

Sustainable Management



*manufacturing as if
people and
planet matter*

Dr André Reichel

Scientific Coordinator GSaME &
Associate Cluster Director H

Course Objectives

You will be able to answer the following questions:

- How can the terms Sustainability/Sustainable Development be defined?
- What are the implications for the economy?
- How can business firms cope with Sustainability?
- What is the connection between aME and Sustainability?

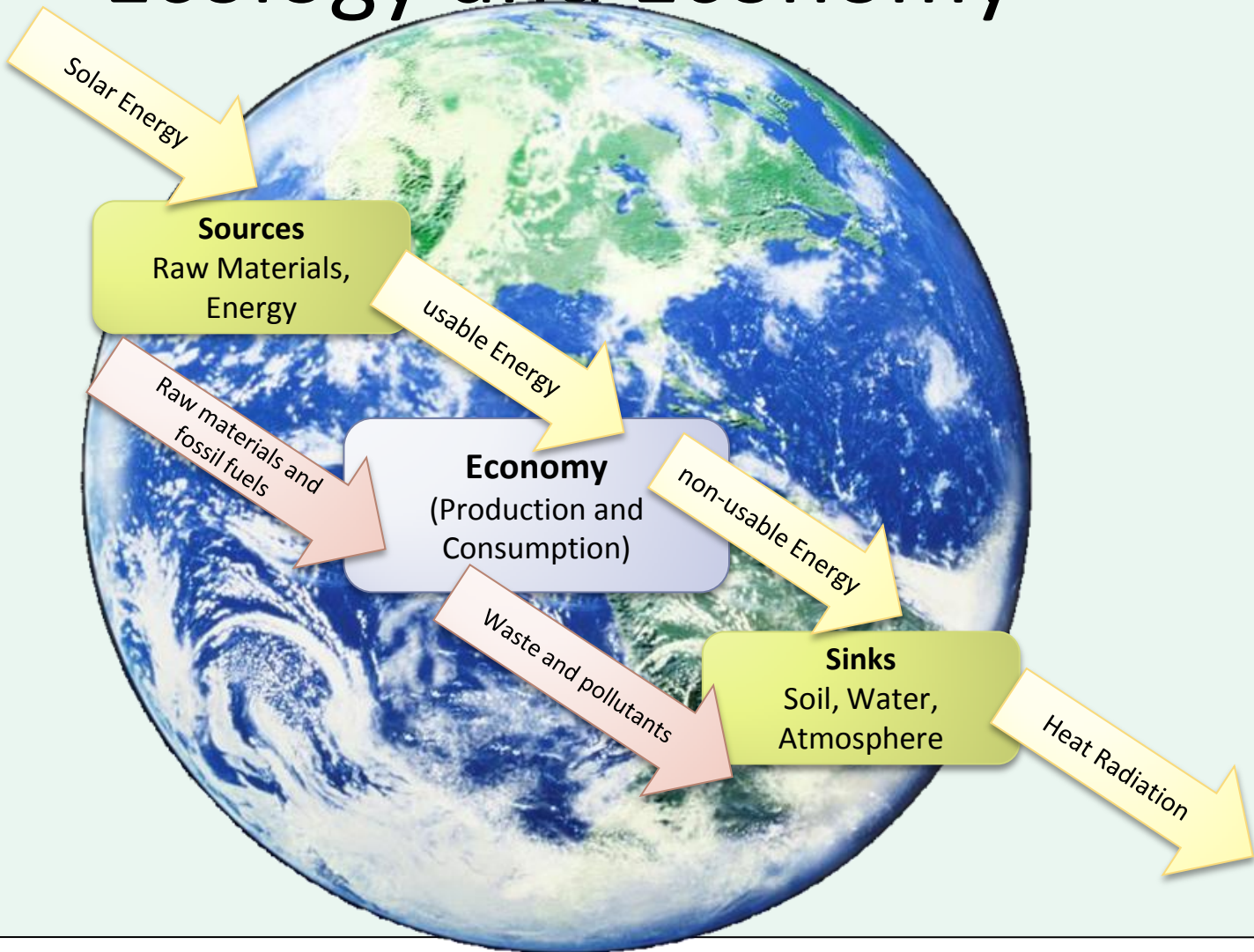


Overview

- 1. The Concept of „Sustainability“**
- 2. Sustainable Economics, Sustainable Society**
- 3. Corporate Roads to Sustainability**
- 4. Case Studies**
- 5. Sustainable Manufacturing Engineering?**

