

March 24 KEYNOTE ADDRESS:
DRIVERS OF CHANGE
Gary Lawrence
 Arup

I was asked to give the closing keynote address at the American Society of Collegiate Schools of Planning one year. But I did not have a clue what most of the things being talked about in this Collegiate Schools of Planning conference were about. Student research, PhD dissertations, academic research—all the topics bordered on abstractions to the extreme. I tend to think more in terms of how we actually take these ideas and either diffuse them or push them out into practice so they can be much more readily applied to the problems that we must solve as societies. So I'm going to try to be a little bit provocative here this morning about the research agenda. My base case will be, in case we miss it at the end, is that as the AIA takes on its research, if it's not building partnerships with all the other disciplines also doing research that have to do with the urban form and the quality of life for people, then it is missing a big bet. It's much harder to integrate this research after it's done, rather than work with various disciplines upfront and figure out what we need to focus on and actually make a difference for the future.

In the past, the vast majority of the facilities that we still have with us today were engineering-led. Architecture was considered to be a subset of engineering, particularly in the academic world. But in the 1950s, architecture branched out as a discipline of its own. The idea of the architectural engineer was lost. Only eight schools in the United States now offer architectural engineering degrees. The engineering schools and the landscape

A Question of Understanding

"I am a reasonably intelligent person, I am also the Director of Planning for the 22nd largest city in the US. I have paid very close attention and I have no idea what any of you are talking about."

"Perhaps when a man has special knowledge and special powers like my own, it rather encourages him to seek a complex explanation when a simpler one is at hand."



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Engineering an Empire

The vast majority of the great, iconic, human-made structures of our past are engineering-driven



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The Rise of the Aesthetic

Over the past few decades aesthetics ascended and, in some cases, overwhelmed the need for utility.



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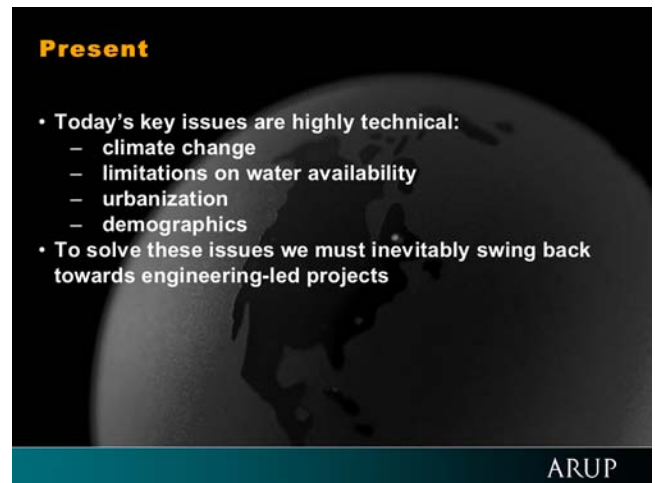
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architects branched off in their own specialties. Part of this specialization, I learned, was driven by promotional opportunities, part of it was driven by the specializations that students were seeking.

In the process of dividing ourselves in the design communities, we created much more depth at the expense of breadth and understanding the intersections of ideas and initiatives. The governments, the engineering firms, and the design firms follow the primary academic model in terms of these specializations. The specialization produces a lot of good but it also creates some problems for problem solving downstream.

Arup's Research Program

When Ove Arup retired in his 90s, he put the entire company into a trust for the benefit of the employees. The board of trustees has no fiduciary stake in the firm and it has three roles: select the operating board, make sure the conditions of the trust are maintained, and keep the pensions funded. One of the conditions of the trust is that at least 8 percent of our global gross receipts on an annual basis has to be put into research. Ove's view was that we should never learn on our client's time. We should learn out of our profits. So we have a big research campus and we have a design and technical executive who drives research issues within our own firm that are much more practically oriented. That is, we take the best of the available science and find ways to integrate that into the offers we can make to our clients to help them either reduce their cost or increase their value.



