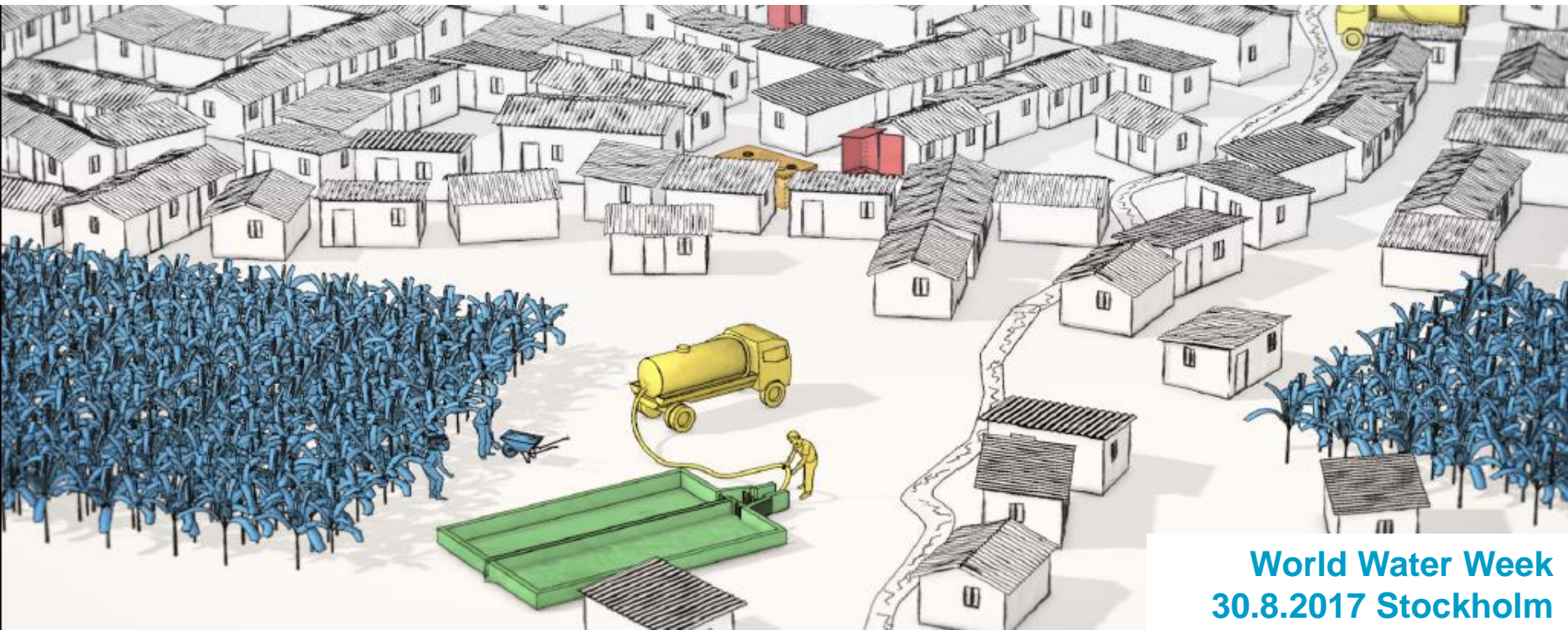


Systems thinking for sustainable urban water management

Dr. Sabine Hoffmann



World Water Week
30.8.2017 Stockholm



There is an urgent need to develop more flexible, cost-effective and resource-efficient systems



... 844 million people without access to improved drinking water



... 2.3 billion people without access to improved sanitation

Guiding principles

- **Adopting a systemic view** – integrating different systems
- **Coordinating and managing interfaces** between systems
- **Increasing water productivity**
- **Considering wastewater as a resource**
- **Realigning technologies and institutions**
- **Ensuring inclusive stakeholder involvement**

