

INFORMATION ARCHITECTURE OF CITIES

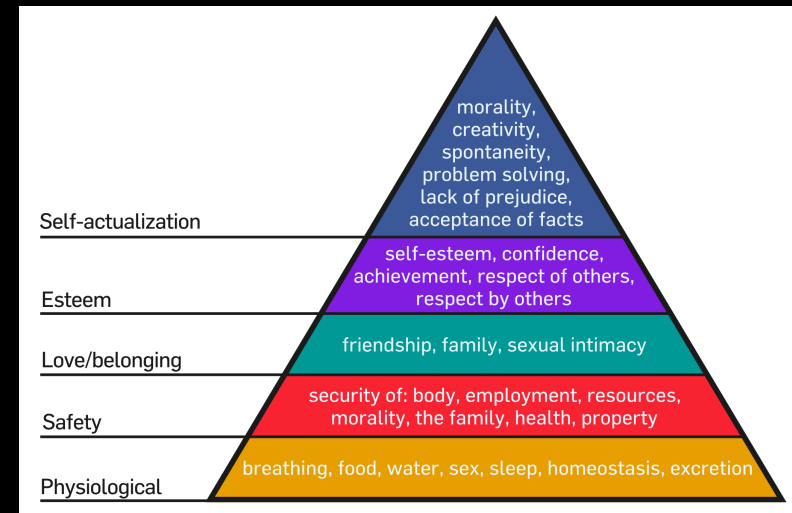
The story so far:

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. In terms of stocks and flows of people, cities around the world behave the same since antiquity: +100% of inhabitants → +115% of economic development (West & Bettencourt, 2015)

Modern Eudaimonia

Models of eudaimonia in psychology emerged from early work on self-actualisation and the means of its accomplishment by researchers such as [Erikson](#), [Allport](#), and Abraham [Maslow](#). The psychologist C. D. Ryff highlighted the distinction between *eudaimonia wellbeing*, which she identified as psychological well-being, and *hedonic wellbeing* or pleasure. Building on Aristotelian ideals of belonging and benefiting others, flourishing, thriving and exercising excellence, she conceptualised eudaimonia as a six-factor structure:

- 1 Autonomy
- 2 Personal growth
- 3 Self-acceptance
- 4 Purpose in life
- 5 Environmental mastery
- 6 Positive relations with others.



Maslow's Hierarchy of Needs

Table 1: Human Development Index and its components

[Download all data](#)

Table 1: Human Development Index and its Components

HDI rank	Country	Human Development Index (HDI) Value, 2013	Life expectancy at birth (years), 2013	Mean years of schooling (years), 2012 ^a	Expected years of schooling (years), 2012 ^a	Gross national income (GNI) per capita (2011 PPP \$), 2013	Human Development Index (HDI) Value, 2012	Change in rank, 2012-2013
Very high human development								
1	Norway	0.944	81.5	12.6	17.6	63,909	0.943	0
2	Australia	0.933	82.5	12.8	19.9	41,524	0.931	0
3	Switzerland	0.917	82.6	12.2	15.7	53,762	0.916	0
4	Netherlands	0.915	81.0	11.9	17.9	42,397	0.915	0
5	United States	0.914	78.9	12.9	16.5	52,308	0.912	0
6	Germany	0.911	80.7	12.9	16.3	43,049	0.911	0
7	New Zealand	0.910	81.1	12.5	19.4	32,569	0.908	0
8	Canada	0.902	81.5	12.3	15.9	41,887	0.901	0
9	Singapore	0.901	82.3	10.2 ^b	15.4 ^c	72,371	0.899	3
10	Denmark	0.900	79.4	12.1	16.9	42,880	0.900	0

