REPRINT

Andrea Resmini
University of Borås

Luca Rosati
Information architect

A Brief History of Information Architecture

This article is a reprint of parts of Chapter 2, "Towards a Pervasive Information Architecture", from Andrea Resmini and Luca Rosati's "Pervasive Information Architecture", a book published by Morgan Kauffman. The text was partially edited for clarity by the authors. The Journal would like to thank Morgan Kauffman for consenting to the reprint. All rights remain the property of the original right holders.

> *The metaphors we use constantly in our everyday language profoundly influence what we do because they shape our understanding. They help us describe and explore new ideas in terms and concepts found in more familiar domains.*
>
> *Earl Morrogh, Information Architecture: An Emerging 21st Century Profession, 2003*

Information architecture (IA) is a professional practice and field of studies focused on solving the basic problems of accessing, and using, the vast amounts of information available today. You commonly hear of information architecture in connection with the design of web sites both large and small, and when wireframes, labels, and taxonomies are discussed. As it is today, it is mainly a production activity, a craft, and it relies on an inductive process and a set, or many sets, of guidelines, best practices, and personal and professional expertise. In other words, information architecture is arguably not a science but, very much like say industrial design, an applied art.

Even though its modern use, strictly related to the design of information, goes back no farther than the mid-1970s and Richard Saul Wurman's famous address at the American Institute of Architecture conference of 1976, use of the term information together with the term architecture[1], has been around for a little bit longer and in quite

[1] *It must be remembered that Wurman wrote an article with Joel Katz entitled "Beyond Graphics: The Architecture of Information," which was published by the AIA Journal in 1975. In an interview with Dirk Knemeyer in 2004, Wurman said: "The common term then was 'information design.' What got confusing was information design and interior design and industrial design, at that moment and still today in many and most people's minds, are about making something look good.*

a few different settings. In an IBM research paper written in 1964, some 12 years before Wurman, and entitled "Architecture of the IBM System/360" (Amdahl et al 1964), architecture is defined as

> *the conceptual structure and functional behavior, distinguishing the organization of data flows and controls, logical design, and physical implementation.*

It is not disputable that we are talking computer architectures here, disks and boxes and wires and hubs, but the way in which the term architecture is abstracted and conceptualized in connection with structure and behavior and not just physical layouts laid the basis for the subsequent extension of its use to other areas of computing[2].

A few years later, in 1970, at the Xerox Palo Alto Research Center (PARC), a group of people specialized in information science was assembled and then given the charter to develop technology which could support the *"architecture of information"* (Pake 1985). This group was single-handedly responsible for a number of important contributions in what we would call today the field of human-computer interaction, including the first personal computer with a user-friendly interface, laser printing, and the first WYSIWYG text editor. As Marti Hearst, now a professor at the University of California Berkeley, recalls,

> *(p)erhaps because of the social nature of information creation and use, much of the technical research at PARC has emphasized the human-computer interaction and social aspects of computing.*

Weitzman (1995) supports this notion that the modern inception of the term originally came from Xerox Labs[3]. Quoting Smith and Alexander (1988), Weitzman maintains that

> *Xerox was among the first corporations to address this notion of information structure and use the "elegant and inspiring phraseology, the architecture of information" to define its new corporate mission.*

This high-level framing, the necessity for a broader vision, remained one of the core concepts for those who wrote about information architecture up to the mid 1980s, as

---

Interior designers make your place look better, industrial designers were engineers doing something that usually went to an engineer to put a package around it. Information design was epitomized by which map looked the best—not which took care of a lot of parallel systemic parts. That is what I thought 'architecture' did and was a clearer word that had to do with systems that worked and performed. . . . I thought the explosion of data needed an architecture, needed a series of systems, needed systemic design, a series of performance criteria to measure it. There are thousands of people using the term [information architecture], and they have no idea where the term came from, and 90 percent of them aren't doing what I think they should be doing anyway."

