

Tech and Modular Construction: Disrupting the Traditional Development Process

This is a summary of the September 27, 2018 meeting of the ULI Chicago District Council, which gathered at the Union League Club in Chicago to hear from a panel of experts on the changing state of construction, including what these shifts entail for the development community. Topics included the rise in construction costs over the current cycle, and the innovative new technology and construction methods being developed in response.

The moderator was [Christian Beaudoin](#), *Director, Americas Research and Strategy*, JLL. Joining him on the panel were [Irma Doré](#), *Program Manager, Architecture*, Kattera; [Alan Schachtman](#), *Director & Residential Business Unit Leader*, Clayco, Inc.; and [Timothy Swanson](#), *Chief Design Officer*, Skender.

Unlike many other sectors of our economy, construction has remained largely rooted in the 20th century as leaders have resisted technological changes that have transformed the way other industries do business. That truth was illustrated in moderator Christian Beaudoin's opening remarks, when he said construction sites today look much the same as they did 20 years ago.

In 1997, the Gross Domestic Product per construction job was around \$65,000—the same as that of manufacturing jobs. Since then, however, as construction job-related GDP has been stagnant, the GDP growth per job in manufacturing has soared by 70%, said Beaudoin.

"We're just getting started in terms of construction investment activity," he added. "Venture capital investment in construction technology started out almost at zero only a decade ago."

Since 2009, there has been \$4.3 billion in construction investment, and for this year alone, the figure is projected to eclipse \$2 billion—the most ever.

That surge is in response to an urgent situation: construction costs have risen 8.8% in the last year, and 5% since May as the specter of a global tariff war has taken shape. Over the next 12 months, construction costs are forecast to rise another 6.2%.

What are some of the biggest opportunities for improvement? In Alan Schachtman's view, there is "a huge disparity in the industry of how architects deal with virtual design and construction, and all of that integration. There are a lot of great architects that are way, way behind the curve."

Irma Doré, meanwhile, offered a bigger-picture critique: "At Kattera, we think the whole industry is kind of messed up. There is not one is worse than the other, and not one is better than the other."

Doré, whose role at [Kattera](#) is to guide clients' experience with the three-year-old company's various divisions, said the firm's tagline is "better, faster, cheaper."

All services—including architecture, design, manufacturing, labor, and research and development—are under one roof, and Kattera is the only fully integrated company in the sector, she said.

She shared a quote from Kattera co-founder Fritz Wolff: “iPhones today would cost \$750,000 each if we had the same productivity gains in technology as we have had in building housing...the whole system is broken.”

“When our industry isn’t even beating inflation, then we’ve got sort of a broken system,” added Timothy Swanson. “Frankly the risk aversion that exists within our industry, (when) we did not partner before, means that there is no single aspect” to blame.

One of the advantages of pre-fabricated construction: the smart use of technology enables a more efficient design process, which also leads to construction efficiencies, said Schactman. That means lower cost per square foot, as well as more rapid completion of projects. Schactman said a recently completed 132-unit project was built in 12 months, or two to three months faster than the norm. It also came in about \$10-15 less expensive per square foot, compared to traditional concrete frame buildings.

Being able to build in the factory is especially helpful in areas, like Chicago, that have extreme weather conditions. “We’re shifting to as much work in the factory as humanly possible,” said Swanson, whose firm, [Skender](#), has three open projects: six floors, 10 floors and 17 floors, being completed in Chicago in early 2019.

For Kattera, construction starts in the computer with a “library” of designs to apply to a given project, then proceeds from that point. The company’s client base: large-scale developers seeking an efficient process for their “large pipeline” of work, said Doré.

“They give us guidelines for a site. We do a yield study in a week, turn around price in a week, and very quickly they have a number that helps them compete with others,” said Doré.

At the same time, she noted that the designs are not “cookie-cutter.”

“It’s repetitive and it’s efficient but we recognize that we have to have certain branding in markets,” said Doré. “We’re component-based, not modular-based.”

In Chicago, working with the bureaucracy has historically been a difficult one for developers to navigate. In light of that challenge, [Clayco](#) “took it head on and met with the building department early and often,” said Schactman.

