4nd International Symposium ZEBISTIS
Zero **E**mission **B**uilding-**I**ntegrating
Sustainable **T**echnologies and **I**nfrastructure **S**ystems

1st Symposium on Green Infrastructure for Future City

Green Infrastructure in future cities in Germany

Haiko Pieplow
BMUB, TU Berlin/IWF

Burkhard Schallock
Frauenhofer IPK Berlin

Peter Thomas
HATI GmbH, Berlin

Fraunhofer IPK INSTITUTE PRODUCTION SYSTEMS AND DESIGN TECHNOLOGY
Sustainable MANUFACTURING
HATI GmbH

Resource challenge

World population living in cities

2014: 50 %

2050: 70 %

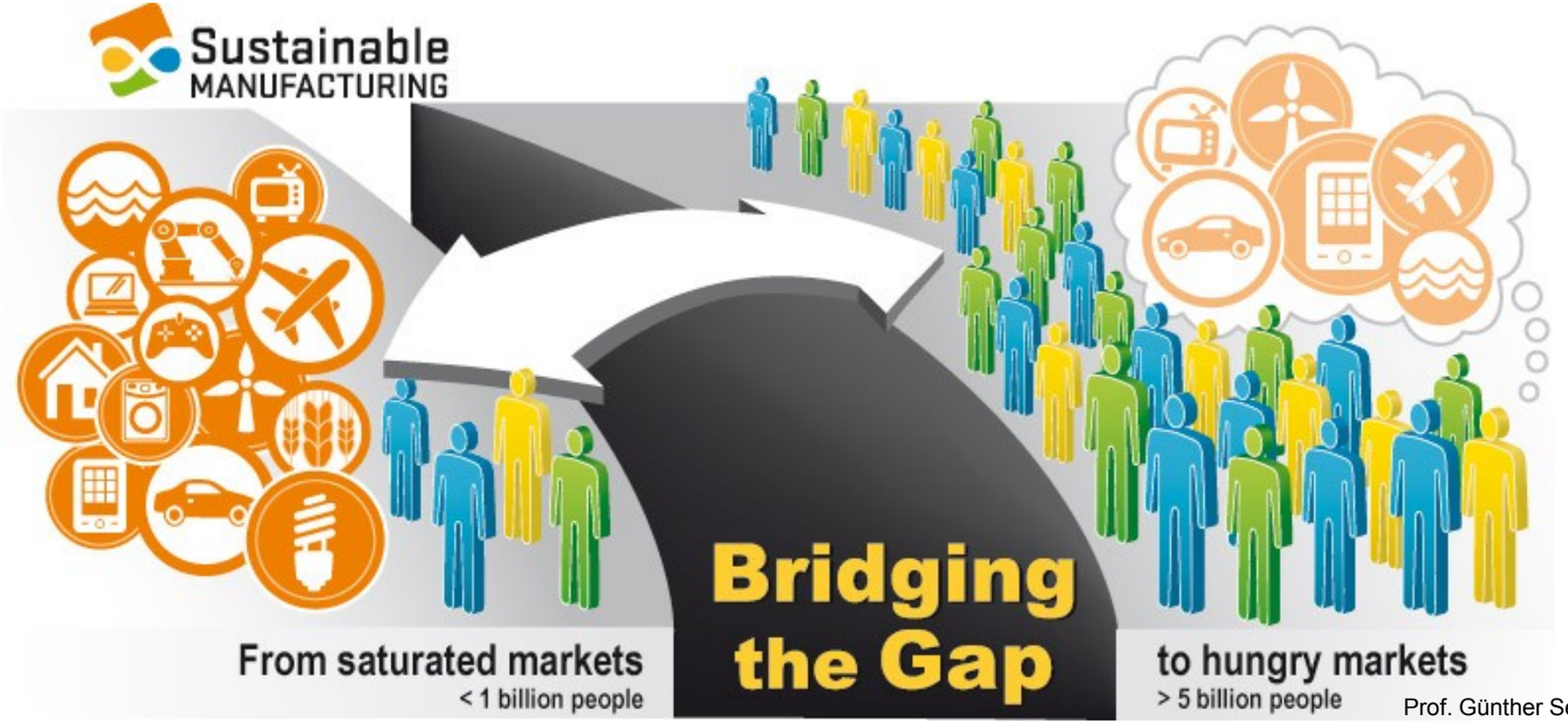
Prof. Günther Seliger

How to design buildings, quarters and cities and manufacture products and services