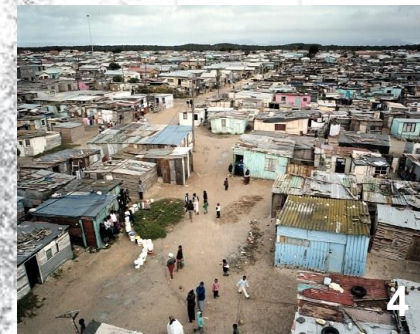
Cities are not homogeneous

Different contexts mean different challenges



3

The peri-urban interface



4

Informal settlements



6

Inner-city middle and high income settlements

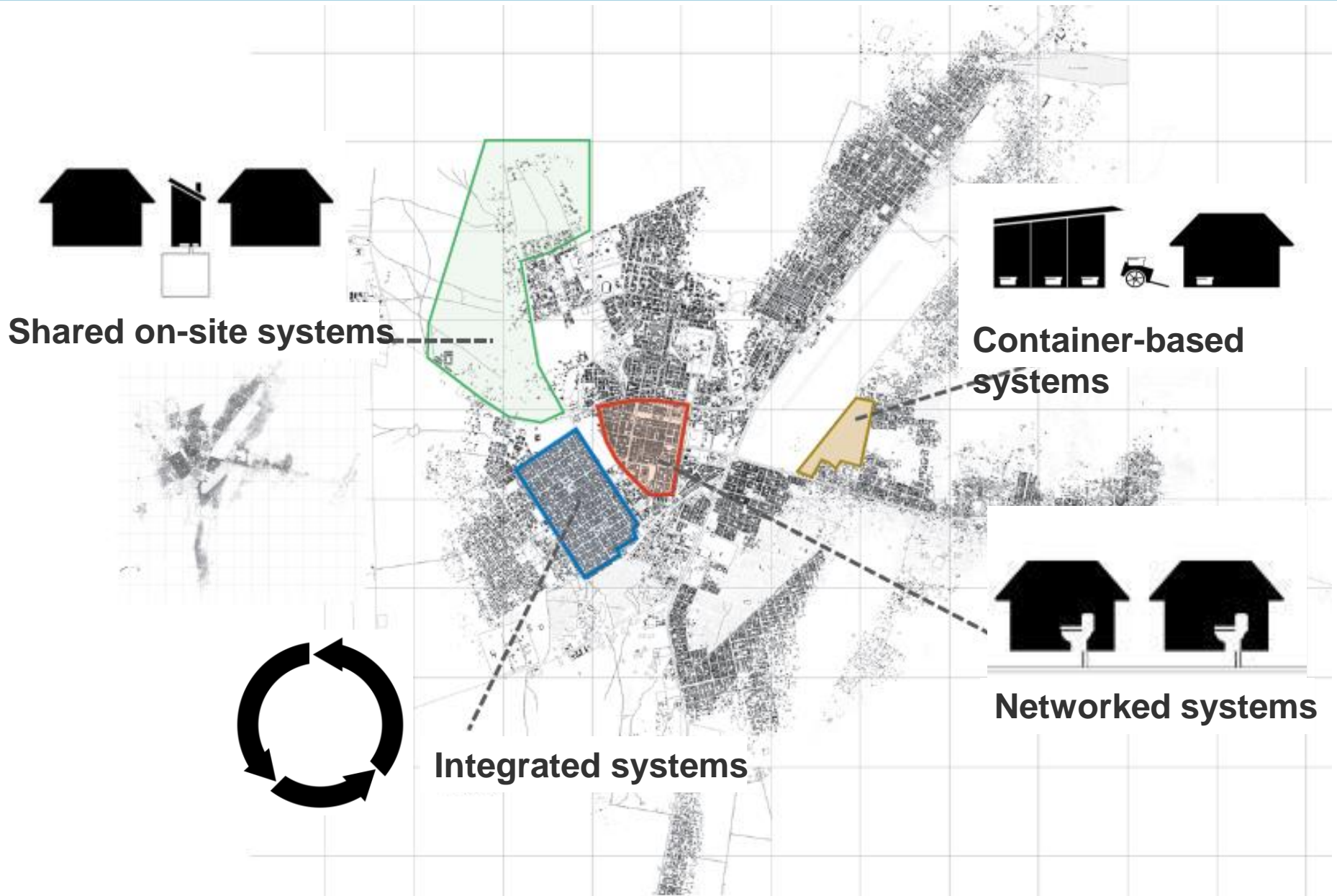


5

Planned urban development areas

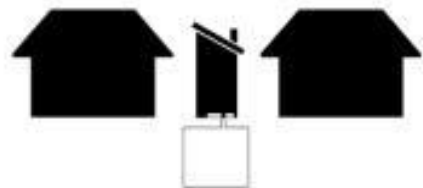
Lüthi et al., «Sustainable sanitation in cities – a framework for action.» (2011)

