Zürcher Hochschule
für Angewandte Wissenschaften

School of
Engineering
INE Institut für
Nachhaltige Entwicklung

Sustainable Development

10.05. 2016

Dr. Merja Hoppe
Institute for Sustainable
Development ZHAW

Applied research for Sustainable Development

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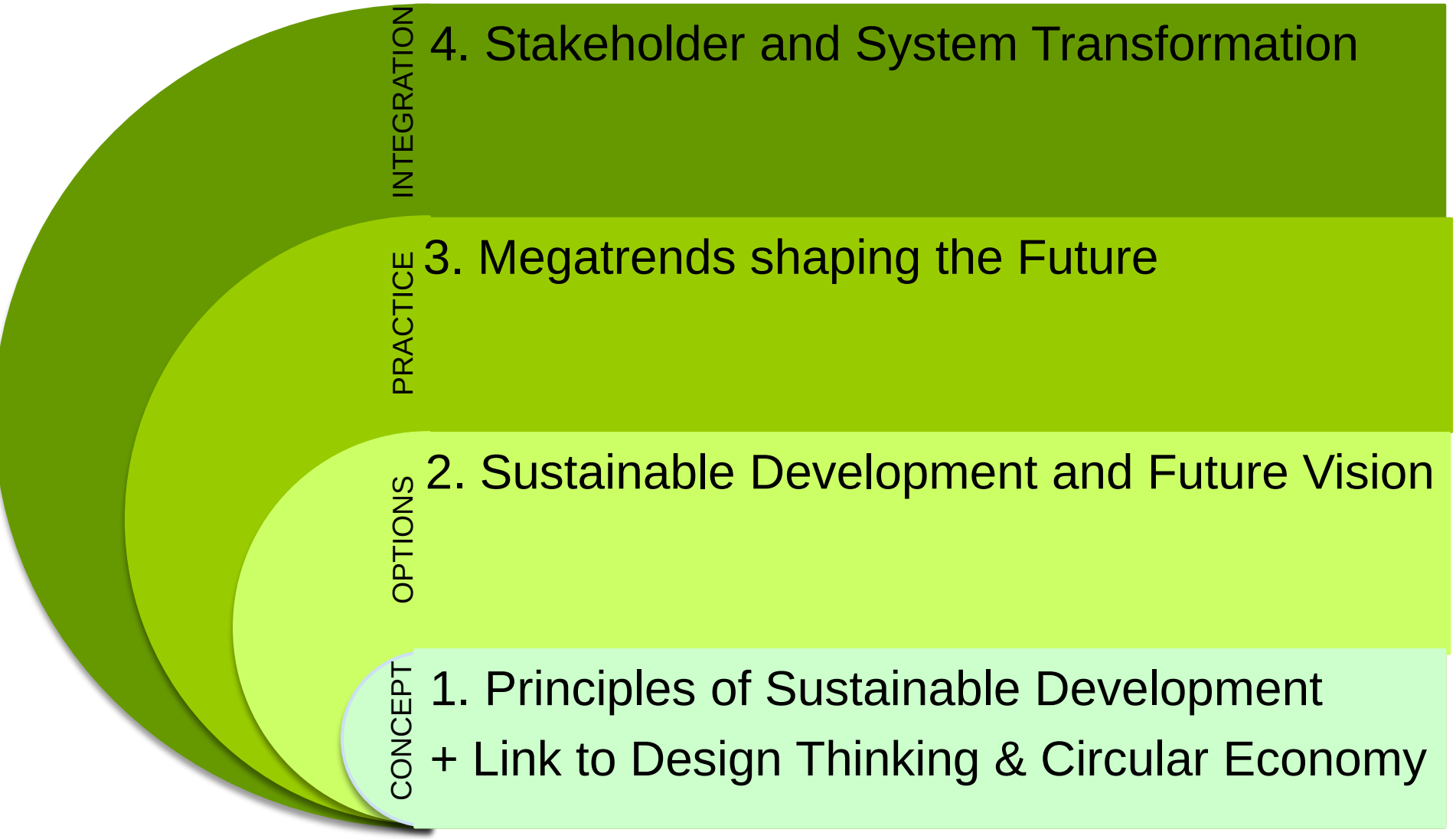

1. Guiding principles

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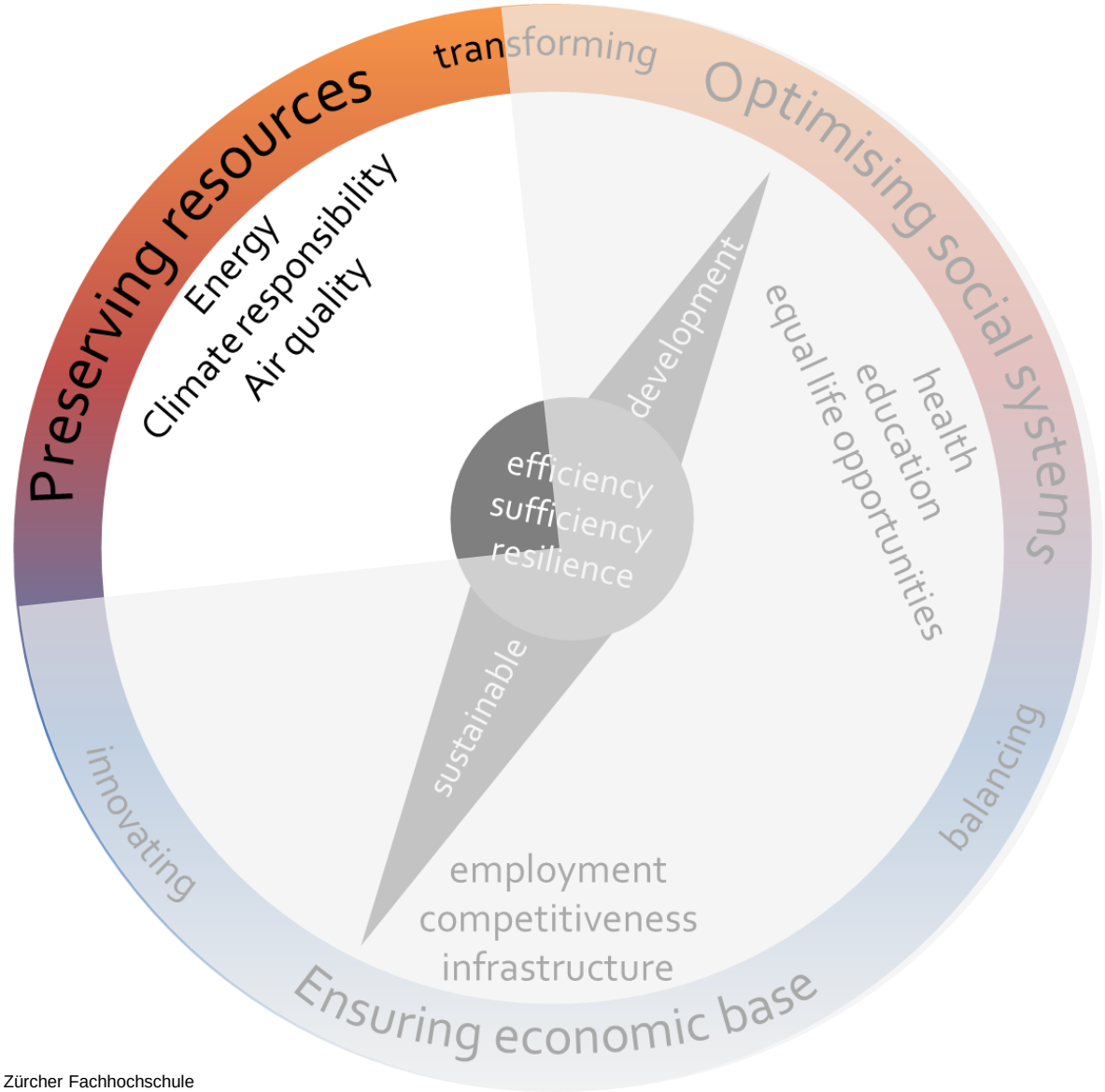