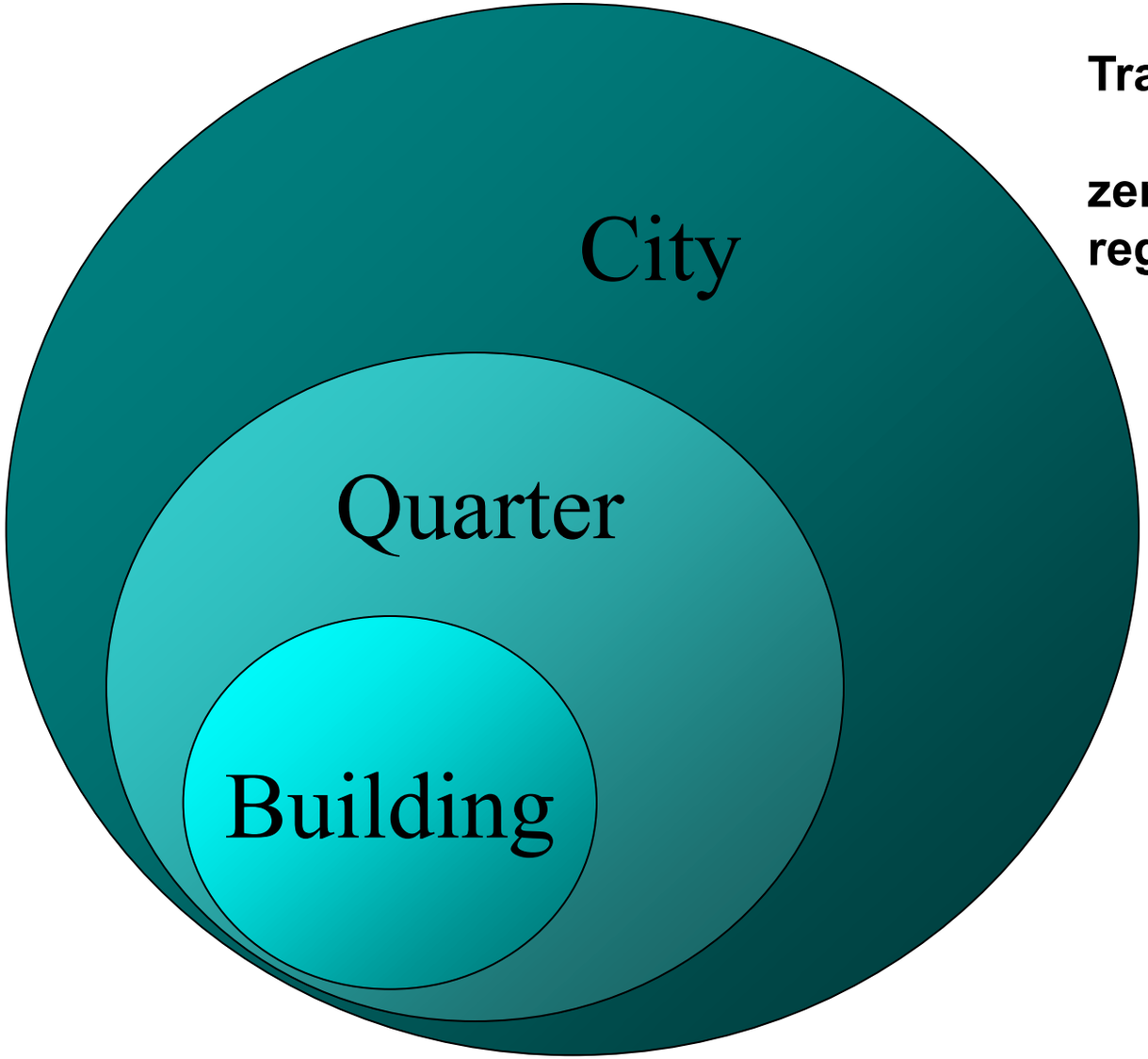
- opening up hungry markets,
- avoiding bad investments in saturated markets,
- increasing human wealth on global level within conditions of environmental resource availability

Adapt existing process paradigms

- between economies of scale and economies of scope,
- to create more benefit for more people with less resources.



