Position Statement
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A Model for Information Environments

For over a decade, we've defined information architecture (in part) as "the structural design of shared information environments," yet we still lack a consensus for what we mean by that phrase. Meanwhile, mobile & cross-channel complexities are only getting more complex, and context is more ambiguous than ever.

This lack of a foundation for key IA concepts contributes to numerous problems:

- Circular discourse on the nature of what information architecture is and does, preventing the practice from defining its central domain and developing a full-fledged intellectual discipline.
- Relegation of IA practice to the same narrowly defined activities and methods, which have matured little in over a decade.
- Use of these "IA methods" without understanding how or why they work, which can result in the mis-use of those methods.
- Missing frameworks for what makes one information environment better than another, contributing to large gaps in the design of digitally enabled or enhanced cross-channel products and experiences.

I propose a three-mode model for how people experience information in their inhabited environments. The model side-steps the counterproductive desire to have a "one true definition," but instead serves as a description of several established, theoretically sound facets for how to understand information.

This model is not meant to be theoretically comprehensive. Rather, it's meant to introduce several foundational (and interdependent) ways for how people encounter and use information.

The modes are: Ecological, Semantic, and Digital.

Ecological information

This is information involved in the relationship between an organism and the organism's natural (or built) environment. I base this mode largely on the ecological psychology theory (and empirical research) of James J Gibson. Gibson adopted the term "information" to mean the intrinsic structural clues an animal "picks up" from the interplay of energy with the surfaces and mediums of the environment. Animals perceive through action, and act based on what they perceive, which forms a sort of "loop" of cognition, where animals act, perceive, calibrate further action, perceive, and so on. This loop isn't based on computed rules and symbols in the brain, but on the brain, body and environment working together as an integrated perceptual system.

While the bulk of Gibson's ideas have heretofore been sidelined by mainstream cognitive science -- which still relies predominantly on a cognitivist, brain-as-computer paradigm -- Gibson's ecological approach has been adopted by many voices in the emerging

"embodied cognition" school of thought. A central tenet of Gibson's is that our cognition and action are shaped by our environment (even if some of that environment is what we ourselves have made). As Louise Barrett puts it in her book Beyond the Brain: How Body and Environment Shape Animal and Human Minds, "When we take a step back and consider how a cognitive process operates as a whole, we often find that the barrier between what's inside the skin and what's outside is often purely arbitrary, and, once we realize this, it dissolves." This point has been a key argument in what has been called the "radical embodied cognition theory" camp, which seeks not to just add embodiment onto mainstream cognitive science, but replace it altogether. My proposed model builds on this more radical conception of embodiment.

One key feature of Gibson's ecological framework is the idea of "invariant" elements in the environment. For example, terrestrial creatures evolved in an environment with a sky above us and earth under our feet -- quite literally the "ground" of all perception. He enumerates many variant and invariant elements of the environment, and how they form the structures we rely upon for orientation and afforded action.

I contend that ecological information is the sort of information upon which all other sorts are based, and that Gibson's anatomy of the elements that make up the ecological environment (substance, surface, object, event, etc.) can serve as a useful framework for how we think about and create all sorts of environments, including those we make or enhance with software.

As part of his theory of information pick-up, Gibson originated the concept of "affordance," which he posits as the basis of all perception. That is, we perceive only that which affords some sort of bodily action (for good or ill). This original framing of affordance is deeper and more significant than the version appropriated by Donald Norman and others. In Gibson's conception, it serves as a first principle upon which everything else rests. In web and software design practice, affordance has typically been a concern mainly for interactive user interface elements such as buttons. I suggest that affordance is also a central concern for information architecture. The challenge is how to understand the equivalent of Gibson's elements of the environment, but in semantic environments. This challenge leads us to the next mode.

Semantic information

This is information from language for communication between people. Included in "language" are oral speech, written text, as well as graphical artifacts like photographs, icons, maps and diagrams. In this model, language is not information in and of itself. Rather, language is environment -- things we add to the natural and built environment with sound, gesture, and pictorial marks on the environment's surfaces (such as text, graphics, etc.).

In the words of embodiment theorist Andy Clark, language is a sort of "augmented reality trick" we use to enhance our environment with human-made and human-taught affordances. Clark argues that language is "cognitive scaffolding" that we create as part of our shared environment.