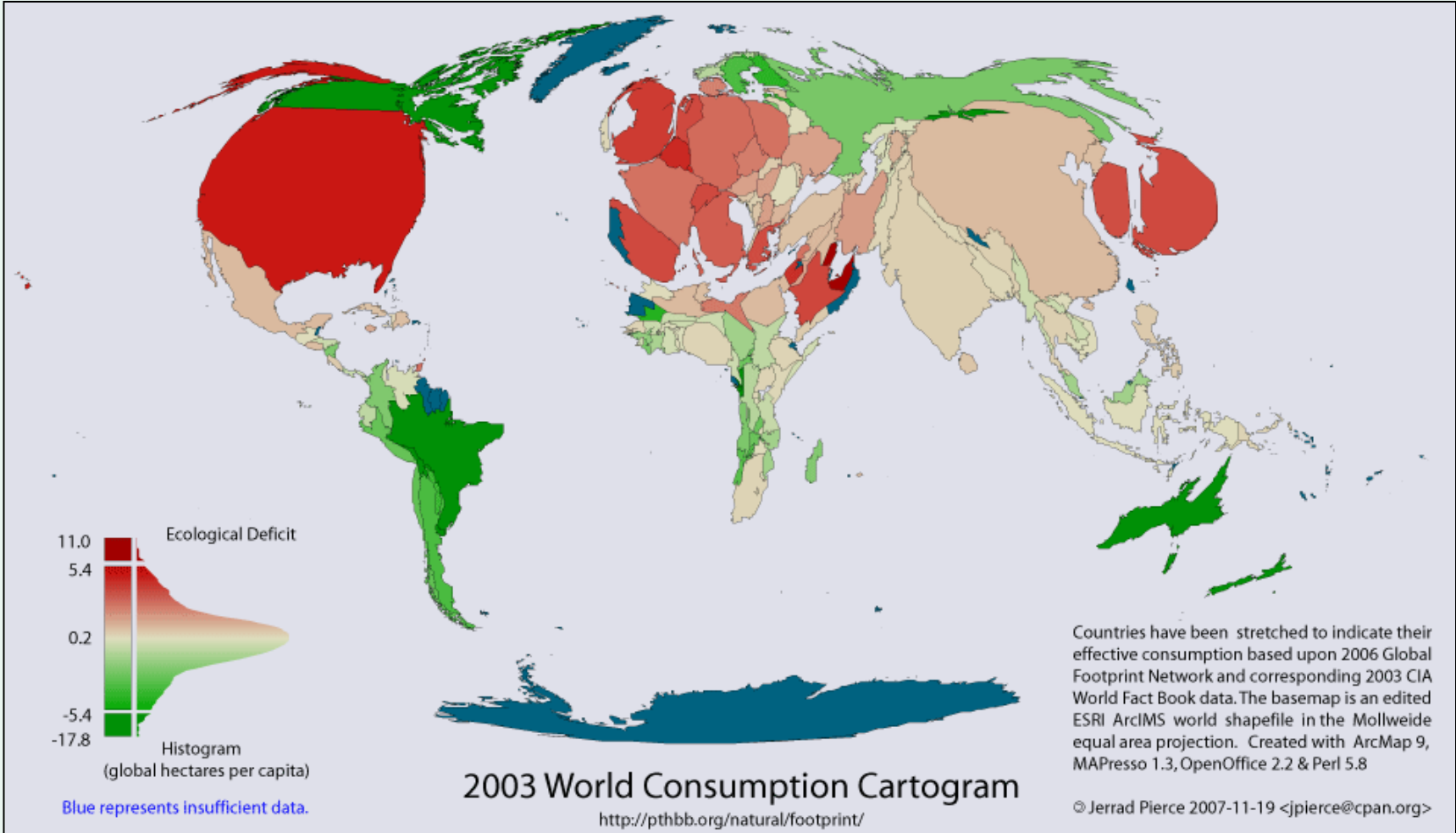


Ecology and Economy

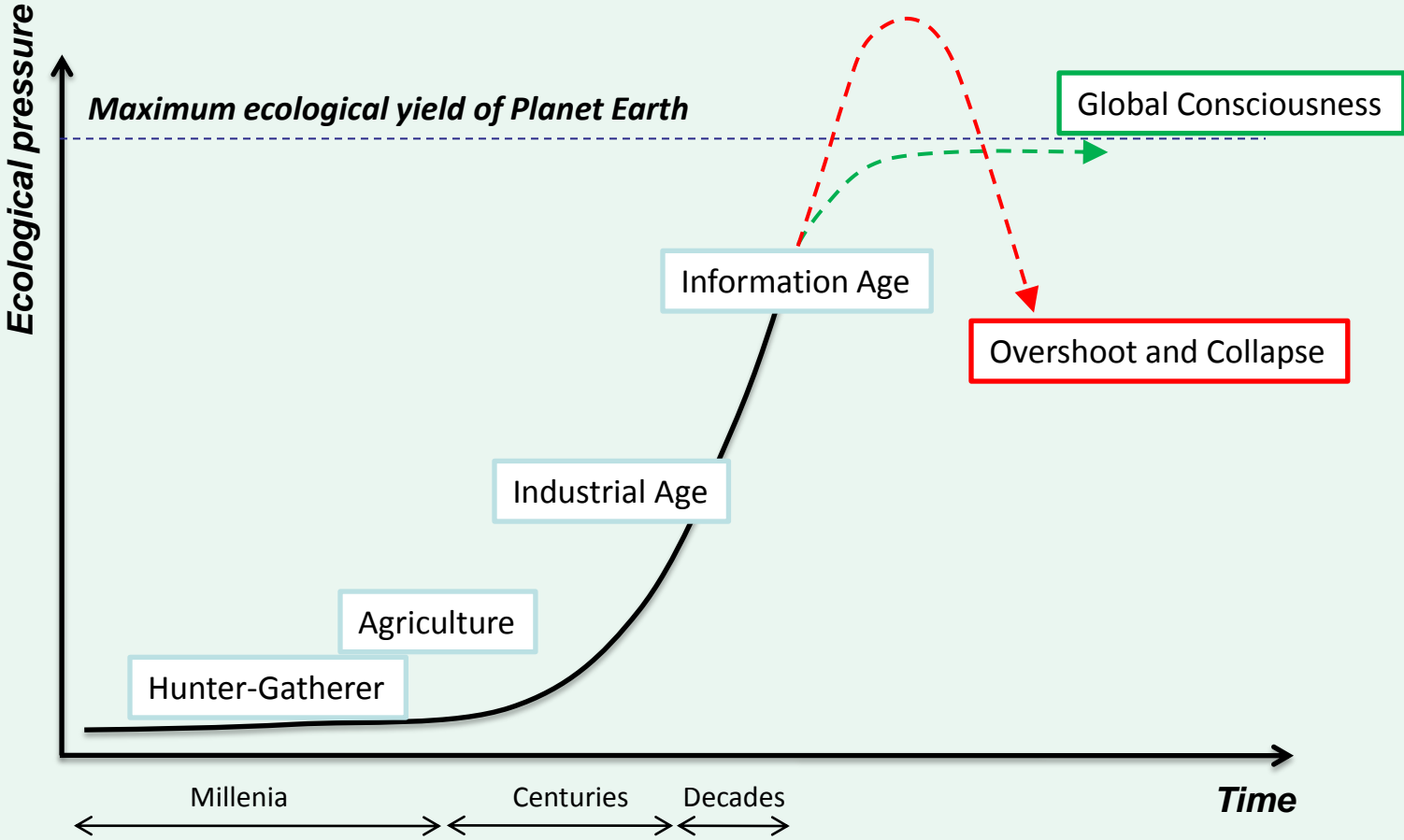


cf. Meadows et al. 2004

Ecological Footprint



Limits to Growth



cf. Markley 1995

History of Sustainability

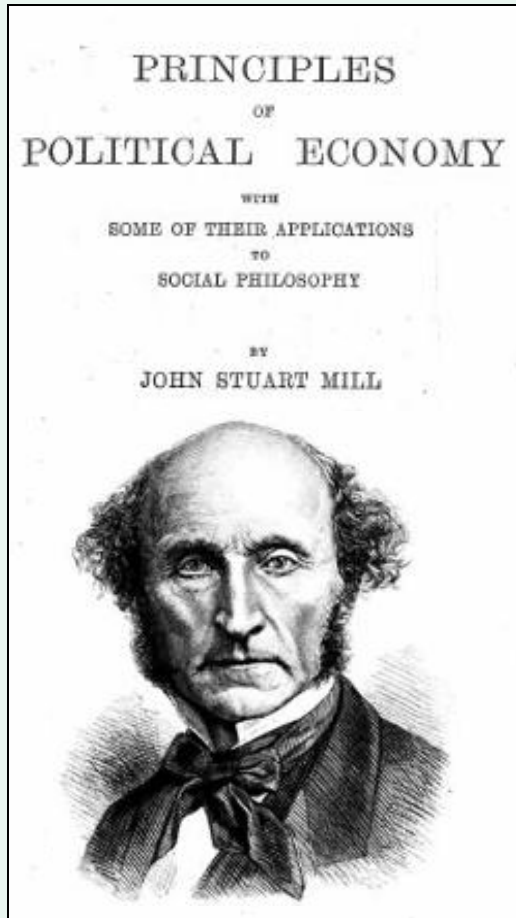


„Wird derhalben die größte Kunst und Einrichtung hiesiger Lande darinnen beruhen , wie eine sothane Conservation und Anbau des Holtzes anzustellen [sei], daß es eine continuierliche beständige und nachhaltende Nutzung gebe, weil es eine unentberliche Sache ist ohne welche das Land in seinem [Wesen]nicht bleiben mag.“

- Extraction Rule of Sustainability:
1. Extraction rate \leq Regeneration rate.
 2. Maintaining reproduction potential.

Long-term view, outer sustainability.

History of Sustainability

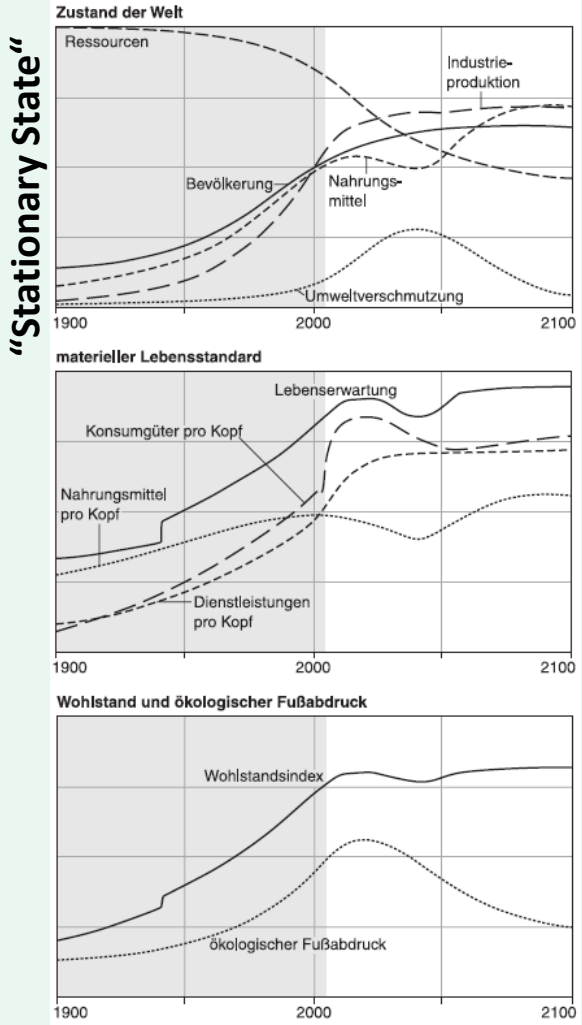
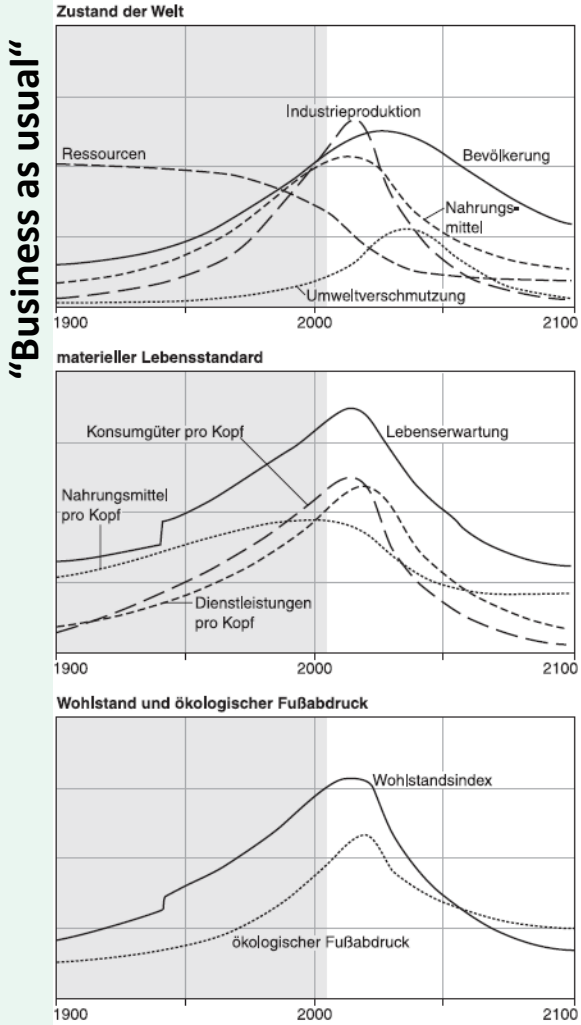
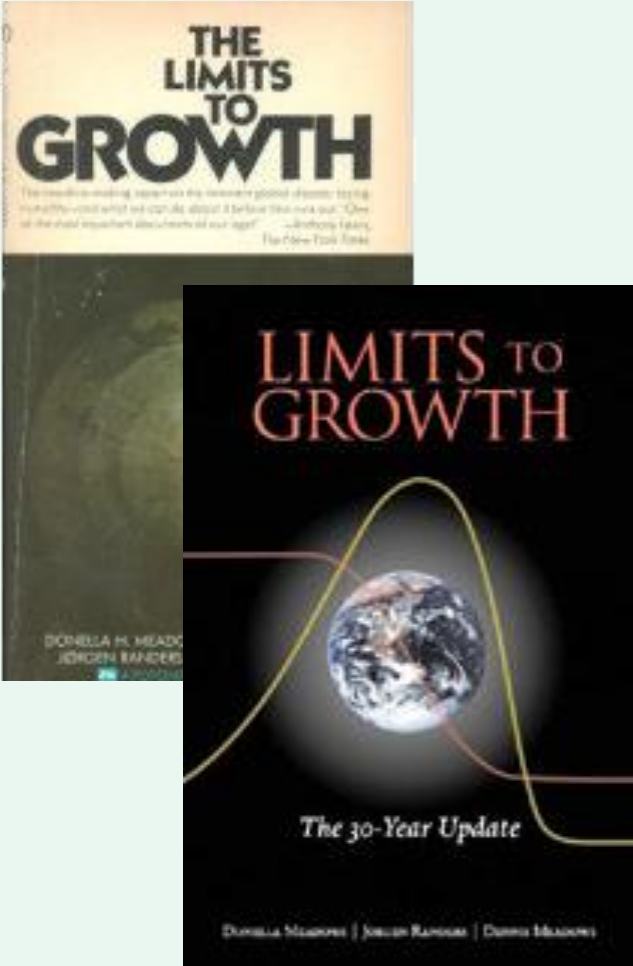


“It is scarcely necessary to remark that a stationary condition of capital and population implies no stationary state of human improvement. There would be as much scope as ever for all kinds of mental culture, and moral and social progress; as much room for improving the Art of Living, and much more likelihood of its being improved, when minds ceased to be engrossed by the art of getting on.”

