

INVITED PAPER

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The Machineries of Context

New Architectures for a New Dimension

FOREWORD

While it may seem it's been around a very long time, Information Architecture (IA) is still a relatively new practice. Compared to many traditional craft-oriented professions – being a tailor, or a chef, or even an artisan cheese-maker – IA practitioners are not only very green, but the practice itself is a mere toddler in comparison. And yet, we're expected to know what we're doing, and "make IA" every day.¹

So, even though we have a lot left to learn, it's important for us to fully grasp the significance of our work. In my own experience creating and using these new sorts of architectures, I've done a lot of thinking - obsessing, really - about the nature of this thing we do. What I've been scratching for is not so much a definition as a fuller understanding, and a way to explain that understanding to others.

Here's what I've come to understand: What IA has been about from the beginning is designing context with hyperlinks. That is, shaping contextual experience with connections afforded by the new, digital layer of the web.² This may sound like a limiting definition, but I believe it's instead a helpfully pragmatic description. What follows is my best effort, for now, at explaining what I mean.

SOME BASIC THINGS ABOUT CONTEXT

For most of human history, spatial context has been fairly straightforward. You're either here, or you're over there. You're either at the office, or at the bowling alley. You're on the stage of a theater with a hundred people watching you, or you're wearing your bathrobe in your kitchen, scrambling eggs.

¹ It's important to keep a distinction between a practice and practitioners. IA is one facet of larger design concerns. I hope this essay makes it clear how important and far-reaching a facet IA really is – but it is not everything. Most people who may call themselves "IAs" actually practice within other facets as well. For more on this, see "Linkosophy," the closing plenary I wrote for the 2008 IA Summit: <http://www.inkblurt.com/2008/04/15/linkosophy/> (retrieved 2009-04-02)

² The word "digital" may bother some, but it's the best term I can think of for distinguishing this layer we've created in our world. I recognize that "digital" implies a specific technology – one that may be replaced by some other paradigm. But remember that even the word "computer" was coined to describe people who did computation, and later mechanical mathematics machines. And the word "phone" is still used for devices that have far outgrown the original meaning of "telephone." For now, "digital" will do for the conversations we're having.

For a long time we've been able to conveniently rely upon the alignment of a given space's context to the physical material that bounds the space. I could look around my house, and seeing walls, a roof and a space devoid of a hundred people staring at me, I could reassure myself that I was not on a theatrical stage, and go about making my eggs in peace.

In fact, we've relied on this assumption that physical boundaries and human context are aligned for so many millennia that it's ingrained in our culture, our language, our deepest bodily assumptions about how reality works.

But as we move forward, keep this idea in mind: context is just the mental map that we've layered on top of our sensory experience. A kitchen only matters as a kitchen because we call it that, and we use it as such. A theater is a theater in any meaningful way only when it is understood as such, called a theater, and used as a theater.

The world we walk around in, live in together, talk about and use together, has contextual relevance because of the information we share about that world. We collectively agree upon a common description, a sort of map, of those spaces and what they mean. In a regular day, we don't have to think about this fact. And that's only because we've been able to rely upon the consensus we share about a space, and the physical cues that place provides for its use.

For any shared space, consensus is important; a given context is what it is mainly due to collective agreement. If I walk into a busy theater wearing my bathrobe, write "Andrew's Kitchen" over the stage and start scrambling eggs, the actors and the hundred people in the audience will say I'm deranged and call the authorities. My label does not change its physical characteristics and predominant social use.

It's with behavior that we tacitly agree upon the contextual meaning of our spaces. But we use language, verbal and visual information, to map it. I don't mean only maps like you buy in a store, but all the other information we share: the sign outside the theater, the ad for the play in the newspaper, the category the address is given in the phone book's business pages. All of these informational cues are used to reinforce explicitly what we determine tacitly through our behavior: going to the theater to see a play.

It's hard to overstate just how much of what we perceive as *reality* is made of these socially constructed maps: information that labels, directs, explains, tells stories about the places we inhabit. And the stories of these places, in turn, shape the labels, ideas and stories we have about ourselves and one another.