2 *Much of this discussion owes a great deal to the work of Rodrigo Ronda León. See References.*

3 *Besides providing further documental evidence to support this notion, Weitzman also underlines how Xerox actually contributed vastly to the general view of information architecture as a tool to support the design and presentation of documents, something that is of vital importance in Wurman's work.*

much as this joining of specialists in information science and in user-focused development (Ronda León 2008), a trait that will be somehow brought to greater visibility and results by the first wave of modern information architects in the 1990s.

From the mid 1980s, information architecture seemingly went through a dormant period, during which the idea of information architecture as both the design of complex or dynamically changing information seemed to be lost to a view much more akin to that of information systems. Articles written in those years mostly refer to information architecture as a tool for the design and creation of computer infrastructures and data layers, with a larger emphasis on the organizational and business aspects of the information networks (Morrogh 2003).

Curiously enough, much of the design deliverables we associate with information architecture today are a product of this period: blueprints, requirements, information categories, guidelines on the underlying business processes, global corporate needs, they all make their way into information architecture-related territory in the 1980s (Brancheau & Wetherbe 1986). They will be incorporated once and for all in the information architect's toolkit by the wave of the late 1990s lead by Rosenfeld and Morville.

This is what Ronda León describes in his graphical chronology of information architecture: identifying key books, papers, and conferences, Ronda León introduces a three-part development hypothesis (Fig. 1) spanning roughly 30 years, in which the two early phases, that of information design (1960s-1970s) and that of system design (1980s), are integrated into the modern mainstream idea of information architecture as we know it today in the 1990s.

It seems fair to infer that the early take on information architecture that developed from the IBM papers, PARC, and Wurman's initial vision was still coalescing when the emergence of the World Wide Web provided a one-time chance for pioneer-minded professionals to operate on large amounts of data in a new media, void of or minimally encumbered by preexisting corporate hierarchies. In 1998, Louis Rosenfeld and Peter Morville's book *Information Architecture for the World Wide Web*[4] hit the shelves, and information architecture went mainstream.

[4] *The book, usually called the Polar Bear book because of the drawing on its cover, is currently in its 3rd edition, published 2006.*