Prof. Günther Seliger



Transformation strategy for future cities

zero emission strategy
regional material flow management

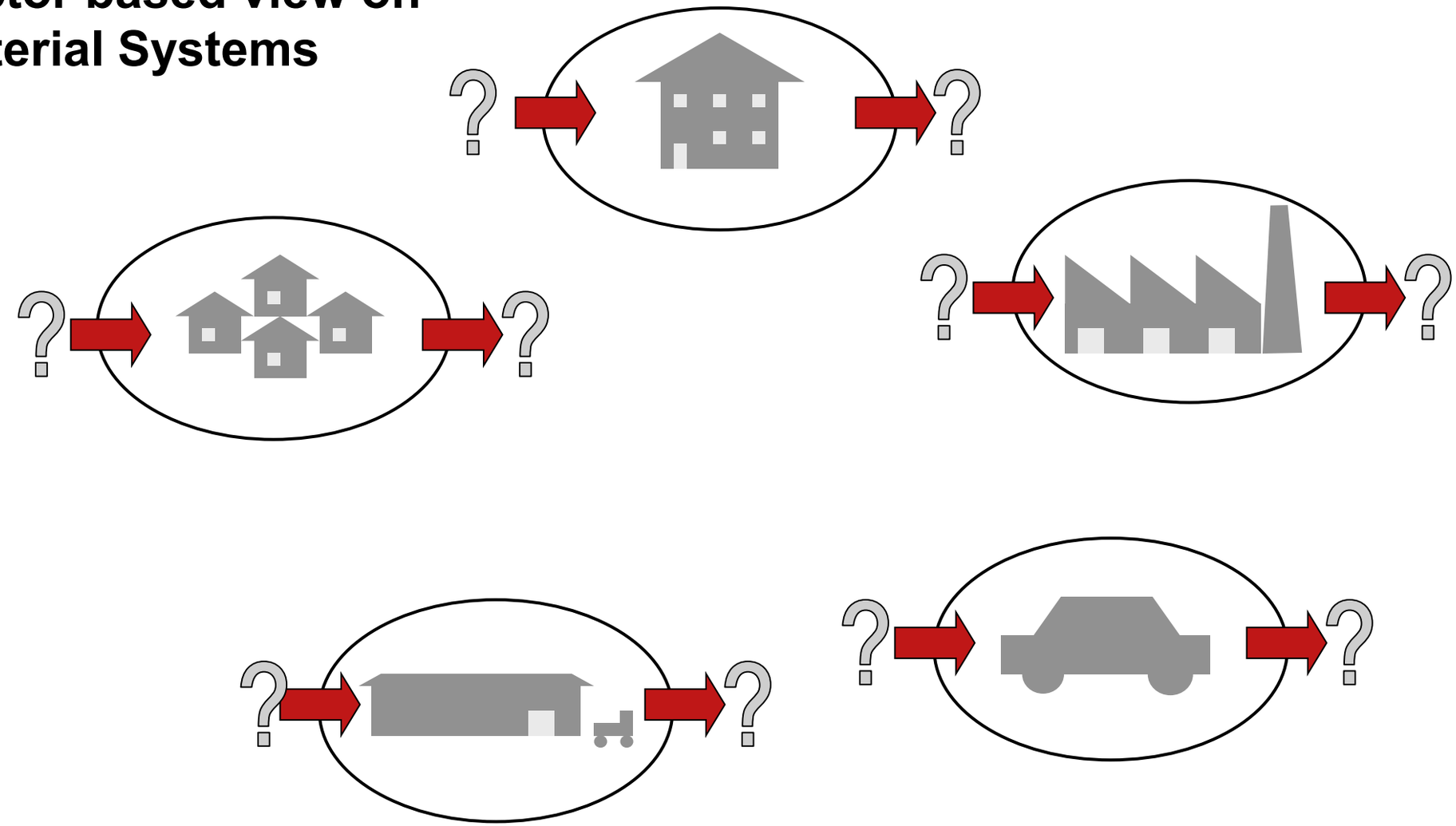
sustainable design

mixed use: living, working

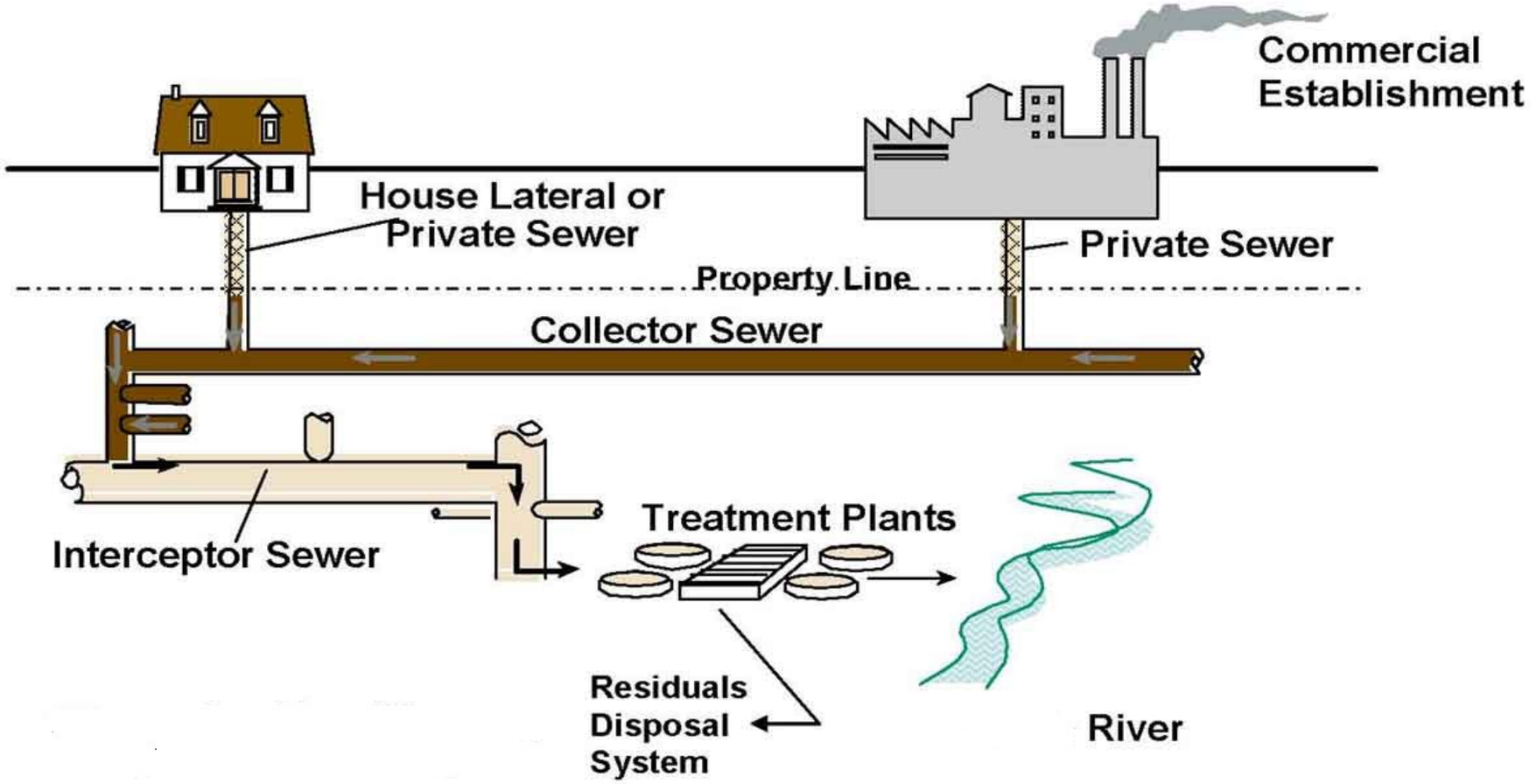
good governance
sustainable manufacturing
innovative companies
smart infrastructure