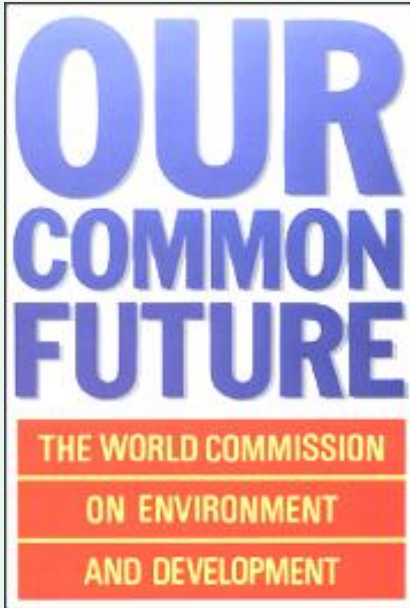
Stationary State Economy:
Zero Growth of Capital and Population

Focus on human and society, inner sustainability.

History of Sustainability



History of Sustainability



Humanity has the ability to make development sustainable to ensure that it **meets the needs of the present without compromising the ability of future generations to meet their own needs.**

The concept of sustainable development does imply **limits** ... imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities.

...[Sustainable] development requires meeting the **basic needs** of all and extending to all the opportunity to fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes.

Focus on inter- and intragenenerational equity.

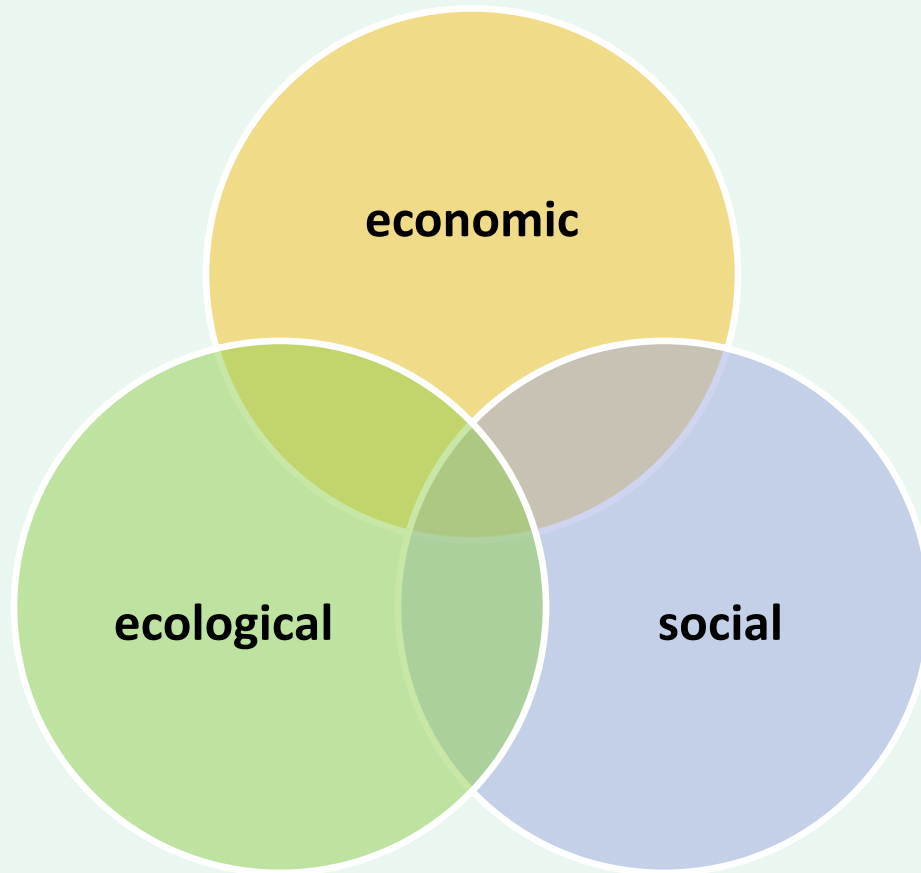
Working Definition of Sustainability

Sustainability means

- the long-term well-being of humanities natural and social environment
- for the sake of individual human well-being
- within natural, societal and technological limits
- organized as a social learning process.



The Triple Bottom Line

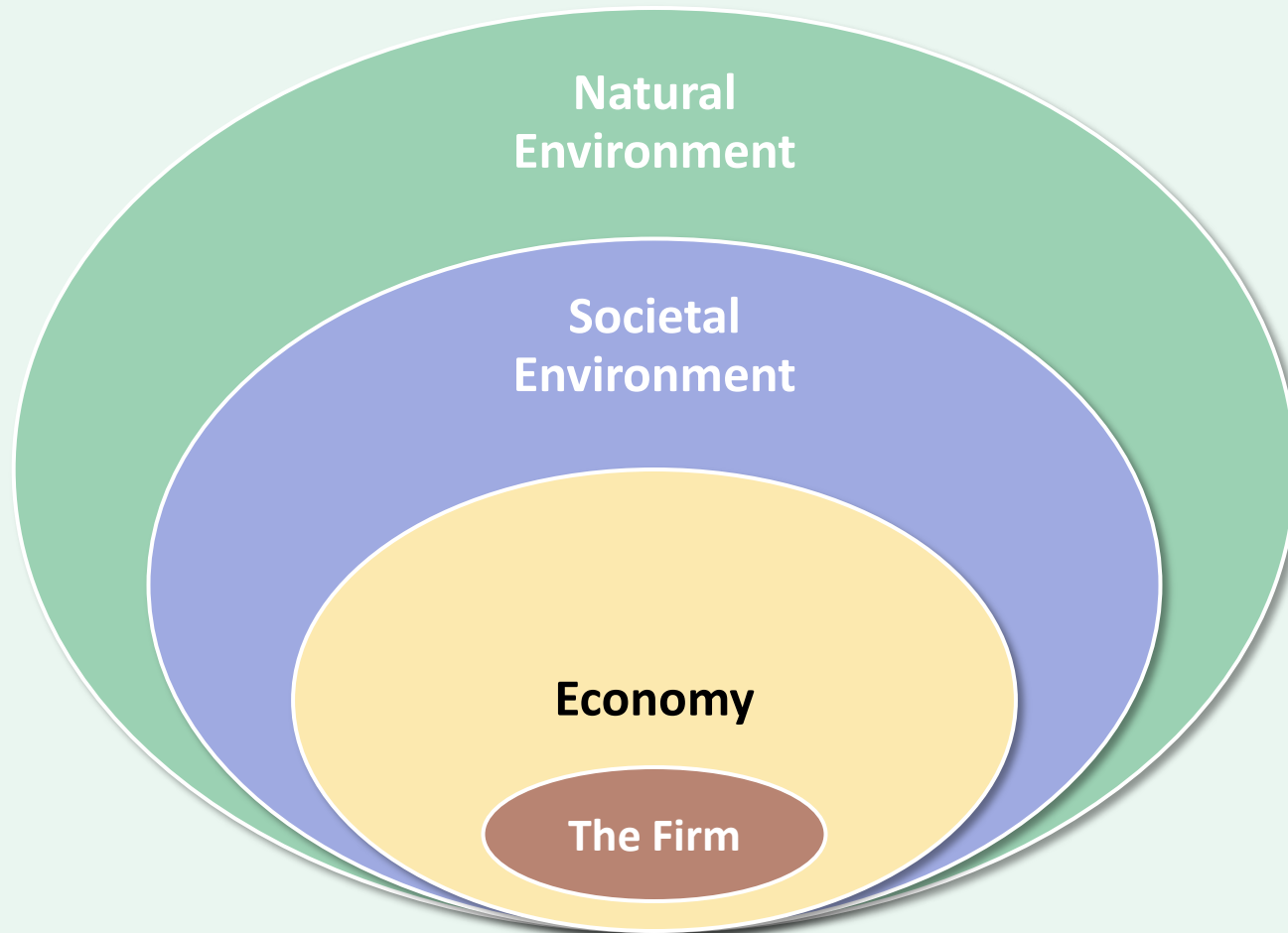


*“Ten years ago, at the United Nations Conference on Environment and Development, held in Rio de Janeiro, we agreed that **the protection of the environment, and social and economic development** are fundamental to sustainable development, based on the Rio Principles.”*

(Jo’Burg Declaration 2002)

- “Win-win” view on Sustainability.
- Decoupling of economic growth and ecologic pressures.
- Economic, ecological and social sustainability.
- Indicators, indicators, indicators...

