Mega-Tall Buildings and Other Future Places of Work

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In 2015, a record breaking of 106 Skyscrapers above 200 feet high emerged across the globe. The Council on Tall Buildings and Urban Habitat (CTBUH) reported that in China a total of 62 Skyscrapers were built. The growth is exponential both is number and height. CTBHU expects an increase from 18% to 27% in super-tall buildings from 2015 to 2016. Of all the 100 tallest buildings in the world, all are at least super-tall buildings which rise above 300 meters. This decade launched the rise of a new breed of skyscrapers, the mega-tall building. This type of skyscraper distinguishes itself by setting a new precedent of height above 600 meters. At this scale, our conceptions and notions of livability in height are challenged. By 2016, a total of 6 Mega-tall buildings will be either fully completed or under way. The new record of the highest mega-tall building will be set the kilometer long Kingdom Tower by Adrian Smith and Gordon Hill Architecture.

Mega-Tall buildings begin to command the urban stage. Towering masterpieces that serve as icons and symbols of power. Deemed deities and destroyers of urban quality of life. Mega-tall buildings are much praised as efficient green construction models for vertical densification as are denounced consumers of resources incapable of ever becoming truly sustainable. These mega high constructions are more than aesthetic and structural advances that establish urban and corporate statements. Their sheer scale challenges fundamental inhabitation models which impact directly multiple spheres of urban life and society, from geography and zoning regulations to economics and cultural beliefs. As such, understanding the role that fundamental science, technology and development plays for addressing the complex environmental and sociocultural challenges inherent to mega-tall constructions is essential.

How is scientific research enabling and influencing how these mega-tall constructions are designed? Where are the true frontiers of scientific and technological innovation in how environmental sensibility and quality of life can blossom? Which are the key driving factors in the future years, that will shape how engineers, architects, and scientists pursue new models that can be truly sustainable? Mega-tall constructions impinge of potential paradigm shifts in intelligent buildings and transportation systems, materials, structures and the very future of the workplace impacting our everyday life. From this framework, this session will propose a discussion on the critical role that advances in sustainability and energy, intelligent transportation, functional natural materials for structural innovation, and spatial quality of the future of work in mega-tall buildings through a panel of engineering and architectural experts in tall constructions.

The session will start with an introduction on the theme of fundamental design transformations in the making of mega-tall buildings and how distinctive spatial characteristics of these constructions are bound to influence the quality of life in the future. Stephen Nichols (Otis) will address the role of digital interaction, physical human interface and intuitive behavior spanning the disciplines of computer science, electrical, mechanical and systems engineering as vertical transportation transforms in taller buildings. The next presentation will center on the theme of functional natural materials that are bound to challenge the status quo of structural systems in high-rise buildings. This discussion will be presented by Michael Ramage (University of Cambridge), who is a research leader in functional natural materials in particular, of engineered timber and bamboo for high rise structures. The session will conclude with a

talk by Jenny Sabin (Cornell University) on the applications of insights from biology and mathematics to the design of material structures.

As population concentration in urban settings rises, we can safely anticipate that vertical densification at unforeseen scales will continue to grow exponentially. Addressing the role of fundamental research and development in potentially transformative models for rendering mega-tall buildings in true synergy with nature while promoting health and overall urban quality of life is critical for our future.