SEMIZENTRAL: An integrated infrastructure concept for fast growing urban areas
Challenge 1: World Population Growth

United Nations 2017: World Population Prospects

10/23/2018
Prof. Dr.-Ing. Martin Wagner, Institute IWAR, TU Darmstadt
Challenge 2: Urbanisation

2000

Total Population: 6,127,700,428

Data: United Nations 2014, World Urbanization Prospect

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Challenge 2: Urbanisation

2015

Total Population: 7,324,782,225

Data: United Nations 2014, World Urbanization Prospect

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Challenge 2: Urbanisation

2030

Total Population: 8,424,937,474

Data: United Nations 2014, World Urbanization Prospect

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Challenge 2: Urbanisation

70% of Chinese live in cities up to 2030

Data: United Nations 2014, World Urbanization Prospect
Challenge 3: Dynamic of urban growth

Example of Shanghai: 77 C/h > 675,000 C/y

In total far more than 1 Million per week in cities!

The Speed of Urban Change (Burdett & Rode 2007, modified with Data United Nations 2014, World Urbanization Prospect

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Growth rates, e.g. Shanghai

Population growth
77 C/h $\rightarrow$ 675,000 C/y

Additional water
132 L/(C·d) $\rightarrow$ 32,500,000 m³/y

Additional solid waste
1 kg/(C·d) $\rightarrow$ 245,000 tons/y
Challenge 4: Limited Resources & Environmental Pollution

Water

Energy

Nutrients (e.g. Phosphorous)

Pollution

http://www.geograph.de, 2013


http://www.baecktrade.de, 2013

SEMIZENTRAL: Integrated treatment on district level

Semizentral contributes to “Smart Cities”:

- Growth of population and urbanisation
  - Adaptable to growth rate
  - Flexible
  - Adjusted

- Environmental Pollution and Scarcity of resources
  - Integration of the sectors wastewater, waste water and energy
  - Production of service water (toilet flushing, irrigation, …) and biosolids for agricultural use

- Enclosed construction ensures low-emission
SEMIZENTRAL: Integrated treatment on district level contributes to “Smart Cities”

Close the loop of urban water and energy demand and production via resource recovery
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