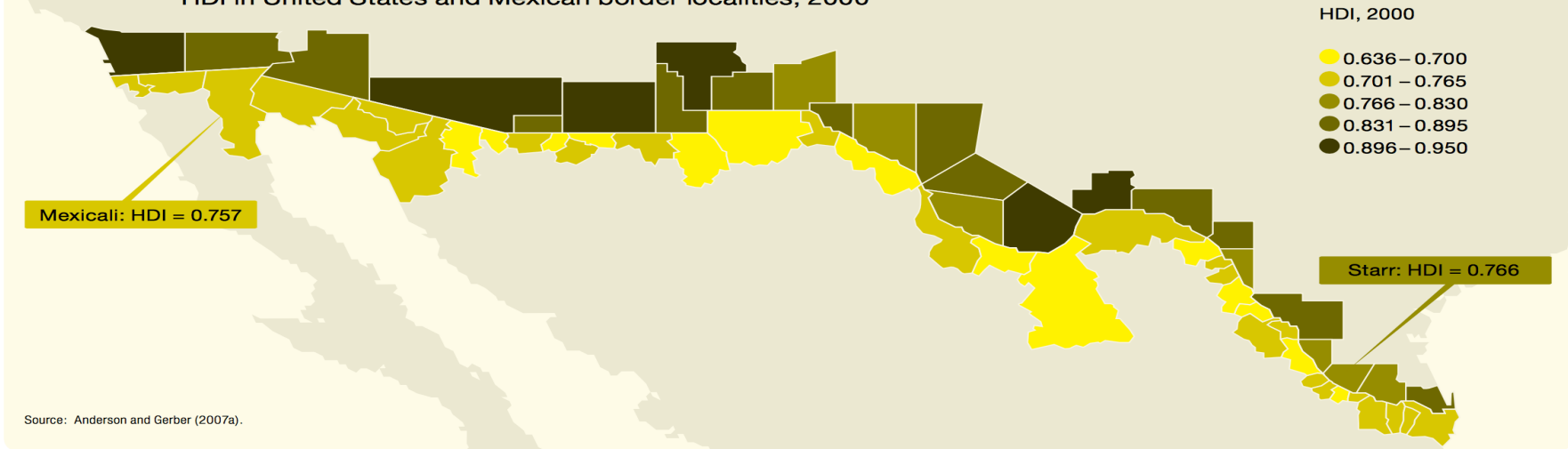
69	Turkey	0.759	75.3	7.6	14.4	18,391	0.756	0
70	Kazakhstan	0.757	66.5	10.4	15.0	19,441	0.755	0
71	Mexico	0.756	77.5	8.5	12.8	15,854	0.755	-1
71	Seychelles	0.756	73.2	9.4 ^d	11.6	24,632	0.755	-1

Human Development Index Report, 2014 UNDP <http://hdr.undp.org/en/data-explorer>

Map 1.1

Borders matter

HDI in United States and Mexican border localities, 2000



Human Development Index Report, 2009 (10)

Overcoming barriers: Human mobility and development. UNDP

<http://hdr.undp.org/en/data-explorer>

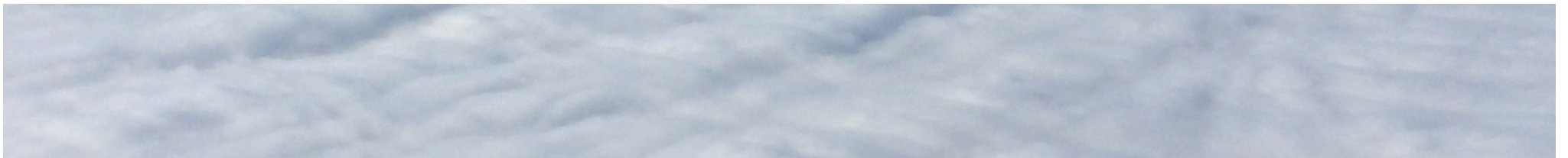
Anderson, J. B. and J. Gerber. 2007. "Data Appendix to Fifty Years of Change on the U.S.-Mexico Border: Growth, Development, and Quality of Life."

