October 2017
Complexity Community Sharing Session

11 Oct (Wed) 11.00am – 1.00pm
Seminar Room 102
Blk 1 Innovation Centre, Level 1 (opposite The Hive), NTU
16 Nanyang Drive, Singapore 637722

Urban skylines: Building heights and shapes as measures of city size

The shape of buildings plays a critical role in the energy efficiency, lifestyles, land uses and infrastructure systems of cities. As most of the world's cities continue to grow and develop, understanding the detailed interplay between the characteristics of urban environments and their built forms is essential to achieving local and global sustainability goals. In this talk, I will present an ongoing research project where we generated and analyzed the most extensive set of 3D city models to date, covering the geometries of more than 8.5 million buildings across 50 U.S. cities. Based on this data, we show that average building height increases systematically with city size, following theoretical predictions from economics and urban scaling theory. We also establish the allometric relationship between the surface area and volume of buildings in terms of characteristic shape parameters. This allows us to demonstrate that the trend towards higher and more voluminous buildings in larger cities decreases their average surface-to-volume ratio, suggesting potentially significant energy savings. At the same time, building's average surface-to-volume ratio increases in the downtown cores of large cities, due to shape effects and specifically to the proliferation of tall, needle-like structures. Thus, the changes in building shapes, associated real estate valuations and energy management are highly heterogeneous and require a systematic approach based on the factors that together drive the form of built environments, entangling physical, infrastructural and socioeconomic aspects of cities.

Dr. Markus Schlapfer

Markus Schlapfer is a principal investigator at the ETH Future Cities Laboratory in Singapore, where he leads the Urban Complexity group within the Big Data-Informed Urban Design project. He also holds an appointment as adjunct assistant professor at NTU, within the School of Computer Science and Engineering. He received his PhD in 2010 from ETH Zurich (Switzerland) at the Department of Mechanical and Process Engineering, and conducted postdoctoral fellowships at the Santa Fe Institute, USA, and at MIT, USA.

His main research goals are the derivation of quantitative, predictive models for the organisation of cities and its interplay with urban infrastructure networks. He grounds his research on the increasing availability of large-scale data on human activities and applies methods from complexity science to gain a comprehensive view of the urban dynamics.

A Paradigm Shift in International Management Education

In the 21st century, there have been seismic shifts from stability to instability, from predictability to non-predictability, and from certainty to complexity in every area of life. Extraordinary political, economic, social, and technological transformations and disruptions have unleashed "tsunamis" of chaos, volatility, and complexity in all aspects of life. Key findings reveal that businesses face increasing complexity that presents both management challenges and opportunities. In fact, in the IBM study, one key finding was the significant gap between the need for complexity management and the organizational resources as well as management capabilities of businesses to address that need.

Forecasting the future, mitigating risks, and making trade-offs become more challenging as cause and effect are not linearly related and, having the same starting conditions, can produce very different outcomes depending on the dynamic interactions of components or elements in the system. In contrast to the earlier Newtonian paradigm which viewed organizations as being stable, the complexity paradigm views organizations as unstable systems that can experience unexpected or disruptive changes. The emergence of the complexity paradigm has had a major impact on all aspects of management.

Dr. Tan Joo Seng

Tan Joo Seng is a Associate Professor of Management at Nanyang Business School. His expertise on global leadership, cultural intelligence, and international business negotiation is sought after by Fortune 500 companies. He is one of the world's leading practitioners on cultural intelligence as he was among the first to develop and conduct corporate leadership training programs based on cultural intelligence.

He is a multiple-award winning educator. He's currently Deputy Director, Renaissance Engineering Program (REP) and Academic Director (Nanyang Executive Education). He's an REP Fellow, an ACI (Asian Consumer Insight) Fellow, and an Affiliated Researcher in NTU's Complexity Institute. One of his current research areas is in complexity and management.

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