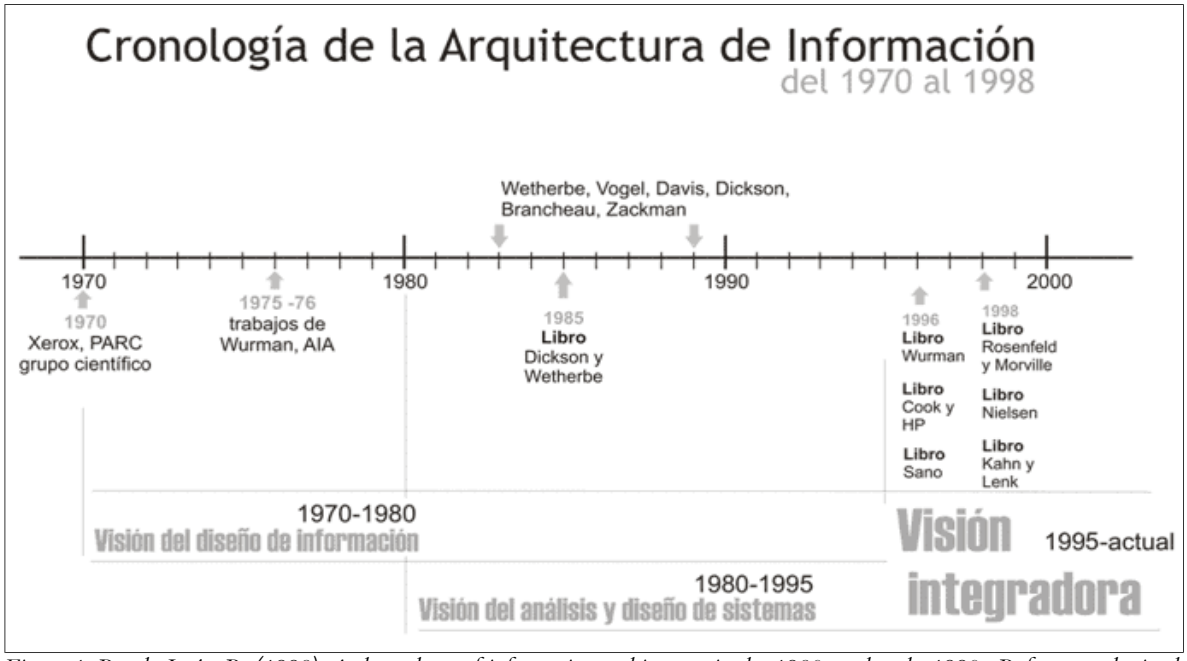

Figure 1: Ronda León, R. (1998). A chronology of information architecture in the 1980s and early 1990s. References obtained from LISA. Image reflects later rediting.

Approaches to Information Architecture

> *That's why I've chosen to call myself an Information Architect. I don't mean a bricks and mortar architect. I mean architect as used in the words architect of foreign policy. I mean architect as in the creating of systemic, structural, and orderly principles to make something work--the thoughtful making of either artifact, or idea, or policy that informs because it is clear. I use the word information in its truest sense. Most of the word information contains the word inform, so I call things information only if they inform me, not if they are just collections of data, of stuff.*
>
> *R. S. Wurman, 1996*

We propose a slightly revised version of the basic scheme outlined by Ronda León, in which the three consecutive periods in the timeline effectively translate to three broad, different and partially overlapping approaches that have characterized the research and practice of information architecture so far, the differentiating factor being the way they work with information: statically, dynamically, and as a resource. It is clear that while both the information design and the information science approaches we describe below see information as the raw material to use for building artifacts, the information systems approach does not. As Roger and Elaine Evernden wrote in their book *Information First* (2003), information architecture is

> *a foundation discipline describing the theory, principles, guidelines, standards conventions and factors for managing information as a resource.*

The focus is clearly on the managing of information for better enterprise-wide consumption and use, and the very idea of design, of creation, is virtually absent.

Information Design

The information design approach roughly corresponds to Richard Saul Wurman's contribution and initial vision. For Wurman, design and architecture are the basis for a science and art of creating *"instruction(s) for organized space"* (Wurman 1997) and for making these *understandable*. Understanding is a key concept in Wurman's work: he published his seminal book *Information Architects* in 1997, just one year before Rosenfeld and Morville's *Information Architecture for the World Wide Web*[5]: the book dealt with the increasing difficulty Wurman was experiencing in communicating rising amounts of information and presented a large selection of design solutions to the problem. It was a designer's book: from a designer, for designers.

Wurman's maintained that as much as architects are expected to create structure and order in the world through planning and building, information architects were expected to draw lines and derive some kind of order in dataspace, their primary task being to make this information simpler, more direct, and ultimately more comprehensible.

At the time, Wurman gave an extremely precise definition of information architect which still largely holds up today:

> *a. the individual who organizes the patterns inherent[6] in data, making the complex clear; b. a person who creates the structure or map of information which allows others to find their personal paths to knowledge; c. the emerging 21st century professional occupation addressing the needs of the age focused upon clarity, human understanding, and the science of the organization of information.*

Even though he was possibly mainly concerned with the static, visual design[7] of large quantities of information, his contribution was undoubtedly a major if unintended source of inspiration in the initial modern re-framing of the field when it later took on to the design of information on the Web (Wodtke 2002).

According to what he said to Dan Klyn in a recent series of interviews[8], Wurman had no master plan in mind when he rolled information architecture on the stage at the national conference of the American Institute of Architects (AIA): he was just trying to

---

[5] *Wurman published "Information Anxiety", which might be considered his most information architecture-related book, in 1988. The book was expanded for its second edition and published in 2000 as "Information Anxiety 2" .*

[6] *See Resmini, A. (2011). Of Patterns and Structures. http://andrearesmini.com/blog/of-patterns-and-structures.*

[7] *See note 12.*

[8] *Klyn, D. (2009). Repost 2009: Conversation with Richard Saul Wurman. http://wildlyappropriate.com/?p=781.*

"find patterns for himself"[9]. Neither was he interested in disseminating his ideas to a new audience, nor in creating a new field or profession, and was actually quite surprised and probably a little upset when he finally did find out what his pattern-finding activities stirred up.

