3   Habitual Contexts

Not all is flux. Much as a river needs banks unless it is to spread aimlessly like a swamp, the flow of information needs meaningful contexts. Even in an age in which distance has been annihilated, location still matters.

The built environment organizes flows of people, resources, and ideas. Social infrastructure has long involved architecture, but has also more recently included network computing. The latter tends to augment rather than replace the former; architecture has acquired a digital layer. As with past layers of technology, such as electrification, mechanical equipment, and transportation, so now digital technologies extend architecture's reach. In doing so they take advantage of architecture's duration. The older and more persistent the grounding structure, the more likely that it has shaped environmental predispositions. In contrast to more ephemeral electronic works that compete for the momentary attention of casual viewers, built environments act as enduring background, and their design is directed inward toward their regular inhabitants.[1]

There, in our most habitual contexts, embodiment provides a continuing basis for human-centered design. For much as the body imposes a schema on space, architecture imposes a schema on the body.[2] The proportions, image, and embellishments of the body are reflected in the proportions, image, and embellishments of buildings. Similarly, cities reflect the form of their buildings, cultural landscapes reflect the structure of their cities and towns, and mythologies orient all of these in the world. Although the sciences have extended this scale of artifice farther into the immense and the microscopic, the orders of magnitude nearest to human dimensions still affect everyday experience most directly.

The disciplines of architecture and interaction design both address how contexts shape actions. Architecture frames intentions. Interactivity, at its very roots, connects those mental states to available opportunities for participation. These processes are ambient. Their benefits are to be found in the quiet periphery, and not in the seductive objects of attention. Why this is so was put well by one of architects' favorite thinkers, Walter Benjamin, who reminded us that "architecture is experienced habitually, in a state of distraction."[3]

Context and Related Terms

In turning from embodiment in person to embodiment in the built world, it will help to define some terms. To begin, let "setting" describe objective, a priori, space. "Context" is not the setting itself, but the *engagement* with it, as well as the bias that setting gives to the interactions that occur within it. "Environment" is the sum of all present contexts. According to the cognitive principles laid out thus far, environment is not an other, or an empty container, but a perception of persistent possibilities for action.

"Space," like embodiment, has occupied philosophers from the ancients to the latest wave of cyberpunks.[4] Because it allows motion, space has been intrinsic to modernity. Space is a means, and not a mere setting, at least according to the philosophical traditions charted by Kant. It is the form of external experience as distinguished from the things encountered within that experience.

"To speak of 'producing space' sounds bizarre," wrote the critical theorist Henri Lefebvre in 1974, "so great is the sway still held by the idea that empty space is prior to whatever ends up filling it."[5] Notions of preexisting space now give way to emergent phenomena. Wherever goods, people, or electronic communications flow, spaces form around them. This emergence has been particularly evident in the case of disembodied electronic channels. In what the sociologist Manuel Castells named the "space of flows," global capital has apparently invented a new kind of space for itself—one whose spatiality emerges from, rather than preceding or containing temporal activities. But as Castells explained, this net changes relations between physical places more than it does away with them. "The space of organizations in the informational economy is increasingly a space of flows.... However, this does not imply that organizations are placeless. On the contrary, we have seen that decision-making continues to be dependent upon the milieu on which metropolitan dominance is based; that service delivery must follow dispersed, segmented, segregated markets.... Thus each component of the information-processing structure is place-oriented."[6] Places emerge at crossovers between infrastructures. Where one flow prompts, regulates, or feeds another, development occurs. Where

the boats met the trains, great cities grew. Increasingly, such connections occur between digital and physical infrastructures. Electronic communication has intensified, not undermined, the hubs of activity in the world's entrepots. This intensification is reflected in the current practices of urban design. As cities everywhere move to correct the separation of use wrought by the industrial age, we have rediscovered how the flows of people, goods, and information are most valuable wherever they are most closely intermingled.

In movements we have seen described as "after cyberspace," information technology contexts are no longer valued for immersiveness so much as for "periphery." Information technology design has occupied itself with tools for deliberative reasoning—a process that occurs in the foreground of human attention. In a recent standard text on interface design, Apple Macintosh project creator Jef Raskin emphasized the term *locus of attention.* "We cannot completely control what our locus of attention will be.... For our purposes, the essential fact about your locus of attention is that there is but one of them. This underlies the solution of numerous interface problems."[7] Unfortunately this attention remains finite while the number and complexity of tools continues to increase. In what has become a problem for almost all design disciplines, the foreground is full.[8]

In response, most agendas of physical computing share a belief in "periphery." As defined by John Seely Brown, the former director of the open research center Xerox PARC, "periphery is background that is outside focal attention but which can quickly be given that attention when necessary."[9] This is one way to deal with information overload. "Periphery is informing without overburdening."[10] Trying to keep too much in the locus of attention tends to be stressful. We find it more natural to use our considerable powers of sensing the surroundings, and then to experience more capacity and resolution where our attention is focused. Thus, as Brown observed, bringing something back from the periphery to the center of attention is a fundamentally engaging and calming process.

Pervasive computing takes this approach beyond the information context to include physical architecture. Graphical user interfaces have long been built on principles of shifting focus—picking up a tool,

opening and closing a window, etc.—but they still leave us staring at a cluttered screen. Portable and embedded systems take the information processing out into the physical realm, where the capacity for periphery is deeper and the act of bringing things to the center is more intuitive. For example, tagging systems can mark parts inventories for direct use by hand-held devices without recourse to a desktop database. Principles of periphery can help reduce contention on a screen, of course, but they also suggest a larger shift in our goals for natural interactions.