[http:// latinamericanstudies.sdsu.edu/BorderData.html](http://latinamericanstudies.sdsu.edu/BorderData.html)

The Alps, on a morning in February 2015



On a morning in February 2015, a nuclear powerplant in Switzerland from above





On another morning in February 2015, a nuclear powerplant in Switzerland from below

ETH zürich

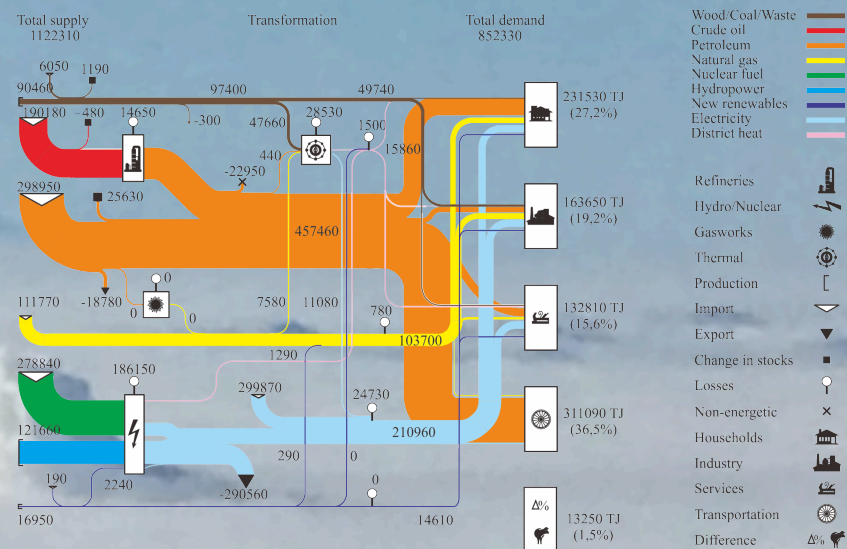
Information Architecture

Prof. Dr. Gerhard Schmitt

(FCL) FUTURE
CITIES
LABORATORY 未来
城市
实验室



Power generation and side effects – do they impact livability?

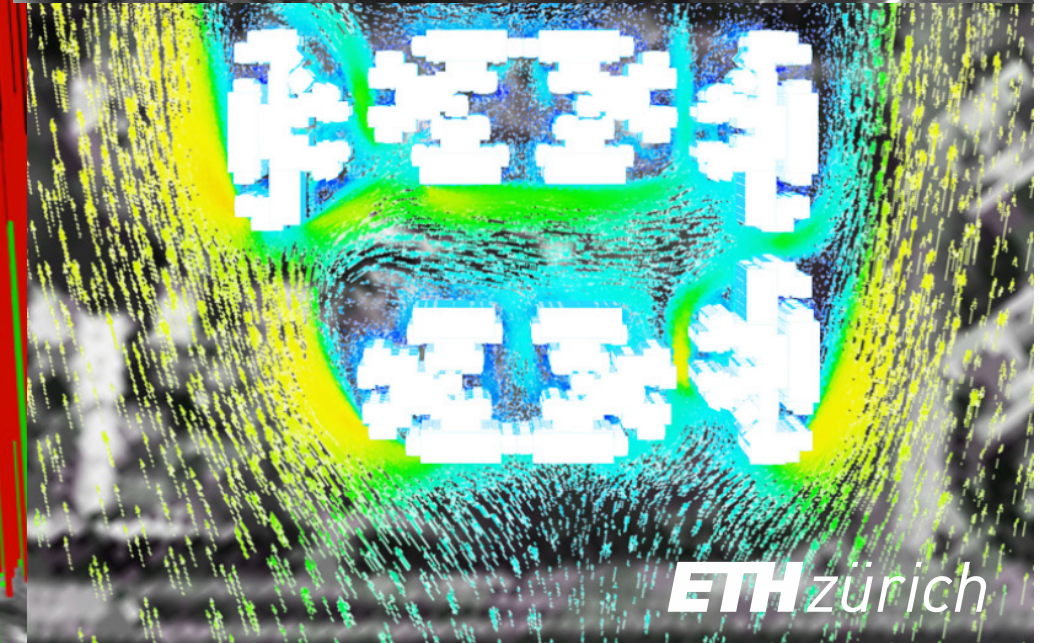


How about urban climate?