For example, we were highly involved in the creation of translucent cement. We took glass fibers and found a way to do the batching of cement so that you can use cement walls for thermal mass while reducing the lighting requirement inside because light penetrates through the concrete.

Much of this research is driven now by a subset of our research program, which is called Drivers of Change. Through the program, we work within the firm and then, subsequently, with people outside the firm to figure out the key issues we must address as designers with our clients to ensure that their problems are solved in the same way and, at the same time, increase the quality of the public experience over time.

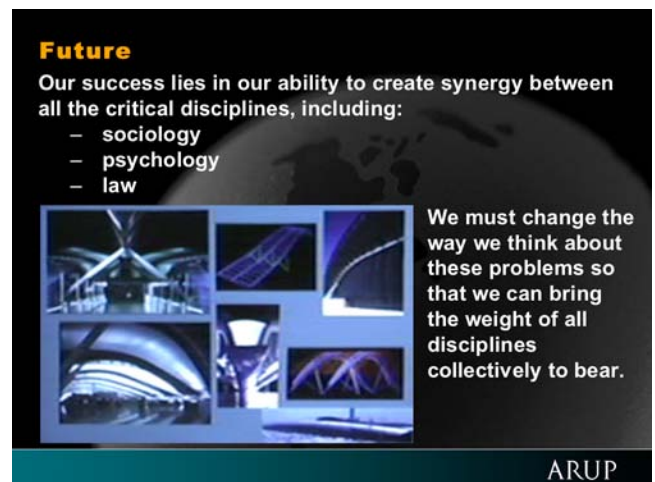
In the first year of the program, we looked at climate, water, and energy. Those are huge topics that cannot be covered in a year, so the research on those continues. This year, our research agenda includes demographic change, urbanization, and waste in all forms. Next year, the entire agenda is going to focus on how all of these ideas get integrated so that we understand the relationships between them, so we have the ability to advise our clients how to apply the best levers so you can always solve more than one problem at a time.

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Integrated Design

Our unwritten rule is that we try to solve at least three problems with every dollar we spend on our client's behalf. And you can only get at that idea through the notion of integrated design. All of these highly technical issues are pushing pressure back onto the projects being science-led and engineering-led. It's becoming evermore important that we find ways to team up as the various disciplines as this swing back occurs. As design professionals, we can't afford to swing back and forth between who's leading these ideas. We're all in this together. The idea of hierarchy or subservience—in terms of who's the leader, in terms of solving the problems, and in terms of determining who the subs are—is being abandoned because the problems are too complex and the issues are too important. All the disciplines have to come together if we are going to have a fighting chance at solving the problems that vex us most.

I want to give you an example of how we integrate not just architecture and engineering, but also psychology, sociology, law, and cultural issues. This integration is an important part of our planning, particularly in places like India, China, and the Middle East where we're doing very large master plans. We have a new cadre of cultural planners that we're bringing in that are working directly with the engineers to figure out how even the symbolism of the engineering and the form of the building relates to the cultural ethic.



Future

Our success lies in our ability to create synergy between all the critical disciplines, including:

- sociology
- psychology
- law

We must change the way we think about these problems so that we can bring the weight of all disciplines collectively to bear.

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Consider, for instance, Kansai Airport.

Kansai Airport is the longest building in the world, and it had the potential to create huge amounts of mass on this site. It's also on an island that tends to sink. The island was created when the Japanese residents tore down a mountain in the middle of the harbor to build an island on which to put the airport because they didn't have any other flat land. So the building's weight and the mass were challenges.

Arup worked on this project with Renzo Piano and a number of other professionals. We had to determine how to reduce the weight and human scale with a building of this size and make it work for all of its inhabitants. We decided the inside of the roof should function as an airplane wing. The air comes down cloth wings, which creates turbulence and hits the floor. Meanwhile, moving the cloth wing a little bit makes a dramatic effect that creates a more human, intimate scale as it's going on. The air is picked up at the floor level and brought back out. So the world's longest building has no internal ductwork in it.

