Urban Land Institute Asia Pacific 亚太区

WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

ULI–WEF Asia Pacific Leadership Symposium: The Future Is Now

A recent joint symposium held in Hong Kong by the Urban Land Institute and the World Economic Forum featured presentations by a number of speakers relating to the impact of new technologies on the construction industry. The following article distills some of the major themes contained in these presentations and in the ensuing breakout sessions.

It has become something of a mantra for companies seeking to remain competitive in an ever-evolving business world that their success—and very often their survival—depend to a great extent on how well they innovate. Whether that translates to making workers more productive or simply improving their products via investments in R&D, most large corporations across the gamut of global industry now devote significant resources to ensuring that their companies are able to change with the times.

Except, that is, for real estate. Whether measured as a function of labour productivity, or of R&D spending as a percentage of revenues, real estate companies continue to devote a vanishingly small level of resources to innovation—an almost paradoxical shortcoming in an industry that would appear to have much to gain by distinguishing between what are often plain-vanilla products. As Boston Consulting Group's Christoph Rothballer observed: "The fundamental way that buildings are being built hasn't changed radically over the past several decades."

Finally, though, that may be about to change. In areas ranging from computer-aided design, to development of new construction materials and technologies, to use of augmented-reality marketing solutions, a long list of innovative new technologies is beginning to be rolled out, with potentially profound consequences for an industry that is unlikely to be standing still for much longer.

In fact, with so much new tech on the verge of maturity, the issue for developers is how to pick out the most promising new technologies amidst a sea of potentially disruptive candidates. Cutting-edge tech that may seem appealing at first glance may still be unsuited for real-world applications because it is either underdeveloped, too expensive, or too hard to scale.

Examples include various advances in materials technology. Organic admixtures that use mushroom-derived or calcium-secreting bacteria that allow buildings to be "grown" or repaired are promising, but remain under development. Even the rapid recent evolution of 3-D printing techniques leaves many builders skeptical. According to one developer at the forum: "Printing just doesn't stand up. You can't build a 60-story printed building—even with the current pace of printing technology growth, the reality is you can't have a discussion about construction without looking at the basic building materials, like steel-reinforced concrete." Many of the advances in materials technology therefore remain theoretical, at least for now.

BIM hits the mainstream

That said, developers were more positive about the potential of new software design tools to manage construction work. As one commented: "That's where the mojo is—it's going to transform current practices." In particular, Building Information Modeling

Public markets reward innovation

http://www.strategyand.pwc.com/global/home/what-we-think/innovation1000/rd-intensity-vs-spend-2016
http://www.stern.nyu.edu/~adamodar/pc/datasets/peGlobal.xls

TARONGAGROUP

(BIM) systems, which replace traditional hardcopy blueprints with 3-D computer modeling, are finally gaining traction as uptake surges throughout the industry. While the BIM concept has been around for several years, the ability to apply it on site via handheld devices gives it a game-changing advantage over legacy paper-based systems, helping architects and contractors to collaborate more easily and make on-the-fly alterations to existing designs.

Computer-designed buildings

A number of software-driven technologies under development have the potential to transform the way buildings are designed and built. BIM systems, of course, are more efficient than traditional paper-based techniques, but the design process is still hugely labour-intensive.

One way to eliminate this is to use computers to do the drawing instead of designers. Companies like U.S.-based Aditazz are currently devising such computer-based platforms, drawing on experience and design algorithms borrowed from the semiconductor manufacturing industry.

Aditazz's software is created specifically to design hospitals but in principle can be used for any type of structure, from factories to affordable housing. According to Aditazz CEO Deepak Aatresh: "The core innovation is first to create libraries of objects which are really collections of lines. These objects kind of know what they are, and a computer knows how to cast an object, move it, and place it somewhere. There are a lot of rules, but fundamentally the tech we've invented is to not draw lines—only a computer draws lines. The job of humans is to express the operational constraints they're looking for."

Some of these constraints will be purely physical, such as the dimensions of the buildable space. Others will be purely operational—for a hospital project, things like the numbers of patients, the optimal waiting time to see a doctor, even salaries of the doctors and nurses or the operating costs of the facility. The software will then come up with a suitable design or, depending on different variables, a number of alternative designs.