- Does it influence livability?
- If yes, how?
- Is it possible to change it?
- What are the drivers of change?

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.

ETH zürich



Prof. Dr. Jan Carmeliet

Since June 2008, Jan Carmeliet has been full professor at the Chair of Building Physics at ETH Zurich and head of the Laboratory of Building Technology of Empa, Dübendorf (Swiss Federal Lab for Materials Science and Technology).

Jan Carmeliet, born 1961 in Belgium, graduated from the Katholieke Universiteit Leuven (K.U.Leuven) in Engineering Architecture and got his PhD in Civil Engineering at K.U.Leuven in 1992, on durability of porous building materials using a probabilistic nonlocal damage mechanics approach.

His research interests concern mainly physical processes in multiscale (porous) materials, poromechanics, particle flow, flow at urban scale, materials for energy technology, computational modelling.

Welcome to one of the world's most livable cities: Zürich

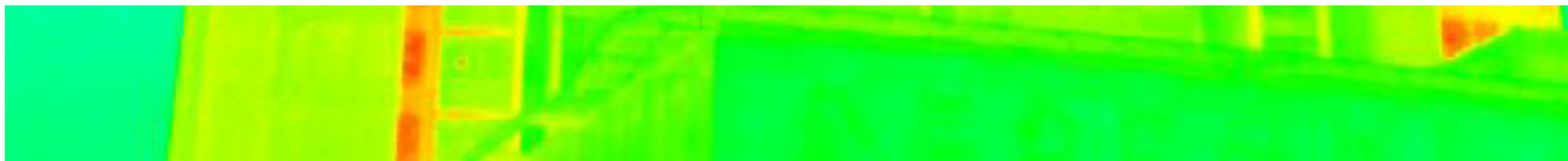


ETH zürich

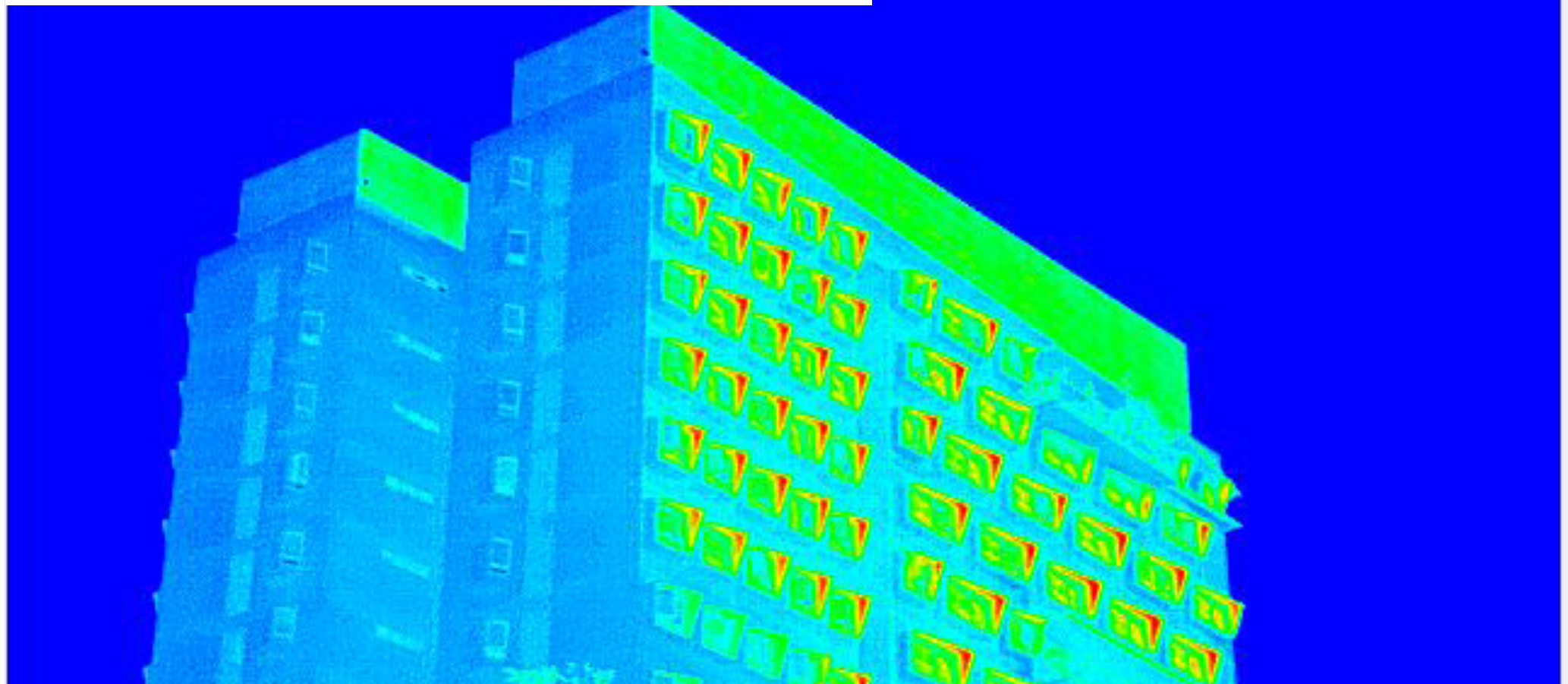
Information Architecture

Prof. Dr. Gerhard Schmitt

(FCL) FUTURE
CITIES
LABORATORY 未来
城市
实验室



Welcome to one of the world's most livable cities: Zürich



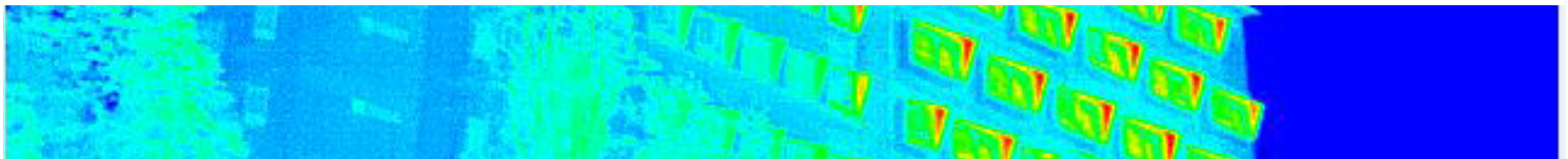
ETH zürich

Information Architecture