The Embedded Spheres Model



Overview

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- 4. Case Studies**
- 5. Sustainable Manufacturing Engineering?**



Sustainability Context

The firm (organization, goals, membership)

in the context of economy (liquidity, ownership)

in the context of society (legitimacy, equity)

in the context of nature (reproduction, entropy)

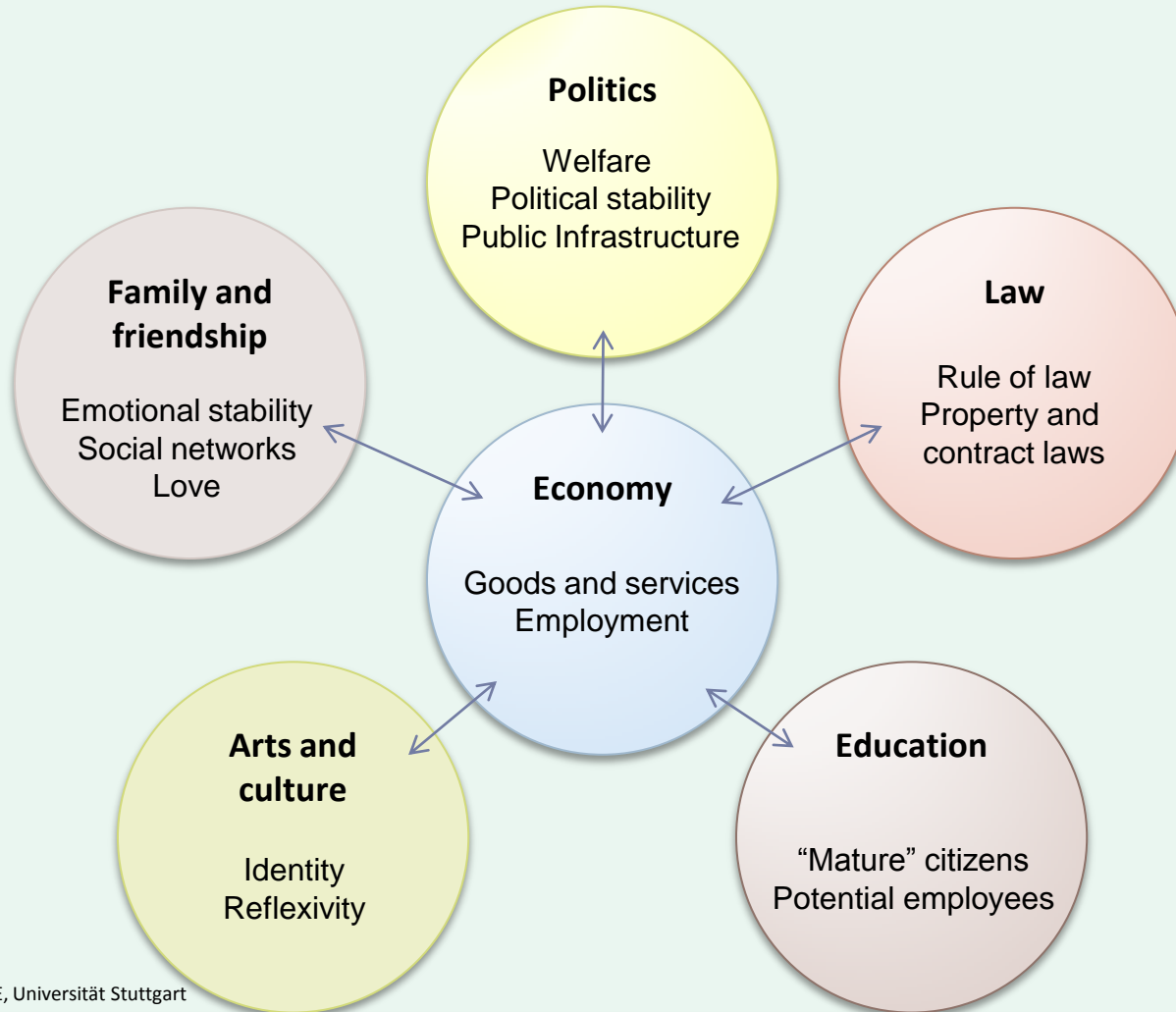
in the context of 無名天地之始



Ecological Context

<p>Sustainability Principles</p> <p>Ecological Stock</p>	<p>Substitution</p>	<p>Limitation</p>
<p>Sources</p>	<p>Depletable resources (e.g. fossil fuels) have to be replaced by renewable resources (e.g. all forms of solar energy).</p>	<p>Harvest rate of renewable resources must not exceed their regeneration rate.</p>
<p>Sinks</p>	<p>Waste and pollutants unknown to the ecosphere have to be replaced by waste and pollutants known to the atmosphere (assimilation ability).</p>	<p>Emission rate of waste and pollutants known to the ecosphere must not exceed its assimilation capacity.</p>

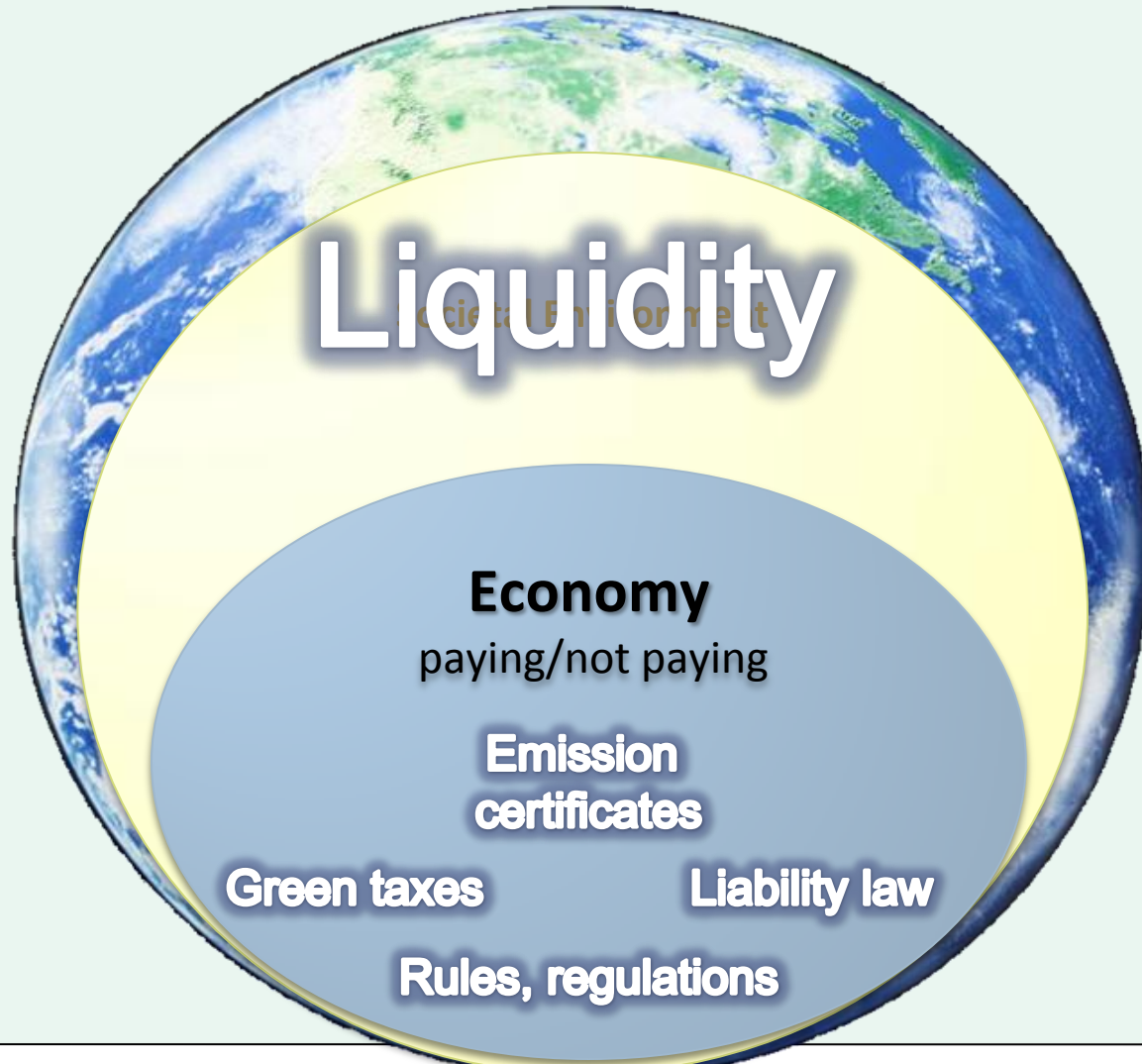
Societal Context



Economy feeds on prerequisites it cannot supply itself with.

Society is not an extension of the economy but its (social) environment on which it is resource dependent on.