1. Guiding principles: preserving resources – energy & climate responsibility

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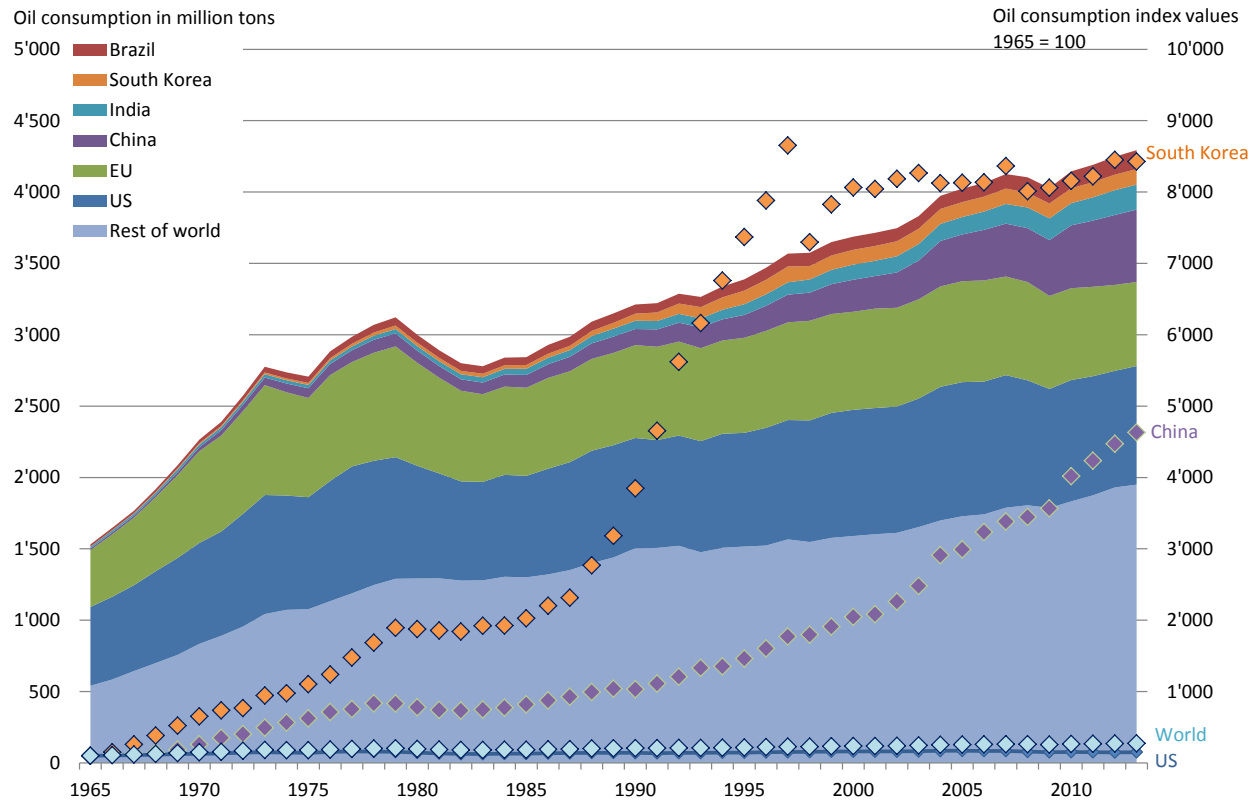

Datasource: BP 2014

Fossil energy consumption

+ GhG emissions
⇒ Temperature
⇒ Extreme wheather events
⇒ Change of precipitation
⇒ Crop yield
⇒ Sea level
⇒ Living conditions
⇒ Conflicts
⇒ Migration

+ Local air pollution
⇒ Damage to health
⇒ Quality of life
⇒ Cost

1. Guiding principles: preserving resources – air quality

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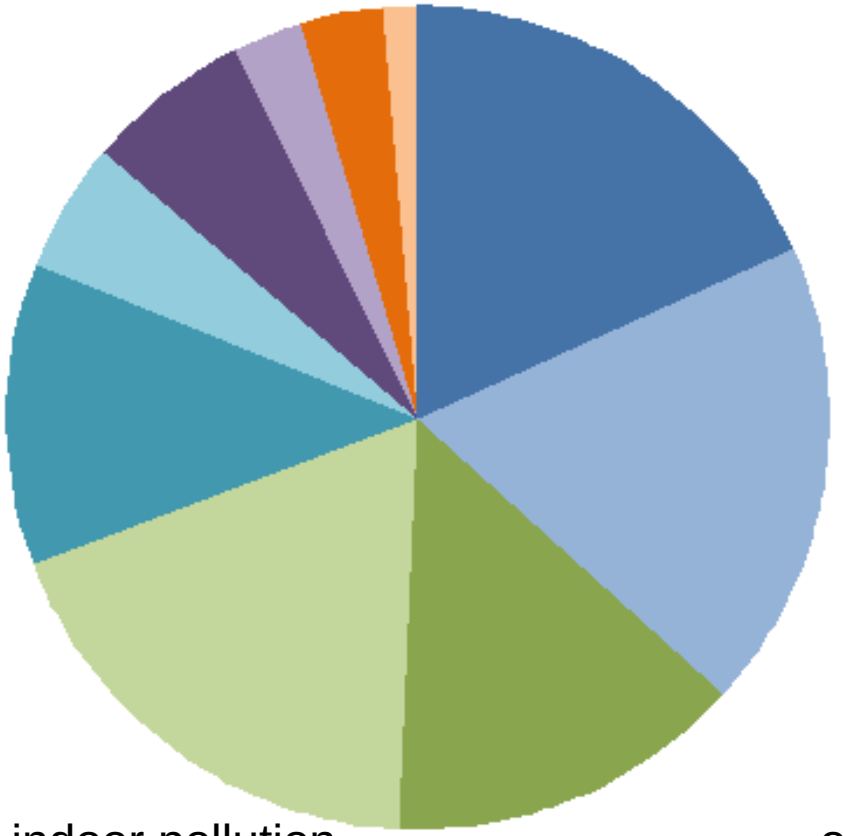