Prof. Dr. Gerhard Schmitt

(FCL) FUTURE
CITIES
LABORATORY

未来
城市
实验室





Welcome to one of the world's most livable cities: Zürich

ETH zürich

Information Architecture
Prof. Dr. Gerhard Schmitt

(FCL) FUTURE
CITIES
LABORATORY 未来
城市
实验室

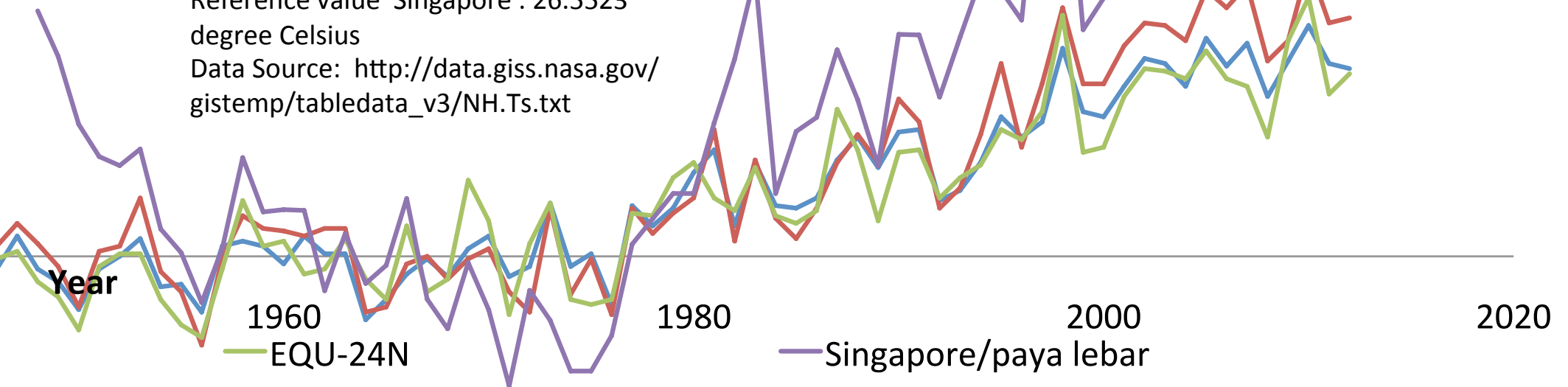
Temperature anomalies of Singapore

Temperature anomaly: The term temperature anomaly means a departure from a reference value or long-term average. (<http://www.ncdc.noaa.gov/cmb-faq/anomalies.php>)

Base period: 1951-1980

Reference value Singapore : 26.5523 degree Celsius

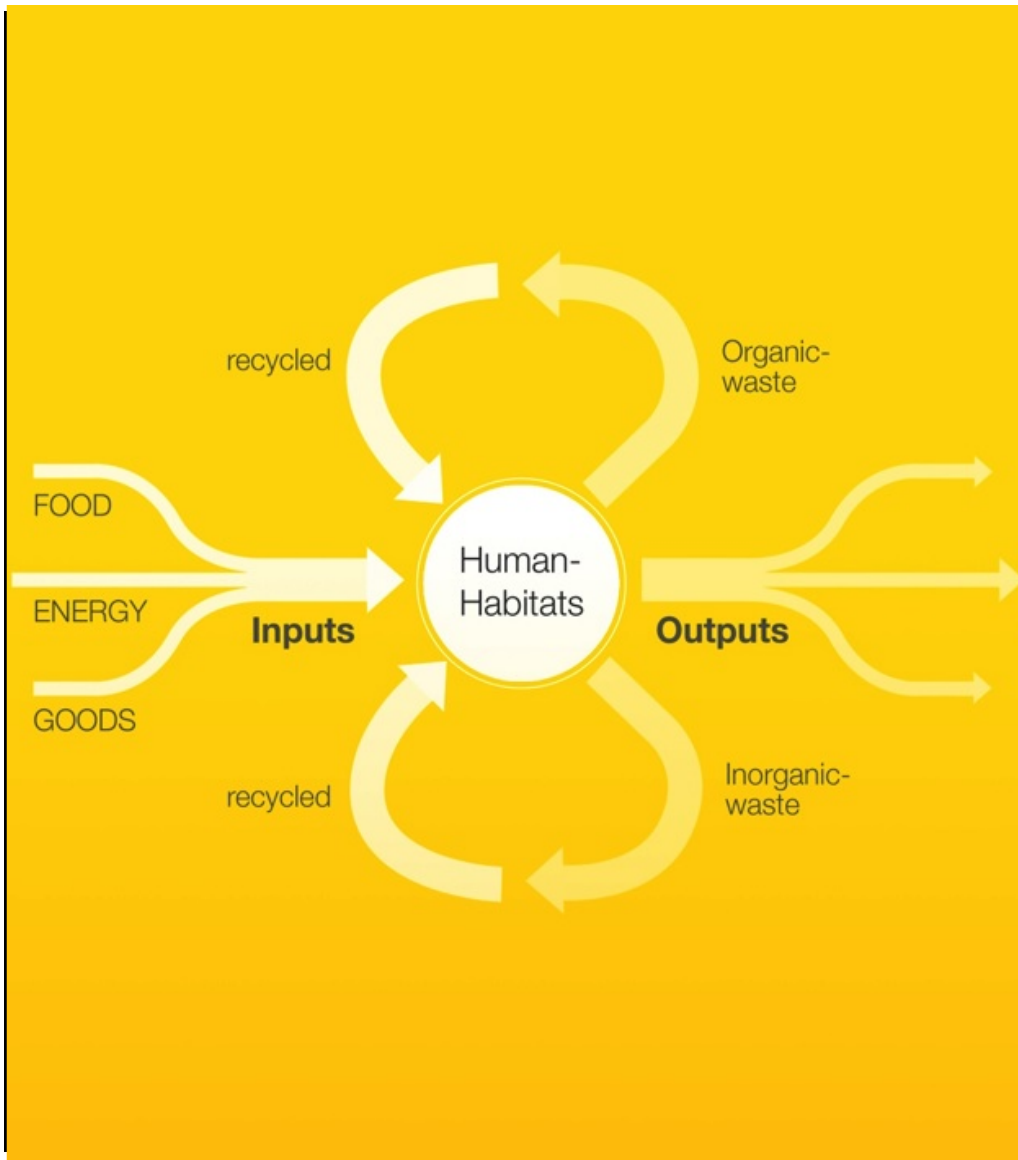
Data Source: http://data.giss.nasa.gov/gistemp/tabledata_v3/NH.Ts.txt





