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"Now What?"

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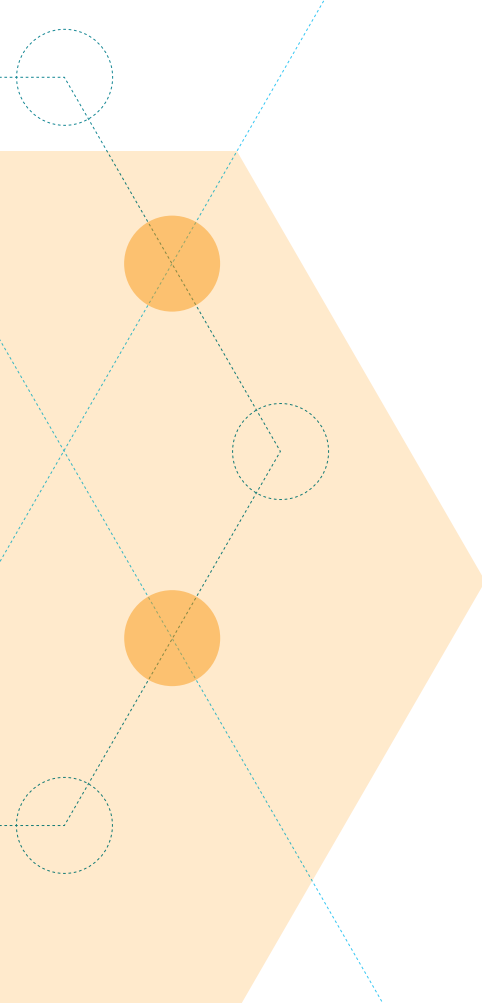
by **Phillip G. Bernstein** FAIA, LEED AP

Design awards recognize inventive architecture and design excellence, but sometimes the most startling revolutions are invisible. A leading industry strategist looks at the coming behind-the-scenes transformation of the architecture profession.

The September 2007 “Architectural Billings Index,” the AIA’s monthly survey of architects and correlated economic activity in design and construction, was announced with an ominous press release recently. The ABI is an excellent “leading indicator” of the overall state of the construction economy, and the September numbers and accompanying analysis suggested that there’s trouble ahead in the non-residential construction economy, the bread-and-butter market for architects. So, into the heady mix of questions that today’s practitioner faces, we can now add the looming possibility of a market downturn. Once that inevitable part of the economic cycle hits, architects will once again turn introspective, contemplating the futures of their practices and asking, “Now what?”

It’s not an idle question. The next few years will be definitive for architects as various forces — not all economic — impel us to consider our role and responsibilities in the rapidly evolving world of the built environment.

Let’s dispense with the economic arguments first. Despite the differences in scale of enterprise, all of us in the AEC (architecture/engineering/construction) industry share a common malady — low profit margins. In good times, both architects and our contractor colleagues achieve profits of approximately 15 percent; as times turn bad, those numbers move downward to below 7 percent and often worse. The processes through which we deliver design services are inefficient, as are the processes through which we deliver buildings — approximately 30 percent of construction dollars



are wasted on the project job site. The AEC industry has not enjoyed the same productivity gains driven by digital technology that have been seen elsewhere in the US economy. That's the first opportunity — improve our performance as businesses that provide value to our clients.

Designing and building have never been so complex an endeavor. Enthralled with the aesthetics of ever more complicated building geometries, we simultaneously solve for emerging sustainability standards, alternative delivery methodologies, “mass-customized” building elements, and a globalized supply chain where the price of concrete in India will affect a project bid in Waltham. We face these challenges with representational tools based on drafting, with collaboration models created before the Internet, and with risk/reward structures and attitudes developed in the 19th century and stretched thin by the lawsuits of the late 20th century.

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Attorney Patrick O'Connor argued in a recent paper presented to the American College of Construction Attorneys that constrained profit margins in the AEC market severely limit opportunities for innovation, since so little capital is available to reinvest in research and development. Today's globalized marketplace, where both materials and the next wave of design competitors are likely coming from China, sorely demands innovation. Times have been pretty good for the last four years or so in our business, so no better time to face these questions, right?

Rather than wait for the next recession, it's time to ask that very important question: Now what?

I'm reminded of the early 1990s, when that recession inspired an intensive investigation of project delivery and risk-management approaches and the architect's role. We fiddled a bit around the edges, sharpening contract models as we joined teams that included program managers, construction managers of all sorts, and even design/build teams. When things picked up later in the decade, we returned to the drawing board (now mostly transformed into the personal computer) and business as usual. But things are different this time: some fundamental transformations are upon us, catalyzed by lots of factors. Pushed hard by the demands of sustainability and spiraling construction costs, architects must now not only develop a design concept and then document “design intent” in construction documents, but also address the entire lifecycle of the building, designing to achieve pre-determined performance outcomes of sustainability, cost, and quality that apply to the building beyond its ribbon-cutting.

What's demanded is nothing less than a dramatic increase in the insight available to architects as we do our work. We need changes that move design and construction from an exercise in “lowest first cost” to one of predictable outcomes. If we can tie our destiny to our ability to achieve those outcomes, we can solve all these issues: productivity, profitability and, most important, greater perception of the value that architects deliver to the process of construction itself. I'm betting better buildings will happen as a result, too.