Different contexts mean different solutions



Guiding principle 1

Adopting a systemic view – integrating different systems



Shared on-site systems

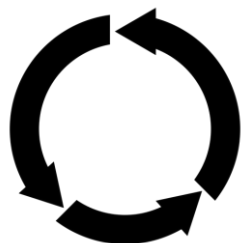


Container-based systems

Water supply

Sanitation

Stormwater drainage

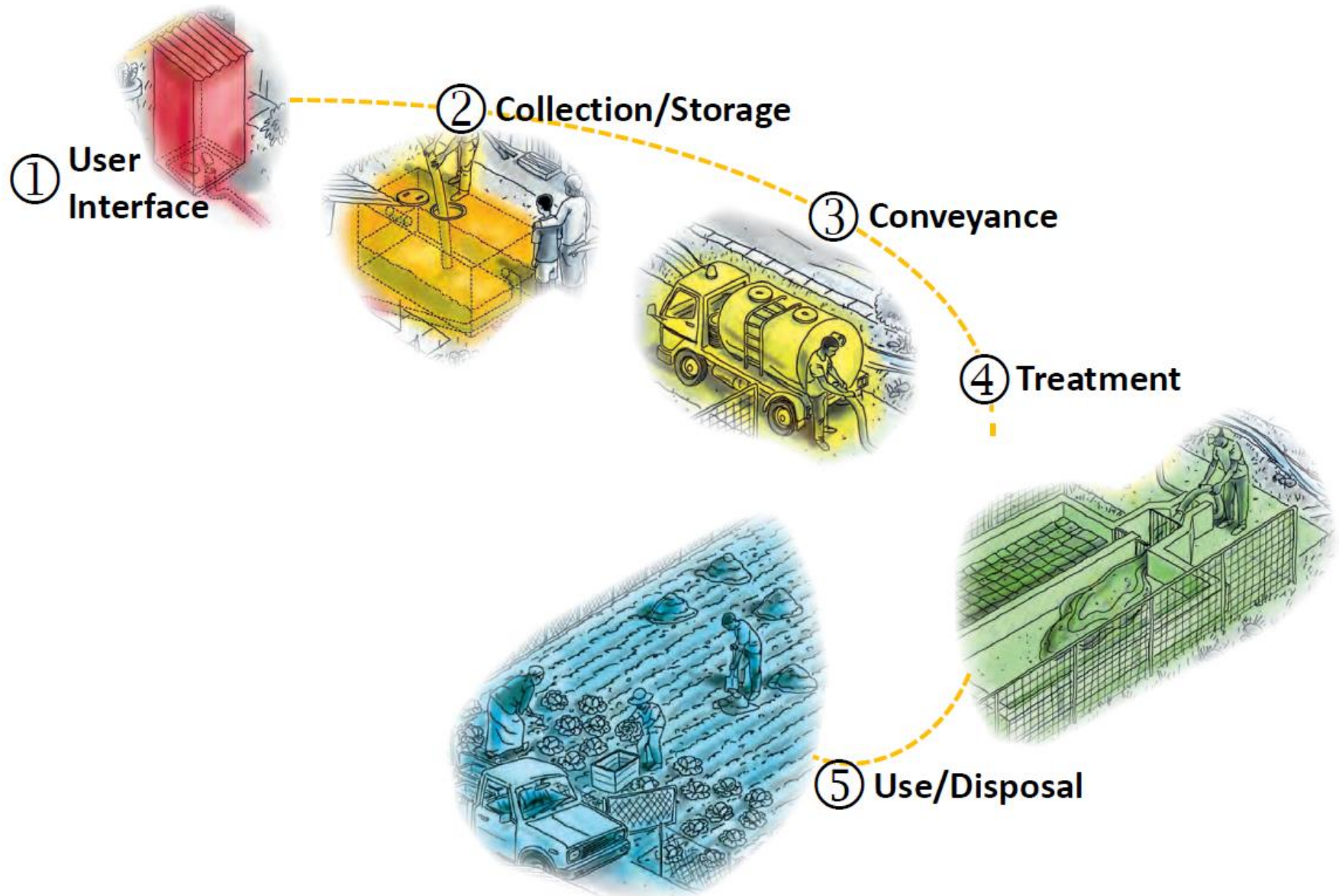