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

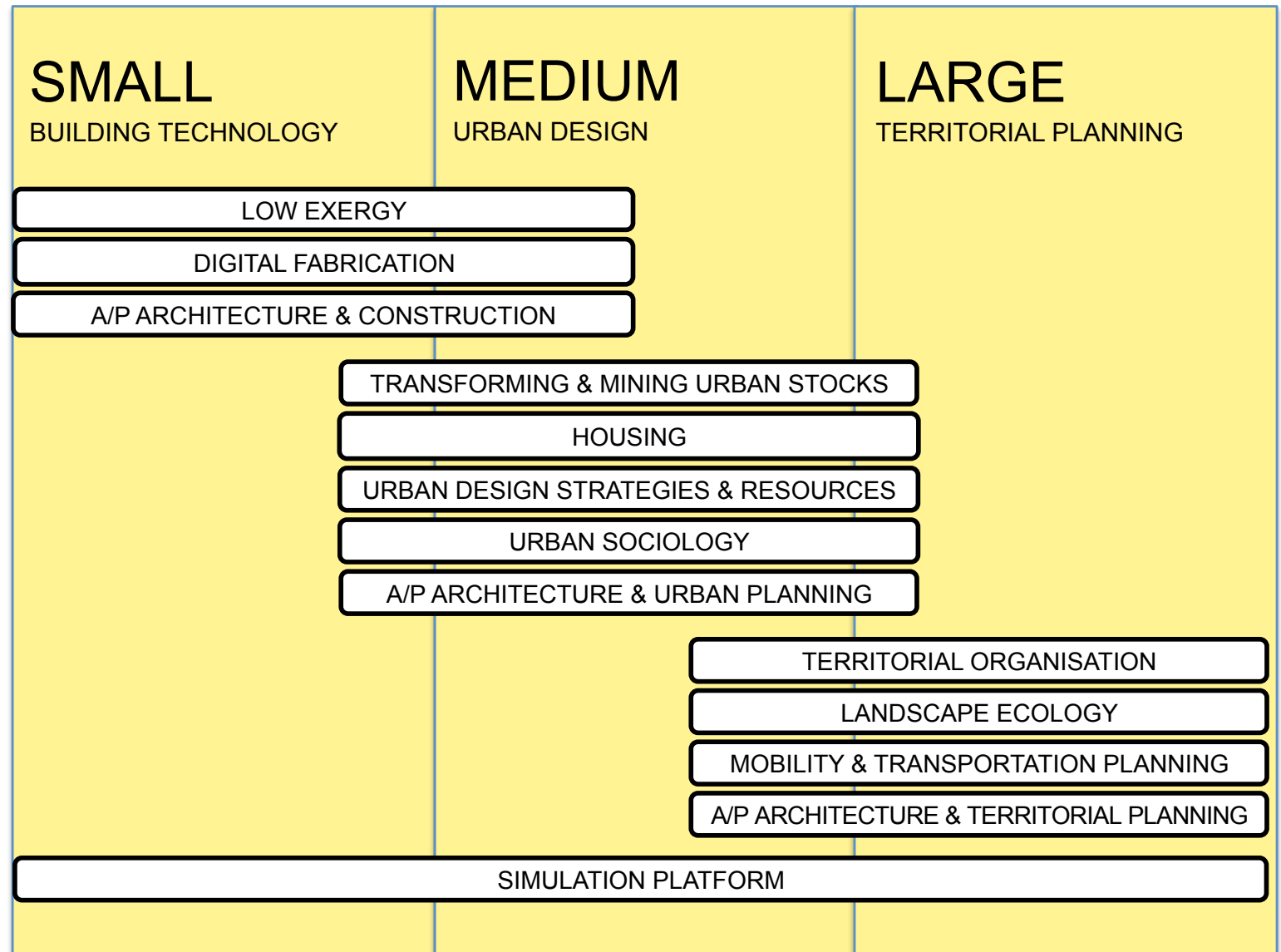
Stocks are entities that rest.
Flows are entities that move.