reduce,
reuse
recycling
of resources

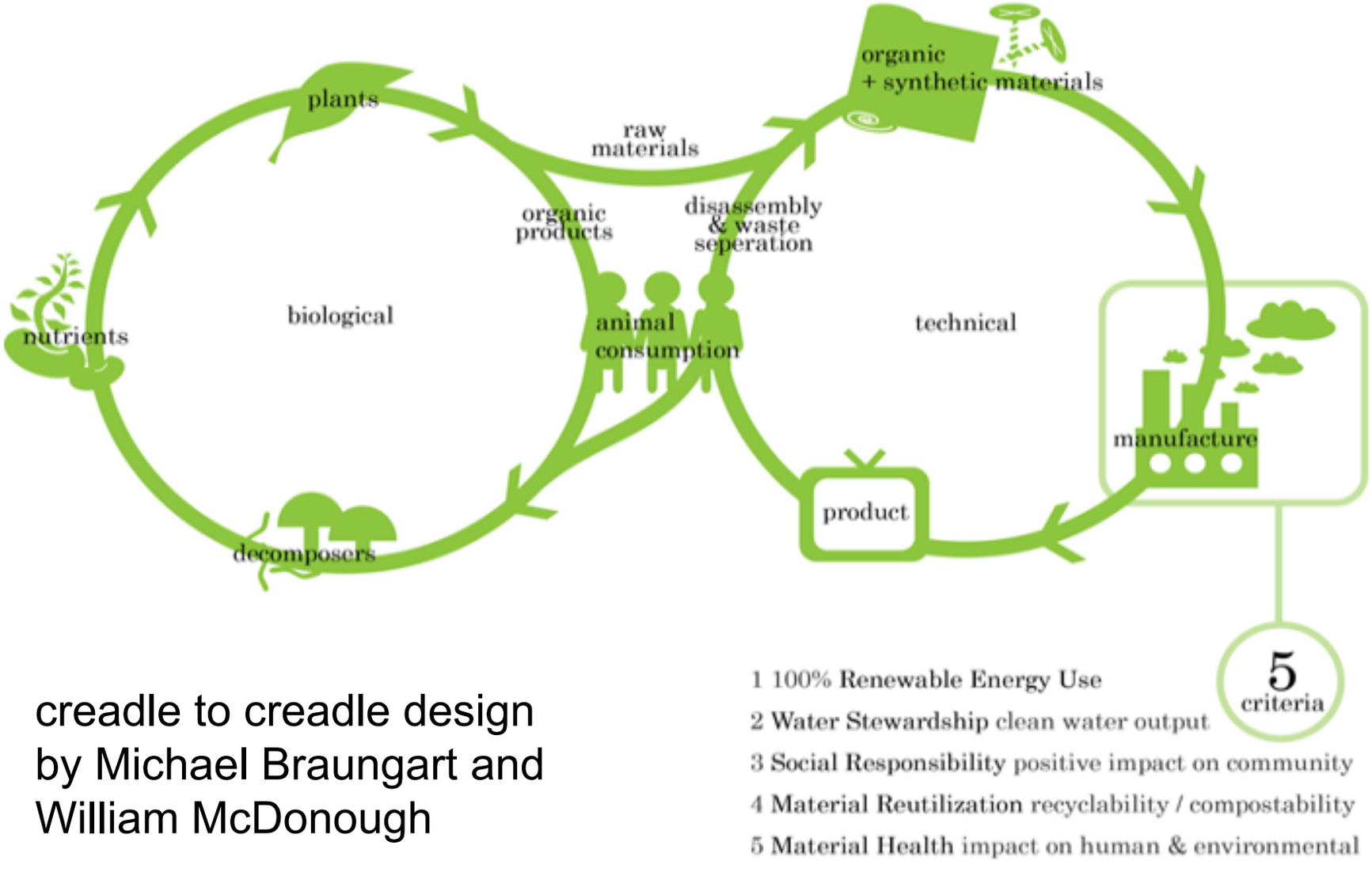
Sector based view on Material Systems



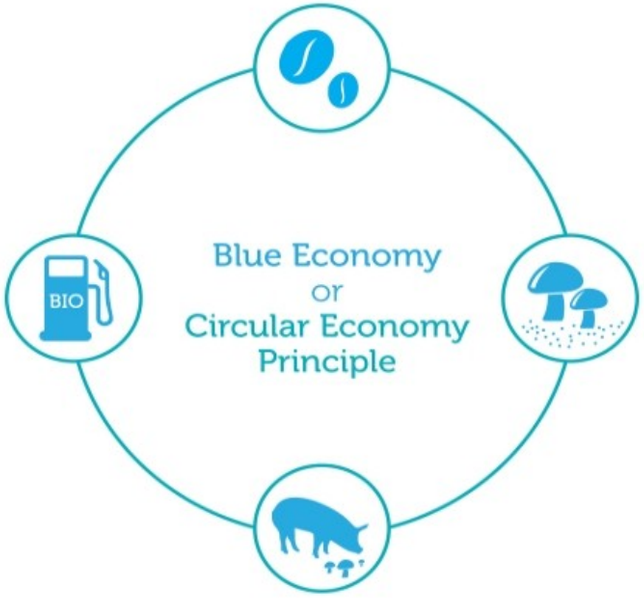
Wastewater System Overview

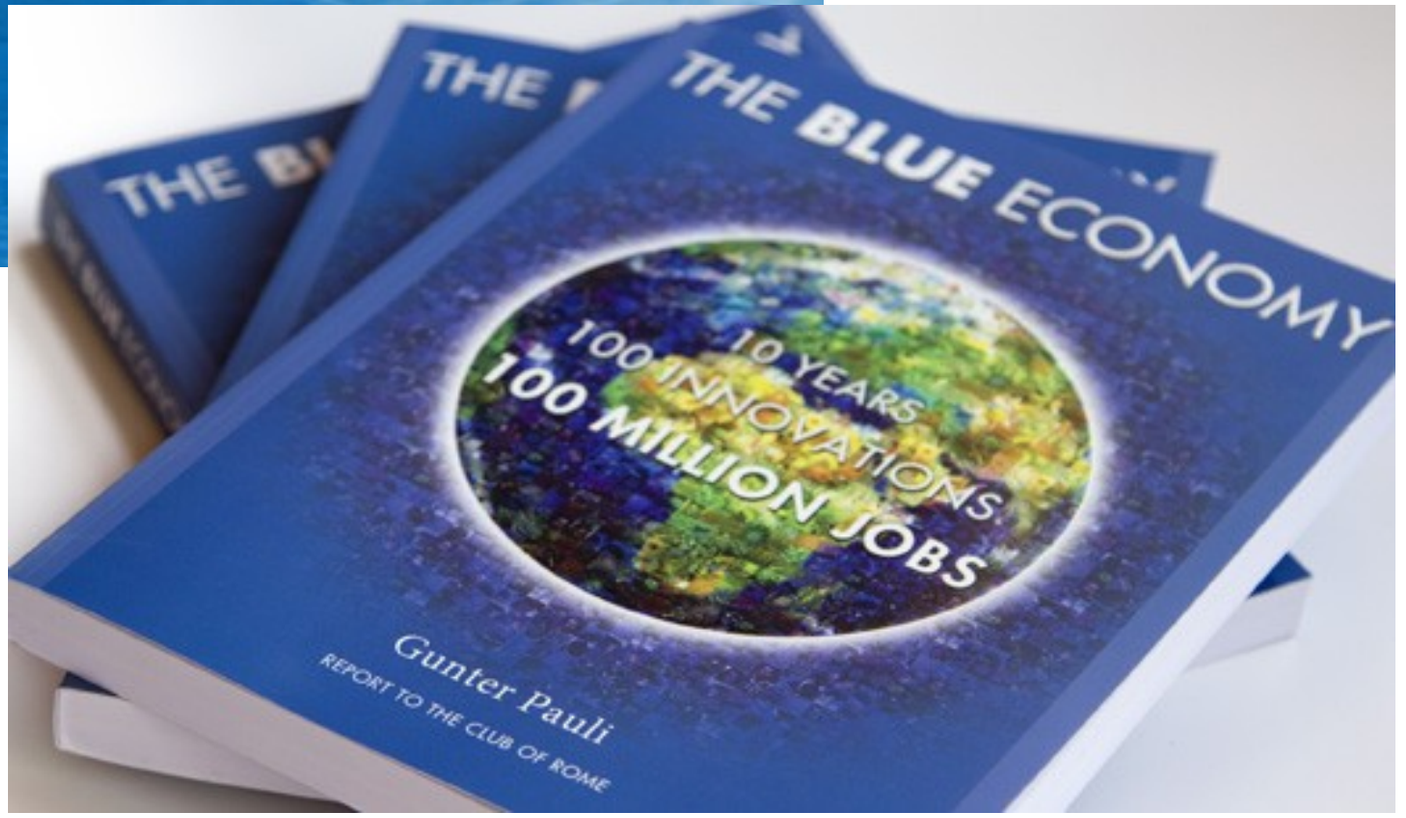


waste of resources, power and money



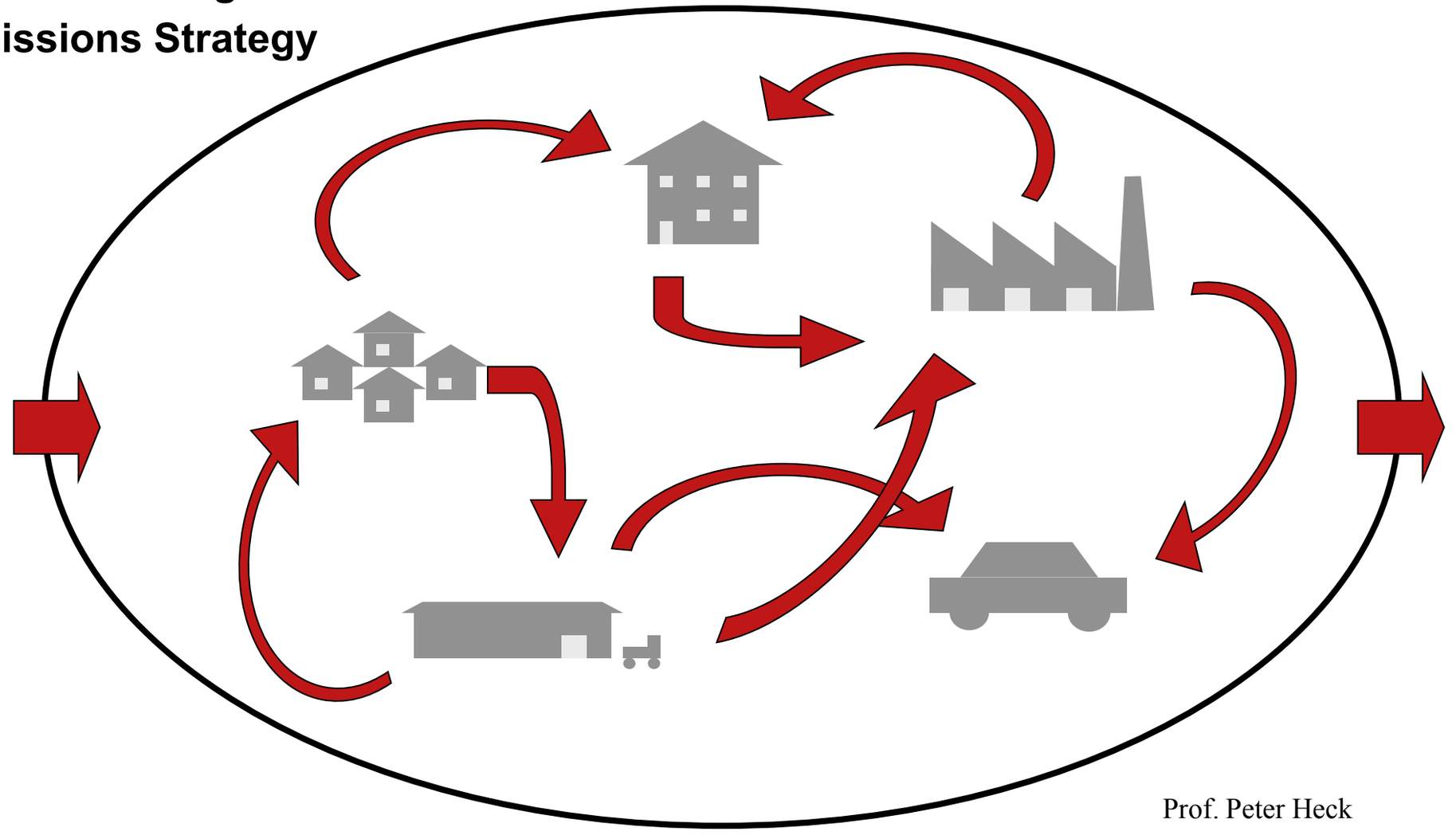
creadle to creadle design
by Michael Braungart and
William McDonough





sustainable system design by Gunter Pauli

Holistic Regional Material Flow Management – Zero Emissions Strategy

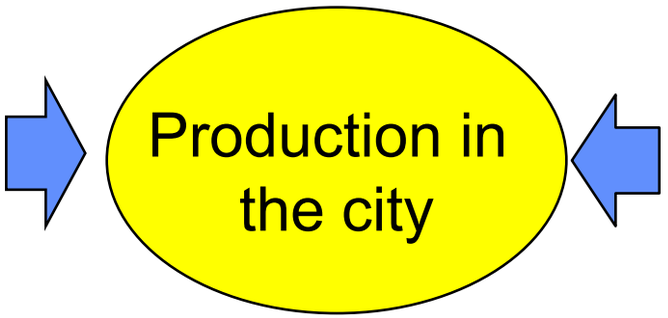


Prof. Peter Heck

Fraunhofer „Tomorrow city“ and „tomorrow factory “

Tomorrow city

- Local production
- smart city
- zero emission and quiet traffic
- energy harvesting in the city
- urban farming
- fresh air/microclimat
- water recycling



Tomorrow factory

- Value creation with resource efficiency
- Ecological suitability
- Aging society still active in production
- No emission