The benefits of this kind of software-driven process are not simply a reduction in costs vis-à-vis the current labour-intensive alternatives. They also imply huge savings of time, with completion of major projects that today might take just a fraction of the historical norm.

BIM at the New Karolinska Hospital

When developers took on construction of Sweden's newly opened 12,000-room New Karolinska Hospital, the world's biggest-ever public/private partnership hospital project, they decided to execute the entire design using a BIM platform—not so much from a principled desire to embrace new technology as from the practical need to manage what would otherwise be an impossible level of detail and administration implied in deployment of a traditional paper-based system.

BIM is also being used at New Karolinska for handling facility management. Because the hospital's BIM model contains all construction data in a single plan, managers know immediately which materials are used in any part of the building, where all components are located, and exactly what part will be needed to repair any given equipment breakdown.

In addition, sensors have been embedded throughout the hospital structure to guide a fleet of 29 automated vehicles deployed to deal with a total of 1,600 deliveries daily throughout the facility, using BIM as an address book and carrying anything from medical equipment to bedding via underground passages that connect individual buildings.

One developer said he intended to supply BIM plans to individual buyers or tenants as a way to save time and money in fitting out new units. Currently, although properties in Asia are often purchased off plan years in advance, buyers have little opportunity to customise until after construction is complete, when existing layouts are often torn out and replaced—a hugely wasteful practice. BIM could in principle eliminate this inefficiency by allowing personalised layouts to be designed and installed as projects are built.

Nor is BIM's usefulness limited to the construction phase, with further potential uses ranging from operations to maintenance to utility construction throughout the life cycle of the building. As one participant said: "Imagine the evolution in performance-based design when you know how buildings are really operating, or you tie that data into whole districts, including the infrastructure."

Prefabrication is another well-established technology steadily growing in popularity. In Singapore, developers have been forced to accelerate adoption of prefab techniques because government policy requires builders to boost productivity in order to cut the number of foreign workers employed in the industry. In Hong Kong, soaring labour costs have also made prefab an increasingly attractive option—although the relatively small size of the local market continues to pose challenges in terms of leveraging economies of scale.

Elsewhere, though, the low cost of labour in Asia's emerging economies means that prefabrication is generally seen as uncompetitive, even in markets such as the Philippines or India, where demand for affordable housing can be measured in the millions or tens of millions of units.

Whether that is necessarily true, though, depends on whom you ask. According to one tech-industry participant, the solution is simply to increase standardisation of components. "The art is to break down prefab

into smaller pieces where you can mass-manufacture across multiple building types and not just on a project-by-project basis," he said. "The current problem with prefab is that it's one project at a time. So you have to make parts that can be used across multiple projects—it's already happening with componets such as windows, but when you extend it to every component you get more variety in design because now the computer can sort through these different parts and create really flexible designs just in time."

Use of lean construction techniques borrowed from the auto sector, which aim to eliminate waste in both time and materials, was suggested as another way to reduce costs when building with prefabricated components.

Status quo resists change

However, as much as builders are becoming increasingly receptive to the need to embrace new tech, a number of factors are conspiring to slow the pace of change. In part, this is an inherited problem. As one participant pointed out, the useful life of buildings is just too long: "A 60-year-old building may not have the high-speed lifts and all the bells and whistles," he said, "but it's not unoccupiable. This means the useful life of buildings is extremely resilient, which in turn is one of the reasons why the pace of tech growth has been so slow."

An even bigger obstacle to progress is resistance from the status quo. On the one hand, according to one developer, architects tasked with customising individual units are often resistant to the idea because they prefer the ease of standardised design to dealing with so many individual players. On the other, contractors are still reluctant to invest in new technology, even as tech costs continue to decline.

