Special 2016 Conference Themed Issue: Megacities

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“Twentieth-century cities were planned as collections of segregated components, which were measured in terms of their economic productivity. The value of buildings was assessed only by capital cost efficiency, rather than their overall contribution to the city...”

Wong et al., page 46
Americas

High-rise development in New York is continuing apace, with a number of significant tower proposals moving forward after clearing various legal hurdles. In Midtown, a settlement between developers has cleared the way for One Vanderbilt Place by KPF, potentially the third-tallest building in the city, to be built next to Grand Central Terminal. On the east side, the Department of City Planning is proceeding with an application to build 247 Cherry Street, a 305-meter residential tower that has been embroiled in litigation over its air rights. While the legal action remains pending, the planning department will review the application and determine a course of action.

Meanwhile, the iconic Empire State Building has been in the news, with reports that the Qatar Investment Authority has invested $622 million in the tower for a 9.9% ownership stake, part of the country’s goal of investing $35 billion in US assets.

As the New York market remains strong, development across the Hudson in Jersey City is keeping pace. The city has recently approved plans for a 72-story tower at 30 Journal Square, just one of several towers that are planned for the long-neglected Journal Square area. The development will feature 741 residential units, in addition to office space.

While the New York region remains the undisputed skyscraper capital of the United States, it has received some healthy competition from Miami, which is in the midst of its own high-rise building spree, with several towers under construction or recently completed. Despite concerns that the condo boom might be beginning to wane, strong sales for the Brickell Flatiron have spurred construction of the tower; 55% of its 549 units are currently under contract, accounting for $75 million in sales in 2016.

Similarly, construction on Zaha Hadid Architects’ One Thousand Museum is continuing on pace, buoyed by strong confidence in the project. The structure has reached above the 15th floor, giving onlookers a view of the unique exoskeleton that defines the project. Further south in the Coconut Grove area, another high-profile project recently wrapped up, with the announcement that the Grove at Grand Bay is preparing for opening. The two-tower complex features twin, twisting 94-meter residential buildings.

Along with Miami, another US city in the midst of a high-rise boom is San Francisco, with projects rising up and down Market Street, centered on the gestating Transbay Transit Center. With construction poised to begin on Foster + Partners’ and Heller Manus Architects’ Oceanwide Center, new renderings have been revealed for the 21-story Waldorf Astoria Hotel that will be built as part of the mixed-use complex.
While construction across cities in the US remains strong, a new tower is set to rise in oft-overlooked Edmonton. The under-construction Stantec Tower is set to anchor the growing Ice District and will be the tallest skyscraper in western Canada upon completion. The tower recently reached a construction milestone when crews completed the concrete pour for its foundation.

Asia & Oceania

Although tall by most standards, the 251-meter Stantec Tower would be underwhelming when compared to bKL Architecture’s proposed H700 Shenzhen Tower, which at 739 meters could become the tallest tower in Shenzhen and China, and the third-tallest worldwide, assuming it would complete after the 1,000-plus-meter Jeddah Tower in Saudi Arabia. A planning package for the megatall tower was recently resubmitted to Shenzhen planning authorities for approval.

Once the tallest tower in China, Jin Mao Tower by Skidmore, Owings & Merrill has spruced up its public offerings with a new skywalk outside the 88th floor. The 60-meter-long, 1.2-meter-wide fenceless, transparent walkway will offer stunning – and adventurous – views of the surrounding cityscape for those willing to be lashed to the building with ropes.

While China has long been home to some of the world’s tallest buildings, KPF’s Lotte World Tower will soon propel South Korea’s Seoul to join that list. Developers recently announced that the 556-meter tower will be completed on schedule, and have organized a celebratory concert to recognize the hard work of the many people who helped construct the tower.

Meanwhile, across the Sea of Japan, a number of projects are transforming neighborhoods in Tokyo and Sapporo. In the capital, the recently completed Tokyo Garden Terrace complex by KPF and Nikken Sekkei adds a pair of high-rises to the city’s Chiyoda ward. Along with the new construction, the
SOM and China: Evolving Skyscraper Design Amid Rapid Urban Growth

China’s rapid urban and economic growth has challenged designers, engineers, and planners to innovate and collaborate to meet the needs of a changing country. Skidmore, Owings & Merrill (SOM) has been practicing in China for more than two decades, working with residents and policymakers to shape urban environments. The firm’s integrated, interdisciplinary approach has produced work at all scales that addresses the challenges of urbanization and gives form to the aspirations of the country. Through a survey of notable projects in China, this case study expresses how practices have evolved to help Chinese cities become more vibrant and compelling.