Those transformations might look like the following:

1 A move to more collaborative project delivery. The traditional AEC “three-legged stool” of owner, architect, and constructor is emblematic of the separation of design activity (performed as a “service” by architects paid to exercise their judgment) and construction (performed by constructors paid to create a product, the building). Under this arrangement, collaborative efforts in which the constructor might think about the design, and the architect might have an opinion on how to build are rendered impossible; everyone knows the architect is innocent of means and methods, and the constructor is not a licensed design professional. Yet it is precisely in the intersection of these two sensibilities where a lot of construction managers and attorneys make their livings. If we take advantage of the best thinking for every situation, with a slavish devotion to serving the interest of the client and irrespective of role within the team, our value will increase. And if the desired outcomes of the

AEC process (measured by whatever is important to the client and agreed upon by all) are paramount, then new ways of collaboration will evolve. Perhaps traditional “design/bid/build” models are replaced by teams in which shared achievement of project goals results in shared rewards. Or maybe we experiment with dramatically different delivery models, in which the key players, including the owner, sign a single agreement whose core idea is the successful completion of the project. Such an agreement might feature a predefined contingency to be divided among the parties as extra profit — if it is not used covering mistakes along the way. Some innovation is called for here.

2 Structural changes to the architectural workplace. Consider the following: More than 50 percent of college students today are women, and women constitute almost 40 percent of all architecture students. Yet, according to AIA statistics, only about 15 percent of the principals of US firms are women. Where is everyone going? Data on minority participation in the profession is even more depressing. In a globalized marketplace, where knowledge work is increasingly outsourced to the lowest-cost location (drafting services based in India are one example) and competition for work spans all time zones, architecture must have access to the best minds regardless of gender or ethnicity. Further, if my current generation of students is any indication, today’s young talent is distinctly uninterested in the 80-hour-a-week grind that is the initiation rite for many architects entering practice. The architectural workplace, bolstered by more profitable projects delivered through innovative delivery methods, should become a place that is friendly and fulfilling — for everyone.

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3 New practice models. Changing delivery models, driven by newly productive workplaces, will be supported by new business models for practice, manifested primarily in new contract models, compensation schemes, scopes of service, and definitions of deliverables. Contracts might become transformed from current standard-form descriptions of what needs to be done (and the resulting punishments if it is not) into more aspirational descriptions of what the project should accomplish, how that accomplishment will be measured, and how the parties will be rewarded accordingly. Imagine a scenario in which construction documents consist only of information that the contractor, already on board during the design phase and with a shared interest in the project’s success, deems necessary. Since these collaborative models must be based on a high degree of trust and the dissolution of organizational divisions among team members, liability within the delivery team would be eliminated, and the team would work together to deal with external sources of risk.

4 Intensive innovation in the use of new technologies. That this is the first mention of technology in this hypothetical future is entirely intentional, since technologies in and of themselves don’t move the AEC industry to change — much. However, the next five years will see dramatic improvements in the availability of processor speeds (as Intel brings multiprocessor computers to the market), bandwidth (as ubiquitous, wireless connectivity expands the Internet), storage capacity (as disk storage is increasingly commoditized and connected to the network), and displays (as screens expand to drafting-table size and as display-resolution increases with processor capabilities). So we’ll have unlimited access to computation and storage, excellent ways to see and display that information, and the ability to move information to almost anywhere in the AEC enterprise instantly. Surely increased collaboration among the parties — in lots of forms — will be the result. Those collaborations will be facilitated not by traditional, low-resolution drawings but by high-resolution building information models that will support interactive decision-making by the entire owner/designer/constructor team.

5 More information from new visualization and representation technologies. Those same building information models will become the basis for newly defined design deliverables. Digital models, created as early prototypes of physical construction, will provide improved decision-making, visualization, and generation of alternatives, as well as detailed quantitative and numerical analysis. Analysis tools, running in parallel with models, will report real-time implications of design decisions as they are represented in the model, providing immediate indications of future building performance. Eventually, design models will replace traditional drawings with databases that become the basis of construction administration and facilities-management processes.

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6 **The growing use of digital fabrication in construction.** The lessons of integrated design and delivery have been learned and refined by the manufacturing industry, and taking those ideas to heart in building may be our best opportunity to dramatically improve productivity. Computer-controlled creation of building elements will evolve in two forms: digital prototyping of concepts prior to construction to support design exploration and validation, and component fabrication of discrete building elements, derived from geometry and metadata originating from the project designer's models themselves. The move toward digital fabrication will be inexorable, driven by the desire to achieve more predictable, sustainable construction; interest in construction of more complex forms; and the replacement of "stick-built" assemblies with manufactured components as field construction skills continue to deteriorate. As the AEC industry moves toward process integration and more tightly connected design/construction business models, the traditional risk-management barriers that have separated design from building activity will continue to fall, while the demand for higher-resolution design

data driven deeper into the construction process will increase. Over time, constructors will evolve from managers overseeing armies of semi-skilled laborers who create unique, hand-crafted artifacts to "super-assemblers" who snap together building components created in factories worldwide.

OK, lots of provocative ideas here, but again — now what? Well, now we have to decide the extent to which these ideas, all derived from a vision in which the bright lines between design and construction begin to blur, affect the way we define the role of architects. The basic economic structure of the construction industry is rife with inefficiencies that will be wrung out to the benefit of someone, as in all rational markets. The resulting changes, driven by new technologies, will provide opportunities for leadership of all kinds. It's a perfect opportunity for architects. We're trained to take complex, messy circumstances, and then imagine and synthesize unique solutions while leading a team with disparate talents and inclinations toward the common goal of better architecture in the broadest sense. In a rational market, someone is always asking, "Now what?" Architects can answer that. ■

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