, friends, and shop assistants, and where they happen to build their own custom furry friend. Once inside, children need to do the following:

1. Choose their plush character among a rather large number of different animals and dolls.
2. Plump up the same plush with the help of a dedicated shop assistant and a pumping machine straight out of a movie by Federico Fellini. The machine simply injects feathery stuff into the plush, and children have complete control on how stuffed the plush has to be.
3. Fetch a cloth heart, rub it on their noses, head, and fingers, following a ritual meant to infuse the plush with feelings and life, and then choose what he or she will be best at: reading, roaring, running, roaming, you name it.
4. Insert the cloth heart inside the plush, which now has a life of its own. The shop assistant quickly sews in a few final expert stitches, sealing the heart (and a barcode) inside, checks the plush, and hands it over with a goodbye.
5. Go to a computer that reads the barcode for that specific plush, give it a name, register it, and print its birth certificate.

It’s not over though: dresses and accessories are, of course, available to make that plush even more personal; birthday parties can be arranged for both kids and plusses; and rescues can be organized should the fluffy animal or doll (heaven forbid) get lost: the barcode allows one to identify and return lost and founds to their legitimate and distressed owners. “Build-A-Bear is not a shop, it’s a workshop!” is their motto. Build-A-Bear does not sell products, it sells experiences, say we.  

**DANCING WITH USER EXPERIENCE**

*Un, dos, tres, cuatro: ¡Tierra, Cielo! / Cinco, seis: ¡Paraiso, Infierno! / Siete, ocho, nueve, diez: / Hay que saber mover los pies. / En la rayuela o en la vida/ vos podes elegir un dia. / ¿Por que costado, de que lado saltarás?*  
*(Gotan Project 2010)*

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2 In case you are wondering, Build-A-Bear is a privacy-aware enterprise: it is perfectly feasible not to insert the barcode inside the plush as well as possible to walk out of the shop without registering it. This of course means that the animal or doll cannot be tracked at all, for good and for worse. No fears of Big Brother watching us, but no safeguards in case the plush goes AWOL.

3 If you think plushes are a small, marginal thing, think of the impact the entertainment industry has on global culture with its gadgets, toys, video games, and movies.

4 In English: One, two, three, four: Earth, Sky! Five, six: Heaven, Hell! Seven, eight, nine, ten: You have to know how to move your feet. Playing hopscotch or in your life, you can choose one day: Which way, which side will you jump?
Our day-to-day activities are changing. They are becoming cross-channel experiences that require us not only to move from medium to medium, from device to device, but across domains: something that starts digital, such as an e-mail telling us that a product we were waiting for is now on sale, ends up being physical, with us picking it up at the retail store. Or it could be the reverse, with something being shipped or sent to our address, even an electronic address, after a visit to an office.

In the United States, 53% of consumers reportedly buy products off-line after they research them online, whereas another 43% start their research online, either at their desk computer or through a mobile device, but then find themselves in need to call a customer service number and speak with a human operator to complete the transaction, usually because they cannot find the information they are looking for online (McMullin & Starmer 2010). Similar studies conducted in Europe confirm a strong correlation in consumer patterns among television broadcasting, the mainstream press, and use of the Internet: more than 50% of visitors to online search engines were looking for information related to products or services they saw either in TV commercials or in newspaper advertisements (SEMS 2009). Information coming from one medium is cross-checked or enhanced with related information coming from another medium: this might seem a trivial operation, and to some extent of course it is, as we are simply using what means we have available to improve our chances of getting what we want as we always did. Anyway, this is bound to have larger consequences than the simple flipping through the local variant of the Yellow Pages of old: its impact on design is going to be huge. This constant shifting, this moving back and forth between what is digital and what is physical turns every communication into
a cross-channel communication and pushes customers toward a holistic and ubiquitous approach to products and services. This means that we, as designers, and our clients, as producers, need to embrace a correspondent holistic approach to providing those same products and services: multiple separated interactions need to become one seamless flow. As Jess McMullin and Samantha Starmer have pointed out,

\[
\text{the customer is interacting with (the) brand . . . . they don’t care about the channel. I’m the same customer in each interaction; the whole of the experience should be greater than the sum of its parts.}
\]

(McMullin & Starmer 2010).

Of course this is easier said than done, since, as it is to be expected, different media have long been developing specific languages, rules, and best practices to communicate their content and engage their audiences. In certain cases, think of newspapers—conventions in typography, layout, language, frequency, and distributive channels have had more than 200 years to get to where they are today. Not only that, but they are the hunting field of specialized professionals, researchers, and companies: it only requires plain common sense to understand that difficulties or inadequacies in envisioning and pushing forth a global approach across channels and domains were just to be expected.