Integrated systems



Networked systems

Considering the whole value chain



Identifying different stakeholder groups

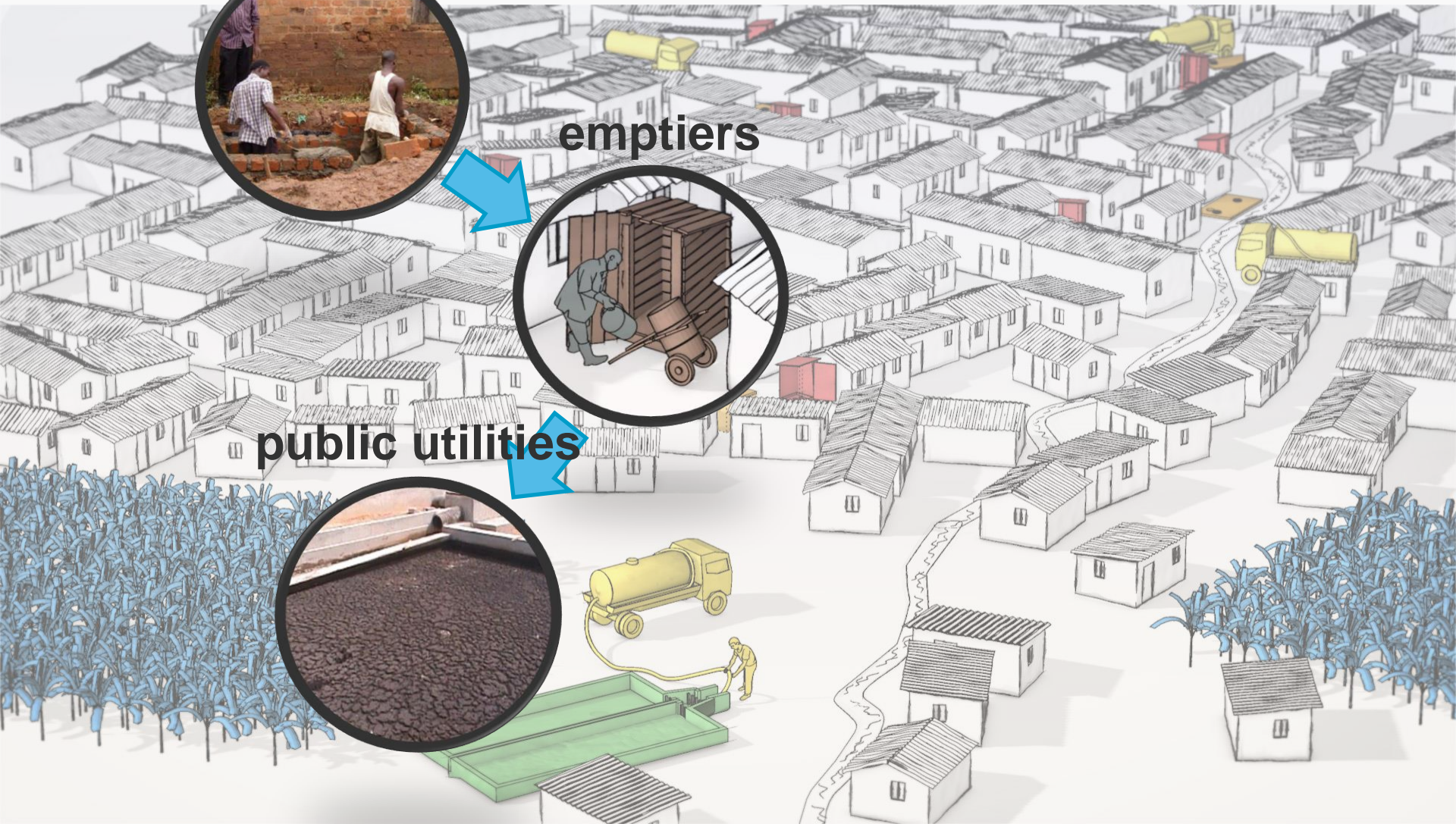
builders



emptiers



public utilities



Guiding principle 2: Coordinating and managing interfaces



Between...