Introduction

The largest-ever human migration – the movement of people from rural to urban China that began in the 1980s – has created burgeoning, vibrant cities across the country. The question of how best to build cities for prosperity, social cohesion, and a healthy environment demands an integrated approach that considers how people can live well, both now and in the future.

SOM was founded as an interdisciplinary practice and brings together design, technical design, structural engineering, urban planning, MEP, interiors, and project management practitioners to create buildings and cities that are sustainable, well-executed, and enduring. An integrated way of working enables the firm to meet the challenges posed by rapid urbanization and to develop and utilize research that can make urban living greener and more enjoyable.

After three decades of working in China, SOM’s projects in the country have become some of the firm’s most iconic and innovative, focusing on practical, sensitive, and lasting design solutions.

China in the 1980s

Economic liberalization and rapid population growth of major urban centers in the 1980s initiated a massive construction boom. Urban growth required dedicated master planning and intensive land redevelopment: Beijing, Shanghai, and Guangzhou were among the first cities to implement new strategic master plans amid surging demand for the construction of complex buildings and capital infrastructure projects. The rapid pace of construction raised questions about the technical constraints of existing methods and introduced a dialogue about how architecture can meet the needs and aspirations of a rapidly changing society.

SOM Arrives in China Amidst Its Transition to a Market Economy

Chinese cities boomed in the 1990s, as did demand for design, structural, and planning services. SOM established its presence in the country through monumental projects that clearly demonstrated a deep sensitivity to China’s cultural history and market needs. The most notable projects during this phase were the Industrial and Commercial Bank of China (ICBC) Headquarters in Beijing and the Jin Mao Tower in Shanghai (see Figure 1).
The ICBC Headquarters on Chang’an Street in Beijing was completed in 1999 – its stone base, structural steel frame, and glass façade with a monumental roof inspired by historical forms creatively incorporated traditional Chinese elements into a modern architectural expression. Technical innovation was also inherent to the building: the steel frame structure was the first of its kind in China, heralding the growth of the steel construction industry.

In the same year, the 88-story Jin Mao Tower was completed in Shanghai. Jin Mao was a monumental success for China and it became a symbol of the country’s ambitions. The building embodied a way of working that interprets local cultural inputs into a modern supertall architectural expression. This cultural sensitivity was carefully integrated with the numerous technical complexities of supertall design by including a performative exterior wall that uses delicately textured shading elements against the unitized glass curtain wall as well as the first megacolumn and outrigger truss system in China. Jin Mao was a soaring demonstration of how architecture could synthesize sensitivity to history and local culture with structural and design excellence.

Both ICBC and Jin Mao demonstrated how thoughtful design resulted in substantially improved buildings and, in turn, more vibrant cities.

SOM's China Practice Evolves

Entering the new century, SOM’s practice in China stepped forward with the evolution of the firm’s principles, paralleling China’s own achievements. The Poly Corporation Headquarters in Beijing demonstrated a deliberate consideration of the relationship between architectural form, context, and environmental responsibility (see Figure 2). An L-shaped layout with a large atrium connects the floors, increasing the feeling of community in the building, while the world’s largest suspension-cable curtain wall system and lightweight structural members welcome natural daylight into the atrium.

“The rapid pace of construction in China raised questions about the technical constraints of existing methods and introduced a dialogue about how architecture can meet the needs and aspirations of a rapidly changing society.”
Cities to Megacities: Perspectives

The CTBUH 2016 International Conference is being held in the three cities of the Pearl River Delta, the world’s largest “megacity,” projected to have 120 million inhabitants by 2050. The conference brings together some of the leading thinkers on urbanization, design, development, and the environment. They stand together – not only on stages in a convention hotel, but also high up in the most representative high-rise buildings in Shenzhen, Guangzhou, and Hong Kong – delivering the very best of the knowledge we have so far accumulated about this extraordinary phenomenon in which human civilization is now participating, and offering insights on the way forward. Some of the most prominent voices at the Conference are collected here, alongside short profiles of some of the exemplary projects featured in the Conference program.