Global air quality
⇒ Health

- air pollution as a cause for premature death
- 7 million per year on a global scale
- due to indoor and outdoor pollution

http://www.who.int 20.03.2016

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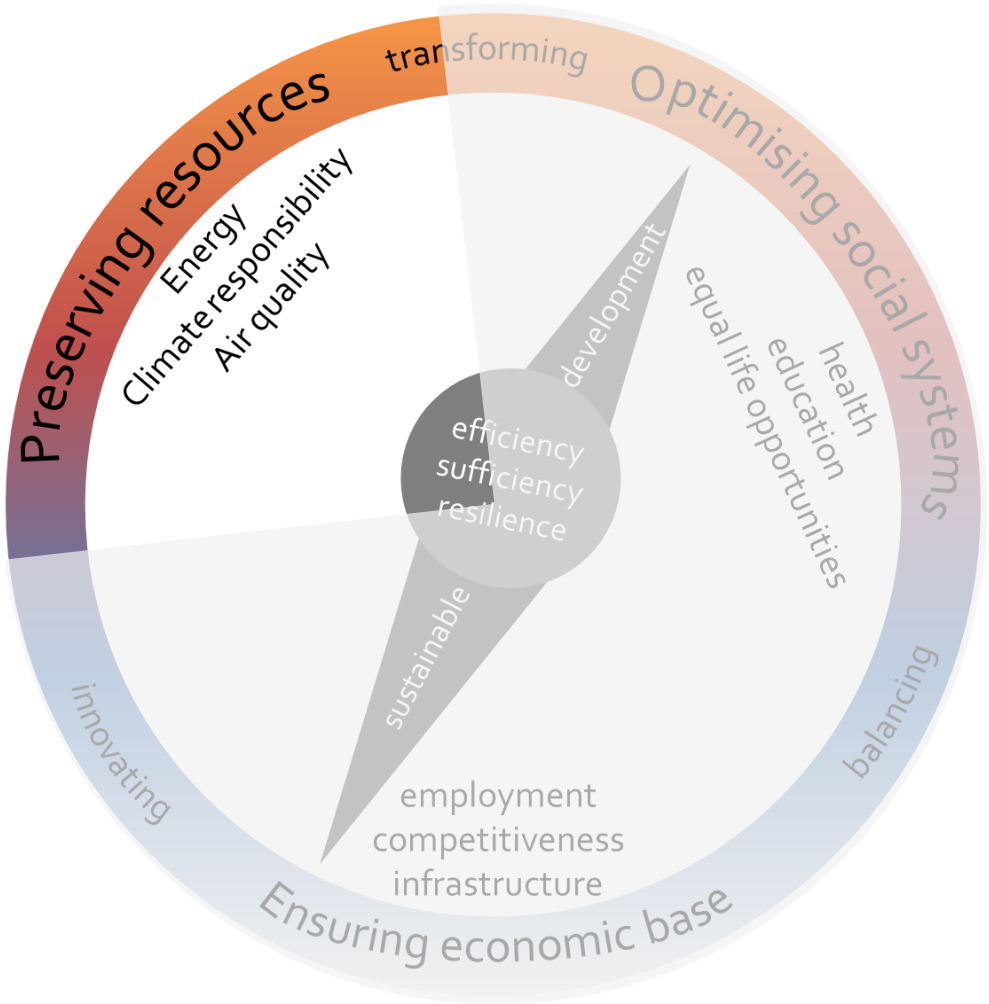

- Reducing energy consumption, in general
- Shifting use of energy to renewables, conesquently
- Reducing consumption of any natural resources
- Planning re-use of resources from the beginning

⇒ Design Thinking for Products & Processes

1. Guiding principles: ensuring the economic base

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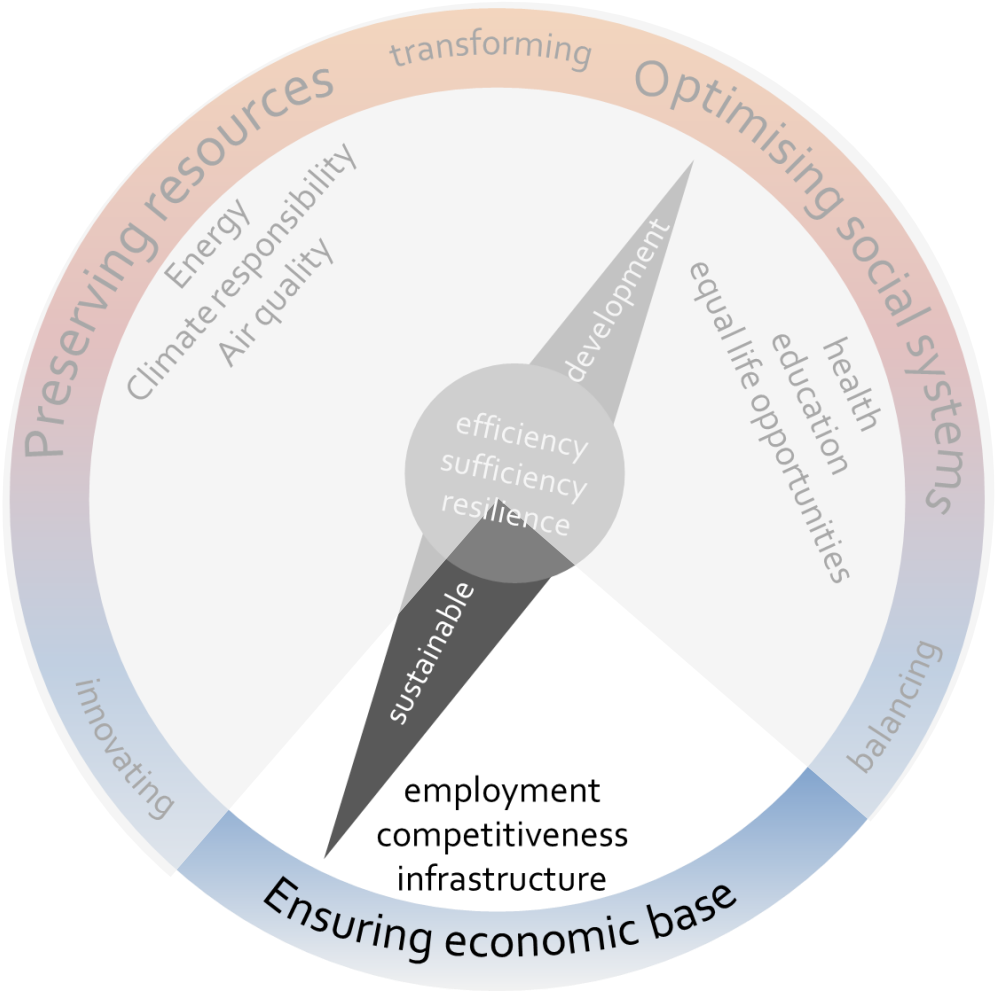