Zero Emission Companies in Germany

Solvis GmbH

Product: Solar-thermal-panels

Features of the factory :
•One year more planning time;
•2000 m² PV and thermal solar panels
•hanging wooden roof and wooden walls;
•large water tanks;
•Hanging flushing toilets;

Result:
•Only 15 % of heat energy consumption
•Energy plus being fed to city;
•All waste water being filtered
and fed into public biogas station

Schmalz GmbH

Product: Vacuum handling devices

Features of the factory:
•New flexible production logistcs with one piece flow, kanbans and milkrun;
•Own PV panels and own wind and water energy and an own wood pallet heating system supply more electricity than needed

Result:
•Energy plus being fed to Grid;
•Increased material efficiency, quality and short throughput time reduced procduction costs

Dubai Institute of Technology (DIT)

- Planning and development of a self-sustained research center (>100 research institutes)
- The DIT will occupy an area of 1 km2 in the first implementation phase (2009-2015)
- For the expansion (2015+) another 4 km2 are planned (Total area: > 5 km2)
- Total investment > 2 billion €
- Return on Investments < 10 years

Dubai Institute of Technology (DIT)

DIT was founded in 2008 to support Dubai in becoming a leading place in the world for R&D activities. *Fraunhofer IPK* supported DIT in creating an Ecosystem that supports Science, Technology & Innovation to lead the region towards a value-based sustainable knowledge economy.

Research Area		Major Topics	Research Institutes	Universities
W	Water	▪ Water Desalination ▪ Water Treatment ▪ Integrated Water Management		
H	Health	▪ Medical Technologies ▪ Biotechnology ▪ Health Management		
E	Energy	▪ Renewable Sources of Energy ▪ Sustainable Fossil Fuels ▪ Energy Efficient Management		
E	Engineering	▪ Production Technology ▪ Sustainable Manufacturing ▪ Engineering Management		
L	Logistics / Mobility	▪ Intelligent Transport Systems ▪ Global Logistics ▪ Logistics Management		

ECB – The Zero Emission Campus

Unique University with focus on Environmental Issues

Ecological Campus Conception

- Zero-Emission Heat and Energy Concept
- Active and Passive Utilisation of Solar Energy
- New: Zero-Emission Water Concept
- Energy Efficient Building Conception
- Educational Aspects

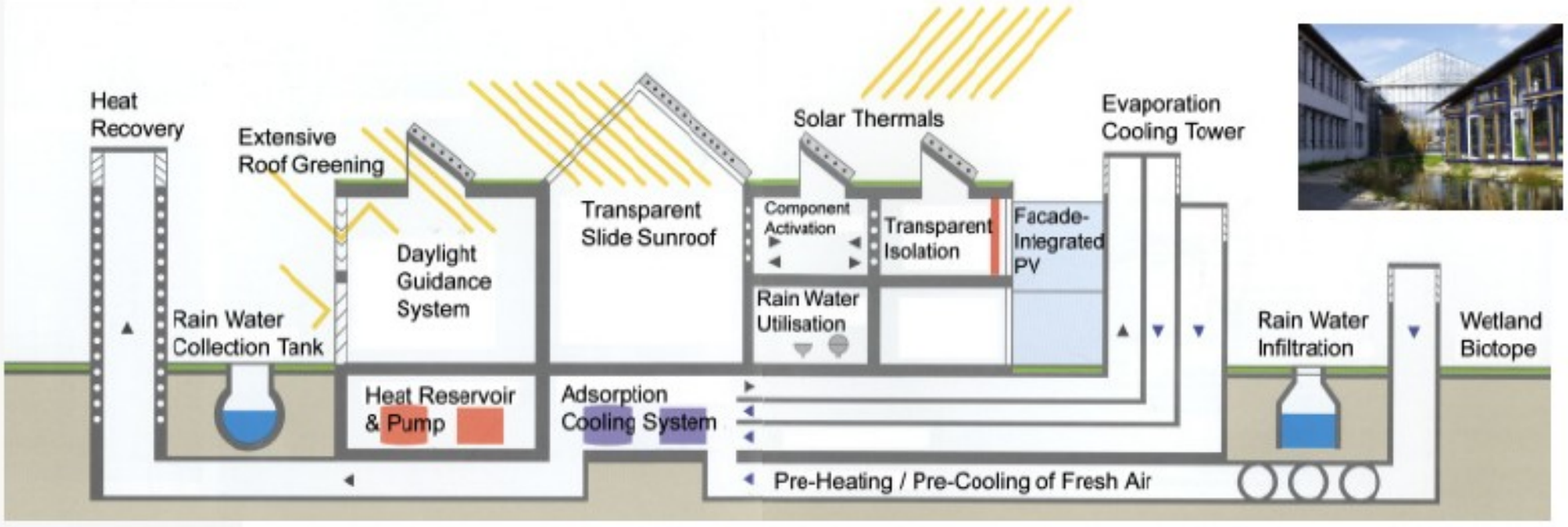
Zero-Emission-Campus Birkenfeld, FH Trier

Discover Potentials - Create Regional Added Value

Flowchart Ecological Concept







GCSM Blue Responsibility Award: Manufacturing for a Sustainable Terra Preta Sanitation System