In fact, if we think of the self as a given context, even our very identities are in many ways constructed of these signs and signifiers. The entity I think of as "me" is an accumulation of collective experience – not just my own, but the experience of all those who have known me and interacted with me. And a big part of that experience is constructed by the nature of the physical spaces I inhabit. We've been able to rely on physical space to help us realize what role or facet of our personality is most appropriate in the moment. We behave

and dress differently at an office party than we do at a funeral or on vacation at the beach.³

Context can also be a function of time. Just as a cathedral may have been a place of worship but is now an ironic discotheque, your college-self might have been a sophomorically rebellious punk, but now you're a more responsible, mellow professional. The few college friends who remain in contact have changed along with you, and the ones who stayed that way have drifted into the fog of your past, separated by the inertia provided by time and space.

The world I just described has lasted a long time, until very recently. But there has been a fundamental disruption.

Now, a user of Twitter can think she's "whispering" in a private space to a friend, but by typing the wrong label ("@" instead of "d") can suddenly be in a theater of not just a hundred but thousands of people. A responsible family man of 40 can discover that college peers he barely knew have posted, on Facebook, pictures of him at 18, shirtless and stoned in a mosh pit, and labeled them with his name.

What on earth happened?

THE POWER OF THE HYPERLINK

Technologies such as the telephone and radio transmission had profound effects on our culture, yet they were still very segmented in their own silos, and centrally controlled by governments and corporations. The same was true for most computers and their networks that emerged soon after. The personal computer "revolution" in the 1970s & 1980s provided only limited connectivity: even the largest consumer networks were smallish, gated communities compared to what the Internet eventually became.

The Internet, too, though miraculous, was relatively limited. Those of us who made our first forays on the pre-web Internet recall the rush we felt when using the command line to tunnel across the globe and download documents from far away, or the novelty of knowing how much coffee was left in a computer lab's coffeepot we would never see in person.⁴

But only a few of us had access to create directories on these networks, and even then the structure of those directories was highly prescribed by system administrators. These machines and networks had only one structure, as immovable as an interstate highway or a skyscraper. The Internet remained the domain of specialists and dedicated hobbyists, and almost nobody else. It took the web as a catalyst to transform the Internet into what it became.

³ For a more thorough and less amateur treatment of these ideas, look into basic works on social construction and semiotics. For the thinking about maps I've borrowed a lot from Denis Wood, especially from his book *The Power of Maps*. The Guilford Press, 1992. In addition, see the seminal work done by Sherry Turkle in the mid-90s, such as her book *Life on the Screen*. (Simon & Schuster, 1997). Turkle explores, in part, how postmodern philosophers' ideas of identity and reality construction have become literally, explicitly evident on the Internet.

⁴ Trojan Room coffee pot, http://en.wikipedia.org/wiki/Trojan_room_coffee_pot (retrieved 2009-03-28)

I want to be sure we don't make the mistake of thinking of the web as merely web pages we use through browsers. By "web" here I mean the essential qualities of the networked hyperlink, which are more pervasive and powerful than mere websites.

The hyperlink, which was already around in various forms, was invented to allow more than one way of structuring an otherwise linear medium, such as a book. What Tim Berners Lee's World-Wide Web project did was add that capability as an easily adopted protocol to an increasingly global networked medium. The combination was transformative.

Once the server protocol was in place and users had the client software, all they had to do was type some simple markup into a document. And no matter where it lived on the network, no matter how deep the directory or far away the computer, without having to ask anybody for permission, users could link to anything they pleased. The web quickly became a giant tangle of messy, idiosyncratic connections that obscured the neatly organized, orthodox directory structures underneath. It was as if regular people in a city could suddenly build skyscrapers and highways of their own that swallowed up the shape of the city as it was previously known.

A NEW DIMENSION

As the web grew, it became something more than just more of the same, but bigger. It entered a sort of phase transition, where a large enough difference in scale results in a difference in kind, as when the movement of H₂O molecules scales upwards and its substance changes from a solid to liquid to finally become a gas.⁵

If the web had remained a hobby-horse tool for university researchers it would've still been the same "molecule", but its growth into a global platform shifted its substance to something that hadn't existed before. It resulted in a new, shared dimension of human experience. If this sounds like hyperbole, or science-fiction raving, consider the example of the photograph.