Figure 2: Wurman showing how to peel a banana on stage at the 11th ASIS&T Information Architecture Summit in Phoenix, Arizona.

Wurman finally came to terms with him being considered part of the ongoing information architecture conversation in 2010, when he was invited to keynote at the 11th ASIS&T IA Summit in Phoenix, Arizona[10].

Information Systems

The information systems approach is tightly connected to the line of research that developed in the 1980s and to the logic of what we identify today as information systems and business informatics: how to solve problems of information management within the larger business vision or logistic needs that drive organizations is the primary concern.

[9] *The interviews contain this brief passage: (Klyn) "Did you intend to create a movement within the field of architecture to focus on information display and organization and such things?" (Wurman) "No".*

[10] *Richard Saul Wurman Keynote on Boxes and Arrows. http://www.boxesandarrows.com/view/ia-summit-10-richard*

The widely recognized semantic shift towards user experience which followed the publication of Rosenfeld and Morville seminal book has made "information systems information architecture" a minority (if important) stance, which is still prominent in large corporate settings and that produces conceptual friction whenever it is compared with "user experience information architecture", largely considered a somewhat less relevant subset and synonym with "website development".

Gene Leganza's report on information architecture published for Forrester Research in 2010 well represents these views. The 20-odd page document clearly defines how the information architect role is primarily an IT function whose main task is to enable consistent access to the correct data, but goes on to consider that in an enterprise hierarchy this might be better served by two different roles: one concerned with the "structuring of all enterprise-wide information assets", and that is "*enterprise IA"*; the other, with the design of "information for an individual Web site, portal, or application UI", and this is *"user experience IA"*, or *"Web IA"*.

Interestingly enough, Leganza also states that there is value in how information architecture helps structure enterprise information which is still unfortunately not evident to many an enterprise architect (with a 43% of them not really considering the domain part of their strategies), and that this value *"is not in attaining some abstract goal of imposing order on disarray but in enabling the provisioning of the right information in the appropriate context to the stakeholders who need it"*.

This enterprise-layered view is not just Forrester's: Carter (1999) defines information architecture in business settings as

> *an holistic way of planning which meets the organization's information needs and avoids duplication, dispersion, and consolidation issues. The information architecture is the collective term used to describe the various components of the overall information infrastructure which take the business model and the component business processes and deliver information systems that support and deliver it. Prime components are the data architecture, the systems architecture and the computer architecture (Carter 1999).*

From a company perspective, it seems just logical. This approach effectively connects information architecture to the strategic company thinking which is behind the idea of enterprise or enterprise-level information architecture in a way that "UX IA" has not yet managed to do. At the same time though, it quickly moves the unique design thinking which drives information architecture to abstract, user-centered problems towards issues of data connections, bandwidth, costs, server topology, and storage limits that are not normally part of the mindset of the information architect and that tend to be rather specific and technological in nature.

Information Science

The information science approach is the one best represented by Rosenfeld and Morville initial take on the field. In an interview with Scott Hill for O'Reilly in 2000[11], they stated that

> *(i)n 1994, before the Web took the world by storm, we were teaching some of the first academic and commercial courses about the Internet. We both believed the Internet would become an important medium and that librarians had a great deal to offer this brave new world of networked information environments.*

Figure 3: Lou Rosenfeld (left) and Peter Morville (right) in 2000, with Samantha Bailey, then Vice President of Consulting Operations at Argus Associates. Photo courtesy of P. Morville.