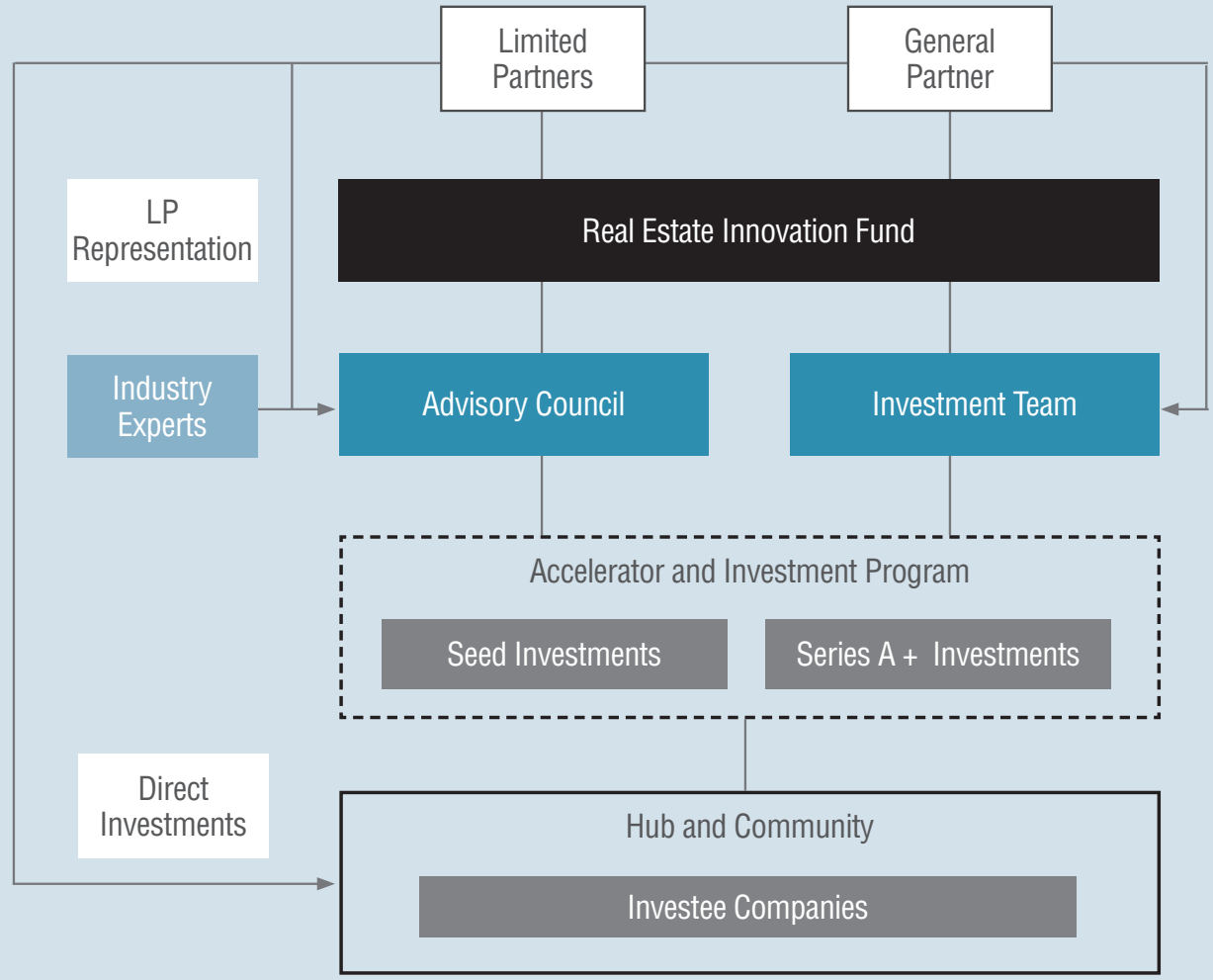
The biggest roadblock of all, however, lies on the regulatory side. The high level of oversight in Asia's construction industries is a necessary byproduct of the need to ensure building safety, creating deep bureaucratic roots. A byproduct of this culture, however, is that widespread adoption of new technologies is going to require wholesale changes in existing building codes and approval processes—a tall order in an environment where bureaucratic mind-sets remain generally backward-looking and have little reason to push through new rules.

In a few markets—in particular Singapore—government policy has driven the industry to embrace new technology faster. More often, though, bureaucratic inertia is the invisible hand inhibiting change, with developers at the forum repeatedly bemoaning a monolithic culture of outdated regulation and rigid procedures. As one tech-industry participant noted: "Everyone is making their own personal island of reasoning, and no one looks at it as a system."

Current planning practice in Hong Kong, for example, frustrates developer plans to offer customisation of units during project construction because alterations are prohibited until an occupation permit is issued. At the same time, the need for modern buildings to be adaptable for mixed-use purposes, be they office/retail/residential, or industrial/office, or something else, is frustrated by a permitting system that prohibits buildings serving multiple functions. This generates enormous inefficiencies and encourages occupiers simply to break the law in order to get things done.