Even so, this shift toward cross-mediality gains momentum all the time, and design we must, as the lack of coordination between communicating or mutually supporting channels is bound to affect the whole process. When multiple interactions are designed as unstructured and unrelated, but are in fact perceived as one single experience by the user, as McMullin and Starmer point out, structural gaps and behavioral inconsistencies are common and unavoidable, and the sheer cognitive load and awkwardness of switching back and forth between noncommunicating and apparently diverse touch points hampers the final user experience.

This is why we believe it is necessary to rethink the design process to be pervasive, ecologic, and holistic: every artifact, product, or service is but a part of what we dubbed, in an article we wrote in 2009, a ubiquitous ecology, an emergent information-based system where old and new media and physical and digital environments are designed, delivered, and experienced as a seamless whole. The name simply acknowledges that ubiquitous ecologies share a characteristic of pervasiveness with ubiquitous computing, the systemic nature of media ecologies, and the emergent nature of complex systems.

Two Italian information architects, Davide Potente and Erika Salvini (2009), describe how such an approach has been exploited successfully, to a degree, by Apple, and if and how it could be applied elsewhere. Potente and Salvini argue that the Apple Web site and the numerous Apple stores, in addition to the obvious and necessary interface differences, share a common information organization layer (Table 3.1 and Figure 3.3).
**Table 3.1** Comparison between Apple Web Site IA and Apple Retail Store IA

<table>
<thead>
<tr>
<th>Web site</th>
<th>Stores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>Posters on the walls with upcoming products previews</td>
</tr>
<tr>
<td>Store</td>
<td>Stands/tables showing products with related details</td>
</tr>
<tr>
<td>Mac</td>
<td>Area for Mac computers</td>
</tr>
<tr>
<td>iPod+iTunes</td>
<td>Area for iPods, iTunes, and Apple TV</td>
</tr>
<tr>
<td>iPhone</td>
<td>Area for iPhones</td>
</tr>
<tr>
<td>Downloads</td>
<td>Area for applications</td>
</tr>
<tr>
<td>Support</td>
<td>Genius Bar for product support</td>
</tr>
</tbody>
</table>

**FIGURE 3.3**
Map of correspondences between Apple online taxonomy and product placement inside the Apple retail store.
This is true of correlation strategies as well.\footnote{We will investigate exactly how this works in Part II, Chapter 8, Correlation.} That is, how information and products are connected works exactly the same both in the Web site and in retail stores. Potente and Salvini (2009) decided to apply these insights to verify user experience at Swedish DIY furniture giant IKEA, as

\begin{quote}
customer experience at IKEA is perhaps one of the most representative example of the systemic and pervasive nature of experience. Customers usually start out by exploring and choosing products at home, either on the website or in the paper catalog; then they can move to the store to see them, try them out, and buy them; and finally, at home once again, they assemble the items by themselves following instruction sheets.
\end{quote}

With these ideas in mind, they wanted to see if this was reflected in the way IKEA designed and deployed their multichannel strategy as well. They found out right off the start that the paper catalog, the Web site, and the store use radically different information architectures (Figure 3.4).

Potente and Salvini set out to develop a single scheme for the entire system, starting from a redesign of the paper product catalog. In the article that documents their design, published in the \textit{Bulletin of the American Society for Information Science and Technology} (ASIS&T), they suggest a number of possible solutions, which range from the strictly information architecture based, such as deploying a single classification structure across the different domains, to the more visually directed idea to codify one single color scheme. What is interesting though is that they suggest a move from multichannel to cross-channel—“to introduce a really transversal information architecture”—with an accent on the fact that some of the principles that work on the Web site should be transferred to physical space. Their idea seems to be that of finding ways to reduce disorientation and increase user engagement through recognition; they have no fear of being bold all over the place. They sketch possible redesigned layouts for the stores themselves, including more ways to access departments in accordance to principles of faceted classification; introduce ways to make customers aware of where they are and where they are going through way-finding techniques and breadcrumbs; organize a totally new taxonomy for the paper catalog; and finally suggest a hub structure for the store (as opposed to the current organic if logical free flow of today) to increase the findability of special spots such as the pick-up areas.
Precise and Imprecise

Design: the performing of a very complicated act of faith.

(Jones 1966)

This is by no means a book on design methods, theories, or methodologies. But we feel like a few words are necessary to explain how we design pervasive information architectures. It won’t take much; you can have some popcorn again meanwhile, and we’ll all feel better afterward.

Even though we use the word process a lot, we do not see design as an abstract activity; quite the contrary: design is inductive, certainly nonprescriptive, but it’s very concrete, directed, and geared toward building both an artifact and a better comprehension of the problem space. Design produces ideas and objects. As such, it needs some base structures in place to be carried out successfully and communicated: this is usually done by adopting methods (you can have more popcorn now, in case you already emptied the bowl).

Welsh architect and designer John Chris Jones, in his book Design Methods, which we heartily suggest if you want to really grasp this particular subject matter, affirms that a design method is any action one may take while designing, and that regardless of which particular method one decides to follows, there is always

6 The book is an incredible compendium of Jones’s own struggle in the field and lists more than 30 full-fledged design methodologies that can be adopted out of the box.
a need for temperance between the opposing forces of intuition and rationalization. This is because design oscillates between creation and communication. Jones exemplifies this dichotomy by structuring the act of designing as the conversation between two sides: procedure, “the paper work,” and process, “the thinking.”