There was a time, not long ago, when the idea of a digital photograph was a sort of novelty, a "virtual picture." We thought at the time "sure, that's neat that we can have pictures on our computers, but they don't count as actual pictures until they're printed out and made *real*". We might take pictures and store them on computers, but that was just the equivalent of keeping them in a box in a closet. If we wanted them to *matter* we took them out and framed them, or put them in albums on our coffee tables so people could see them.

Now, only about a decade later, most people reading this article take pictures with the intention of sharing them on the Internet. They print them out as an exception rather than the rule. In fact, in an amazing reversal, we're taking pictures that were kept in our photo albums and frames for years and we're now scanning them so we can share them in places like Facebook. If you want a picture to matter, you put it in a place where the most possible people might see it: on the web.

⁵ A great introduction to emergence science is Steven Johnson's book *Emergence*; it's also where I first encountered the phase-transition analogy.

Why? Because the web has reached a tipping point where it is pervasive and permanent enough to be treated as a real dimension. It's becoming the place of record for conversations, stories and even our identities. And that's because it's such a perfect medium for people to associate, connect, and discover. We know that if we do it there, it has the best chance for exposure, response and relevance. The hyperlink made this possible.⁶

MAP AND LANDSCAPE

In the physical world, we have places and then we have our descriptions of those places. There's the theater mentioned earlier, and then there's all the information we've created that names it, explains it, tells people how to get there and what will happen there. That information is somewhat fluid - the sponsorship or theatrical company can change, the sort of performances can shift from drama to musicals. But the physical structure itself is not affected by those descriptions, unless we make a separate effort to change its material substance.

In the words of Alfred Korzybski, "The map is not the territory".⁷ I might look at a map of my city and see the address of the theater on it. If it's a map for tourists it might even have a little picture of the theater's building right there on the map. I could touch that little picture all day long and do no more than make an unsightly smudge. I still have to take my attention away from the map and find my way through real streets to the physical structure. The description is separate from the actual instantiation of the space. On the web, this distinction becomes less clear. Here, a "map" has labels that are also hyperlinks. So when I *touch* the label representing the place I want to visit, the label *actually takes me there*.

We've always experienced information spatially. If we're reading a newspaper, we're looking at a sort of map of stories arranged by topic and importance on newsprint. In a book, we're moving through the ideas or timeline of the story linearly as we move through the pages from front to back.

But as we began digitizing our information sources and adding hyperlinks, the information slipped the bounds of physical constraint and started reassembling itself into other structures, many all at once. Still, our minds try to make spatial sense of it, and use spatial memory to organize and keep track of it all, interchangeably making use of semantic relevance and spatial positioning to process our contextual experience. Andrew Dillon's research in 2000 showed this to be the case. After watching users navigate information spaces and talk about their experience, he sees "semantic" and "space" merged: "Completely separating both forms of representation is rare and somewhat artificial to users of an information space. Users easily move from one to the other since both serve to advance their desire for task completion. Indeed, it makes best sense to think of the user's model of the information space as being constructed out of both".⁸

⁶ I realize these observations are mainly true in developed countries, among middle and upper classes. But even so, it is still true of many millions of people, and the rate of Internet access is growing with unprecedented speed even in developing nations.

⁷ Korzybski, A. Science and Sanity. Institute of General Semantics. 1933, p. 747-61

The web complicates these experiences even further, because its open hyperlinking allows almost any structure imaginable to emerge, confusing the boundaries between the link and the linked. A link to a place becomes part of that place's actual substance. Every link either creates a new context or adds dimension to an existing context. On the web, the map doesn't just make the territory meaningful, *the map makes the territory*.

This very development, the emergence of out-of-control link-structures, sparked the need for early Information Architecture. While the web at large thrives on massive emergent linking, more discrete web structures for particular needs had to be optimized for those needs. But just because IA shapes semantic spatial context for particular needs, does that make it truly architectural?

ARCHITECTURE AND CONTEXT

When you find your way through an airport, or go from making dinner in the kitchen to eating it in the dining room, you're experiencing artificially designed and constructed space, made for people by people. Even the places we build for flora and fauna (parks, zoos) are designed so those natural things can better co-exist with people.