Economy: Waste of the Linear Economy = potential for the Green Economy

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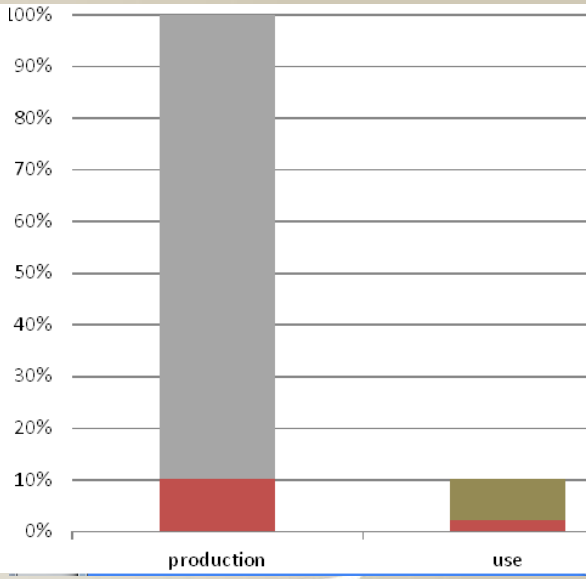
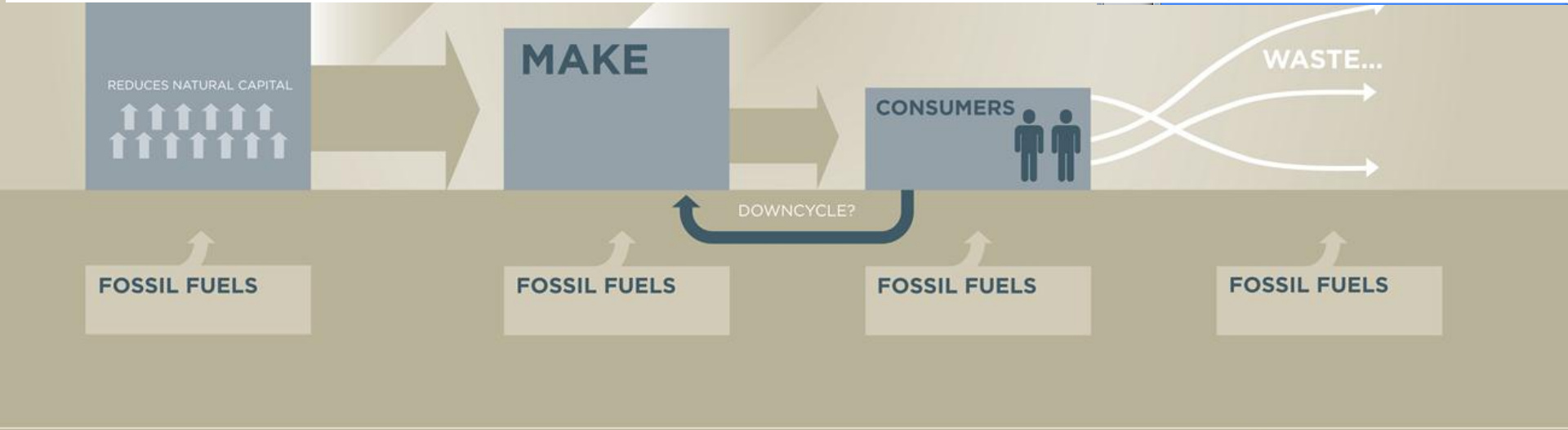
- 90% of the raw materials used in manufacturing become waste before the product leaves the factory
- 80% of products made get thrown away within the first six months of their life. (Girlings, Rubbish 2005)

⇒ designing reusable products
⇒ managing material flows to minimise and eliminate the use of toxic chemicals and eradicates waste





https://kumu.io

ELLEN MACARTHUR FOUNDATION

Green Economy: circular instead of linear economy adressing energy, waste, water

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Use instead of consumption

- sharing, leasing etc

Cycle instead of waste

- avoid waste from the beginning
- re-use of products and materials
- recycling

Energy recovery

- alternative energy sources: solar, wind, biogas, geothermie, water
- energy efficiency
- production-heat-energy combination

Market potential for a circular economy as a promising future market

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- McKinsey estimate shift towards circularity to bring a +$1 trillion by 2025 to the global economy

- Especially manufacturers will benefit due to their reliance on raw materials

⇒ $630 billion/y by 2025 materials and cost savings in the EU

- China has set up CACE (China Association of Circular Economy) to encourage circular economy

⇒ output value +15% 2006 – 2010

⇒ expected to further expand (1 - 1.8 trillion yuan 2010 - 2015)

Business models for a circular economy

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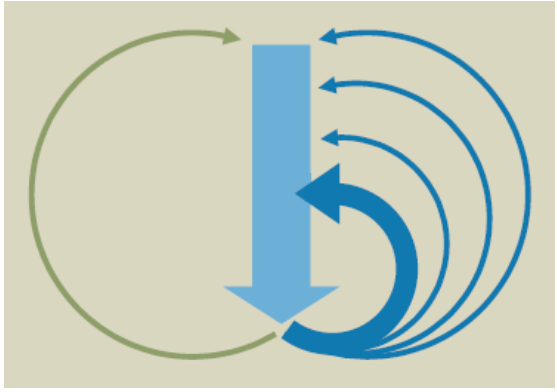
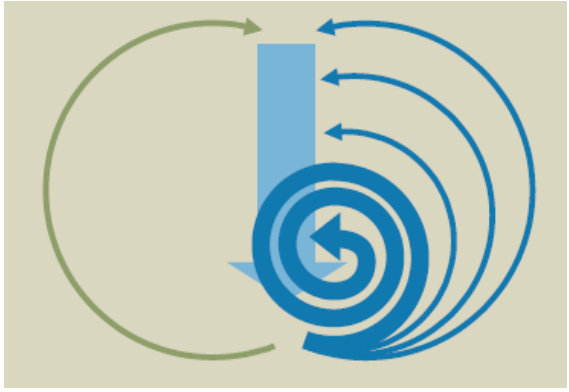
- Focus on generating more durable products, biodegradable materials, facilitate disassembly and collaborate with other actors in the supply chain

