

Building Smarter: An Interview with Jerry Laiserin

[Architect and industry analyst Jerry Laiserin is an advocate for "building smarter" -- the application of information technology to transform the way the built environment is designed, constructed and operated. His technology strategy publication, the LaiserinLetter, can be found at <<http://www.laiserin.com/>>.]

UBIQUITY: Tell us about your background. When did you decide to become an architect?

LAISERIN: I guess I decided somewhere around the age of 10 or 11, when I first realized that buildings were actually *designed* by somebody, and that designing them was a job that people could do. I thought that designing buildings was a really wonderful thing to aspire to, and eventually I did get to architecture school and got a Masters Degree and went out into the professional world.

UBIQUITY: And what did you find there?

LAISERIN: One of the first things I discovered was that although architects do many cool things and are responsible for a lot of great stuff, the way of generating and handling all the information needed for designing buildings wasn't particularly efficient and wasn't entirely within the control of the architect. There were lots of other parties involved -- people like construction managers using some of the early computerized scheduling systems, critical path method, and so on. This is back in the days when these things were done by service bureaus, before personal computers. And it occurred to me fairly early in my professional career as an architect that the control of information about the project was as important to the successful outcome as the design itself, which had been the traditional role of the architect. So, among other things, I went back to school and got an MBA at New York University, to help me understand these issues.

UBIQUITY: But your architecture degree was from where?

LAISERIN: Princeton. And Princeton was a very interesting place at the time, and always has been an architecture school that was strong on critical theory. A very high percentage of architecture graduates from Princeton go on to teaching and writing. Someone did a survey recently, I think from Australia, of the most intellectual architecture schools in the world, and Princeton was number one. My point here being that because it was the antithesis of a business school kind of education, a lot of people to this day say, "Well, I can understand an architect who got an MBA, but an architect from Princeton who got an MBA, that's nuts." The general rule is that the architecture profession

doesn't really proactively go out and control or manage the economic data and information that surround the process of designing and building buildings.

UBIQUITY: Did your experience in business school tempt you to abandon architecture?

LAISERIN: No. After business school I continued in the architecture profession but became more and more aware of the growing potential of computers, communications, and digital media to transform this process that I was increasingly frustrated with. So I took a kind of sabbatical -- several years during the mid-1980s when I was what's called a Resident Visitor at AT&T Bell Laboratories. This is in the days when AT&T Bell Labs was still a national treasure among research institutions.

UBIQUITY: What years are we talking about now?

LAISERIN: I would say from about '83 until at least '86, and it was a very exciting time there. It was also a transitional time for AT&T, because that's when the original antitrust settlement breakup of the Ma Bell system occurred. But Bell Labs continued as a research institution. It was very diverse and doing a lot of interesting things. And the role that I had as a long-term independent contractor was to go around visiting different parts of the Labs and different researchers and engage in what they called then "technology transfer." That involved talking to people and understanding what they were working on, and then by means of analogies, both verbal and diagrammatic, sometimes in written form, sometimes in video, I would produce information that might be useful to other parts of the Labs, so that everyone could understand what the other folks in the Labs were doing. There were tens of thousands of researchers at Bell Labs in those days.

UBIQUITY: What kinds of projects did you get familiar with?

LAISERIN: This was twenty years ago, and Bell Labs was exploring how to take the traditional voice signals of the phone network and send them over what was the relatively new medium of the Internet. And of course today, that's been commercialized as Voice over IP. Or take mobile and wireless communications. They had a system called AMPS at that time which was a mobile phone service, and the precursor to today's cell phone and wireless technologies. And of course the UNIX system was a Bell Labs development at that time as well. So working there gave me that additional experience with information and computer technologies, so that by the time I returned to the architecture profession, my second career really became much more about managing the information flow within

projects rather than doing the actual project management as I had done previously. And since about 1990 that has been my full-time business as a consultant, writer, lecturer, participant in various industry groups and so on, trying to help the world in general, and architects in particular, design and build smarter through the use of digital technologies.

UBIQUITY: What do you think makes it hard for the architecture and building professions to come fully to grips with information technology?

LAISERIN: That's a challenging question, and it's something a lot of people have struggled with for a long time. The standard reasons that are offered, all of which have some validity, are first of all that buildings are designed and built by means which (compared to, let's say, manufactured products or consumer goods) necessarily make the design and construction of buildings a very slow process. And there are lots of reasons why people tend to be very conservative about how buildings get done. There are regulatory issues in terms of codes. It's only recently in the United States that we've gone to a national building code that is relatively uniform across all jurisdictions. It used to be every state and every municipality had its own building code, and that's part of this fragmentation of the industry, both the construction industry and the design business of architecture and engineering.