Part of what defines a given context are its boundaries and connections, and connection is just as important as boundary for how we experience architecture. The connections – doors, windows, walkways – shape and define the spatial contexts just as surely as their boundaries and interior artifacts.⁹

In “Small Pieces Loosely Joined”, David Weinberger observes that “(...) the Web has created a weird amalgam of documents and buildings. With normal paper documents, we read them, file them, throw them out, or send them to someone else. We do not go to them. We don't visit them. Web documents are different. They're places on the Web. We go to them as we might go to the Washington Monument or to the old Endicott Building. They're there, we're here, and if we want to see them, we've got to travel. *They're there*. With this phrase, space or something like it has entered the picture.”¹⁰

Information Architecture is the architecture for that “weird amalgam” sort of space. Like physical architecture, there is a shaping of contextual experience through creating boundaries and connections. But for IA, the hyperlink is the connection. It's precisely this new design challenge of the interstitial connections made by hyperlinks, and their resulting environments, that IA emerged to address.

⁸ Dillon, A. (2000) Spatial semantics and individual differences in the perception of shape in information space. *Journal of the American Society for Information Science*, 51(6), p. 521-528

⁹ I realize there's much more to architecture than this, but I do believe it would be hard to call something architecture unless it involved shaping space into connected contexts; also, I'm describing here the act of architecture as performed by anyone shaping space, not just the profession or official “discipline,” which of course concerns itself with many more factors than the essential structural act.

¹⁰ Weinberger, D. *Small Pieces Loosely Joined*. Available at <http://www.smallpieces.com/content/chapter2.html> (retrieved 2009-03-27)

A NEW KIND OF ARCHITECTURE

Most of the conversations in web design circles in the mid-to-late 90s were about what was happening on web *pages* - that is, how to adapt what we knew about print design and HCI best-practices to this weirdly hybrid medium. Within a given context, how should the various controls and information contents behave? What makes them more useful and usable?

There was a growing realization, however, of an additional problem at hand: not just what happened *on* pages, but what happened *between* them.¹¹ How are they linked together, and why? What's the best way to link them together to make the overall structure work for the user? People obsessed with this question started finding each other online, and many discovered the now famous "Polar Bear Book" by Peter Morville and Louis Rosenfeld. The book happened to be called "Information Architecture for the World-Wide Web".

Why "Information Architecture"? Well, the authors had been using the term "architect" for this work as far back as 1994, when writing for Web Review magazine. Both acknowledged in interviews that they were aware of other uses of the term Information Architecture. They maintained that rather than co-opting the term, they were just applying it to this new medium, hence the "for the World Wide Web" in the title.¹²

The use of the word *architect* for similar kinds of information-oriented work arose in multiple places. IT professionals were using variations, as were Enterprise Architecture pioneer John Zachman and information-design leader Richard Saul Wurman (who has a background in architecture). Morville explicitly addressed this issue in 2000: "We first began using the metaphor of building architecture as a way to explain our focus back in 1994. In 1995, we began writing the "Web Architect" column for Web Review magazine. Then, in 1996, Richard Saul Wurman's book *Information Architects* caught our eye. At first, we were excited by the notion that information architecture was becoming mainstream. But when we read the book, we realized that his definition of information architecture didn't match ours. He focused on the presentation and layout of information on a two-dimensional page. We focused on the structure and organization of sites. We brashly decided that in our world view, Wurman was really talking about the digital equivalent of interior design or information design, not true information architecture. Of course, not everyone would agree. A healthy and sometimes heated debate over the definition of information architecture continues to this day. These debates are a good illustration of the ambiguity of language and of the political and emotional implications of information architecture design."¹³ But language is a fickle thing; before long the community that coalesced around

¹¹ Rosenfeld, L., A jaundiced eye interview, 1997. "Argus' mission is to change the perception that information architecture pertains exclusively to the relationship of chunks of information *within* pages, as opposed to *between* pages." (retrieved 2009-03-27)

¹² For anyone new to the subject, let me point out that while the "Polar Bear Book" was seminal in the identity formation for the IA community, and while it is certainly an excellent tutorial for many essential IA-related methods, it should not be mistaken as a full definition for the practice, which has evolved considerably since its first edition in 1998, and even since the most recent edition was completed in 2006. Given the rate of knowledge creation on the web, books (no matter how excellent) are rarely the place to look to fully understand the "state of the art" for any field.