Economic Context



Organizational Context

Societal turbulences

- Ageing Workforce
- Diversity & gender
- Sustainability pressures
- „2.0“-Society

Market turbulences

- Customer demands
- New consumerism
- New competitors
- Network competition

Political turbulences

- Green rules & regulations
- Diversity & Gender laws
- Labor laws
- International agreements

The Firm

- Heterarchy complements/ substitutes hierarchy
- Motivational offers instead of command and control
- Business model innovation instead of incremental technical change
- Corporate citizenship instead of profit maximization

Technological turbulences

- Green/clean tech
- New Materials
- Nano-Bio
- Simulation technology
- Web 2.0 technology

Ecological turbulences

- Climate change / Carbon footprint
- Resource depletion
- Loss of biodiversity
- Degradation of ecosystem services

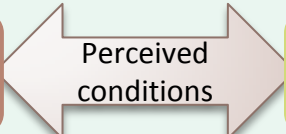
Management Perspectives

Economic centrism

Ecological centrism

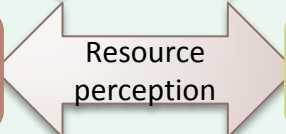
Relative (economic) limits:
Growth of limits

Absolute(physical) limits:
Limits to growth



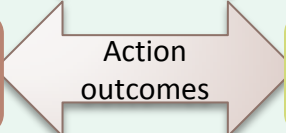
Substitution

Complementation



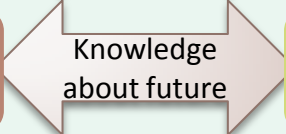
Reversibility

Irreversibility



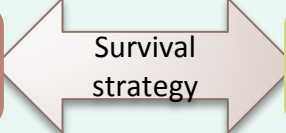
Prediction

Uncertainty



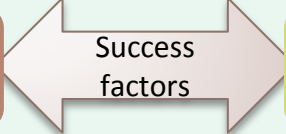
Innovation and Growth

Caution and Adaptability



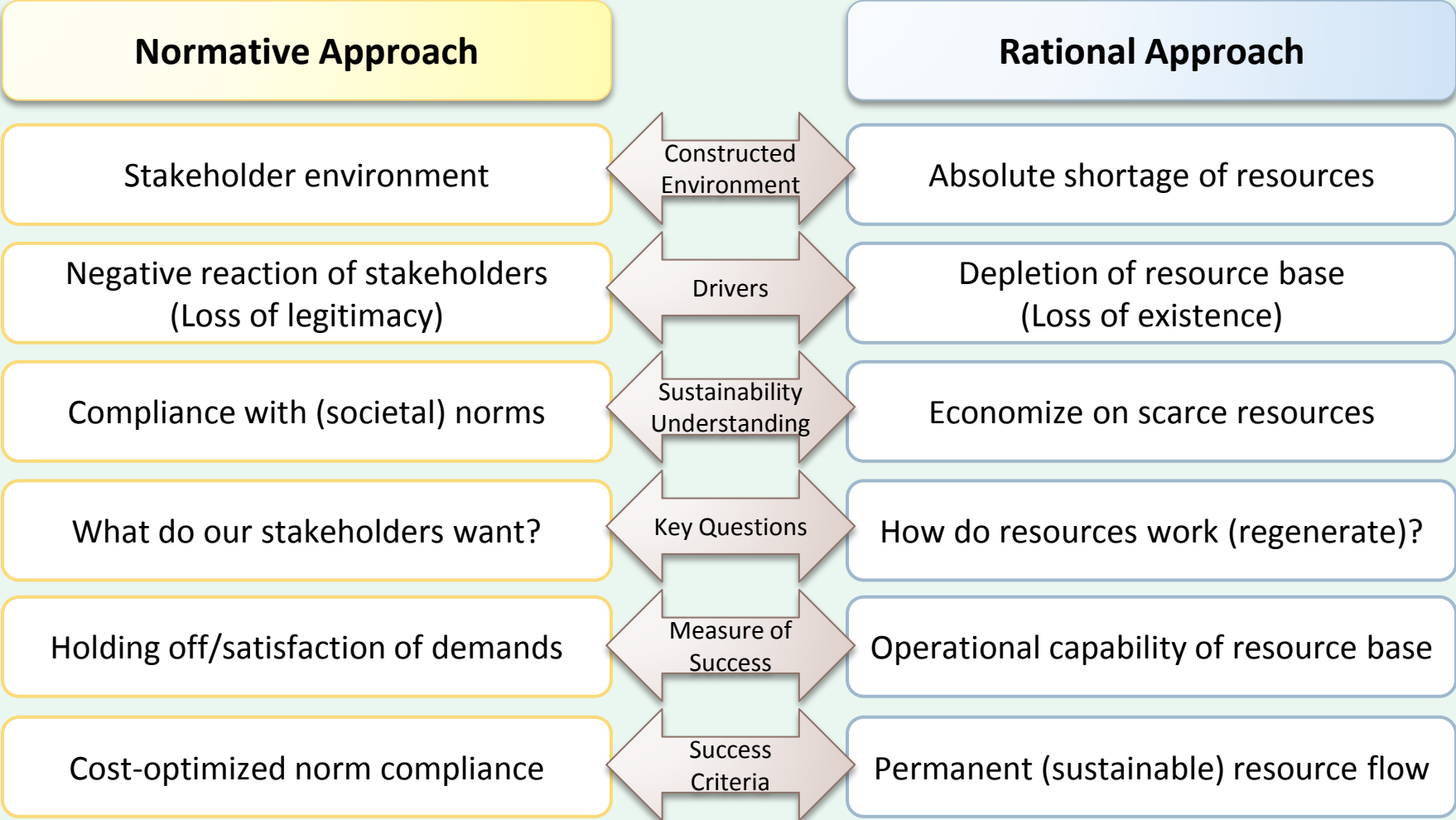
Efficiency and Liquidity

Effectiveness and Existence



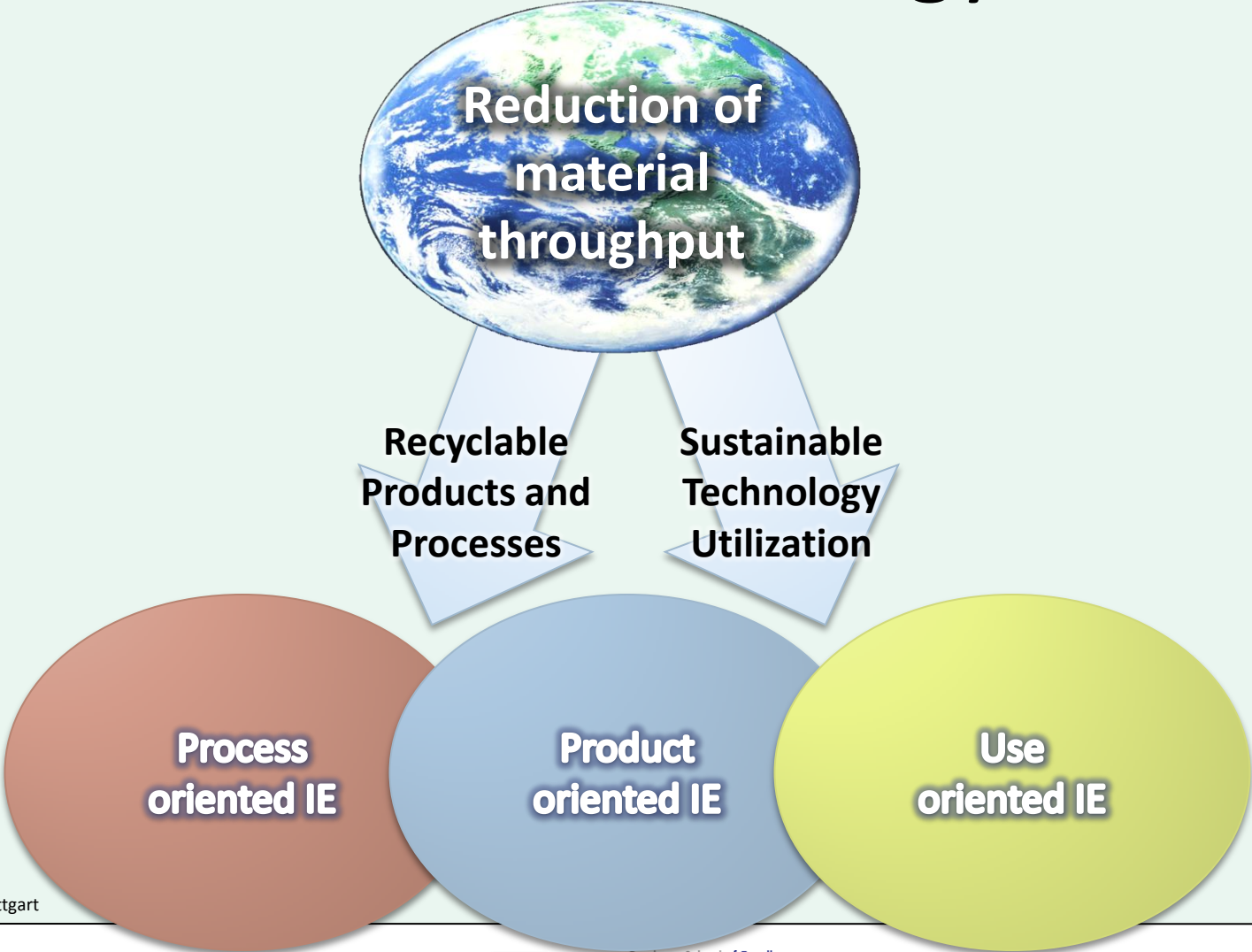
cf. Majer 1998

Management Perspectives



cf. Müller-Christ 2001, 2007

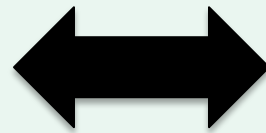
Industrial Ecology



Degrowth Economics



Physical Degrowth



Economic Degrowth

Degrowth Economics

Positive effects of growth

- Economies of scale.
- Positive feedback on sales by network effects of installed product base.
- Better refinancing conditions

Side-effects of growth

- Increased fixed costs.
- Increased quality and service costs.
- ...for more growth???



