INFORMATION ARCHITECTURE OF CITIES

Urban Energy I



Information Architecture

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The story so far:

- 1. Cities are complex systems, have a metabolism that can be expressed in terms of stocks and flows
- 2. The criteria for the livability of cities are emerging
- 3. Urban climate influences livability. An Urban Heat Island is a side effect of urban planning and architecture
- 4. In the tropics, UHI, in combination with air pollution, can have a detrimental effect on livability

Value Lab Asia Computing & Visualising Big Data

Aschwanden, G., Zhong, C., Papadopoulou, M., Vernay, D. Müller Arisona, S. and Schmitt, G. 2012. System Design Proposal for an Urban Information Platform, eCAADe.







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(FCL)	FUTURE	未来
	CITIES	城市
	LABORATORY	实验室

From climate to energy

- Urbanisation changes the original climate and creates a local climate zone
- Planning and design decisions influence the urban climate
- The most direct influence is the anthropogenic energy input into the city
- How does this work?

Questions to the expert:

- Energy flows
- Heat flux and energy balance
- livability?

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Dr Matthias BERGER

Executive Coordinator, Simulation Platform of the ETH Future Cities Laboratory in Singapore

Matthias Berger received the Dipl.-Ing. degree in electrical engineering from the Otto-von-Guericke University Magdeburg (Germany) in 2006. He joined the High Voltage Laboratory of ETH Zurich (2006 - 2011) where his PhD was dedicated to modelling and optimization of multiple energy carrier systems and integration of distributed energy resources.

Matthias has studied history and philosophy of knowledge (2008 - 2011) at the Department of Humanities, Social and Political Sciences of ETH Zurich. His practical experiences include working as a project coordinator for Seed Sustainability (2007 - 2008) as well as R&D at EADS Space Transportation in Bremen and EADS Astrium in Friedrichshafen (both Germany, 2005 - 2006). Matthias is member of AAAS, IAEE and IEEE. At present he is with SEC's Future Cities Laboratory (Singapore). His research focus is simulation and visualization of energy-related issues of urban environments.

Information Architecture of Cities - Motivation

- In the next 25 years, 2 billion more people need living and working spaces in existing and new cities
- In the next 75 years, 3-4 billion more people, mostly in Africa, need living and working spaces in urban systems
- The livability of these cities will form the basis for their sustainability and resilience



Urban Metabolism

Understand the city as a dynamic and complex system

Read and model this system in terms of Stocks and Flows

Recognize Urban Stocks as basic elements of the urban metabolism and as locally available resources



Stocks and Flows

Stocks are entities that rest. Flows are entities that move.

People, materials, air, water, food, health, space, finances, data and information are examples for stocks and flows in the urban context.

They interact with each other in the city as a complex system.





Complex Systems

Complexity science helps to model Systems in economics, physics, biology, chemistry, and others.

More recently, architecture and urban systems - in particular, urban networks - have become an area of interest for complexity science.