UBIQUITY: Compare it to other industries.

LAISERIN: If we look at industries like automobile manufacturing or aerospace manufacturing, there are relatively few dominant players, and then a whole hierarchy of the second- and third-tier suppliers. The dominant players can dictate process change, and they can dictate kinds of information flows, such as the RFID systems we're seeing now with companies like Wal-Mart, who are able to insist on how their suppliers deliver information. But in the AEC -- the Architecture Engineering and Construction industry -- there is no dominant player as Wal-Mart is in retail, or as General Motors or Toyota are in automotive, or Boeing or Airbus in aerospace. Probably the largest building contractor or design firm in the U.S. has maybe one or two percent of the market, so you would need hundreds of firms to aggregate even 50 percent of the market. So, fragmentation is an issue, plus the understandable conservatism because of the nature of buildings and their long life cycle.

UBIQUITY: How does that compare to the design of major consumer products?

LAISERIN: Consumer products are typically designed and brought to market in 18 months or less, and their shelf life on the market might also be 18 months. Whereas buildings may take a couple of years to design and build, and then there's the anticipation that they will be a useful asset for 30, 50 or 100 years. So, on the one hand, there are lots of good reasons why people in the AEC business are conservative about how they change their process, but on the other hand I think there is some unfortunate resistance to greater use of digital technology for automating some of these processes. Here's just one problem: if every architect in the world became twice as productive tomorrow, the world probably is not going to need to buy twice as many buildings as it did yesterday, and that implies either that architects' fees have to go down or that fewer architects will be able to practice the profession. Business process reengineering, to dredge up a business buzz phrase from a couple of years ago, often automates or streamlines a lot of people right out of the process.

UBIQUITY: And there are studies that show this?

LAISERIN: Yes, there are people at Stanford and elsewhere who have studied this idea of productivity in the AEC industry, and the numbers I've seen show that whereas overall U.S. industrial productivity has gone up significantly (nearly double) over the last 35 years, overall productivity in the AEC industries has actually declined during the same period. One thing this means is that that if we, in our industry, simply adopted the kinds of changes that have happened in the rest of the business world in the last 35 years, productivity in AEC would more than double right away.

UBIQUITY: Can you think of architectural leaders who are exceptions to the general trend of technology avoidance?

LAISERIN: Well, yes, there certainly are exceptions, and fortunately the number of those exceptions is growing. Probably the most visible exception is the architectural firm of Frank Gehry, an architect out in California who's best known for things like the Guggenheim Museum in Bilbao, Spain, or the Music Experience Project in Seattle, and the new Disney Concert Hall in Los Angeles. Gehry's office came relatively late to the computerization process, but when they did they did it full-bore. That's quite a contrast to many other firms that simply used the computer to do something called computer-aided drafting -- using the computer to duplicate in electronic form all the same sorts of drawings that architects had always done manually with pencils on paper. Most of the computer technology that's being used in many architectural firms today is still geared towards replicating the old paper and pencil kinds of processes.

UBIQUITY: How did Gehry improve on that?

LAISERIN: Where Gehry's office was really innovative was to come to the technology and say, you know, we're architects, we work in 3D.: Our buildings are very sculptural; they're not linear, and they're difficult to describe in conventional 2D drawings anyway, whether we do them by hand or on the computer. So we'll go directly to 3D models. And when architects go to 3D models, it isn't only a matter of representing the geometry or the physical appearance of the building -- there's software available on the market that integrates the 3D model with other data, properties and attributes of materials, and the actual components of the building, so that you're not just replicating the old way of drawing by hand but on the computer. You're now actually doing something that changes the kind of information the architect produces and the way that information is handled.

UBIQUITY: What was the practical effect of this change?

LAISERIN: By taking those data-rich, multi-dimensional models from the computer, they (Gehry) were able to send the digital design files directly out to fabricators to drive the CNC -- the computer numerical control machines -- that actually custom-manufactured the components for the building, whether it was curved glass or titanium skin panels, or structural framing. Many of Gehry's buildings use components manufactured directly from the architect's files. It wasn't a question of sending someone a drawing so they could redraw it and then have it keyed in to drive a cutting machine or whatever, and then it's trimmed and fitted to relatively loose tolerances in the field. Gehry's buildings are, in a sense, custom-manufactured and assembled on site. So the process is completely and very radically different. Gehry's office has been so successful with their use of this technology that they have actually set up a separate company called Gehry Technologies <www.gehrytechnologies.com> for the benefit of other architects, engineers and contractors.