According to Jones, procedure is whatever formal superstructure you decide to put in place to assure that certain formal checkpoints can be assessed and anything at all communicated to others. For example, he suggests that at the very least, three logbooks with “data, ideas, and diary of events” will suffice to keep the design flow on track. Process, on the other hand, is design proper and should not be bound by constraint, but wander freely: “the mind must be free to jump about in any sequence, at any time, from any aspect of the problem, or its solution, to another, as intuitively as possible” (Jones 1992). In this view, which is our view as well, the method, albeit important to assure that everyone is on board and that you get paid regularly by your client, is secondary to the “free flow of mind.”

One more factor is necessary to consider when assessing what designing pervasive information architecture means. As we move from single artifacts to ubiquitous ecologies, the gestalt principle, which is “the whole is more than the sum of its parts,” assumes an entirely new, design-oriented meaning: local compromises, or even mishandling and shortcomings, might actually make the global architecture better. Let’s try to explain how with an example.

In 1967–1971, Dutch architect Herman Hertzberger designed his Diagoon Experimental dwellings in Delft, The Netherlands, in a way to allow its inhabitants to adapt the houses to different, personal configurations within the same underlying structure (Figure 3.5). Hertzberger suggested a number of possible layouts, but the final decisions were left to the individual owners, who could do whatever they liked: they could “literally shape their own environment, while also benefiting from the design help of the architect” (Politano 2006).

This flexibility worked at all scales. Hertzberger used modular concrete blocks, which are manageable and easily handled. As architect and writer Brian Lawson maintains in his really enjoyable book How Designers Think, Hertzberger was “far from trying to optimise this object to any one particular function but rather seeing it as sort of compromise.” One single concrete block could then be used in the front garden as a “a house number, serve to house a light fitting, act as a stand for milk bottles, offer a place to sit, or even act as a table for an outdoor meal” (Lawson 2005).

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7 For more on the gestalt principles in connection with design, see Lidwell and colleagues (2003), especially closure, common fate, figure-ground, good continuation, law of Prägnanz, proximity, similarity, and uniform correctness. For a more general overview, see Gombrich (2000) and Gombrich and colleagues (1973).
This is an approach that runs contrary to the break-it-down, isolate-the-issues pattern view that scholars such as Christopher Alexander have been pushing. It is also an approach we think suits best the design of complex, user-concerned systems: in designing pervasive architectures it is preferable to sacrifice local details and local precision for a better global experience than it is to do vice versa, as local imprecision might become global precision. If they are all part of a single process, a somewhat lacking but totally integrated Web site serves its user better than a super-hot, super-trendy Web site that has nothing in common—language, layout, categories, or architecture—with either the paper catalogs or the stores. Breaking things down definitely may help understand, but this understanding does not necessarily imply that we should (re)build complex systems that way.

These points, notes, and concerns are dealt with in detail in Part Three: for now, let’s just see how these loose thoughts apply to the design of pervasive information architectures. Just remember that in the design of ubiquitous ecologies, imprecise may not be a bad thing. Not at all.

**DESIGNING PROCESSES**

Think for a moment of when you go shopping: it is not exactly just buying, is it? It is not the simple act of picking up something from the store (or Web site) and paying for it at the cashier (or on the check-out page). It is much more than that: it starts earlier on, maybe when reading about a certain product in a
magazine or seeing it in a commercial on TV, and it might evolve into searching more information about it on the Web or consulting with friends. It might include deciding which retail shop or Web shop is most convenient based on its location, prices, or shipping policies. As Donald Norman says,

> a product is all about the experience. . . . Most companies treat every stage as a different process, done by a different division of the company: R&D, manufacturing, packaging, sales, and then as a necessary afterthought, service. . . . If you think of the product as a service, then the separate parts make no sense—the point of a product is to offer great experiences to its owner, which means that it offers a service. And that experience, that service, comprises the totality of its parts: The whole is indeed made up of all of the parts. The real value of a product consists of far more than the product’s components.

(Norman 2009a).

Norman stresses heavily how discovery, purchase, and anticipation (of use) are all a large part of one single user experience. Having just brought what we bought home with us, we still have to open the package, maybe perform some installation, use our newly acquired item for the first time, and check for some assistance. And then maybe it also needs updates, subscriptions, add-ons, changes of plan, or accessories.