⇒ Make a business out of re-use and re-cycling of products

⇒ New businesses in design and product development of circular economy products

⇒ Services for process design, communication of products to customers





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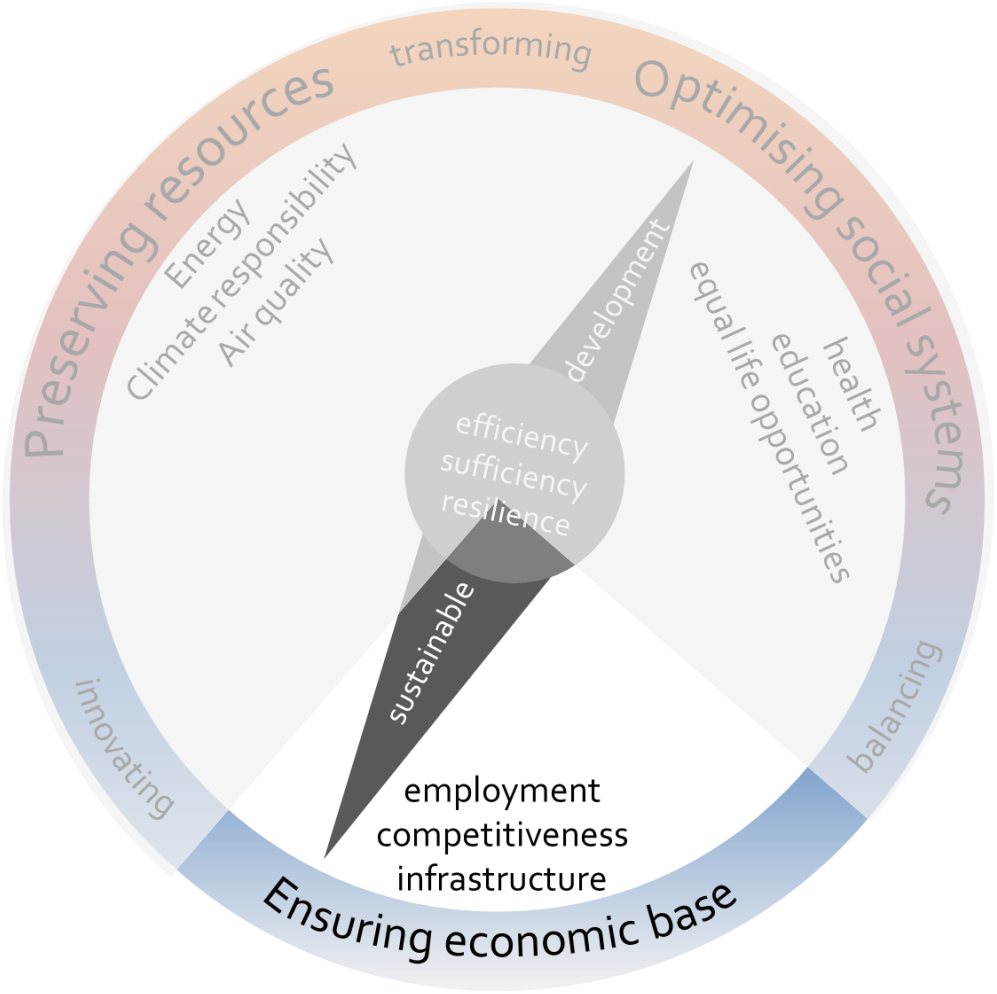

- Employment for all
- Increasing economic competitiveness
- Providing infrastructure as a basis for economy and society

⇒ Exploring economic benefits of sustainability with Design Thinking

1. Guiding principles: optimising social systems

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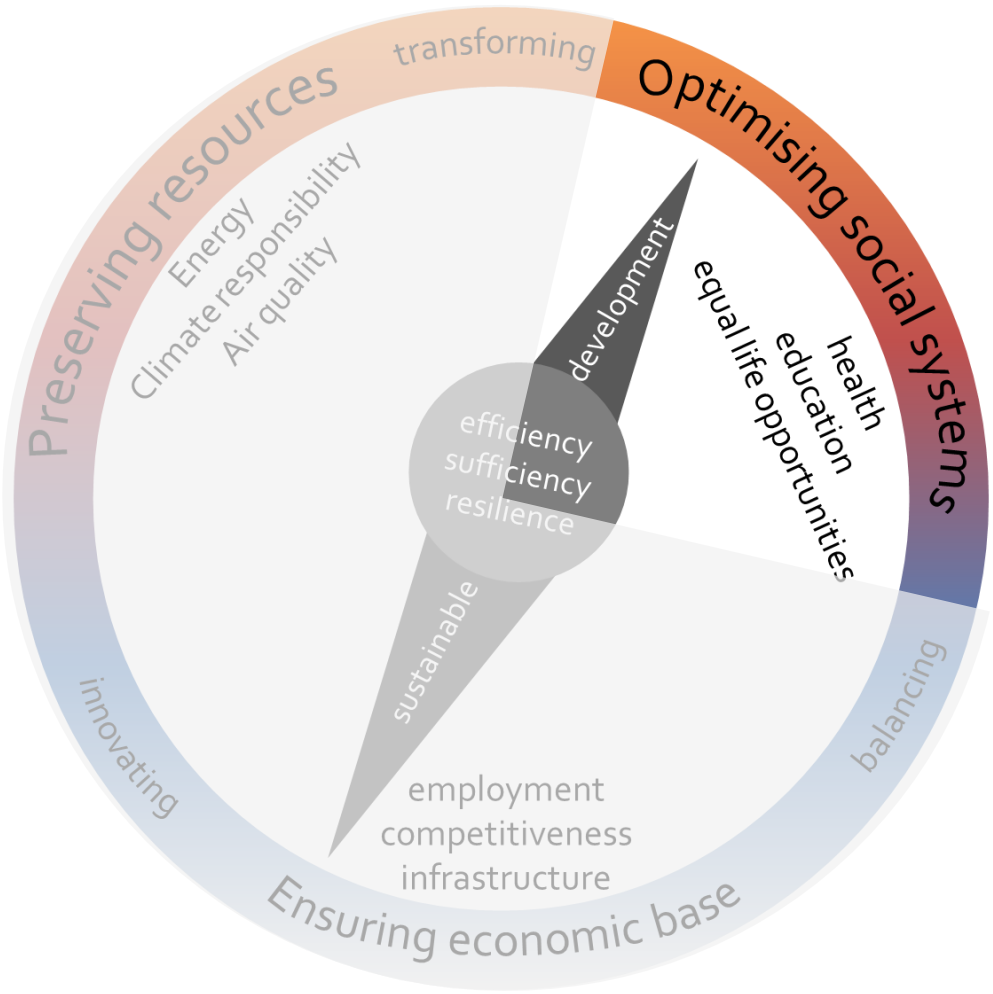
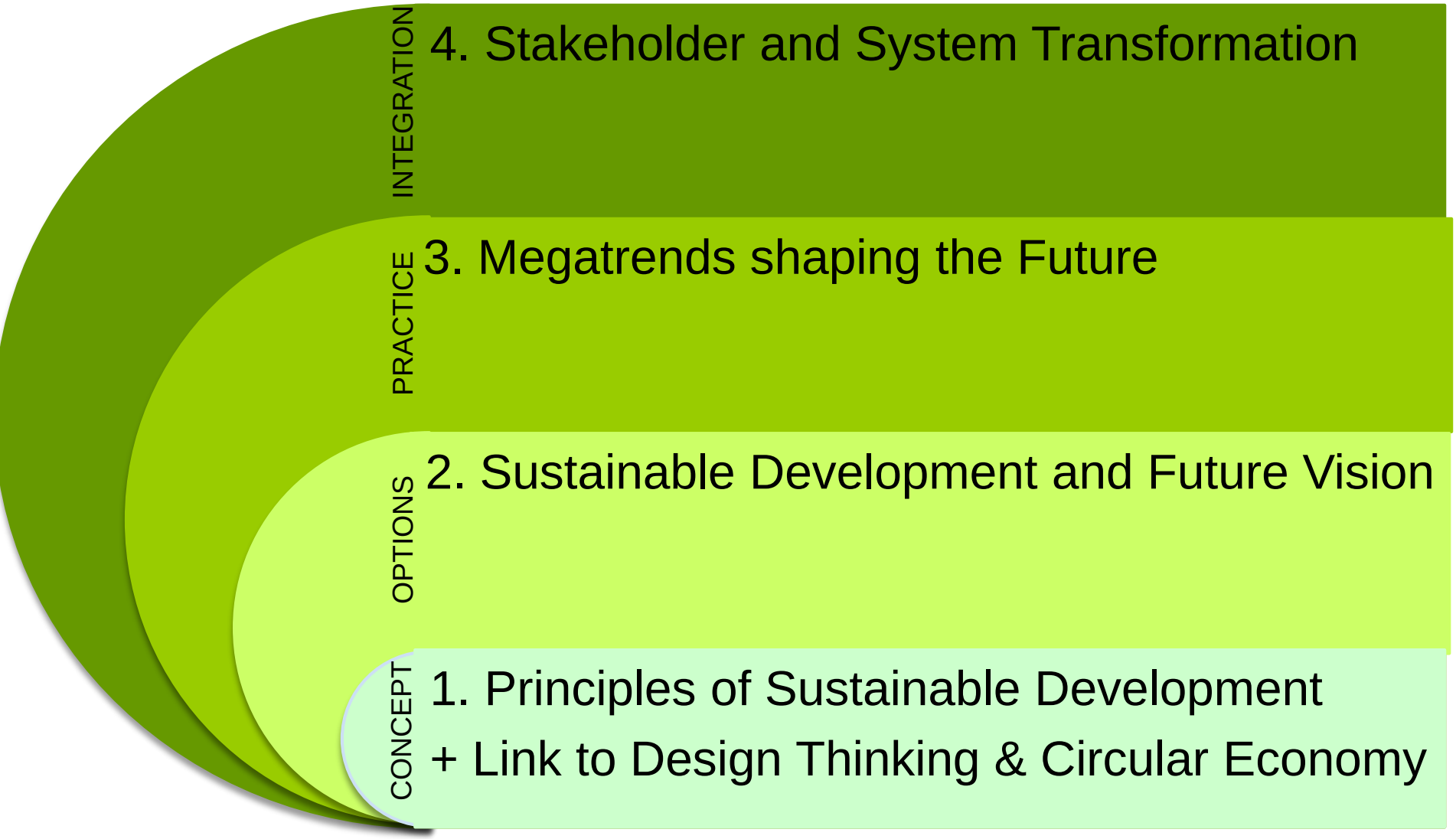