The project achieved huge savings for sustainability in terms of the manufacture of the ductwork and the shipping cost to get it there, thereby dramatically reducing the operating cost of the building. Kansai Airport became one of the most flexible buildings in the entire airline industry because you can put walls anywhere—the air is coming from below and the ducts pull it back out to the system.

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What we didn't anticipate, but we next capitalized on, is the fabric on the cloth wing bounced light really effectively so that we were able to reduce the illumination investment by two-thirds. So when we talk about integrated design, we have everybody at the table focusing on the problem to be solved. And that has huge consequences for sustainability. If you can save weight, if you can save energy from the light, or mechanical systems, then you can also improve the quality of the human environment. That, for us, translates into the gold standard.

From Theory to Practice

Many of our solutions are driven by research from various scientific entities, other engineering firms, academic engineers, and academic architects. We have a huge library in London where we are subscribers to most of the academic journals in the world. We have people whose only job is to scan those journals for ideas about how we might take ideas and put them into practice. This is not to discount the contribution of anybody's research. It's that we need to have help. If you're worried about Arup's success,

and you all should be, we need help in the rapid translation of ideas from the academy into practice. And we need to have ideas that are prepackaged, in terms of their relationship with other disciplines, if we are going to be much more effective at solving problems.


One of the things that I do for the firm is help both our staff and our clients ask better questions. Too often we're limited by the questions the client asks, which are largely based on conventional wisdom. If we pursue those simple answers without helping the client understand that if they thought about their problem differently, we can not add more value. Over time to pursue additional value we help our clients reformulate their questions.

This is an unscientific number, but in my view, the problems that really vex us now and into the future—climate, water, poverty alleviation—are about 40 percent technical and about 60 percent political. They have to do with people actually choosing to behave in a different way, getting the incentives lined up appropriately, getting them to understand the nature of the problem and their contribution.

We don't believe that we can actually move forward on any kind of solution without having the human equation as part of it. We talk a lot about happiness, fear, and nostalgia; we think about these projects because in order to get the public to actually accept that things need

The Way Forward


- Users of facility and purpose of facility must always be the starting point
- Ergonomics, lighting and movement patterns are solutions
- First we must ask the right questions



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The Right Questions

- Are people actually happier?
- Do the settings reduce fear and anxiety?
- Are they consistent with subconscious impulses, such as defensible space?



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to change, their behaviors foremost among them, solutions have to appeal to how they view themselves in the world.

We use a variety of tools to communicate with the public on this, and government officials and private sector officials as well, and this also relates to, directly to the academy and their research. One of the tools we use is called Sphere; it is a graphical user interface on the front of a bunch of quantitative analyses and qualitative analyses that demonstrate, in terms of the full spectrum of things, the cause-and-effect relationship to urban development—whether it's at the building scale or the community scale. What's better and what's worse if your criterion is sustainability? We look at the natural resources, what's being consumed, and the environmental consequences. We look at the consequence of the decision at the social and economic sides, similar to a variety of other tools. This is all informed by our research and the research of other institutions who join with us on what are global best practices. We're constantly working against this notion of what is best practice rather than what is absolutely right because nobody seems to actually know what's absolutely right, so we have to move these things forward. We're constantly learning.

Where are we going wrong? Well, one of the ways that we've gone wrong, and this is my opinion, is that we have too often focused on the aesthetic at the expense of utility. And Arup has been involved in a number of these projects focusing on the aesthetic alone. For instance, the Athens Olympics did a tremendous job of integrating both the street scale and the transportation scale in Athens. The Parthenon did that as well. The planning for Mexico City in the Aztec days did it as well.

The Role of Research

Compelling, qualitative and quantitative information on the relationship between urban form, productivity and wellness.

We fail to convince our clients that sustainability matters when we don't have information they can plug into their business case analysis.