Degrowth Economics

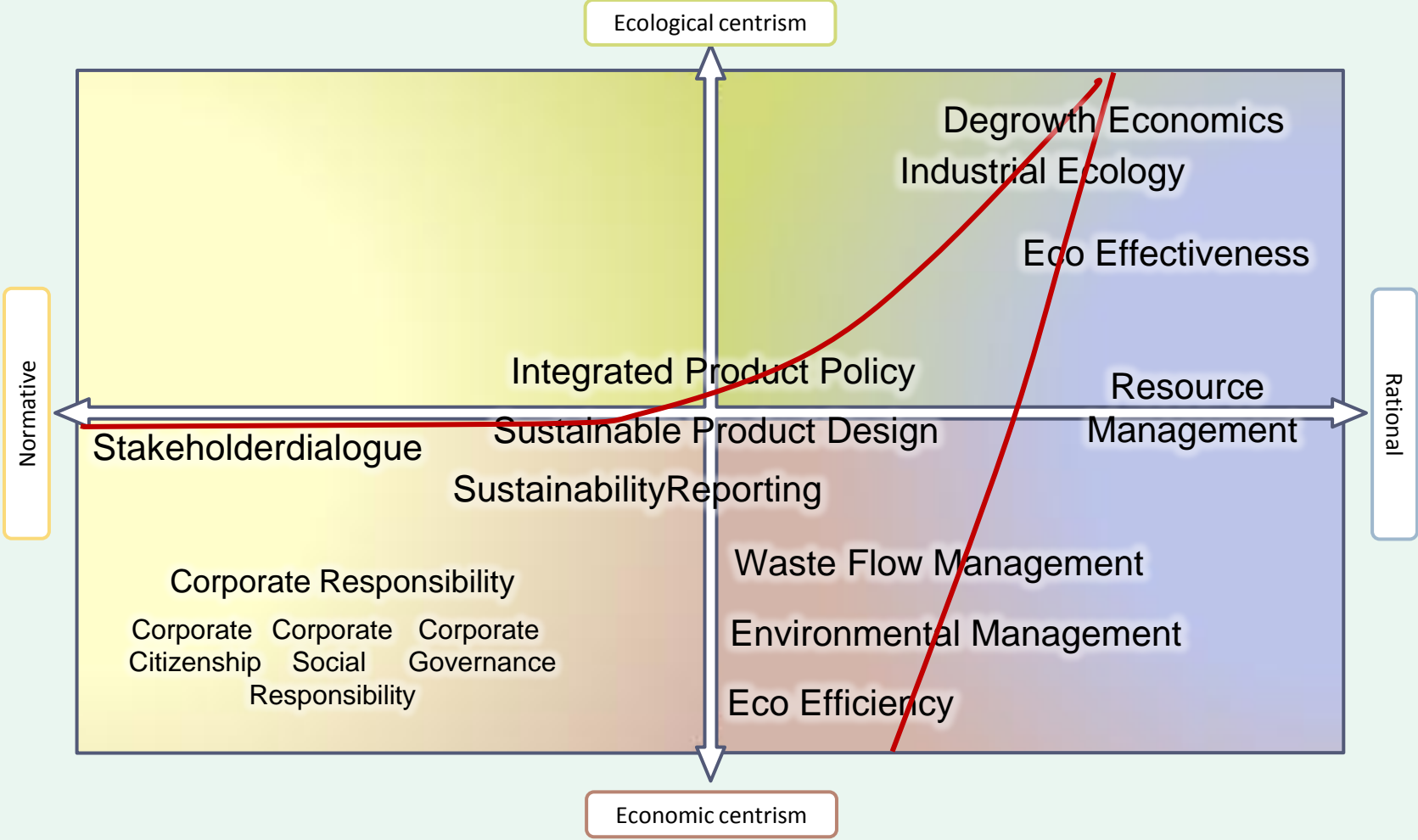
Constant growth vs. constant profit

- Permanent firm growth not empirically evident over the long term.
- Cyclical up and down in sales and capital more realistic.
- Constant positive profit \neq constant growth in profit

Minimum conditions of economic well-being

- Ability to discharge liabilities at all times.
- Ability to pay for all capital costs.
- Economic profit must not drop below zero.

Concepts of Sustainability Management



cf. Paech 2005

The Sustainable Production System

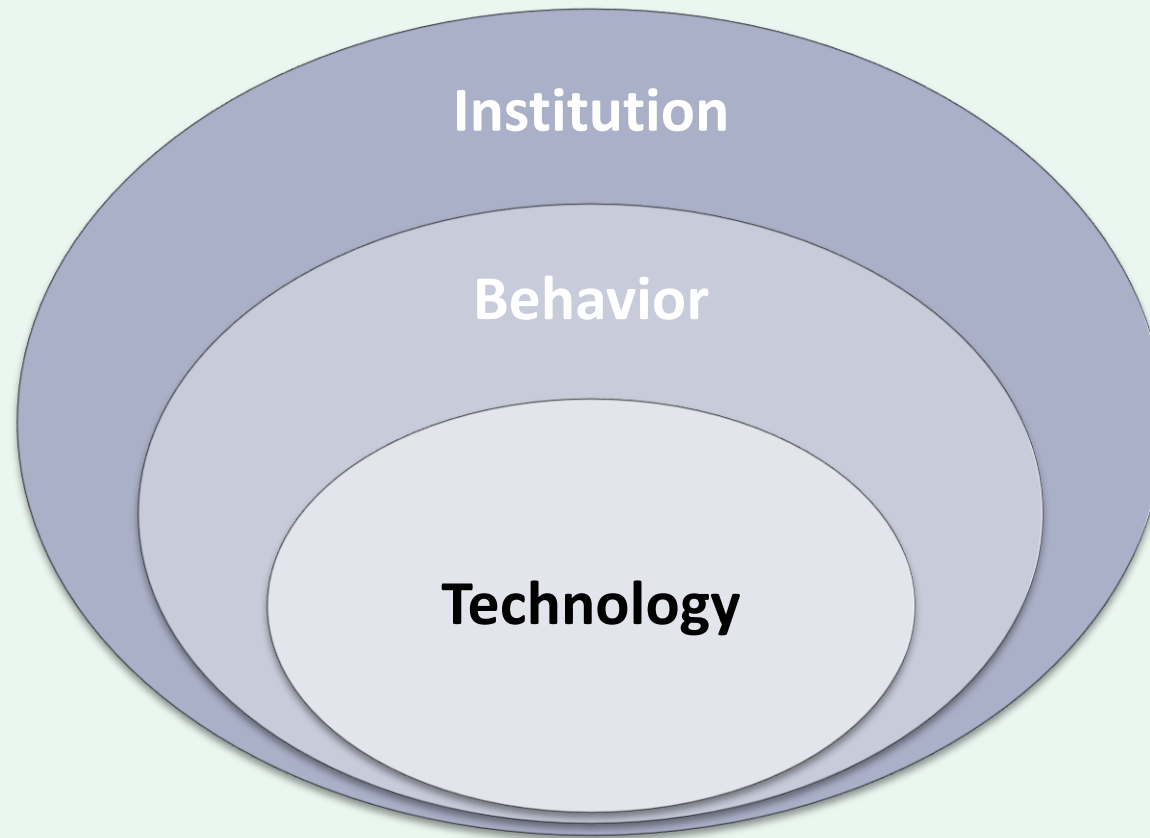


Overview

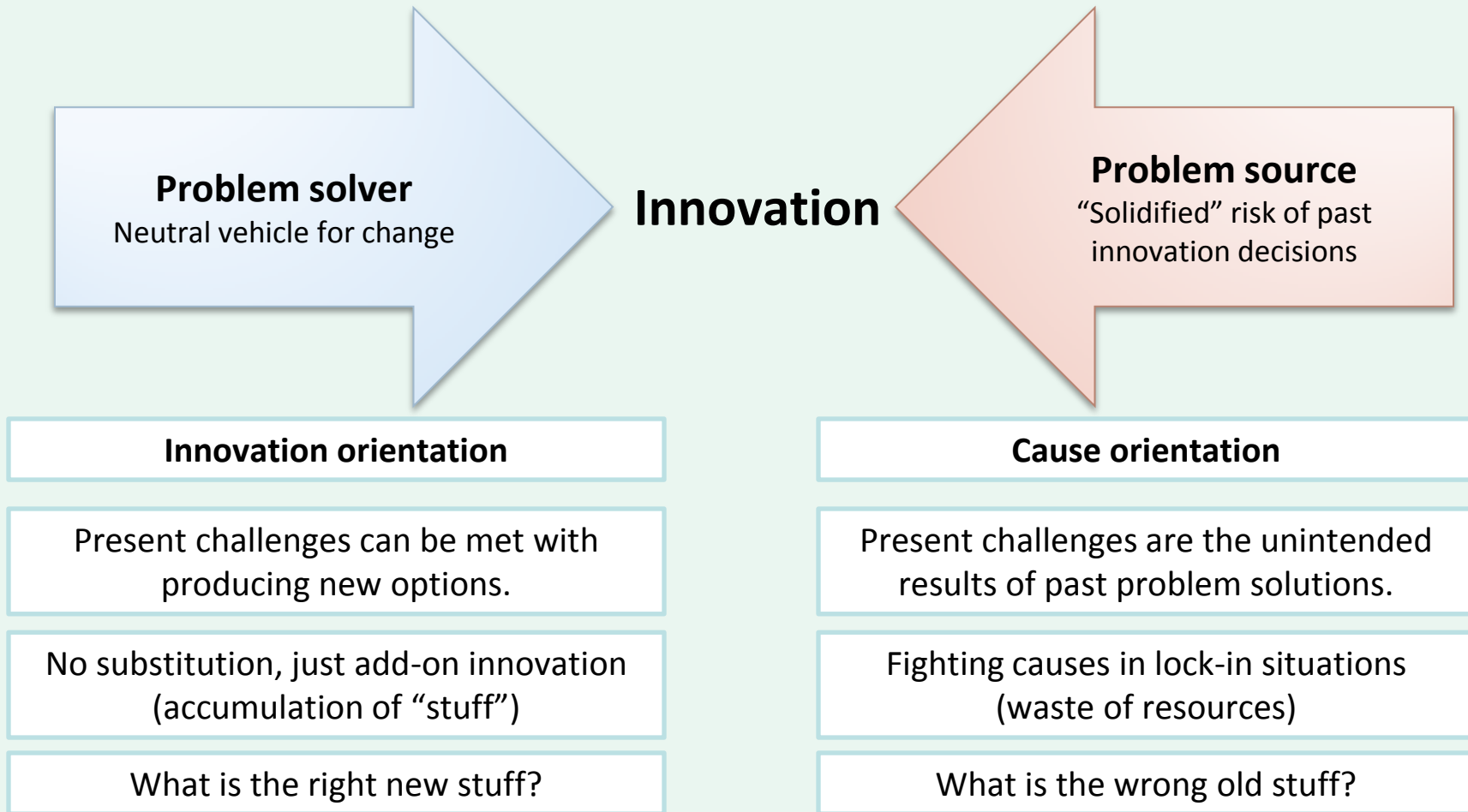
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Innovation