- Ensure healthy living conditions
- Provide education as basis for success in life, booster for economic competitiveness and wealth
- Provide equal opportunities of life

⇒ Considering social issues in Design Thinking

⇒ DT for social systems?


INTEGRATION
4. Stakeholder and System Transformation
PRACTICE
3. Megatrends shaping the Future
OPTIONS
2. Sustainable Development and Future Vision
CONCEPT
1. Principles of Sustainable Development
+ Link to Design Thinking & Circular Economy

2. Future Vision
What will vs. what should happen

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What will happen?

What should happen?

Status quo

Understanding the system

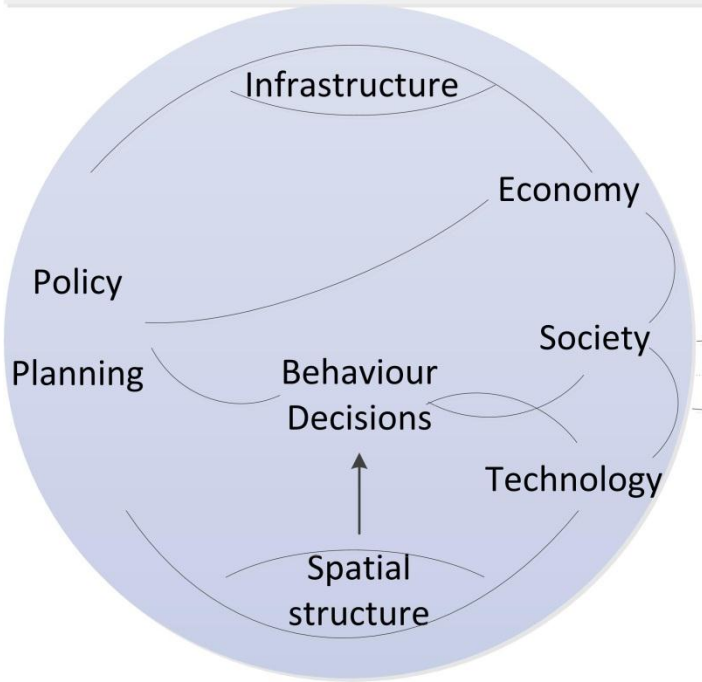
Identifying trends

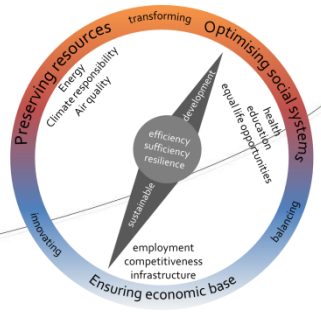
Transformation

Designing change

Future

Developing a vision





Sustainable Future

Key aspects to address & guiding principles for change

«business as usual»
«more of the same»