Tall Buildings and Context: Appropriate High-Rise Vernaculars

Day 2 Plenary Panel Discussion
Tuesday 18 October, 9:15–10:45 a.m., Shenzhen

The issue of skyscraper form and expression being appropriate to cultural and social context is currently a hotly debated topic in China, as well as other parts of the world. Some believe that skyscrapers are starting to homogenize cities architecturally, and often deny hundreds of years of vernacular traditions in a place, replacing these traditions with coldly calculating real estate equations that simply extract the greatest amount of floor space from a building’s footprint. As such, countless cities around the world now hold claim to a number of towers conforming to the extruded glass box typology, and this building type is considered to be perhaps the greatest contributor to skyline homogeneity. However, in practice, it can be difficult to pinpoint exactly what makes a building contextually appropriate, and thus the basis upon which to measure appropriateness can be difficult to define. Gathering together some of the most prominent and inventive practitioners reshaping the skylines of China and beyond, this plenary panel discussion examines this challenge through a variety of lenses, from both the developer and architect viewpoint.

“Skyscrapers have always been about power, but they should also be about society. As our global society increasingly becomes an urban one, then development of skyscrapers should be taking a critical new direction.”

– Winy Maas, Co-Founding Director, MVRDV

Towards a Forest City

Plenary 3: Cities to Megacities: The Future
Tuesday 18 October, 3:45–5:15 p.m., Shenzhen

Shijiazhuang, capital of Hebei province, a metropolis of three million in northeast China, is the city with the nation’s highest rate of air pollution. The government of Shijiazhuang has asked Stefano Boeri Architetti to design a new city for 100,000 inhabitants. Both a city of new generation, capable of becoming a model of sustainable growth, as well as a small vertical town of public and private buildings, residences, offices, laboratories, museums, and schools, it will be completely covered horizontally and vertically by millions of plants and trees. Due to the great extension of its surface, the Forest City will be able to absorb and use renewable energy and transport sustainable networks, which would make a huge contribution to the absorption of CO₂, the reduction of energy consumption and global warming. Its results will be quite evident.
Ping An Finance Center, Shenzhen

Ping An Finance Center, located in Shenzhen’s Futian District, represents a new generation of the prototypical Asian skyscraper: very tall, very dense, and hyper-connected. The building rises from a prominent location, connecting seamlessly to neighboring commercial and residential properties, as well as the Pearl River Delta’s high-speed rail corridor. At its final height of 599 meters, the tower symbolizes a city that has witnessed unprecedented urban growth, from 300,000 people to approximately 10 million – in the 35 years since becoming China’s first Special Economic Zone. The shape of the tower is that of a taught steel cable, outstretched by the sky and the ground at once. At the top of the tower, the façades taper to form a pyramid, giving the tower a prismatic aesthetic.

Completion Date: 2016
Height: 599 m (1,965 ft)
Stories: 115
Area: 459,525 sq m (4,946,286 sq ft)
Primary Functions: Office/Hotel

Assessing the Urbanization of the Pearl River Delta

Session 2B: Megacities – Setting the Scene
Monday 17 October, 11:45 a.m.–12:45 p.m., Shenzhen

With the world’s urban population expected to increase by roughly 2.5 billion people by 2050, developing an understanding of megalopolis is critical to understanding and shaping this trend. The Pearl River Delta, with over 55 million people, is one of the most populous urbanized areas in the world. This presentation explores its growth, the resulting social and environmental effects, as well as strategies for the region’s future. It presents historic and current urbanization facts of the Pearl River Delta, comparing it to other urbanized regions of the world. Questions regarding the future viability of megalopolises have global applicability, and the authors will summarize key issues and future strategies for the Pearl River Delta.

Do We Need 700-Meter High-Rise Buildings?