Most participants were fairly pessimistic about short-term prospects of persuading regulators to adapt the existing framework. One person suggested, however, that change could be driven organically through consumer pressure to move from the current specifications-based mind-set "towards a more performance-based approach enabled by technology that can monitor building performance." Such a system could be used not only for monitoring construction, but also within the design process itself: "If you think about it, all these rules for buildings exist because of safety—what you want is to create something, and for the software to tell you instantaneously whether it complies with the rules."

Ecosystem-driven approach



Financing innovation

In some ways, the shortage of innovation in real estate circles is a chicken-or-egg problem. Just as real estate professionals have historically been slow to embrace new technology as a way to promote advanced design and construction techniques, the industry has been just as slow to develop ways to help finance upcoming innovation.

One reason for this, according to Pathum Dissanayake, COO of Sydney-based real estate venture capital firm Taronga Group, is that what makes for good real estate investment or real estate investment methodology doesn't necessarily translate into good innovation investment methodology. In terms of return profile, for example, "venture capital investors are probably not going to see yield for a long time," he said. "The returns are back-ended, the [innovator] will probably need more funding down the track, and there is no salvage value—so if it goes belly up, that's it."

At the same time, however, the lack of any real culture of innovation in the real estate industry means that individuals working from within have little incentive to innovate because if they fail—and that risk is always going to be high—they will probably be out of a job.

Direct investments are possible, but what works better, Dissanayake suggests, is the same "virtuous circle" approach used by venture capitalists in the more tech-driven industries to provide visible financial and nonfinancial support to new companies. This "ecosystem-driven model" involves an externally managed fund backed by both in-house and external experts, with the new venture integrated into a "hub-and-community" grouping of investee companies that can share knowledge and experience. This type of environment is far better suited to promoting ideas that originate within developers or real estate investment companies but are difficult to develop as stand-alone concepts.

Participants

WORLD ECONOMIC FORUM
Dr. Michael Max Buehler
Practice Lead Real Estate Industries
World Economic Forum