Rosenfeld and Morville were not overtly familiar with Wurman's work at the time. In the words of Morville (2004) they

> *found (them)selves using the architecture metaphor with clients to highlight the importance of structure and organization in website design. Lou got a gig writing the Web Architect column for Web Review magazine, and I soon joined in. In 1996, a book titled Information Architects appeared in our offices. We learned that a fellow by the name of Richard Saul Wurman had coined the expression 'information architect' in 1975. After reading his book, I remember thinking "this is not information architecture, this is information design".*

This is an accurate and insightful statement. Their initial view was entirely focused on the new dynamic environment of the World Wide Web, and it certainly had little in common with the more traditional, less-Internet based *information design* approach that

[11] *Hill, S. (2000). An Interview with Louis Rosenfeld and Peter Morville. http://www.oreillynet.com/pub/a/oreilly/web/news/infoarch_0100.html*

Wurman outlined in his books. Organization, labeling, navigation, and search were the touch points around which they structured their practice. Rosenfeld believed these were the key concepts to address in order to

> *help people find and manage information more successfully. Organization systems are the ways content can be grouped. Labeling systems are essentially what you call those content groups. Navigation systems, like navigation bars and site maps, help you move around and browse through the content. Searching systems help you formulate queries that can be matched with relevant documents (Hill 2000).*

Very famously, they remarked a few years later that the real difference they could see between their view and Wurman's, *post hoc*, was that for them information architecture was very much the design of what was *between* the pages of a web site, meaning the links, the structure, the connections, while for Wurman it seemed to be the design of the pages *themselves*[12]. It could also be said that Rosenfeld and Morville designed for a world of ever-changing, dynamic content, something somewhat unsurprisingly still alien to Wurman's vision.

Rosenfeld and Morville, and those many following along their initial LIS view, must be credited for bringing in many of the core methodologies used for the design of navigation, labeling, and site-structure. They offered the blooming community of practice an extremely empirical and practical approach, and they single-handedly brought user research and usability engineering into the core of mainstream IA tools.

While through the years their views on the subject evolved (as Rosenfeld is fond of saying, they *"certainly embraced other disciplines"*), so far their seminal idea of information architecture as the design of taxonomies, menus, and structures still represents the mainstream and most accredited view of what the field is about, especially for those outside the field itself.

Pervasive Information Architecture

> *Instability is what fuels the process (Soddu 1992)*

Rosenfeld and Morville's were met with enormous success, and in the late 1990s and early 2000s the practice of information architecture was usually synonym with designing web sites for the World Wide Web. As 2000 became 2005, things were changing again. Users were entering the scene as producers (or *prosumers*, a term acknowledging their mutated role as both consumers and producers of information),

[12] *For an interesting reverse view on this issue, see the conversation with Richard Saul Wurman published in this same issue of the Journal of Information Architecture. My. (2011). Lifeboat #5: Richard Saul Wurman. Journal of Information Architecture. Volume 3. Issue 2. Reprinted from My. (1976). What Do We Use for Lifeboats When the Ship Goes Down. Harper & Row.*

tagging was everywhere, and personal mobile devices and home appliances were redrawing the boundaries of computing.

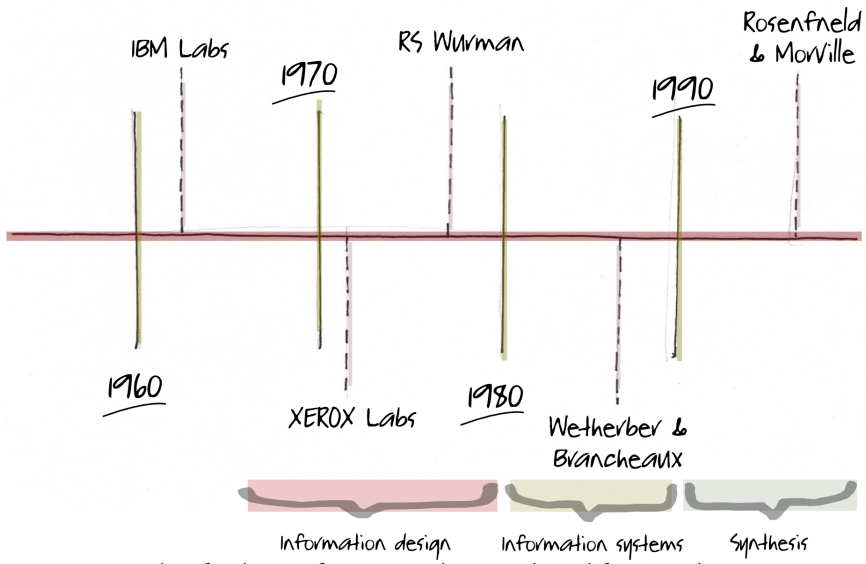

Figure 4: A timeline for classic information architecture derived from Ronda Leon. Resmini & Rosati, Pervasive Information Architecture, Morgan Kauffman