This is mainly a matter of embodiment in context. Our embodied predispositions have been underfed while our foreground deliberative attention has been oversaturated. To change that balance, we need to change what we expect of interactive technology, and where we expect to find it.
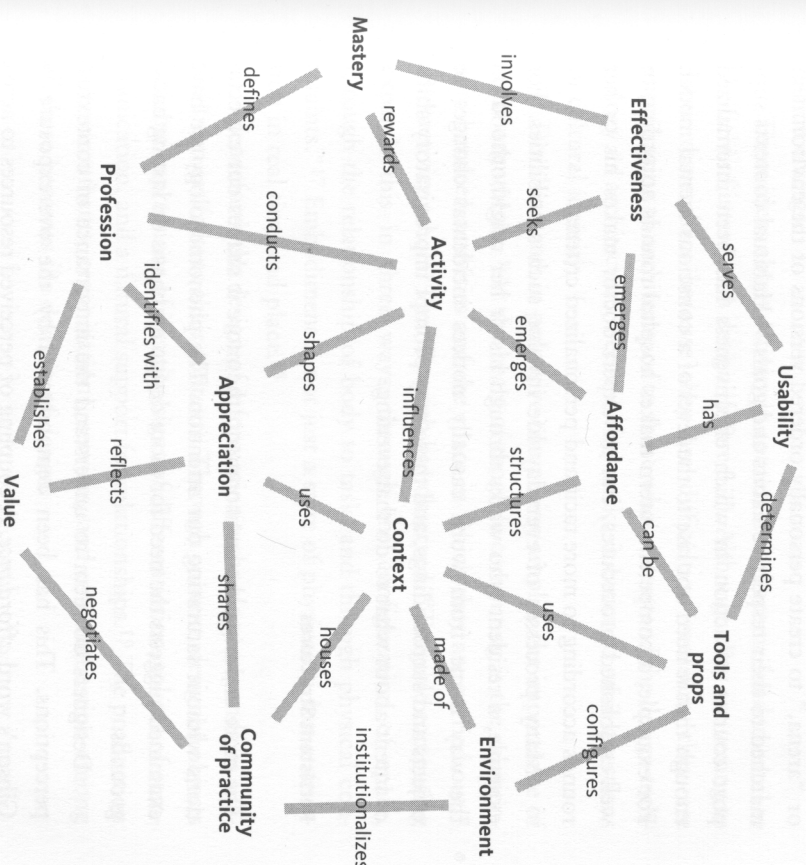
Context and the Roots of Interactivity

As reflected by so much recent emphasis on embodiment, contextual factors matter more than early researchers in interactivity anticipated. If more recent study finds the phenomenology of engagement at the roots of interactivity, it is because these designers build technologies around everyday life. This shifts design values from objects to experiences, from performance to appropriateness, from procedure to situation, and from behavior to intent.

With its new emphasis on intentions in activity, contextual design departs from an earlier generation of inquiry into environment and behavior. Whereas that work aimed to reduce design to a linear, predictable process, based on measurable models of conditioned response, the current work recognizes the importance of expectations. "When we speak of 'direct manipulation,' 'intelligent agents,' 'expert behavior,' and 'novice behavior,' we are really positing concepts in which consciousness is central," the anthropologist Bonnie Nardi has explained.[11] Intent makes people different from machines in any flow, and it gives an asymmetrical cast to the relation between people and things (figure 3.1). Cognitive science has emphasized mental representations at the expense of context. "Thus we have produced

reams of studies on mentalistic phenomena such as 'plans' and 'mental models' and 'cognitive maps,' with insufficient attention to the world of physical artifacts."[12] Designers more interested in rich description than in predictive models tend to welcome such emphasis on artifacts. As a way of describing the intrinsic unity of context, activity, and intentionality, "activity theory" has become a useful expression.

Mastery · involves · Effectiveness · rewards · seeks · defines · conducts · Profession · Activity · serves · Usability · determines · identifies with · shapes · emerges · emerges · Affordance · has · can be · Tools and props · establishes · reflects · Appreciation · influences · uses · structures · Value · negotiates · shares · Context · uses · made of · Environment · houses · institutionalizes · configures · Community of practice

3.1 A concept map for embodied activity in context

The word *situation* keeps us mindful of the ethnographic perspective. Ethnographers remind us that actors play their settings. An improvisatory action grows out of the immediacy of a context. Situated action theory explains how experts engage contexts. As voiced by the work practices ethnographer Lucy Suchman, who introduced the theory into a still very mechanistic field in the late 1980s, "The organization of the situated action is an emergent property of moment-by-moment interactions between actors, and between actors and the environments of their action."[13] Within the situated action model of work, actors operate within a stable institutional framework, or "arena," to create personally ordered versions of the environment matched to their respective habits and goals.[14] Habitual contexts support courses of action in which effectiveness has been internalized enough that it need not rise to the level of a conscious mental model. For example, a competent intern makes hospital rounds according to well-established procedures, but an expert doctor makes his or her rounds according to more tacit and personalized criteria.

Many processes of everyday life involve such sensibilities. For example, a resident who walks through his or her neighborhood on the way home from work casually notices incidental changes to objects and surroundings, and these may prompt improvisatory shifts of intent about what to do that evening.

Persistent Structures

The more enduring the environment, the more it shapes our expectations without saturating our attention. The phenomenology we have examined suggests the need for more design emphasis on lasting backgrounds.

Designers do seem to understand the importance of contextual perceptions. This has been demonstrated by the overexposure of Gibson's word *affordance*. A coupling of perceived resources to active intent creates a context for that action.[15] The sum of all such contexts present is the environment. One's active state heightens this impression. Thus affordances are inherent properties of environments. When affordances are perceived similarly by different people, the identity of