Session 2A: Development Drivers
Monday 17 October, 11:15 a.m.–12:45 p.m., Shenzhen

In the era of globalization, the importance of urban and urban areas is increasing progressively. Through analysis of dense urban high-rise building complexes, as well as research on the relationship of those structures to a city’s social organization, one can develop a thesis that the source and vibrancy of high-density cities arises from the opportunity for social proximity to build positive relationships among residents. Based on the principle of sustainable development, we can discuss how to deal with space and development models, and to ultimately build a high-density vertical city that raises the standards of livability.

Saudi Arabia, Jeddah City, and Jeddah Tower

Session 6B: Jeddah City and Jeddah Tower
Tuesday October 18, 11:15 a.m.–12:45 p.m., Shenzhen

The Kingdom of Saudi Arabia has embarked on an ambitious project to construct the world’s tallest building, Jeddah Tower. Surrounding the kilometer-plus building will be a new city built out of the desert on the outskirts of Jeddah. Together, Jedda Tower and Jeddah City are designed to become a new global destination for Saudi Arabia, introducing new forms of engagement with the country through a changing economic model. Previously reliant on oil, the Kingdom is developing Jeddah as a means of reorienting its economy towards a global model based on business and tourism. The instantly iconic Jeddah Tower will be the new anchor of this changing economic model, attracting investment to the region through its status as a symbol and icon for the country. The surrounding Jeddah City will not only benefit from that investment, but also reorient design in the region towards a more sustainable and vernacular architecture.
Megacities: Setting the Scene

The rise of the megacity presents unprecedented opportunities to understand the human urbanization phenomenon, and to observe the effects of multi-core, polycentric cities growing together to effectively become one. This paper establishes the criteria for defining such megacities, discusses their characteristics and locations, and assesses the impact they are having and will have on tall buildings, urban development, transportation, infrastructure, and quality of life.

Note: Please also refer to the Tall Buildings in Numbers study on pages 52 and 53

Introduction

Anyone concerned with the development of human civilization in the 21st Century will likely have heard the term “megacity.” It is – as it should be – increasingly prevalent in both mainstream and academic discussions of the great trends of our time: urbanization, rising technological and physical connectivity, increasingly polarized extremes of wealth and poverty, environmental degradation, and climate change. It is a subject as large and far-reaching as its name implies. This introduction sets the scene on how megacities and the built environment are growing together, and examines the implications for those who plan, design, develop, and operate tall buildings and urban infrastructure.

What is a Megacity?

In order to rationalize the data CTBUH collects – predominantly on skyscrapers and large urban developments – with that collected by other organizations, first a definition that reflects a distillation of the prominent literature on the subject should be set forth:

A megacity is an urban agglomeration with a total population of 10 million people or greater, consisting of a continuous built-up area that encompasses one or more city centers and suburban areas, economically and functionally linked to those centers.

A megacity is typically, though not always, polycentric, with multiple nodes of concentrated urban activity and high-density development, rather than being centered around one large primary central business district (CBD). Indeed, a telltale sign of a megacity, and an indicator of its polycentric nature, is the tendency of residents and urban planners alike to refer to more than one “CBD.” Even if there is a consensus about the location of the “center of town,” development and transportation patterns strongly suggest otherwise; it should be thought of as an interwoven web, rather than a series of concentric zones.

The polycentric pattern is often the result of established urban centers traditionally separated by distance and their own identities eventually merging together through a continuous spread of urban and suburban development. A key aspect of the megacity is that these linkages of urbanity fuse the agglomeration together, not only physically, but also economically, functionally, and often, culturally.

In a megacity, the extent of urban development spread will not be described by a single radius or a compact, circular shape; in other words, it is asymmetrical and polymorphic. This is due to a variety of factors, including but not limited to; uneven development patterns, geographic obstacles, transport corridors, and political boundaries. While green spaces and “undeveloped” land may separate urban centers, this does not necessarily indicate that there is a definitive economic, cultural or political division between cities and their relationship within a megacity. In other words, there may be considerable amounts of open space contained within a megacity (see Figure 1). Open spaces could be the result of geological features such as mountains and bodies of water, military installations or protected greenbelts. Meanwhile, “leapfrog” development has a tendency to create long,
narrow strands of development along transportation routes, which then fill in perpendicularly to those corridors over time.