Even though a persistent thread kept information architecture tied to the creation of Web-only content, and this was (and partly is) especially true if you move into LIS-connected research, many started to consider that this was a limitation with little rationale behind it: new problems needed to be addressed and information architecture was moving into new territories, becoming a boundary practice whose contributions were crucial where complexity, unfamiliarity and information overload stood in the way of the user, regardless of the very nature of the environment being designed. For these people[13], information architecture was moving beyond the confines of the Web.

What was appropriate for simple hypertext systems in the late 1990s is certainly not even barely sufficient anymore. Simply being able to be connected while being on the move means there is no certainty of the physical context in which a certain piece of information is produced, remediated, or consumed, turning each information architecture into a huge design challenge. There is no switching off if information follows us in real-time when we walk out the door: as a result, the way we interact, the data we need, how we allow ourselves to be distracted by the information we receive, the urgency or timing of warnings and reminders change all the time.

[13] *Among them Adam Greenfield, Peter Morville, and Joel Grossman.*

This marks a new stage, a new phase, where information architecture becomes pervasive, and starts to address the design of information spaces as a process, opening up a conversation with ubiquitous computing and service design, and where the information architect recognizes gathering, organizing, and presenting information as tasks analogous to those an architect faces in designing a building, as both *"design spaces for human beings to live, work, and play in"*[14]. If the architect has to

> *ascertain those needs (i.e., must gather information about the needs); organize the needs into a coherent pattern that clarifies their nature and interactions, and; design a building that will - by means of its rooms, fixtures, machines, and layout, i.e., flow of people and materials - meet the occupants' needs (Wurman 1997)*

then the information architect has a definitely similar goal in information space, as presenting information for a purpose *is* an architectural task. And places in cyberspace such as Facebook or Twitter are the places where people spend a significant amount of their time every day.

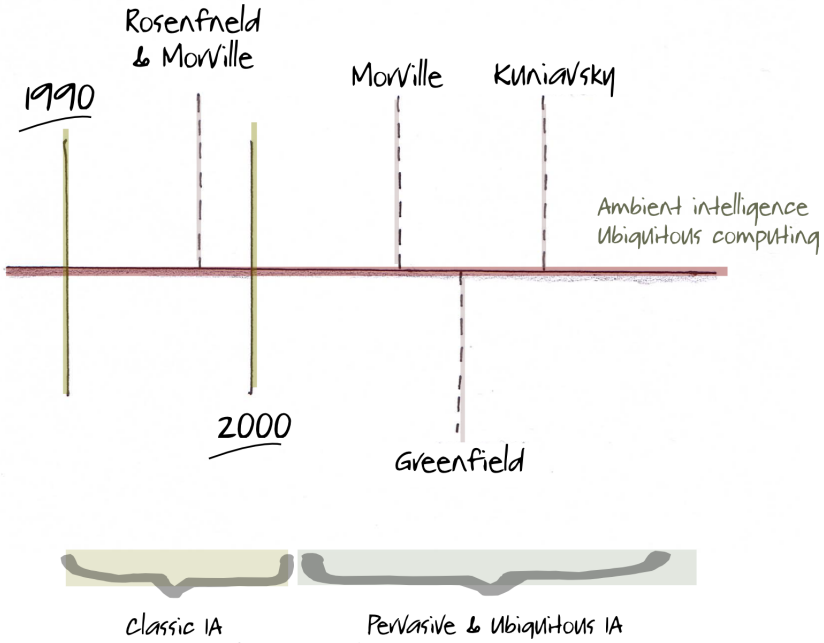

Figure 5: Moving into pervasive information architecture

When we increasingly experience the world through one or many disembodied self (Inalhan & Finch 2004); when we live in a world where relationships with people, places, objects, and companies are shaped by semantics and not only by physical