This is the sort of information we most often mean when we talk about the IA practice of organizing and structuring information. But what's often missing is the realization that by creating and connecting labels -- "mere" language -- we're actually creating architecture.

We are making places, not in a metaphorical sense, but in a literal sense of architecture as structures for human habitation.

Additionally, we have a rich body of knowledge from fields like Library Science that have given us tools for organizing semantic information, but we have very little theoretical grounding for why cognition is helped or hindered by one approach over another.

Even though semantic information is more central and concrete to human cognitive experience than we may realize, there are still important differences in how we perceive semantic versus ecological affordance. Our cognition "satisfices" in that it uses whatever cognitive "loop" will do the job of picking up affordance information most readily. Semantic information takes more cognitive work (unless a semantic cue has been so ingrained over time that it "specifies" environmental information almost as directly as the ecological environment -- such as how a stop sign is the next best thing to an actual physical barrier). Teasing apart the way human perception picks up affordance from semantic versus ecological information is a key area for understanding how people comprehend the simulated physicality of software interfaces. It's also key for understanding how people "navigate" among labels and connections, and how they perceive the invariant or variant elements of a software-based (or -enhanced) environment.

Digital information

This is information as code, used in the "black box" realm of machines transmitting and receiving between one another. In other words, it is the Claude Shannon framing of "information" -- coded symbols and rules, made for (and even by) computing devices. This binary conception of information has become pervasive since the mid 20th century, evidenced in part by the mainstream cognitive science assumption that the brain works like a computer, telling the robotically unthinking body what to do. It comes out of an intellectual tradition going back at least to Descartes, who posited the seat of human existence in our ability to "think."

Humans do not comprehend the digital information mode in its native state, but we experience its effects, both systematically and culturally. For example, when we see confusing error codes, or encounter digital-system structures that make sense to the machine but not to the user, we're experiencing some of the negative effects of digital information. Of course, there are positive effects, such as the ability to have digital networks and devices in the first place! But there are often cultural assumptions that arise from the priority we place on the digital framing of information, such as preferring pure hierarchy, workflow efficiency and structural linearity over the more organic, messy, and fluidly "nested" way in which people actually perceive and comprehend their environments.

Digital information is valuable, powerful and influential, but we do not live in the digital realm -- we live in the ecological & semantic realm. One major task of information architecture is to push the things made and enhanced with digital information further toward being comprehensible and habitable.

One way in which IA accomplishes this task is by creating bridges between two different sorts of ontology. One sort of ontology (in its original meaning) is the very human question of the nature of being. While most users of digital systems aren't explicitly pondering the philosophical question of existence, they most definitely are attempting to

comprehend and act within their environment from a tacit set of ontological assumptions about the nature of the places and actions afforded by the labels, connections and rules that make up that environment. Much of information architecture practice is focused on discovering what those embodied ontological assumptions are, for a given set of people within a given set of scenarios and contexts, then creating digitally manifested ontologies as semantic-environmental elements that accommodate users' embodied assumptions and behavioral patterns. This is the real undertaking behind things like "mental models" and "user journeys" as well as the semantic construction-site work of taxonomy, categorization and the like.

The Environmental Frame

If we frame information in these environmental modes, we find that we no longer think of IA practice as confined to organizing categories and links in a sort of semantic vacuum. Nor do we begin our work primarily concerned with a particular device or software platform.

Instead, we consider the whole experienced environment, and put ourselves to the task of figuring out how the semantic structures we're adding to the environment might change the overall ecology. What "scaffolds" are we creating, and how do they shape the existential reality for people who are just trying to act on what they perceive while getting on in life? These are the deeper, more slowly changing issues behind the work of IA, only after which we should get into the more granular concerns of specific technologies.

Especially as computing is now more pervasive and ubiquitous than ever – and promises to become only more so -- our work is becoming interdependent with those traditional architectural disciplines. Additionally important is understanding the information-technology architectures of digital systems well enough to collaborate with and bring influence to the work done in that realm as well. That is, while the semantic mode is (in a sense) the "home" concern of information architecture, understanding the environmental role of all three modes is essential to IA practice going forward.

Sources Mentioned

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