2. Future Vision
Example: concept of smart cities

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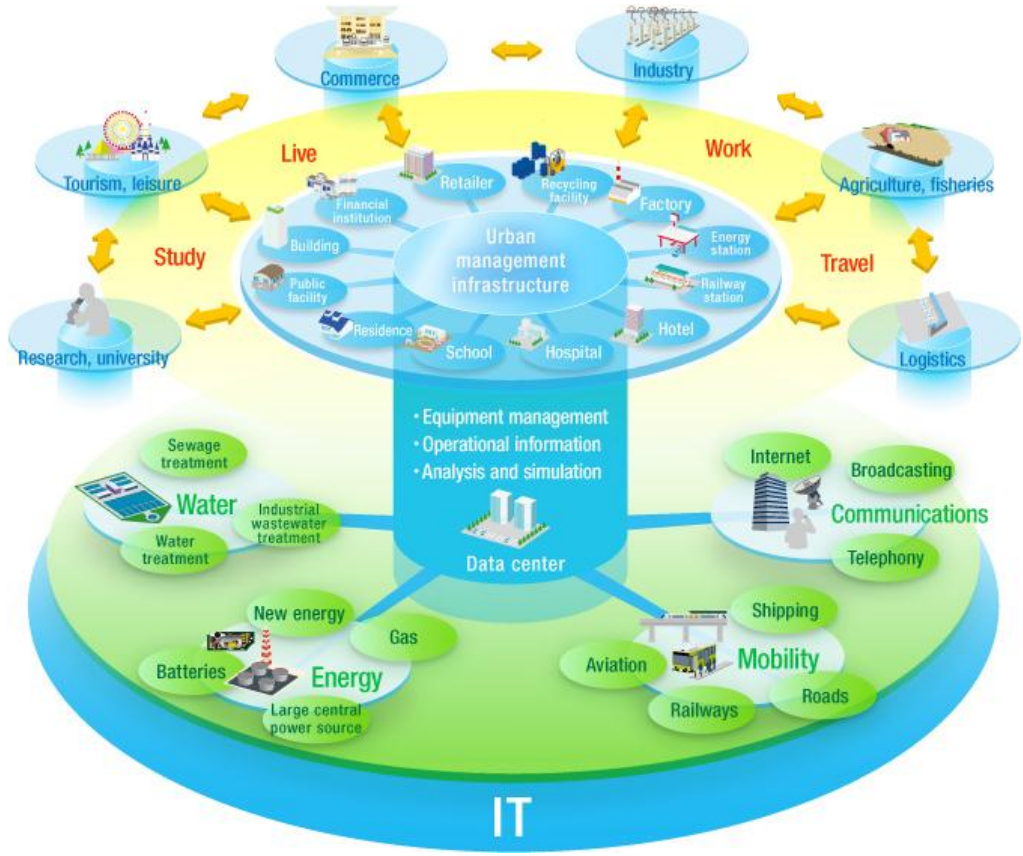
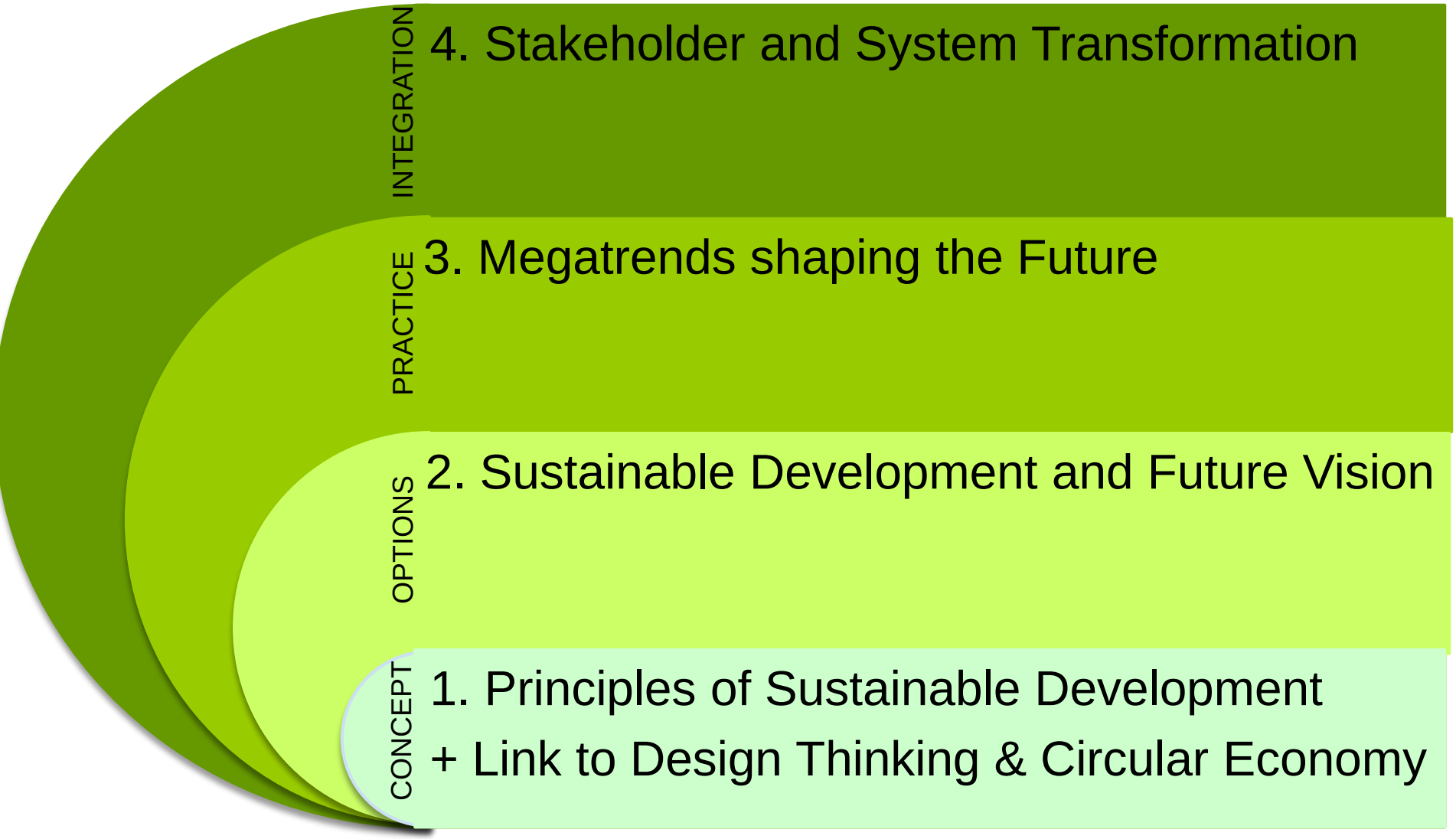


- Technology and network based city concept
- Integrated and intelligent planning of all areas: living, working, education and networks

⇒ Applying principles of sustainability: resource sufficiency, efficiency and resilience

⇒ Supporting strategies, planning and design of measures

www.hitachi.com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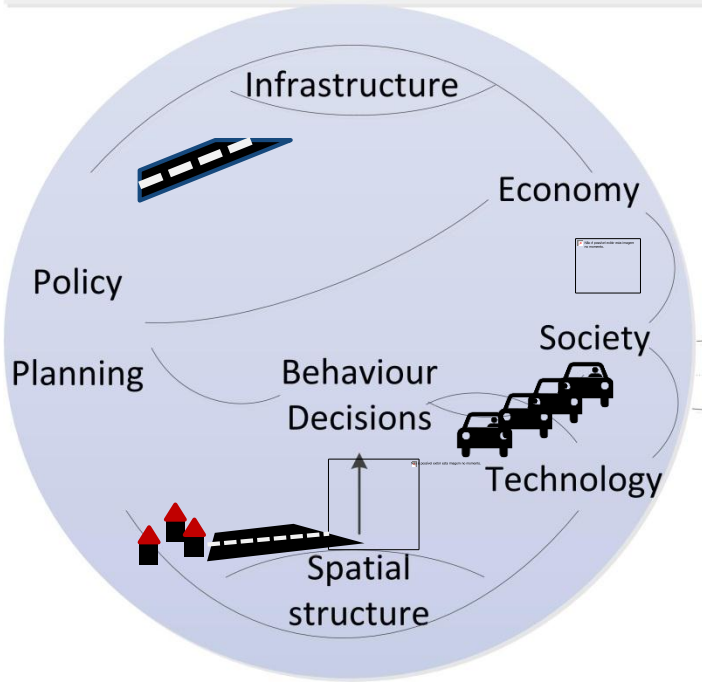

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3. Megatrends
Future impact of ongoing trends

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- fundamental
- long-term (>10 y) and global
- transformation processes with
- economic and social impact

⇒ 1-7 recent, data based trends

⇒ 8-10 prospective trends

Challenges &
opportunities

3. Megatrends: Continuing the story - … including uncertainties

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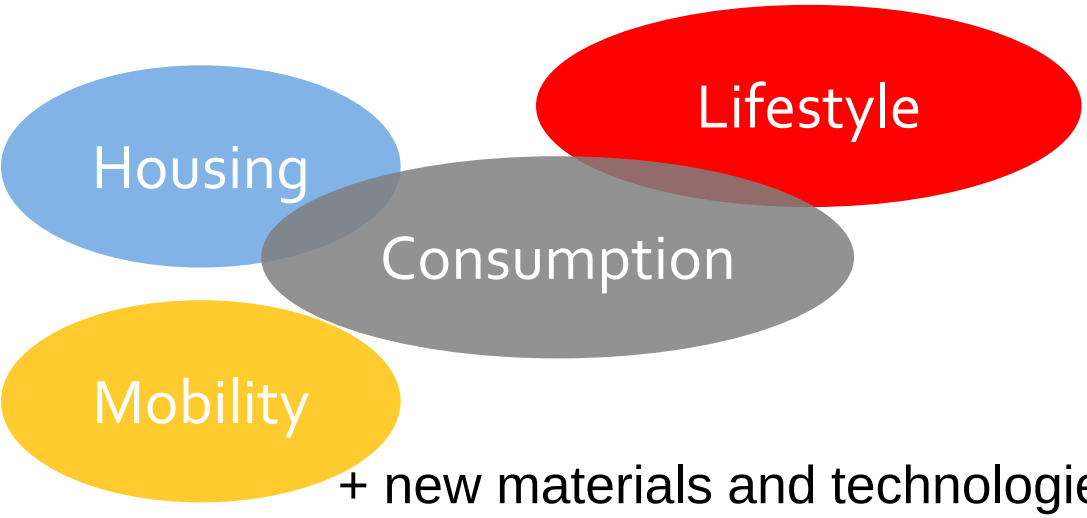
+ demand for ‘individualised’ products and services
+ demand and needs of ageing population
+ small household size
⇒ increasing consumption +