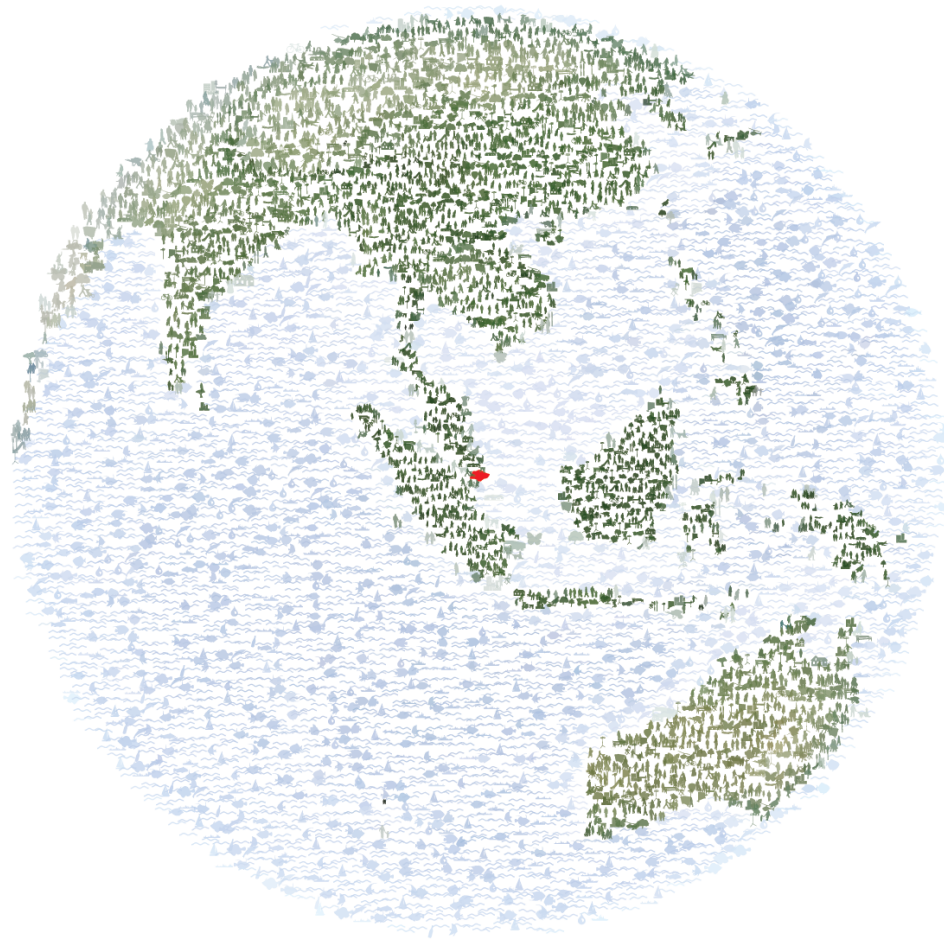
People, materials, air, water, food, health, space, finances, data and information are examples for stocks and flows in the urban context.

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

Scales, Stocks and Flows

SPACE
ENERGY
MATERIALS
PEOPLE
CAPITAL
WATER
INFORMATION





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.