¹³ Hill, S. An Interview with Louis Rosenfeld and Peter Morville, 2000. http://www.oreillynet.com/pub/a/oreilly/web/news/inforarch_0100.html (retrieved 2009-03-28)

this tricky question of designing link-structures for the web had tacitly truncated the rubric into simply “Information Architecture.” And that's how it stuck.

I go into this bit of history because the provenance of the term is important for practitioners to understand as part of their social history, and also because it is an occasional point of contention within the design community. Knowing where it came from won't stop the debates, but it can at least provide a common reference point. Furthermore, it shows that there's an honest intellectual origin for the name. That is, it wasn't appropriated merely to lend an air of gravitas to “website librarians” and pricey bohemian consultants.¹⁴

My contention is that the name of the practice is not merely metaphorical. And that understanding why can help clarify the practice's nature and significance. Recall that for millennia, our species has relied on context being relatively stable, aligned with physical boundaries. This assumption is baked into our languages, cultures and stories. We plan cities, governments, and wedding-party seating charts on this assumption. Dairy goods go together because they all need refrigeration; theaters and kitchens are in different rooms, and because it's a separate place, a separate context, what happens in Vegas can actually stay in Vegas.

Our early understanding of the web-space mimicked these long-held assumptions. Because the web was made mainly of content pages representing articles and products, so much of early IA had to do with organizing such inventories into efficient, durable hierarchies for storage and retrieval.

But the web has evolved into a vast universe of machinery where context can change radically with a single keystroke, and the inhabitants can do most of the linking, organizing and structuring for themselves. Almost everyone has a camera, or email, or a way to publish globally from their mobile phones.

Some have argued IA is outmoded now that users can do so much of what the experts used to do for them. But the fact is that none of this user-driven creation could happen without architecture. It takes structure to allow people to make their own structures; you need a link saying “Write a Post” and a “post-writing context” for someone to be able to create content with links in the first place.¹⁵

Everything from microblogs to wikis to social networks and bookmark-tagging platforms have architecture, predetermined contexts and functionality – made by links, categories and rules of conditional logic – that organizes digital

¹⁴ Let me be clear on librarians: just because some use the word as a sort of pejorative, a caricature of old-media authoritarians, I don't buy it. Library Science is more progressive and sophisticated than some give it credit for. Unfortunately words do accumulate certain sorts of baggage, and librarian is no exception.

¹⁵ It's important to acknowledge that many of the architectural innovations we've seen (especially in social platforms and game environments) have been created by people who don't necessarily call themselves Information Architects or consider themselves part of an “IA community.” They're developers or designers who happen to be making architectural connections and contexts as part of their work. IA practice needs to pay attention to this wider world, learn from it, and invite conversations and sharing with it, whether these other designers call their work IA or not.

space to support user activity. The mental models we have to understand for this work have less to do with organizing content and more to do with organizing the contextual conditions that best empower users.

The web has always been social. The hyperlink is inherently social – a pointer made by one person to something made by another person – and it has always been made of a conversational fabric. It's just that the web has only recently (in its short history) found its stride as a user-generated dimension: a destiny written into its DNA from the beginning. Controlling the organization of how people make those links was always a fool's dream. But people do need structures and mechanisms – machineries of context – to make any of this activity happen. And that requires new rules and patterns.¹⁶

There is, in fact, very little we can assume in this new kind of space – this “metaspace” that's come unmoored from physical tethers. Significant slices of what we call reality can be replicated, shared and broadcast anywhere. The contexts are defined not with walls, but with links - connections made using semantic materials. They're created by the language that describes them, and exist only because of that description.

In the web dimension, matter is replaced by language, and form is provided by structured semantics. Taxonomies, vocabularies, meta-data, and business rules are the tools and materials to create those forms, all in the service of this new architecture.

FUTURE CHALLENGES

Recall the earlier position that the web is more than just what we look at in browsers. It's the whole dimension of hyperlinked, emergent context – this new kind of space.