Innovation Critique

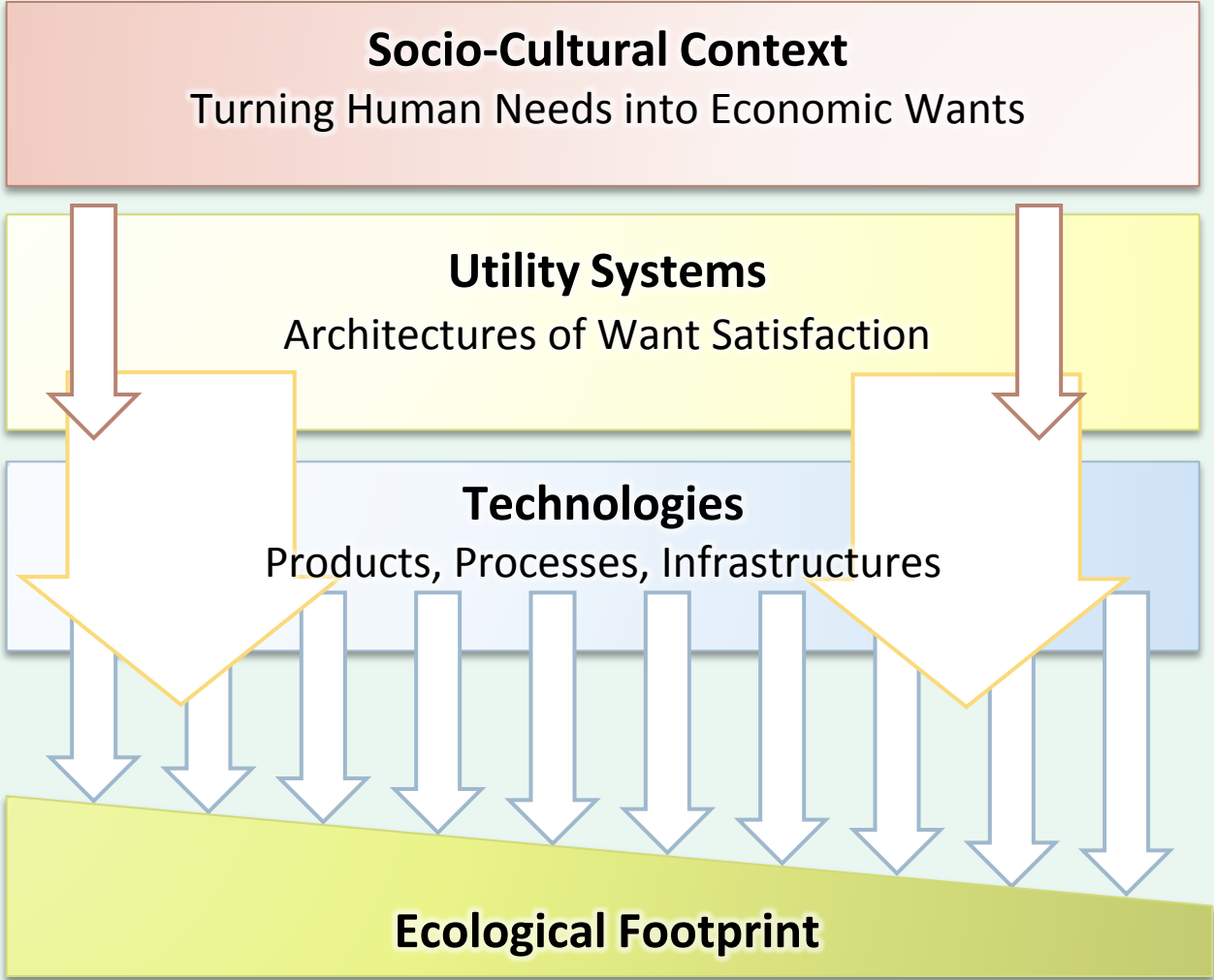


Innovation Spectrum



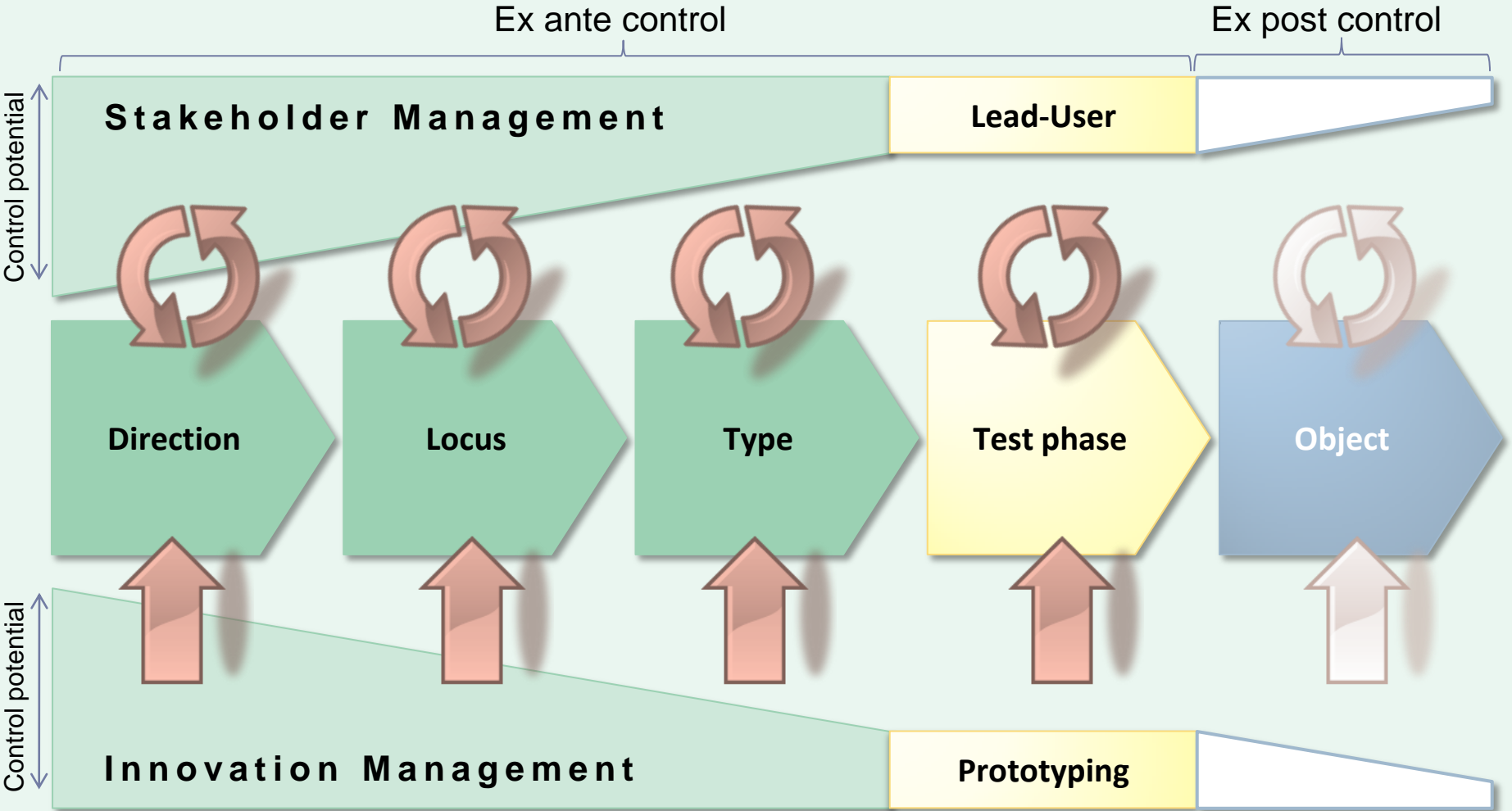
cf. Paech 2005

Loci of Innovation



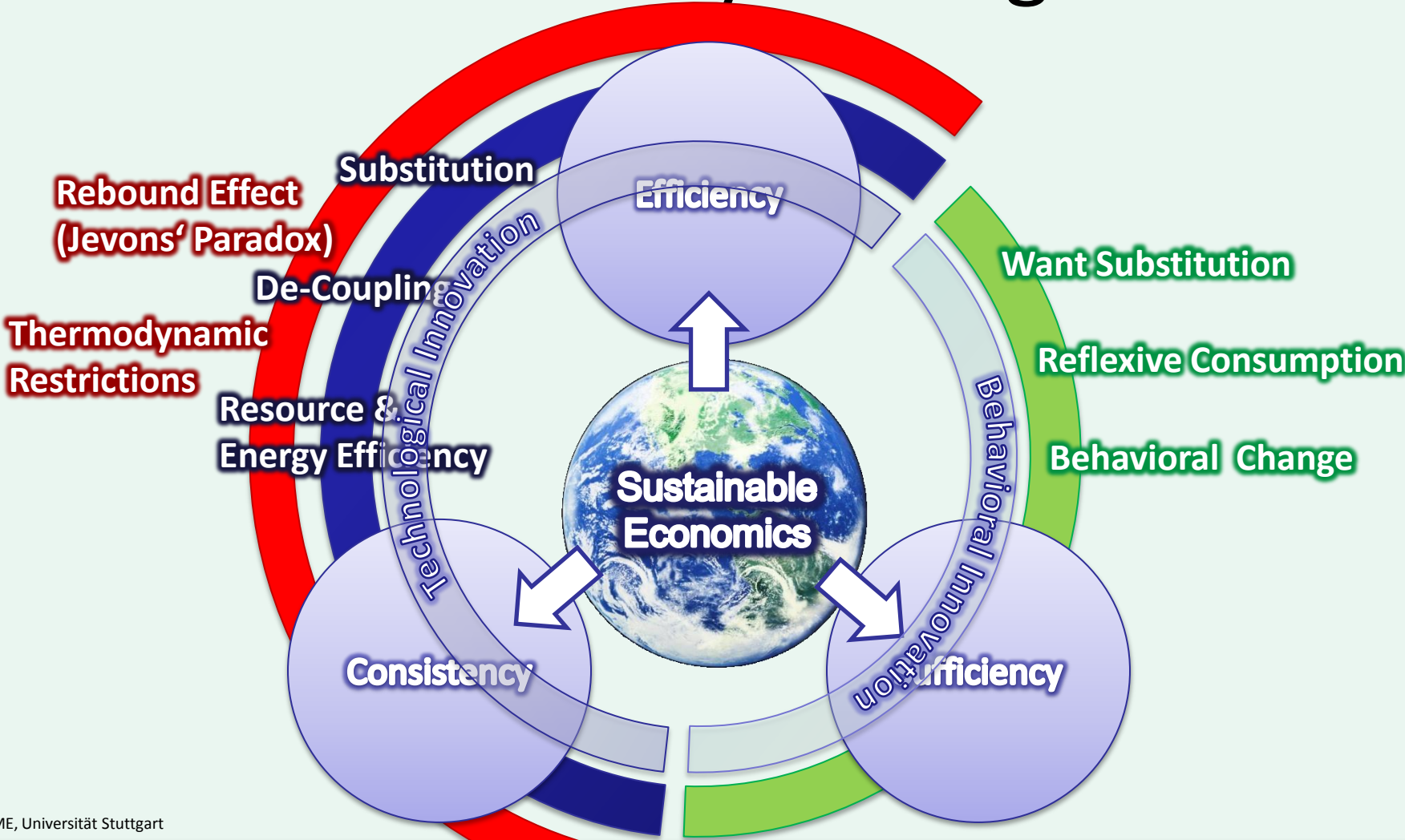