At times, anticipation can easily span periods measured in days or weeks, as the item has to travel in from far away, and a whole lot of additional information is pushed our way to comfort, reassure, and engage us while we wait. Track numbers for checking on a Web site, a warning of some delay, which will hopefully have little impact on the final date of arrival, text messages, or e-mail to tell us that port has been reached. So many of these steps are information based and rely on a stream of continuous information: the more this is integrated, the less we feel clueless, stranded, anxious, or plain cheated. This spans the small and trivial—such as using a coherent terminology, fonts, or layout so we don’t have to wonder if “dispatch” really means “shipping”—to the big and complex, such as coordinating product interfaces with shop layout as Apple does or coordinating information flows across several different channels.

It’s a fact that our experiences with artifacts today are characterized by complexity, instability, and ultimately always configure a process, a word that implies an idea of unfolding in space and time of actions, events, or behaviors characterized by a certain continuity. Linguistically speaking, no surprise there: process came to English from the Old French proces, originally meaning “journey,” and got there from the Latin processus, past participle of the verb procedere, meaning “to proceed, to move, to go on.”

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**Design is like Hopscotch**

User experience is a large, complex process where designers play a game of hopscotch across the rhizome of multiple channels, contexts, and artifacts.
If you remember the quote at the beginning of this chapter, it was the text to a rayuela, that is, a game of hopscotch. It is a children’s game that goes back some centuries, one you play by drawing a course you have to jump through alternatively using one foot or two feet (Figure 3.6). That initial quote is not there just because we are fans of the guys in the Gotan Project (we are), but because it allows us to draw some interesting parallelism between the interplay of cross-channel user experience and the complex and multidimensional nature of pervasive information architecture as we intend them in this book. We are sure it is not the worst metaphor you ever listened to, so cut us some slack and read on.

First of all, the original hopscotch is a game that can be played alone or in a group. Then, Rayuela is not only a song on a game (hopscotch), but it is a joke, a play of words and wits in itself, and only a second-level reference to the game. The song is actually an homage and a direct quote of the novel by the same name written by Julio Cortázar: we can hear the writer himself reading some excerpt from his text in the background. Cortázar’s novel, in turn, is a hypernovel—a work conceived to allow multiple reading paths and built as an encyclopedia of sorts, loaded with citations from other works and authors, both hidden and explicit: “in its own way, this book consists of many books” (Table of Instructions, in Cortázar 1987).

If you are thinking about James Joyce, you are quite on target: Rayuela, translated into English as “hopscotch” and published in 1966, is somewhat considered the Hispanic-American literary equivalent of Ulysses. It certainly has all the wit, the puns, and the streams of consciousness you associate with Leopold Bloom’s wanderings through Dublin, and both texts weave a narrative that draws from complexity. But we also believe it has much in common with the Chinese Encyclopedia Jorge Luis Borges mentioned in his writings.
and that you will encounter a few chapters down the road, when dealing with the problem of consistency. It shares a certain structural resemblance as well with Ludovico Ariosto’s epic *Orlando furioso* (and its theatrical rendition by Luca Ronconi in the 1960s–1970s) and with Quentin Tarantino’s blockbuster *Pulp Fiction*. These you will meet when discussing correlation. Now we are confusing you. That’s ok. After all, this is like hopscotch, and you have to follow the flow. As we said before, it’s the process, not the procedure. And that’s all we have to learn.

**A MANIFESTO OF PERVERSIVE INFORMATION ARCHITECTURE**

To The Inhabitants of SPACE IN GENERAL . . ./This Work is Dedicated . . ./In the Hope that/Even as he was Initiated into the Mysteries/Of THREE DIMENSIONS/Having been previously conversant/With ONLY TWO/So the Citizens of that Celestial Region/ May aspire yet higher and higher/To the Secrets of FOUR FIVE or EVEN SIX Dimensions.

(Abbott 1995)

At this point we expect you to be slightly befuddled. So many different fields, practices, and disciplines are converging into this boundary zone where digital design, networked resources, social interactions, and mobile access blend: why focus on an information-driven approach? Why start thinking about pervasive information architectures?

Well, for one thing, everything is becoming information, and the information we can (and cannot) access increases constantly. In his book *Everything Is Miscellaneous*, American philosopher and technologist David Weinberger (2007) points out how the digital world we are building is not limited in size, scope, and nature the way the physical world is:

> in a store, it’s easy to tell the labels from the goods they label, and in a library the books and their metadata are kept in separate rooms. But it’s not so clear online.

In physical and logical space, what Weinberger calls first order and second order “we’ve had to think carefully about which metadata we’ll capture because the physical world limits the amount of metadata we can make available.” Not so in digital space: we can have all the metadata we want. One object, say, a computer, may possess a million pieces of information in metadata. Information is the backbone and is not going away easily: this not only requires attention, it requires design. This is the rationale; then there are some matters of personal preferences.
If you allow us one more bad metaphor, there are different ways you can be a brick-and-mortar architect: you could be an architect and build your houses starting from how you want to structure space, such as Frank Gehry does (Figure 3.7) and Frank Lloyd Wright did, or accept the limits of industrial-scale housing and building and work from the inside, such as Giò Ponti or Carlo Scarpa did. Both approaches are legitimate and both qualify as architecture: we just happen to be interested in the Gehry kind of design. We are certainly not saying that this is the only way to tackle this issue, but we sure think it is one way to do it.