Source: http://www.unwater.org


Source: http://www.thepolisblog.org

- Challenges
  - Sanitation is a basic need that still has to be fulfilled for a large part of humanity
    - 40% of the world's population currently lacking basic sanitation
    - Every 20 seconds, a child dies as a result of poor sanitation
  - Water-based sanitation systems are environmentally inefficient
    - High resource consumption (water, energy), heavy sewage infrastructures
    - The cycle of nutrients is broken: nutrients are not fed back to the soil, supporting use of fertilizers and soil depletion
- In order to take up these challenges, the organizers of the Global Conference on Sustainable Manufacturing (GCSM) launch on the 15.11.2013 an international competition on sustainable sanitation
  - Objective: design new closed-loop sustainable sanitation systems
  - Main criteria: ease of deployment and resource efficiency

www.gcsm.eu

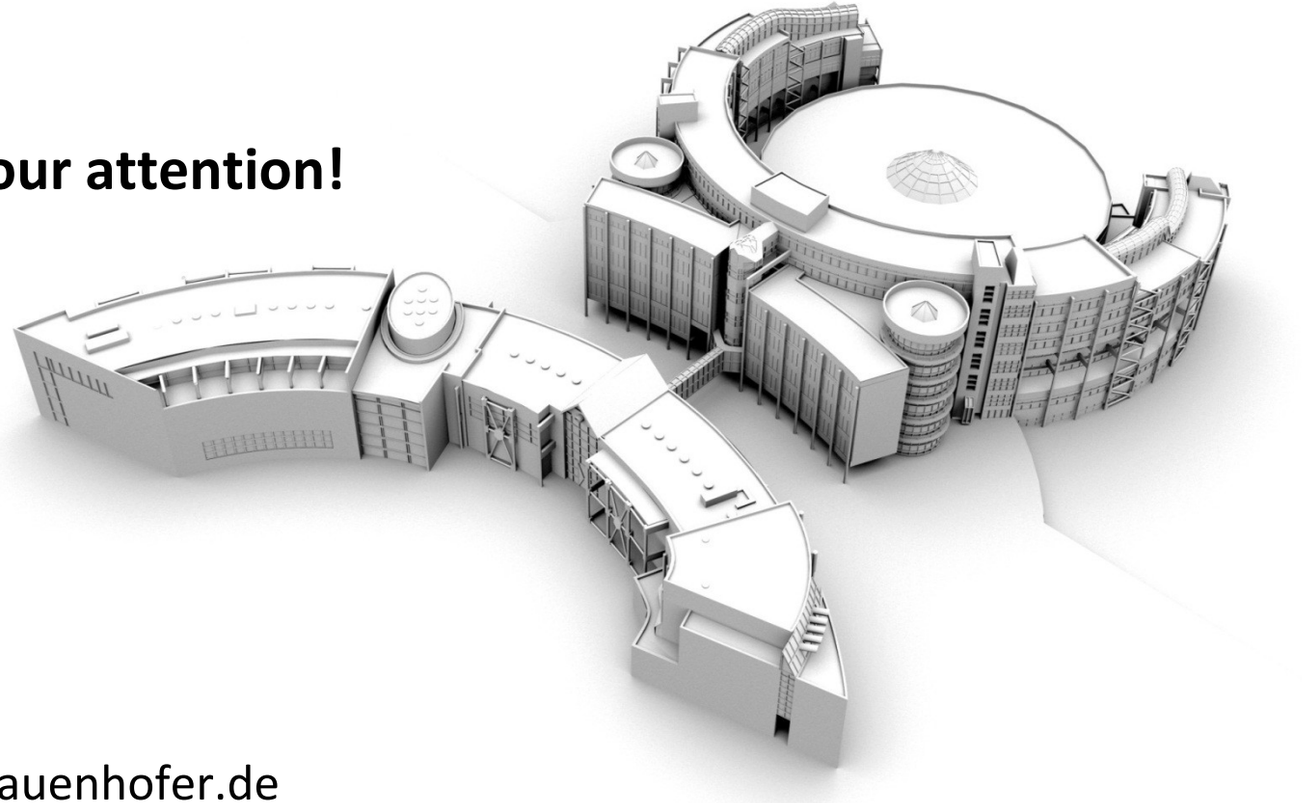
GCSM Blue Responsibility Award: Manufacturing for a Sustainable Terra Preta Sanitation System

- Requirements for submission:
  - Overall system design of the sanitation system, including toilets, excreta storage, transportation and transformation into fertile soil enabling food generation.
  - Provide a prototype (at least digital, preferably physical) for at least one of the elements of the whole chain
  - Definition of realistic business models under the motto: “make sustainable business out of shit”

GCSM

- Important dates:
  - 15.11.2013 - Official launch
  - 28.02.2014 - Registration deadline
  - 31.07.2014 - Deadline for full submission
  - 31.08.2014 - Announcement of shortlisted contributions
  - 22-24.09.2014 - GCSM Conference: presentation of shortlisted contributions and attribution of awards
- Award: 10 000 Euro
- Contact: Prof. Dr.-Ing. G. Seliger, seliger@mf.tu-berlin.de

Thank you very much for your attention!



haiko.pieplow@bmub.bund.de

burkhard.schallock-jacobi@ibk.frauenhofer.de

thomas@hati.de