- parts of the water and sanitation systems
- different water and sanitation systems
- different components of the water cycle

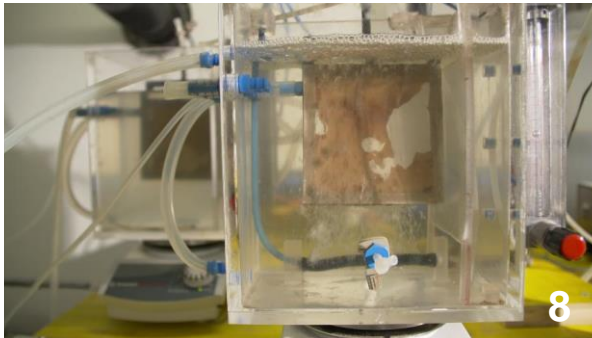


**Centralized management
of decentralized schemes**

Guiding principle 3: Increasing water productivity



Reducing water waste



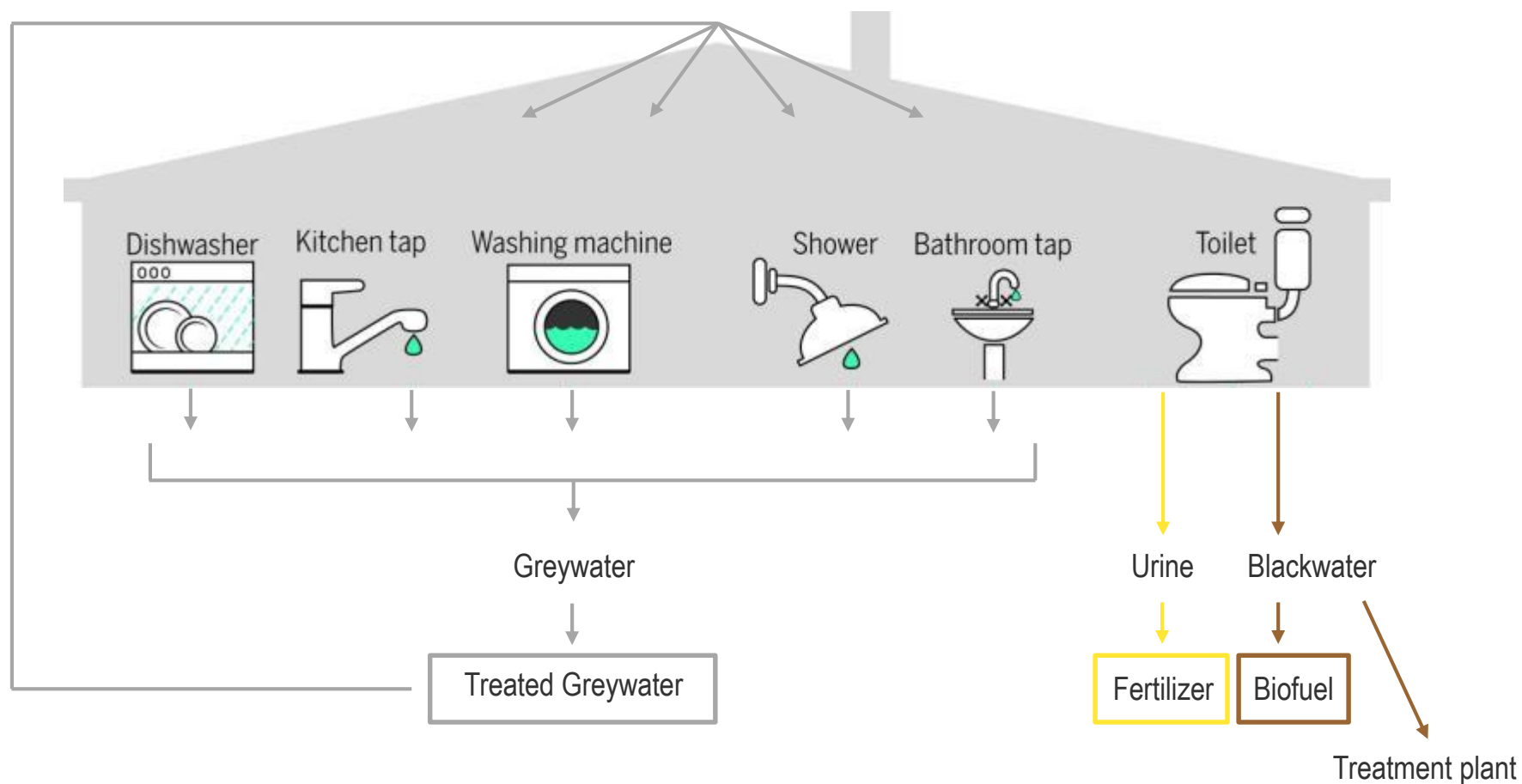
Regenerating high-quality water



Using water multiple times

Guiding principle 4: Considering wastewater as a resource

Recovering water, energy and nutrients