At the same time, designing pervasive information architectures does not translate naively (or purposefully) into a simple enlargement of the playground information architects call their own with a few new hot topics and areas: this is not an exercise in land grabbing. More buzzwords on the business card are not the point: designing artifacts from a structural, informational point of view as the complex open systems they are becoming is it.

We are not in this alone, of course, not at all: we have plenty of company, we just use many different labels and names and come from different places. Donald Norman (2009a), for example, calls this approach systems thinking:

no product is an island. A product is more than the product. It is a cohesive, integrated set of experiences. Think through all of the stages of a product or service—from initial intentions through final reflections, from first usage to help, service, and maintenance. Make them all work together seamlessly. That’s systems thinking.

Mike Kuniavsky (2010), one of the founding partners of the UX firm Adaptive Path, calls it simply ubiquitous computing user experience design: in his book Smart Things he frames devices as “service avatars” within a hierarchy of experience.
scales (covert, mobile, personal, environmental, architectural, urban), embrac- ing and extending the conceptual framework of the service design. User experi- ence, service design, and ubiquitous computing are all coming up to the same crowded intersection downtown where everyone is trying to figure out where (and how) to go next. We call this next pervasive information architecture, the design of information within ubiquitous ecologies, and it is definitely interesting to see that, as Peter Morville commented on his Web site,

while Kuniavsky advises that we view information as one of many design materials (like wood and carbon fiber) from which devices can be made, he also highlights its role as “the core material in creating user experiences.”

(Morville 2010).

Since information architecture relies on principles that are largely independent from any specific medium - after all it is concerned with the structuring of information space as much as architecture is concerned with structuring physical space - it provides a flexible but solid conceptual model for the design of cross-context and cross-channel user experiences which span different media and environments (Figure 3.8). By addressing these structural issues, it is capable of providing all actors with a constant, coherent cognitive framework throughout the whole process. It is important to emphasize that this is not interface design or interaction design. These are both valuable and necessary pieces of the general picture, but they are usually concerned with single touch points, one at a time.

When we say that information architecture needs to structure the process, we move one step up the ladder of abstraction, where information architecture is less of a specific set of tools for, say, Web design and more of a design connector between channels and contexts.

This in turn requires a change in perspective, as it implies that information architecture has to sprout new branches and twigs from its roots and grow taller, richer, and greener. We IAs have to have a little more Wurman in our pockets and move beyond the Polar Bear Book: as information bleeds out to mobile devices and physical spaces, information architecture is not just for the World Wide Web, but helps design all shared informational spaces, places, services, and processes that render the user experience possible in the first place. How can we do this? First things first: we need to acknowledge a few new facts. That’s what the manifesto is for. It goes like this.

1. Information architectures become ecosystems. When different media and different contexts are intertwined tightly, no artifact can stand as a single, isolated entity. Every artifact becomes an element in a larger ecosystem. All of these artifacts have multiple links or relationships with each other and have to be designed as part of one single seamless user experience process.
2. **Users become intermediaries.** Users are now contributing participants in these ecosystems and actively produce new content or remediate existing content by ways of linking, mash-ups, commentary, or critique. The traditional distinction between authors and readers, or producers and consumers, becomes thin to the point of being useless and void of all meaning.

3. **Static becomes dynamic.** On the one hand, these architectures aggregate and remediate content that physically might reside elsewhere and that might have been released for completely different purposes. On the other hand, the active role played by intermediaries makes them perpetually unfinished, perpetually changing, and perpetually open to further refinement and manipulation.

4. **Dynamic becomes hybrid.** These new architectures embrace different domains (physical, digital, and hybrid), different types of entities
5. **Horizontal prevails over vertical.** In these new architectures, correlation between elements becomes the predominant characteristic at the expenses of traditional top-down hierarchies. In open and ever-changing architectures, hierarchical models are difficult to maintain and support, as intermediaries push toward spontaneity, ephemeral or temporary structures of meaning, and constant change.

6. **Product design becomes experience design.** When every single artifact, be it content, product, or service, is part of a larger ecosystem, focus shifts from how to design single items to how to design experiences across processes. Everyday shopping does not concern itself with the convenience store or supermarket only, but configures a process that may start on traditional media, include the Web, proceed to another shop to finalize a purchase, and finally return to the Web for assistance, updates, customization, and networking with other people or devices.

7. **Experiences become cross-media experiences.** Experiences bridge multiple connected media and environments into ubiquitous ecologies, a single unitarian process where all parts contribute to one global seamless user experience.

**HEURISTICS FOR A PERVERSIVE INFORMATION ARCHITECTURE**

The manifesto outlines what we believe are some relevant trends: to make them into a design method, we had to turn them into actionable goals. At the same time though, we didn’t want to overdo it and overrationalize what is at its core an art-and-craft vision: years of practice have just showed us that sometimes making it up as you go is actually what you should be doing – as Eric Reiss (2010) summed up brilliantly in an article for the online design magazine Johnny Holland.