For the purposes of the 45 megacities noted in this study (see Table 1), it should be clearly noted that the cited population, area, and density figures are the result of existing political boundaries which can dilute density numbers, because they may encompass open spaces and adjacent hinterlands potentially available for future development lying beyond highly built-up areas. For example, if a district, county, prefecture or other political jurisdiction adjoins a heavily built-up area, and a distinctly dense tendril of urban land penetrates into what is otherwise a rural political unit, along a watercourse, highway or railway, the entire surrounding political unit is typically counted in area and population figures. Thus, the “Los Angeles” megacity in this study extends all the way through open desert to the Colorado River and the border with Arizona, because the political entity of Riverside County, California – heavily urbanized in the west and sparsely populated in the east – is included.

In step with the theme and site of the CTBUH 2016 Conference, the primary benchmark for a megacity in this study is the Pearl River Delta region of southern China, the world’s largest megacity (see Figures 2 and 3). Drawing a line around the boundaries of the Pearl River Delta’s urban centers would encompass a span of up to 367 kilometers from southwest to northeast (that is, from the southwestern...

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Figure 2. Example of undeveloped space comprised of mountains and farms within the urbanized area. © (cc-by) Doc Searls

Figure 2. The Pearl River Delta megacity boundaries. Source: www.citypopulation.de

Figure 3. The Pearl River Delta megacities (from left to right): Hong Kong, Guangzhou, and Shenzhen.
Shifting Urban Gravity, from “Central” To “Core” Business Districts

In the age of the multi-million inhabitant city, the traditional concept of a single Central Business District (CBD) is becoming increasingly unrealistic. As we are seeing in megacities as dispersed as Shanghai, New York, and London, the concept of multiple core business centers – drawing on their own unique flavors and infrastructure – has become de facto urban planning policy. The three conference cities of Shenzhen, Guangzhou, and Hong Kong exemplify this urban trend perfectly. The historical urban centers of these cities have now dispersed to numerous nodes simultaneously as the conventional concept of the CBD has gradually evolved from a single, concentrated business district to multiple “core business districts.” And as cities stand to increase their populations into the tens of millions, this seems inherently sensible. This paper charts the development of the multi-CBD city, especially in the context of Hong Kong, and explains the philosophy and execution of this new type of CBD.

Introduction: The Traditional CBD And its Contemporary Challenges

The traditional central business district is a phenomenon that arose at the end of the 19th century. As corporations grew and contemporary inventions such as the telephone and the elevator came into common use, it made sense to concentrate multi-story office buildings near to each other. This facilitated meetings and information exchange. A typical CBD would cover approximately 20 minutes’ walking distance in all directions from a main transportation center, such as a railway station or ferry pier. “Classic” CBDs might include: Chicago’s Loop, which is named after the elevated railway that surrounds it and connects it to outer regions; New York’s Financial District, famed for its towering skyscrapers clustered around narrow streets laid out in the early 1800s by the city’s first settlers and surrounded by water on three sides; and the City of London, the traditional banking core of that metropolis, commonly called the “Square Mile.”

Today, traditional CBDs retain strong cultural identification as the focal points of their cities and generally support high rents and
commercial activity. Since the turn of the last century, a growing global taste for urban living has revived and even transformed some CBDs, in particular, from weekday business-only districts to 24/7 mixed-use, “live-work-play” environments.

At the same time, the existing stock of buildings in traditional CBDs struggles to keep up with contemporary demand for higher specifications, including technological connectivity and flexible workspaces among other necessities. A combination of several factors, including sound planning principles enabling greater densification above major transportation nodes and investment in mass transit infrastructure, has been the catalyst for the creation of new core business districts – away from the traditional city center, but still fundamentally designed to take advantage of the efficiencies of density and access to efficient mass transportation networks.