This dimension is again proving itself to confound our preconceptions, and is dissolving our comfortable boundaries. Now, with the addition of an inexpensive webcam, there can be little practical difference between talking to yourself alone in your room for a moment in time, and talking to anyone in the world, at any time, even long after you've passed from the earth. Cultural anthropologist Michael Wesch has called this merging of realities *context collapse*.¹⁷ What does this mean to design something that allows such a disruption of human experience? Should we better understand the implications of changing what *here* means before we change it?

The fact is there's no slowing it down. The techno-social ecosystem has a mind of its own, and it's plugging into everything it possibly can. As it becomes easier and less expensive to put any object, event or activity “on the grid” we're finding that all those things want to be linked to everything else, just as if they weren't physical things at all. The physical and the digital are merging into a single continuum.

¹⁶ For an excellent introduction to how architectural patterns inform social architectures, see Christina Wodtke's article “The Elements of Social Architecture.” <http://www.alistapart.com/articles/theelementsofsocialarchitecture> (retrieved 2009-04-02), and many of the patterns represented in “Designing Social Interfaces” by Erin Malone and Christian Crumlish http://designingsocialinterfaces.com/patterns.wiki/index.php?title=Main_Page (retrieved 2009-04-16).

¹⁷ Wesch, M. Context Collapse, <http://mediatedcultures.net/ksudigg/?p=183> (retrieved 2009-03-28)

It's been called the "Internet of Things" or "Everyware," and thought-leaders such as Adam Greenfield, Kevin Kelley, Bruce Sterling and Peter Morville have pointed out the positive and negative consequences of such a network-saturated existence. Regardless of its benefits or threats, this ubiquitously networked world is already arriving, and it means we have to consider the web-like attributes of this new generation of material goods and human activity when developing the digital-space capabilities that support them. It is in this merger of "digital" and "real" where Information Architecture and physical Architecture find great opportunities for collaboration.

This is just one of the many new frontiers ahead of Information Architecture as it matures as a practice, a profession and an academic discipline.¹⁸ When we acknowledge the profound ways in which we affect human experience when we design contextual structures, we realize there's much work and research to be done that goes beyond the currently conventional understanding of IA.

There are many fascinating questions to explore for this work: Is context a quantifiable construct that can be traced, outlined and measured? How do privacy and ethics factor into IA best practices? What can we learn from neuroscience about how our brains experience and understand context; and how does it affect our personal identities? As everything becomes part of a codified grid, what can we learn from the design of game environments as models for how to approach ubiquitous computing? Is meta-data a new metaphysics?

Some of these questions have been explored in academia under other departmental labels, and some have yet to be investigated.¹⁹ But as a relatively new discipline, Information Architecture needs to wrestle with these questions in the light of its own central concern: the shaping of context and connection in the digital dimension. Even though practitioners in the field may not think about these sorts of questions on a daily basis, a mature, thriving discipline needs that work to be done somewhere. The evolution of the practice depends on it.

I believe it's important to establish and acknowledge that IA is literally architectural. Increasingly significant parts of people's lives exist within the places we design. Everything from dating sites to company intranets not only house precious portions of our identities and our labor, but we spend as much or more time inhabiting these places as we do our physical homes and offices.

And the word *inhabit* is a good one, because it reminds us that we're not making virtual environments where people merely pretend to live and work. Our reality is caught up in, and substantially consists of, our language, our stories, our information and data. How these contexts are linked, merged,

¹⁸ There are important distinctions between the bottom-up, indigenous coalescence known as a "practice" and the more top-down, artificial, standards-driven structure of "discipline" that I don't explain here. For more, see the latter portions of "Linkosophy", <http://www.inkblurt.com/2008/04/15/linkosophy/>. (retrieved 2009-04-02) For an all-inclusive term, I tend to use the word "field."

¹⁹ In fact, the academics studying ubiquitous-computing design are highly focused on context as a subject. One good example is "Understanding and Using Context" by Anind K. Dey: <http://www.cc.gatech.edu/fce/ctk/pubs/PeTe5-1.pdf> (retrieved 2009-04-02)

split apart, defined and redefined affects our lives in deeply significant ways that match or rival the significance of any physical edifice.

To say that Information Architecture is about designing structure in the service of information is to get it mostly wrong. IA is about using information as raw material in the service of architecture for a new contextual reality. Understanding that new reality, continuing to develop the methods, tools and community of practice around that work, is an important step toward the future of IA as a field of work and study.