Guiding principle 4: Considering wastewater as a resource



NEST
Next generation of
sustainable building



**Collecting and treating
separated wastewater streams
within the building**

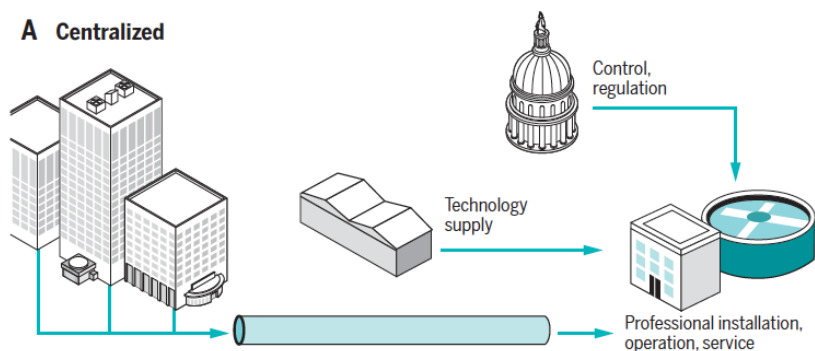


**Water, energy, and nutrient
recovery**

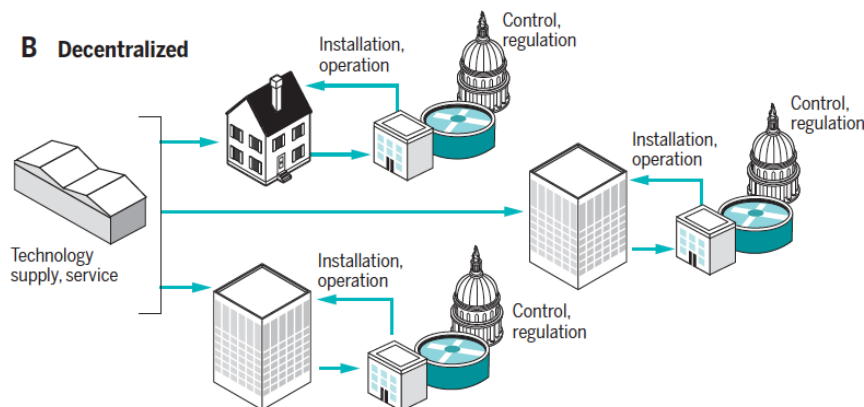
Guiding principle 5: Realigning technologies and institutions

Transition towards sustainable urban water management presupposes the co-evolution of technologies and institutions