**Pacific Place – An Early CBD**

In the 1980s, the capacity and quality constraints of Central were becoming apparent, but there were no obvious greenfield alternatives for development in the area. Swire Properties decided to acquire a site as part of a former military barracks just east of Admiralty, a steeply inclined location on the south (or “wrong”) side of Queensway that had confounded previous development attempts. The resulting Pacific Place development (Hong Kong’s first fully integrated mixed-use development) cleverly assembled office and hotel towers and a retail mall on a hillside location that has become the connective tissue between three distinct districts previously divided by heavy traffic, topography, and incompatible land use (see Figure 2). The residential areas between mid-levels and the Peak, the bright, dense streets of Wan Chai, and the corporate/banking core of Admiralty were now linked through a series of under- and above-ground pedestrian walkways that protected occupants from inclement weather and busy traffic, and yet safely connected them with their surroundings in new ways, via carefully placed skylights, ramps, view corridors, and lobbies. Importantly, these walkways connect directly to the Admiralty MTR station, further establishing Pacific Place as an attractive alternative to the traditional CBD.

**Hong Kong Central**

Hong Kong’s Central fits the traditional definition of a CBD (see Figure 1). True to its name, Central is the historical center of the city for banking and commerce, the location of the Hong Kong Station/Airport Express rail link, and the point of embarkation for the famous Star Ferry to Kowloon. This area is densely populated, not only with offices, but with support services, restaurants, and institutions, such as the Hong Kong Club. These well-established amenities, connected by an extensive network of pedestrian footbridges underpinned by access to the MTR railway network, have reinforced Central’s “centrality.”

However, Central also has several significant limitations that have curtailed further growth. Its building stock, which averages between 40 and 50 years of age, while relatively expensive, is not ideally suited to meet future demand, and premium or Grade “AAA” space is limited. As the demands of modern companies have evolved, the need for high-quality design and specifications and fit-for-purpose accommodation has grown. For example, office buildings with extra or redundant power supplies, resilience against disasters and business disruptions, higher ceilings, larger floor plates, raised floors, CAT-5 telecom provisions, and other technological amenities have been increasingly in demand. Moreover, the diverse ownership structure of property in Central limits the opportunity for a more holistic approach to improving and upgrading the overall aesthetics of the area.

**Taikoo Place, Hong Kong**

The gravity shift that began in the 1980s with Pacific Place has continued eastwards along Hong Kong Island, following many of the same principles, while moving up several orders of magnitude in scale. Swire Properties’ redevelopment of the Island East area began in 1972 with Taikoo Shing, a high-rise development cluster which was among the first privately funded housing schemes in Hong Kong on this scale (see Figure 3). Now home to over 60,000
Introduction

Cities are growing at a phenomenal rate, with the number of megacities in the world having more than tripled in the past 25 years. The rush toward urbanization is expected to continue, with population and land-use growth projected to add 2.5 billion people to the world’s urban population by 2050, 90% of which will be concentrated in Asia and Africa. Caught in an unprecedented growth spurt, these cities are undergoing an “urban puberty” phase and are rapidly outgrowing their infrastructure. Contributing about 70% of the world’s carbon emissions, cities are causing an escalating rise in global temperatures that will lead to inevitable crisis if governments, urban planners, and architects fail to urgently rethink the way that cities are planned.

Since 2001, the authors have designed and built a series of prototypes as part of a process of urban re-evaluation, adopting the Asian megacity as an ideal testing ground for new urban typologies and architectural strategies. Reimagining the early 20th-century garden city, the authors propose that a multi-layered, high-density, high-amenity 21st-century megacity that is dense and vertical, yet sociable and sustainable, is the only way forward. The “Garden City Megacity” is built on a series of “Macro-Architecture Micro-Urbanism” strategies that radically intensify land use, multiply green space, and integrate climate-specific solutions to reduce the environmental impact of cities and improve the quality of life for people.

Layering Cities

Over the last two centuries – as towns became cities and cities became megacities – land has been taken for granted, as an infinite horizontal site for building, farming, and mining. The combined effects of land exploitation, exploding megacity populations, rapid urbanization, and economic growth have led to the degradation of land quality and quantity, the depletion of non-renewable energy sources, and the rise of global warming. Land scarcity is also reflected in the competition to meet the conflicting needs of a city, resulting in high land costs and stark trade-offs between various land uses.

The authors propose visualizing a city in terms of layers – as a three-dimensional matrix, rather than as a two-dimensional grid (see Figure 1). This calls for innovative land use solutions that involve a replanning of cities – vertically, not horizontally. On top of reclaiming, restoring, and re-energizing our
“Visualize a city in terms of layers – as a three-dimensional matrix, rather than as a two-dimensional grid. This calls for innovative land use solutions that involve a replanning of cities – vertically, not horizontally.”