If you are thinking that we or Reiss might be pushing it a bit too far in an effort to score a goal, it might help our discussion to say that this idea is not much of a minority stance among design researchers. Quite the contrary. As Brian Lawson observes in *How Designers Think,* “the comfort of a set of principles may be one thing, but to become dominated by a doctrinaire approach is another.” Design, says Lawson, is essentially experimental, and methods, theories, and philosophies are far from being defined precisely, even when their proponents seem to think, or strongly maintain in print, otherwise.
So, if those in the manifesto are the goals, how do you go about them with a hands-on perspective? We retraced our steps and, based on our own experience with the initial stages of design, saw that we could reduce many different, preliminary observations and requests to a smallish set of primary modelers, or heuristics. **Heuristics** are not precise, formalized procedures: they are guidelines, problem-solving suggestions, and directions, not directives.

Heuristics reside in the process part of design, not in the procedure. They are hopscotch, not rocket science.\(^8\) With a few of these, we could identify and impact on process-wide indicators that affect the general design of a pervasive experience, yet retain the “make it up as you go” freedom that is necessary when you are not in familiar waters. After a few iterations, many coffees and muffins, some articles, more than a couple of bored friends, one book, and a dozen public talks, we had a satisfactory lineup consisting of five heuristics and their poignant definitions.

1. **Place-making**—the capability of a pervasive information architecture model to help users reduce disorientation, build a sense of place, and increase legibility and way-finding across digital, physical, and cross-channel environments.

2. **Consistency**—the capability of a pervasive information architecture model to suit the purposes, the contexts, and the people it is designed for (internal consistency) and to maintain the same logic along different media, environments, and times in which it acts (external consistency).

3. **Resilience**—the capability of a pervasive information architecture model to shape and adapt itself to specific users, needs, and seeking strategies.

4. **Reduction**—the capability of a pervasive information architecture model to manage large information sets and minimize the stress and frustration associated with choosing from an ever-growing set of information sources, services, and goods.

5. **Correlation**—the capability of a pervasive information architecture model to suggest relevant connections among pieces of information, services, and goods to help users achieve explicit goals or stimulate latent needs.

We consider place-making, consistency, and resilience to be some sort of ground heuristics, those on which we build. They give the design some anchoring points. Reduction and correlation bring both purposefulness and complexity to the process; they refine, restrict, and expand where and when necessary. They give the design depth.

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\(^8\) Although, of course, you need some mathematics to be able to play hopscotch and to fire your rockets. The amount required varies a little, though.
At this point, there is a legitimate and pertinent question you may feel like asking: namely, where do these heuristics come from? Not as a group, but individually. Why place-making and not, say, remapping, minimization, or some other cool name?

Unfortunately, as it sure would have been a classy coup de théâtre, we have no superior call to support our choices. We cannot claim we received them in our sleep from a spaceship orbiting Venus, nor did we more prosaically come home from a deranged evening in a Chinese restaurant with far too many fortune cookies in our pockets. These heuristics are simply the result of many years of professional and scholarly practice in the field of information architecture. The projects we worked on, large and small, brought us to reflect on our own design practice in the frame of a wider perspective – one capable of moving beyond a single product- or artifact-oriented approach (be it a Web site, a coordinated corporate project, or a physical/digital installation) to embrace a more holistic or ecological approach that wouldn’t leave us out in the cold as our projects moved into cross-channel territory. These are the heuristics that allow us to impact on those specific issues in the design of cross-channel ubiquitous ecologies we think are strategic for its success.

We claim no illumination; we claim no splendid isolation: as said before, so many brilliant thinkers and designers are working on these issues. Sometimes we wake up from dreams where we are attending some grand information architecture opening night in our underwear, a rubber duck and flippers, and our set of heuristics.

But the truth is, designing is like playing hopscotch, and these guidelines are essentially the result of our own personal design journey so far, a qualitative, bottom-up process, subsequently integrated by those personal reflections (over coffee and muffins) and long discussions with (bored) friends and colleagues in the quiet of our houses or in the most improbable places in the world we mentioned, with lots of further readings. They work well enough, and we pass them on to you for discussion, not for worship. Nothing in design is worth worshipping; everything is worth a try.

Lawson (2005) writes that “some designers seem to see their whole career as a journey towards the goal of ultimate truth, whereas others seem more relaxed and flexible in their attitudes to the driving forces behind their work”: we definitely belong to this second group.