UBIQUITY: Gehry's office did the software?

LAISERIN: The underlying software for this is a French aerospace software called CATIA, from Dassault Systemes, that has been heavily customized by Gehry Technologies.

UBIQUITY: Aerospace?

LAISERIN: Many of Gehry's buildings have compound curved metal skins, and aircraft have compound curved metals skins. An oversimplification, perhaps, but that was one of the reasons for that choice. Another firm that's done similar kinds of innovation in process change that relies in large part on digital technologies is Foster & Partners <www.fosterandpartners.com>, founded by Lord Norman

Foster, who was knighted a few years ago by the Queen, and who is based in the U.K. Foster & Partners is known for things like the reconstruction of the Reichstag building in Berlin and The Great Court of the British Museum, as well as the new Greater London Council building, also in London. Foster & Partners, by integrating data with the model of the building and by integrating all of the acoustical simulations and environmental and structural simulations into these data-rich models have significantly advanced both the process by which they build, but also the nature of the buildings that they're actually building.

UBIQUITY: Are the examples you've cited perhaps a new trend?

LAISERIN: Yes, I think so; what we're seeing now is that more and more, there are other architectural practices around the world that are beginning to look at this. Maybe they're not applying it to all their buildings and maybe they're not applying it to 100% of any one building, but they're taking individual systems that may be critical to a particular project (or individual components that they're modeling in this way) so that we are getting to the stage where there is greater awareness of this process called Building Information Modeling, which is just a different way of thinking about what architects and contractors do. We still do the same thing in the end, but the way we think about creating and sharing information in the process is different.

UBIQUITY: How do you think of your own role? Do you think of yourself as a missionary for digital technology in architecture?

LAISERIN: Missionary may be too strong a word, but I guess you'd have to say that I am a True Believer. Actually I have an online newsletter where I advocate these positions, and I constantly attend and organize conferences and present papers. A number of people, including myself, tried, with some success, to start something called the aecXML project, to bring the data exchange capabilities and semantic richness and intelligence of the XML language to the world of architecture, engineering and construction. And so, back in 1999-2000, during the peak of the dot-com boom, I was one of the people who helped get that thing started and was its first Executive Director. That effort is now part of the National Institute of Building Sciences, in Washington, D.C. It hasn't changed the world, but, you know, every little bit helps.

UBIQUITY: What do you see happening in the digitalization of architecture in the years ahead?

LAISERIN: Let's say I'm guardedly optimistic. The running joke among my friends who have similar interests is that wide-scale

adoption of digital technologies has been five years away for the last 25 years. Still, I think we may actually be within five years from seeing some major impact this time around, and there are a number of reasons for that optimism. First of all, there's a lot of research that has been published both in the U.S. and the U.K. indicating that as much as 30% of the dollars that are spent on building construction are effectively wasted as a consequence of bad information management, missing information, erroneous information, duplicated information that may conflict internally, information that is available but is out of date, and so on. And globally, the construction industries account for something over three trillion, that's trillion with a T, US dollars of global production. At a 30% savings rate, there is potentially a trillion dollars globally to be saved every year. So there is a clear incentive to do something and clear rewards for doing things better. There's a tremendous economic incentive to change in ways that other industries have changed, and that gives me cause for optimism.

UBIQUITY: The savings would be real?

LAISERIN: They definitely would; if you consider, from an environmental point of view, that heating, cooling, and lighting the interior spaces in buildings accounts for nearly 40% of all the energy consumption in the United States, and almost two-thirds of the electricity -- not industrial production, not automotive or other transportation emissions, just buildings! So if we could cut that in half -- which folks like Lawrence Berkeley Labs believe is doable -- that would be a huge boost towards a rational energy policy and a healthier environment in this country. But what people call green building or sustainable building really depends on performance simulations -- the ability to manage information about building materials and building processes. So again, if we get smarter, if we start to build smarter, we will build healthier, we will build more economically, we will build more socially and environmentally responsibly. I think that trillion dollars that potentially could be saved could also be reallocated on a global basis by building smarter. We could have better quality buildings, healthier buildings, buildings that are more people-friendly, environment-friendly, and so on, and in developing countries we could recycle some of those dollars that are wasted on inefficient processes to provide better infrastructure and improve living standards for literally millions of people. The groundwork is being laid to significantly transform the built environment over the coming decades.

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The Laiserin Letter can be found at <<http://www.laiserin.com/>>

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