Figure 1. Axonometric diagram of the “Layered City.”

existing land, new land must be created. The use of land needs to be intensified by layering urban (and rural) environments – residential, recreational, commercial, agricultural, and infrastructural – above and below the existing ground level of the city.

These strategies for “layering cities” aim at offering a good quality of life for people by creating highly dense urban environments that are also highly vibrant, humane, and resilient in the sustainable long term. The layered approach introduces “multiple ground levels” of various functions at strategic horizons in the sky (see Figure 2). This achieves high-density, high-amenity developments where civic, community, and green spaces are multiplied over the same limited land area. Complementary programs of the right proportions are also integrated into vertical, mixed-use “cities within cities” that generate a 24/7 live-work-play vibrancy.

To ensure human-scaled “domesticated structures,” the authors’ designs take references from the surrounding district and incorporate external spaces (e.g., sky streets/parks) into the high-rise, recreating the proportions of neighborhood streetscapes (see Figure 3).

To further foster a sense of identity and belonging, concepts of neighborhood and community that are specific to the unique culture and context of the project are first studied and then translated into the contemporary high-rise as a system of “sky villages.”

“Layering Cities” also necessitates innovating the way in which both architecture and infrastructure/urbanism are combined in large-scale, radical yet synergistic ways. This “both-and” concept requires a strategic rethinking of building typologies, with considerations for energy production, water rights, air rights, and biodiversity indices to support self-sufficient townships and natural ecosystems in our cities. The traditional “bar graph” skyline, for instance, is picturesque but problematic. It gives visual interest at a distance, but the ground level can be very repetitive. The varied heights of buildings also overshadow each other, presenting a self-shading problem that is a disaster for solar collection in cities. To overcome this, the authors propose an “inverted skyline” (see Figure 4), which creates opportunities for

Figure 2. The layered approach introduces “multiple ground levels” of various functions at strategic horizons in the sky.

Figure 3. Sky streets and parks recreate the proportions of neighborhood streetscapes at height.
Tall Buildings in Numbers

Tall Buildings and Megacities

In this study, CTBUH undertook an examination of the populations, areas, densities, and several measures of skyscraper activity in the world’s 45 “megacities” – defined as urban agglomerations with a total population of 10 million people or greater, consisting of a continuous built-up area that encompasses one or more city centers and suburban areas, economically and functionally linked to those centers. The findings, also shown in the accompanying paper in this Journal: Megacities: Setting the Scene (page 30), are sometimes counterintuitive. While the world’s megacities have the majority of 200 meter-plus skyscrapers, there is not an obvious correlation between population density and number of skyscrapers. Vertical urbanism, it would seem, looks quite different in local contexts.

Note: The building silhouettes represent the tallest completed or topped out 200 m+ building in each megacity (only 28 megacities have 200 m+ buildings).
Megacities: Design Challenges and Responses

As this issue and the International Conference are focused on the megacity phenomenon, this edition of Talking Tall features two people who have designed tall buildings, large projects, and entire urban areas in some of the world’s largest and most critical megacities. Scott Duncan and Philip Enquist, both at SOM, spoke with CTBUH Journal Editor Daniel Safarik on the big issues that will face city-makers in the coming century.

In your experience designing buildings and communities in the growing metropolises of Asia, what do you think has been the biggest improvement you’ve seen in terms of urban sustainability?

Enquist: I would say that the expansion of next-generation transportation infrastructure, including international airports, national high speed rail, bus rapid transit, intermodal hubs, renewed interest in bicycles and walkability – has done the most to make cities in Asia, particularly China, more accessible and less car-centric.

Duncan: Government advocacy requiring our buildings to save energy and water, or to preserve open space, has had a major role in promoting sustainability in our cities. I find it fascinating that many of the cities where we are working impose limits on energy or water as a way of addressing overburdened utility infrastructure. For them, it is a pragmatic response.

What remains as the most persistent challenge to achieving a sustainable urbanism?

Enquist: Asian cities have been growing at an unprecedented speed, and often the human dimension – scale, livability, access to jobs, striking a balance with ecosystems – is overlooked. The challenge is developing urbanism that is human, healthy, and in balance with natural systems.