[14] *With interesting repercussions as well. See Kolson Hurley, A. (2010). I'm an Architect. Architect. http://www.architectmagazine.com/architects/im-an-architect.aspx.*

proximity; when our digital identities become persistent even when we are not sitting at a desk and in front of a computer screen, then we are reshaping reality.

Conversely, we need to reshape information architecture to better serve our changing needs. What will information architecture be five years from now, it is difficult to say, but one thing we know: it will be neither big nor little. It will be broad.

References

Amdahl, G. M., Blaauw, G. A., & Brooks, F. P. (1964). Architecture of the IBM System/360. IBM Journal for Research and Development, 8(2). (Reprinted in IBM Journal for Research and Development, 44(1/2), 2000).

Brancheau, J. C. & Wetherbe, J. C. (1986). Information architectures: methods and practice. Information Processing & Management, 22(6). Pp. 453–463.

Carter, H. (1999). Information architecture. Work Study, 48(5), 182–185. http://dx.doi .org/10.1108/00438029910286026.

Evernden, R., & Evernden, E. (2003). Information First: Integrating Knowledge and Information Architecture for Business Advantage. Butterworth-Heinemann .

Greenfield, A. (2006). Everyware: The Dawning Age of Ubiquitous Computing. New Riders.

Grossman, J. (2006). Designing for bridge experiences. UX Matters, June 30. http://www.uxmatters .com/mt/archives/2006/06/designing-for-bridge-experiences.php

Hearst, M. (1996). Research in Support of Digital Libraries at Xerox PARC. D-Lib Mazagine. http://www.dlib.org/dlib/may96/05hearst.html.

Hill, S. (2000). An interview with Louis Rosenfeld and Peter Morville. O'Reilly Media. http://www.oreillynet.com/pub/a/oreilly/web/news/infoarch_0100.html.

Inalhan, G., & Finch, E. (2004). Place Attachment and Sense of Belonging. Facilities, 22(5/6). Pp. 120–128.

Leganza, G. (2010). Topic overview: Information architecture. Forrester Research. Available at http://www.forrester.com/rb/Research/topic_overview_information_architecture/q/id/55951/t/2.

Morrogh, E. (2003). Information Architecture – an Emerging 21st Century Profession. Prentice Hall.

Morville, P. (2004). A brief history of information architecture. In Gilchrist, & Mahon (Eds.), Information Architecture: Designing Information Environments for Purpose (p. xiii). Neal-Schuman Publishers.

Morville, P. (2005). Ambient Findability. O'Reilly Media.

Pake, G. E. (1985). Research at Xerox PARC: a founder's assessment. IEEE Spectrum, 22(10), Pp.54–61 .

Resmini, A. & Rosati, L. (2011). Pervasive Information Architecture. Morgan Kauffman.

Ronda León, R. (2008). Arquitectura de Información: análisis histórico-conceptual. No Solo Usabilidad Journal. Available at http://www.nosolousabilidad.com/articulos/historia_arquitectura_informacion.htm.

Rosenfeld, L. & Morville, P. (1998). Information Architecture for the World Wide Web. O'Reilly.

Smith, D. K. & Alexander, R. C. (1988). Fumbling the Future: How Xerox Invented Then Ignored the First Personal Computer. William Morrow & Co.

Weitzmann, L. M. (1995). The Architecture of Information: Interpretation and Presentation of Information in Dynamic Environments. Massachusetts Institute of Technology. http://dspace.mit.edu/handle/1721.1/29085.

Wodtke, C. (2002). Information Architecture: Blueprints for the Web. New Riders.

Wurman, R. S. (1997). Information Architects. Graphis Inc.

Wurman, R. S. (2000). Information Anxiety 2. Que.