We did some comparative analysis as well, not as a mere, solipsist exercise in style, but as a useful check on the validity of some of our initial assumptions and to examine connections, interactions, or latent influences from preexisting authoritative frameworks as thoroughly as possible. There are many of these, and they range from S. R. Ranganathan’s Prolegomena and Five Laws of
Library Science to Edgar Morin’s ideas on complexity, from Celestino Soddu’s seminal ideas on morphogenetic design\(^9\) to Micheal Graves’s postmodernism, and, of course, from ubiquitous computing to everyware. You’ll find echoes of all of these and more as you read along, and we will expand and comment whenever necessary or provide references. But since ubiquitous computing is probably the most obvious connection you have certainly heard of, it deserves a few more lines to clarify in which sense the idea of pervasive information architecture is different.

**UBIQUITOUS COMPUTING AND EVERYWARE**

At the heart of ubiquitous computing is the idea that information is processed all around us in all sorts of everyday objects and activities for our use and consumption: it is a system-oriented vision where a constellation of closely related, participating items bridges atoms and bits. And that, in turn, bring us back to the concept of open, self-organizing, complex information systems, what we dubbed ubiquitous ecologies. Ambient intelligence, Adam Greenfield’s everyware (Greenfield 2006), and Peter Morville’s pioneering ideas on ambient findability (Morville 2005) all prefigure the necessary adoption of a new holistic vision in the design of information spaces as much as a radical change in the way we experience our interactions with information:

> the stakes, this time, are unusually high. A mobile phone is something that can be switched off or left at home. A computer is something that can be shut down, unplugged, walked away from. But the technology we’re discussing here—ambient, ubiquitous, capable of insinuating itself into all the apertures everyday life affords it—will form our environment in a way neither of those technologies can. There should be little doubt that its advent will profoundly shape both the world and our experience of it in the years ahead.

(Greenfield 2006, p. 6).

Adam Greenfield’s basic assumption is that “information processing is dissolving in behavior” and his observations on everyware are built loosely around 81 theses, brief enunciations that highlight characteristics of these new spime

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\(^9\) See Soddu and Colabella (1992). A glimpse of Soddu’s work can also be seen at http://www.argenia.it/.

**Postmodernism** - A reaction to modernism and to its scientific allure of objectivity, rationality, and progress, postmodernism is a tendency in contemporary culture that spans from architecture to philosophy, which rejects objective truth and the possibility of a single, global narrative. It often emphasizes self-conscious citationism and the reuse of pop patterns, motifs, and memes in acculturated contexts.
For me, information architecture could just as well be called “thing contextualisation.” The “thing” doesn’t necessarily need to be information, and the context certainly doesn’t need to be on a computer screen. Ultimately, it is the good (or bad) arrangement of “things” within a specific context that creates a specific user experience. And creating the desired user experience must, after all, be the goal of our work with pervasive information architecture. Let me tell you a story to illustrate my point. But first, some background.

Welcome to the Danish Royal Theatre

Originally, I trained in the United States as an actor and stage director. In 1976, I was invited to become the assistant to the famed Danish director Sam Besekow at the Danish Royal Theatre in Copenhagen, Denmark. Sam himself had been an assistant to the legendary Max Reinhardt, head of Deutsches Theater in Berlin back in 1930. Naturally, I jumped at this chance to become part of an extraordinary creative lineage.

One of our first projects together was Saturday, Sunday, Monday, a play by the Neapolitan playwright Eduardo de Filippo. Our set designer was Helge Refn, also a theatrical legend. Our 17-member cast was a virtual who’s who of Danish theatre (Figure 3.9).

Saturday, Sunday, Monday is a three-act comedy featuring the extended family of demanding matriarch Mama Rosa and her blustering husband Peppino. During the first act, Saturday, we meet the family in Rosa’s grand Neapolitan kitchen and are introduced to the basic dramatic conflicts while the traditional Sunday meal is being prepared. The second act, Sunday, takes place around the dining table where more family skeletons in the closet are revealed and everything ends in chaos. The final act, Monday, resolves things amicably, as they do in these kinds of “well-made” plays.

After 5 weeks of hard work, we moved out of the rehearsal hall and onto the main stage where our sets were waiting.

Italy Meets Denmark

The “Old Stage” at the Danish Royal Theatre features the baroque ornamentation that places our disreputable business in the same league as churches—architecturally if not always spiritually. Helge’s sets were exquisite—naturalistic, yet with uniquely expressionistic overtones that taunted the imagination. He told me, “Everyone thinks they know what a big Italian kitchen looks like. But I went to Naples and did the research. I’m providing exactly enough reality to point our audience in the right direction, without making them actually question choices I have made that run counter to their own fantasy.” Helge was a very wise man.

Despite the magnificent sets, the run-through of the first act was lackluster. Some of this could be excused by the change of venue. However, by the second act, Sam was clearly peeved. “I want real wine in those glasses!” he ordered. Of course, drinking actual alcohol was against some unwritten Royal Theatre rule. But Sam had the clout to get things his way. Real wine appeared at rehearsals the next day—in a surprisingly decent quality.