Panelists said when people first learn of the approaches behind tech and modular construction, customization is an often-stated concern—and one that is readily overcome with the customized results they produce.

“We believe everybody deserves a good design, and we’re achieving it efficiently,” said Doré. “We’ve got huge global material sourcing...because of our buying power, we can bring finishes that normally you’d see in a condo...That’s one of the aspects that we can leverage and bring that beautiful design. It doesn’t look modular at all, it doesn’t feel modular at all.”

“It’s bringing better design,” said Swanson. “You look around the city and across the country, and there are a lot of buildings that have gone up that maybe don’t look modular, but really don’t look good. The reality is by having access to supply chain and thinking about it in different terms, you’re bringing better materials, better quality, better opportunities.”

Opportunities for modular building cut across a variety of uses, spanning multi-family, affordable housing, office, student housing, hospitality and industrial, among others.

“We’re seeing it in nooks and crannies,” said Swanson, who noted that the average floorplate for offices can come upwards of 75 percent delivered. “It’s happening already in segments.”

In response to Beaudoin’s inquiry about the biggest negative or misconception that they face, Schactman said the impact on existing jobs is an oft-cited concern.

“The world is changing the way things are being manufactured—everything is changing,” he said. “Really the only negatives we hear is that you’re going to lose jobs. The three of us obviously don’t buy it. We’re trying to get the development and construction industry to catch up with everyone else in the world.”

Swanson added that jobs are “shifting, not vanishing” and “we have to be comfortable with the fact that every other industry has seen jobs (in their industry) shift.”

Katerra partners with clients in many markets across the U.S.: “We have to partner with local architects, we have to partner with local GCs. There’s no way we could come in and try to do something here without partnering,” said Doré. “...no one can do it all that way. There’s a lot of value in that local knowledge.”

Reducing the time to complete a project means “you’re changing the cost curve,” Swanson said. “So that comfortable curve of payout—that changes entirely.”

“The other side of that is the debt service that happens on a deal—it gets much shorter,” he added. “Even just a few years ago, from a financial model, the conversations were (about) concern that anything done in this fashion is a more risky endeavor than a traditional fashion. I think we’re starting to get to get past that point.”

As for design, the prefabrication trend is “not a limiting factor but an opportunity to do more with the design and push more with design,” Swanson said. “...more and more as we design more standards and tool sets, we can spend more time actually designing and focusing our time on the way we design things.”

Panelists said that they are often in an educational role, explaining the “old-fashioned” as well as new approach to those who are unfamiliar with its emergence.

“The financial institutions have to come to terms with what our companies are doing,” said Doré. “The biggest hurdle our clients are having right now is (banks) are used to a certain way. What—you have one number, and it’s only six items? Where’s your 30-page schedule?”

Another element of educating clients, said Swanson, is to provide an “apples to apples” comparison, so that aspects such as time savings are factored in.

“We are also one of those few industries that says, ‘It didn’t work that one time, so we’re never going to do it again.’” Swanson added. “We have to grow past that and we have to take it as a lesson learned and apply it and move forward.”

One of Clayco’s enterprises, said Schachtman, is a drone company that employs virtual design construction (VDC) to digitally scan components at various stages of the process. That information is then overlaid with drawings; within a few hours, the company can tell “whether something that’s in place is perfect or is off by a quarter-inch. It’s really that accurate,” he said.

Noting that less than 1 percent of current construction is modular, Beaudoin wrapped up the conversation by asking asked panelists to predict what that percentage would be in a decade.

Doré declined to give a specific figure but said it would be along the lines of how iPhones have played a revolutionary role in the communications sector. Schachtman noted that Europe is far ahead of the U.S. in this realm and “we do have to catch up.”

Swanson came closest to offering a figure.

“Ten years from now, everyone should be doing it this way. I don’t want to say 100 percent, but with everything from how much energy our buildings use, to the materials that we pull out of the ground to the inefficiencies in the entire process, and the escalation that is not slowing down,” said Swanson. “On top of that, the pressures we have for better housing, for better healthcare—there is no reason not to be doing it this way, other than we haven’t been doing it this way.”

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