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Where are we going wrong?

We are misunderstanding the various scales included in the concept of context.

We focus on the relationship of buildings to streets.

We need to focus more on the relationship of buildings to community identity, heritage and the broader ecological function.




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The Modern Metropolis

Cities are seen by some as problems to be overcome.

Others see them as the key to a more sustainable future.

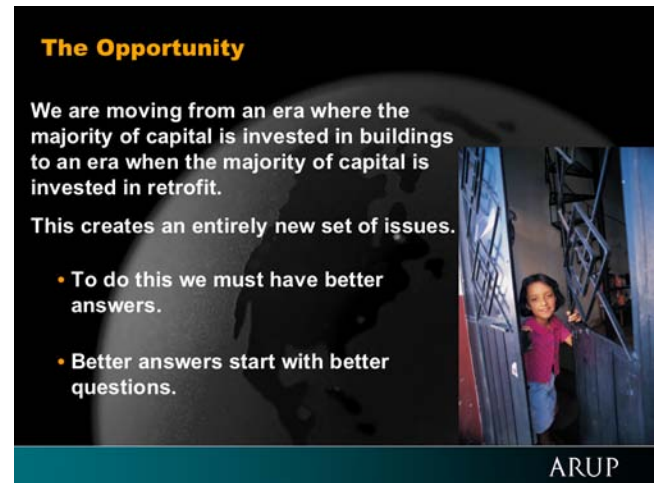
Both are correct



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We've missed a lot on those opportunities and, in many cases, particularly in the United States where we've never had an urban policy, we've never had a national government that actually thought that cities were opportunities rather than problems. We have not been very effective at turning the corner in terms of marrying the aesthetic with the utility in terms of addressing these key kinds of questions. You know, the problem-solving in Moscow, in terms of the Soviet era, was how do we house people in the cheapest possible way?



The Opportunity

We are moving from an era where the majority of capital is invested in buildings to an era when the majority of capital is invested in retrofit.

This creates an entirely new set of issues.

- To do this we must have better answers.
- Better answers start with better questions.

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We're doing a number of projects in China. One such project is called Dong Han, which is a new town for 500,000 people. The premier of China has directed it to be the world's most ecological city when it's done. And it has nothing to do with aesthetics or love of nature. It has to do with really hard core, strategic issues for the Chinese in terms of the availability of fuel, the availability of water, the increasing dissatisfaction of the public with regard to living conditions, and a variety of other things like that.

The opportunity is twofold. One is to find a better way to communicate across disciplines. I know I'm beating that horse, but never to death, in case there are ASPCA folks here. But we need to make sure that we're working much more closely together. We also need to recognize that the world is changing, not only in terms of the limitations we face with regard to resources but also in terms of where investment capital is going to go in the foreseeable future.

The banks we work with, the developers we work with, the cities we work with suggest that, starting now, more than half of all investment capital in the United States and in Europe will be going to retrofit rather than new construction. So how do we, as design professionals recognizing the difficulty of achieving sustainability in a retrofit model, actually come up with solutions that work, solutions that capture not only the embodied energy of the buildings but also integrate the mechanical systems, the aesthetics, the idea of happiness so these buildings work as well as new construction?

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The architect's moral dilemma is the same moral dilemma held by anybody in the design community. We shouldn't be actually engaging in projects that don't seek to optimize human conditions, i.e., optimize conditions for human development over time. It's not as if we've sworn to an oath; we know as well as anybody that we have to feed ourselves. But, pushing back against client expectations, pushing back against contractors, pushing back against all the people involved in development to focus on this issue that our purpose as human beings is to advance the human condition is ultimately where we need to be with regard to integrated design, with our research, and with sustainable development.

The Architect's Moral Dilemma

Architects, engineers and designers who care about the future should only do projects that optimize conditions for human development over time.



"Architects need to accept responsibility for their role in creating the built environment..."

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