Sam gave me an important lesson in direction over coffee that afternoon. “The actor is the centre of art on the stage. Give an actor a glass of coloured water, and he will look like an actor acting the part of someone drinking wine. But give him real wine, and he will look like someone drinking wine—he doesn’t have to act and can therefore concentrate on his art. Our job is to help actors concentrate on the important things.” Basically, this is Sam reducing mental clutter to enhance Chi. Feng shui meets Max Reinhardt.

Back to the First Act

The play was taking shape, but things were still very rocky during the key first act. The actors were trying too hard and it showed. Sam was grouchy. Helge was depressed. During dinner that night (at a bad table in the rear of an Italian restaurant), I had an epiphany.

Let me share the first lines of the play with you:

- ROSA: Haven’t you finished yet?
- VIRGINIA (maid): Nearly. Only two more.
- ROSA: Hurry up—I’m waiting.
- VIRGINIA: Signora, I think I’ve done enough already.
- ROSA: Are you telling me how to make ragu? The more onions there are, the thicker the sauce. I’ll tell you how to make ragu, it’s all in the cooking. Slowly, over a low
flame. Then the onions curl up round the meat in a black crust. When you add the white wine, the crust loosens. That makes a rich golden stock and then you mix it with the tomato sauce and that gives it that lovely dark colour. Ragu shouldn’t only taste right, it should look right. Don’t you tell me how to make ragu!

The next day, I got to the theatre early. I rounded up Helge and our stage manager, V. P. Schmidt. I told them my plan. Within the next hour, we’d fitted working hotplates to the prop cast-iron stove. We’d installed a fan at the back of the set (Italian kitchens can get hot, right?). And we’d bought a sack of onions and a sharp knife (as opposed to the blunt props we usually trust to actors).

A Kitchen to Remember

Well, neither Helge nor I told Sam about this change. We just did it. The rehearsal started and, suddenly, the theater was filled with the smell of frying onions. The actors reacted (only the actresses playing Rosa and Virginia had been told). Those of us sitting in the darkened auditorium reacted. You could hear the onions, too. We were making ragu, not just pretending.

The act finally came together.

On opening night, the curtain went up at 8:07. By 8:20, tummies were rumbling. At the interval, the snack vendors sold out. By the way, the reviews the next day were great. It was a great show, thanks to a great script and superb acting. Sam, Helge, and I merely gave our talented cast the means to an end.

Why I Told You This Story

I think this particular theatrical anecdote is interesting because it encompasses the key sensory and cerebral interactions that define the quality of a “user experience.” As you read through the rest of this book, I hope you’ll pause a moment and reflect
contraptions, as Bruce Sterling would probably call them, and of the social and cultural changes they bring along, one at a time. Some of these theses describe ideas that are pretty close to the five heuristics:

Thesis 21. Everyware recombines practices and technologies in ways that are greater than the sum of its parts.

Thesis 22. Everyware is relational.

Thesis 31. Everyware is a strategy for the reduction of cognitive overload.

Thesis 40. The discourse of seamlessness effaces or elides meaningful distinctions between systems.

Thesis 41. Before they are knit together, the systems that comprise everyware may appear to be relatively conventional, with well-understood interfaces and affordances. When interconnected, they will assuredly interact in emergent and unpredictable ways.

Thesis 47. The practice of technological development is tending to become more decentralized.

Thesis 49. Present IT development practice as applied to everyware will result in unacceptably bad user experience (Greenfield 2006).

These observations largely apply to how we see pervasive information architectures. They are complex systems where the sum is more than its parts and that rely heavily on relationships: how is far more important than what. Correlation is the heuristic indicator that addresses this quality. Similarly, pervasive information architectures are evolving, unfinished, unpredictable systems, or by any means not entirely predictable. This is because, as much as open systems, such architectures are dynamic, undergoing perpetual changes under the actions and influx of people, time, and context. This is what place-making and resilience try to capture and address.
Ultimately, what differentiates the two is the approach, and the goal: Greenfield’s everyware is a theoretical framework that tries to explain a trend, a general phenomenon of convergence supported by mobile and ubiquitous computing in general terms. Pervasive information architecture is a heuristic methodology that focuses on the design of the information flows that underlie ubiquitous ecologies. We want to design the damn thing.

How to structure these new complex, compound artifacts via a heuristic process by means of place-making, consistency, resilience, reduction, and correlation is going to be the core of this section of the book. We explain and explore these in depth, one at a time, in the following chapters: we briefly introduce the theme and issues being addressed, mainly in the form of storytelling; present and discuss the heuristic itself; introduce a series of case studies spanning the physical and the digital; recap briefly, in the form of bullet-point lessons that can be applied while designing; and finally finish you for good with a bibliography of relevant articles, books, movies, videos, or games. Are you ready? Then hold tight, the ride is about to begin. We cannot promise that there will be no bumps and a few scary moments, but we can certainly promise it’s going to be fun. We might even get to use some of those map-making, sword-fighting, code-writing skills we learned on the Internet. Here we go.

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