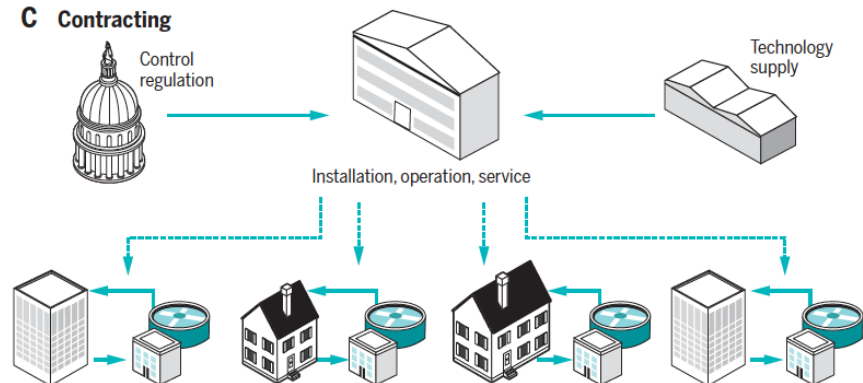
A Centralized



B Decentralized



C Contracting



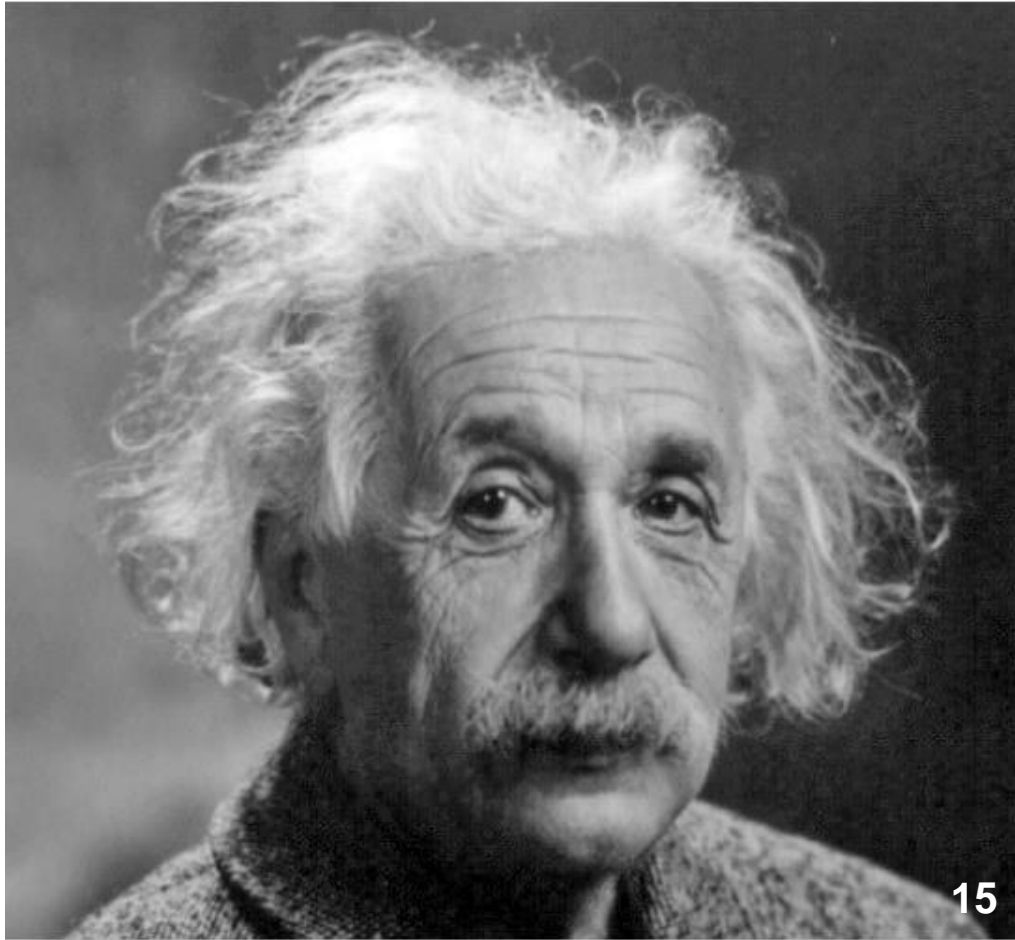
Larsen et al., «Emerging solutions to the water challenges of an urbanizing world», *Science* (2016)

Guiding principle 6: Ensuring inclusive stakeholder involvement



Co-evolution of technologies and institutions requires a sustained transdisciplinary effort by research, policy and practice to induce change





“The purest form of madness is to leave everything as it is and still hope that something will change.”

Albert Einstein

Picture credits

1-4, 6, 8, 9, 10-14: Eawag

5: Heiko Gebauer

7: Arabian Industry

9: The Planner

15: Zeitblüten