Duncan: Europe is and has been ahead of the rest of the world in conserving energy resources and ecological habitats, all carefully controlled through legislation and government oversight. Europe’s density and relative conurbation – it’s almost a megaregion in itself – has demanded that. We have collaborated with engineering teams from Copenhagen on US inner-city urban design projects, such as Chicago’s Southworks steel plant redevelopment, to...
reach for higher goals in energy efficiency, carbon reduction, and water reuse.

What are the implications for architecture and planning of a human population that is increasingly becoming coastal and urban in an age of climate change?

Enquist: The implications are potentially disastrous... catastrophic. We need an entirely new way of thinking about urbanized areas and long-term resiliency. Scott and I have been studying how sea level rise will affect our cities. A recent study from the Harvard Center for the Environment speculated that a one-meter sea level rise would impact 37% of the world’s population. One major implication of all of this will be the migration of large human populations to areas that are more resilient. In the United States, we have intact, viable, well-planned inland cities that would benefit tremendously from an influx of population.

We often discuss ideas such as an “urban homestead act” where the federal government could encourage population growth toward the post industrial cities of the Midwest and Great Lakes region. These were once far larger cities that are free from coastal threats and have access to fresh water. If you look at cities such as Detroit, Cleveland, Erie, Toledo, Chicago, they have all had much higher populations in the past. Many of these cities offer great urban neighborhoods, transit infrastructure, and access to remarkable open space systems and cultural amenities. Repopulating these cities could be part of a larger resilience initiative at the scale of a nation.

Continuing on this theme, there is, depending on your perspective, a “doomsday scenario” or a grand opportunity that may require new habitat for hundreds of millions of people to be built further inland and away from coastal flooding threats. Do you think we have the tools today to design entirely new cities from scratch, knowing what we know now? What do we still need to figure out?

Duncan: We do have the tools. A question we debate often is how many more “new” cities we actually need, or if the world needs new cities at all. Maybe the future of “citymaking” will be more of a “renovation and expansion” project, where we look at how to outfit our cities with enhanced support systems – green infrastructure or “the internet of things,” for example. Many of us have been experimenting with the potential of sensors and other forms of technology to make our cities more sustainable.

Enquist: I agree that we have the tools. The digital world is quickly evolving. The physical world is slow to adjust. We have not reconciled the two worlds. In building cities quickly – because we can – I think we need to figure out how to retain the human dimension, and how to build dense urban environments that balance market pressures with livability, and how to create places that support a 24-hour lifestyle.

The better cities, frankly, have been the cities that have grown slowly, layering many generations of built form. Before new cities are built, we should see how existing cities can adjust, increase residential populations, strengthen infrastructure systems, and provide a new generation of jobs.

Duncan: Equally important is developing strategies for the non-urbanized areas, everything that is not a city. So much of the damage we have done to ecosystems has been through misuse of land. Cities are, in some ways, not the problem.

When you look back at projects you’ve designed in a place that you consider to be a “megacity,” where do you feel like you’ve had the greatest impact as a result of that project, and why?

“How many more ‘new’ cities do we actually need? Maybe the future of ‘citymaking’ will be more of a ‘renovation and expansion’ project, where we look at how to outfit our cities with enhanced support systems – green infrastructure or ‘the internet of things,’ for example.”
About the Council

The Council on Tall Buildings and Urban Habitat is the world’s leading resource for professionals focused on the inception, design, construction, and operation of tall buildings and future cities. A not-for-profit organization, founded in 1969 and based at the Illinois Institute of Technology, Chicago, CTBUH has an Asia office at Tongji University, Shanghai, and a research office at Iuav University, Venice, Italy. CTBUH facilitates the exchange of the latest knowledge available on tall buildings around the world through publications, research, events, working groups, web resources, and its extensive network of international representatives. The Council’s research department is spearheading the investigation of the next generation of tall buildings by aiding original research on sustainability and key development issues. The Council’s free database on tall buildings, The Skyscraper Center, is updated daily with detailed information, images, data, and news. The CTBUH also developed the international standards for measuring tall building height and is recognized as the arbiter for bestowing such designations as “The World’s Tallest Building.”

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