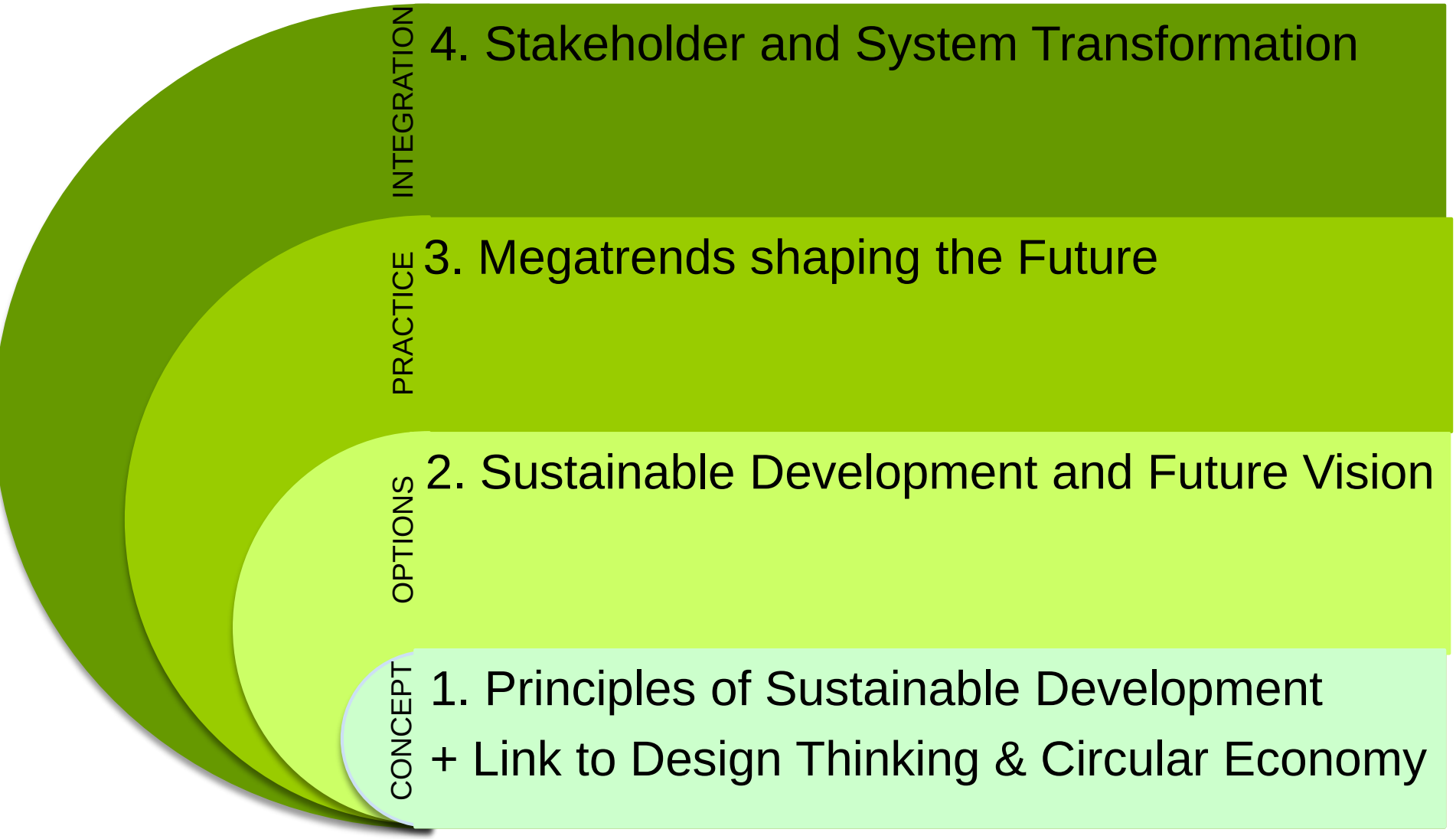


+ extreme wheather events
+ use of space
? local emissions
⇒ political decisions?

+ new materials and technologies
+ ICT networks
⇒ technology and complexity +

- raw materials and energy
+ virtualisation
⇒ direction and impact?

Working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4. Stakeholder and System Transformation Society and Economy

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systemic change

decision makers

tipping point

society

groups

first follower

individuum

leader

1. guiding principles
2. future vision
3. knowledge about trends

⇒ walk the walk

=> Applied Research for Sustainable Development

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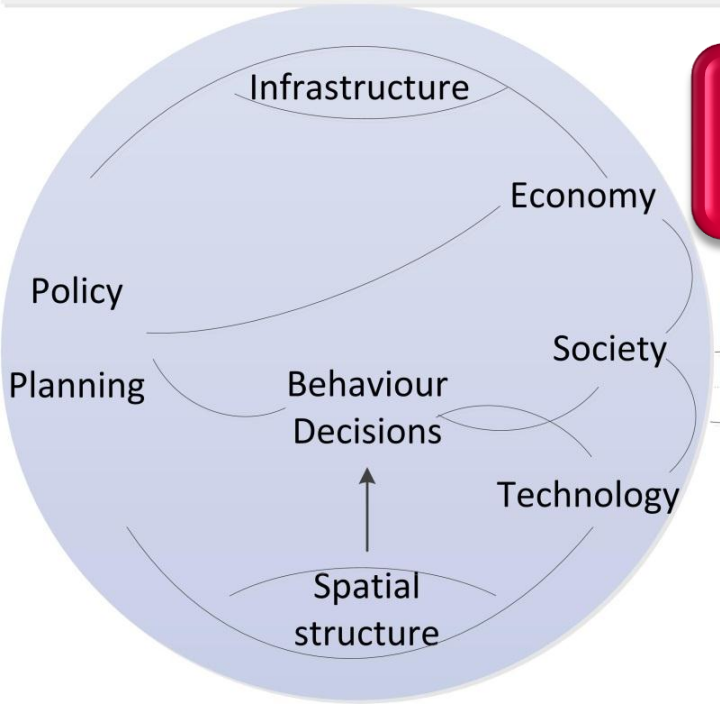

1. Define Sustainability Principles

2. Build a vision

3. Gain knowledge about trends

4. Elaborate strategies

Sustainable Future

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«more of the same»

Thank you!

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