URBAN LAND INSTITUTE
John Fitzgerald
Chief Executive Officer
ULI Asia Pacific

PROFESSIONAL PROPERTY SERVICES LIMITED
Nicholas Brooke
Chair

ORCA CAPITAL/ATOM ASSETS
Ariel Shtarkman
Program Director

ADITAZZ
Deepak Aatresh

AECOM
Sean Chiao

AON RISK SOLUTIONS
Jane Drummond

ASIA CAPITAL REAL ESTATE
Blake Olafson

BALYASNY
Lora Chow

BAML
Karl Choi
Sarah Cooper

BROOKE HUSBAND LIMITED
Chris Brooke

CBRE GLOBAL INVESTORS
Richard Price

CHIEF SECRETARY FOR ADMINISTRATION'S PRIVATE OFFICE
Michael Ko

CISTRI
Peter Holland

COLLIERS INTERNATIONAL
David Hand
David Faulkner

DEVELOPMENT BUREAU, HKSAR
Brenda Au

DIGITAL CONSULT 151 PROPERTY
Max Ryerson

DLA PIPER
Susheela Rivers

DUBAILAND
Hend Al Marri
Mahmoud Hesham El Burai

FAIRLAND HOLDINGS LIMITED
Douglas Wu

FUNG GLOBAL RETAIL & TECHNOLOGY
Kiril Popov

GAYSORN PROPERTY COMPANY LIMITED
Charn Srivikorn

GLOBAL LOGISTIC PROPERTIES
Seek Ngee Huat

GROSVENOR
Ben Cha

HIP SHING HONG GROUP
David Fong

HONG KONG JOCKEY CLUB
Michael John Moir

HONGKONG LAND LIMITED
Clement Lau

HOUSING SOCIETY, HKSAR
Marco Wu

HVS
Daniel Voellm

INSTITUTE OF REAL ESTATE STUDIES AND HEAD OF DEPARTMENT OF REAL ESTATE
Yongheng Deng

INTERNATIONAL LABOUR ORGANIZATION
Edmundo Werna

JERDE PARTNERSHIP
Phil Kim

JLL
Rita Wong
Man Hong Li

KNIGHT FRANK
Paul Hart

KPF
David Malott

KWOK & KOEHLER ENGINEERING LIMITED
Christian Koehler

LAN KWAI FONG
Jonathan Zeman

LINK REAL ESTATE INVESTMENT TRUST
Max Wong

Participants

MAGUSTA
Ben Liang

MAYER BROWN JSM
Andrew MacGeoch

METROPOLITAN REAL ESTATE
John So

MILKEN INSTITUTE
Petra Freddi

MIRVAC
John Carfi

NAN FUNG DEVELOPMENT LIMITED
Donald Choi

NAVVIS
Dr. Felix Reinshagen

OVAL PARTNERSHIP
Christopher Law

PLP ARCHITECTURE
Ron Bakker

POLY TERRA INNOVATION
Thorsten Jelinek

PROFESSIONAL PROPERTY SERVICES
Margaret Brooke

SAUDI ARAMCO
Abdulrahman I. Al-Warthan
Fahad E. Al-Helal
Mishari Eisa

SAVILLS
Erick Luu

SHUI ON LAND LIMITED
Vincent Lo
Albert Chan
David Wong

SM PRIME
Jeffrey Lim

SPACIOUS
Asif Ghafoor

STARR INTERNATIONAL INVESTMENT ADVISORS (ASIA) LIMITED
Alison Cooke

TARONGA GROUP
Pathum Dissanayake

TG INTERNATIONAL MANAGER, LDA
Tiago Guerra

THE BOSTON CONSULTING GROUP
Christoph Rothballer

THE DURST ORGANIZATION
Mark Domino

THE NET GROUP
Carlos Rufino
Raymond Rufino

URBAN LAND INSTITUTE
Patrick L. Phillips

UDP INTERNATIONAL
Sujata Govada

URBAN RENEWAL AUTHORITY, HKSAR
Chi Sing Wai

VEOLIA
Lenny Conil

WATERS ECONOMICS
Fiona Waters

WORLD ECONOMIC FORUM
Sven Witthoeft
Program Director

WS ATKINS PLC
Catherine Li

YORK CAPITAL
Masa Yamaguchi

Publication Staff

Colin Galloway
Author

May Chow
Senior Vice President, Marketing and Communications, Asia Pacific

Novia Pau
Associate
ULI Asia Pacific

James A. Mulligan
Senior Editor

David James Rose
Manuscript Editor

Betsy Van Buskirk
Creative Director

Anne Morgan
Graphic Designer

Urban Land Institute Asia Pacific 亚太区

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

About the Urban Land Institute

The Urban Land Institute is a global, member-driven organization comprising more than 40,000 real estate and urban development professionals dedicated to advancing the Institute's mission of providing leadership in the responsible use of land and creating and sustaining thriving communities worldwide.

ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics. Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific regions, with members in 80 countries.

The extraordinary impact that ULI makes on land use decision making is based on its members sharing expertise on a variety of factors affecting the built environment, including urbanization, demographic and population changes, new economic drivers, technology advancements, and environmental concerns.

Peer-to-peer learning is achieved through the knowledge shared by members at thousands of convenings each year that reinforce ULI's position as a global authority on land use and real estate. In 2016 alone, more than 3,200 events were held in 340 cities around the world.

Drawing on the work of its members, the Institute recognizes and shares best practices in urban design and development for the benefit of communities around the globe.

More information is available at uli.org. Follow ULI on Twitter, Facebook, LinkedIn, and Instagram.

About the World Economic Forum

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation. The Forum engages the foremost political, business, and other leaders of society to shape global, regional, and industry agendas.

It was established in 1971 as a not-for-profit foundation and is headquartered in Geneva, Switzerland. It is independent, impartial, and not tied to any special interests. The Forum strives in all its efforts to demonstrate entrepreneurship in the global public interest while upholding the highest standards of governance.

Moral and intellectual integrity is at the heart of everything it does. Our activities are shaped by a unique institutional culture founded on the stakeholder theory, which asserts that an organization is accountable to all parts of society. The institution carefully blends and balances the best of many kinds of organizations, from both the public and private sectors, international organizations, and academic institutions.

We believe that progress happens by bringing together people from all walks of life who have the drive and the influence to make positive change.