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Innovation Process

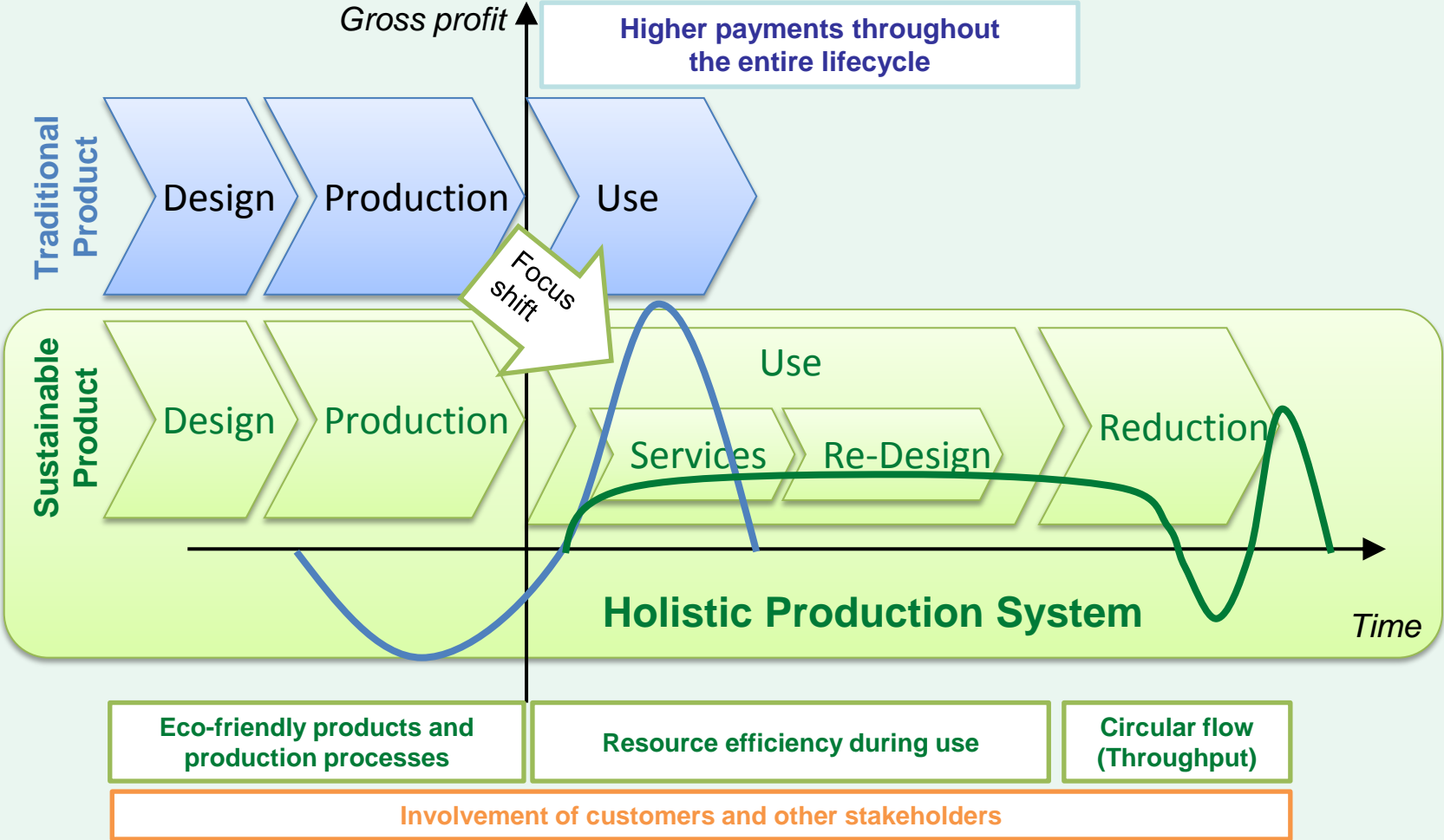


cf. Paech 2005

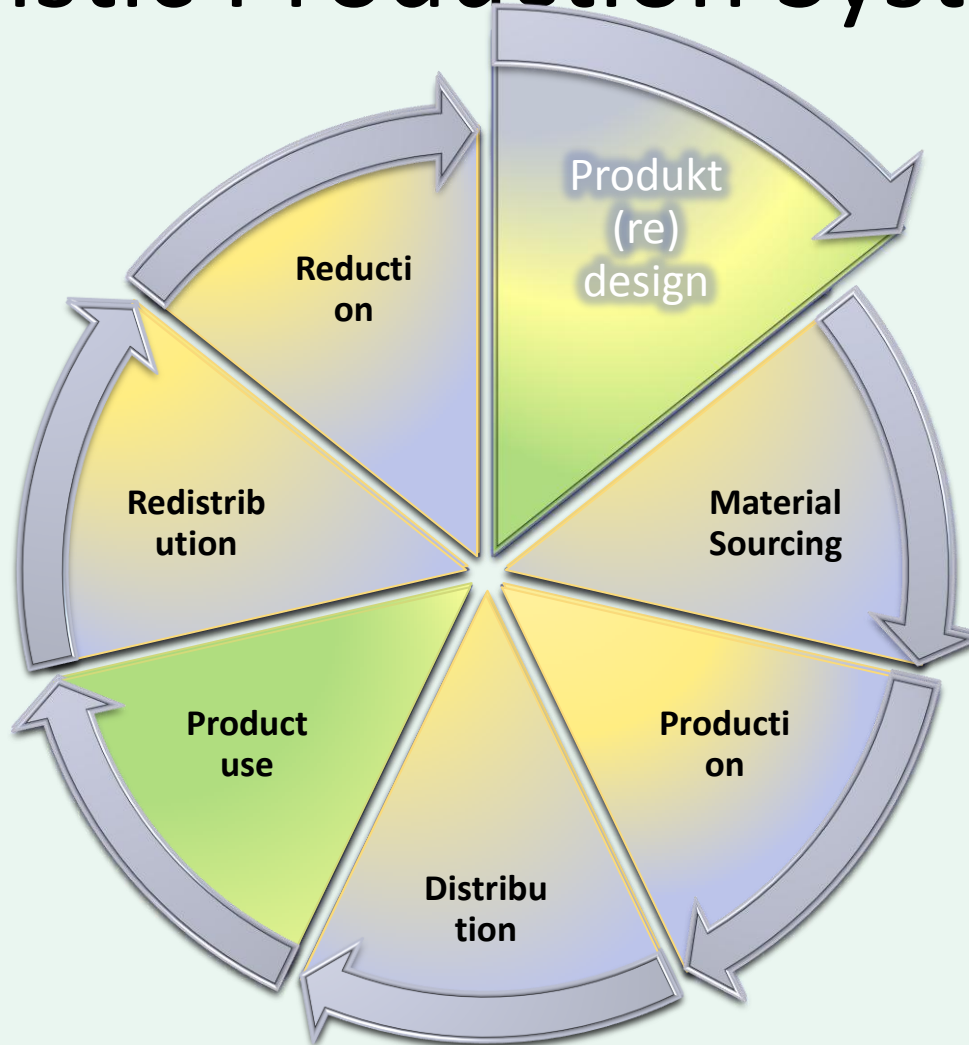
Sustainability Strategies



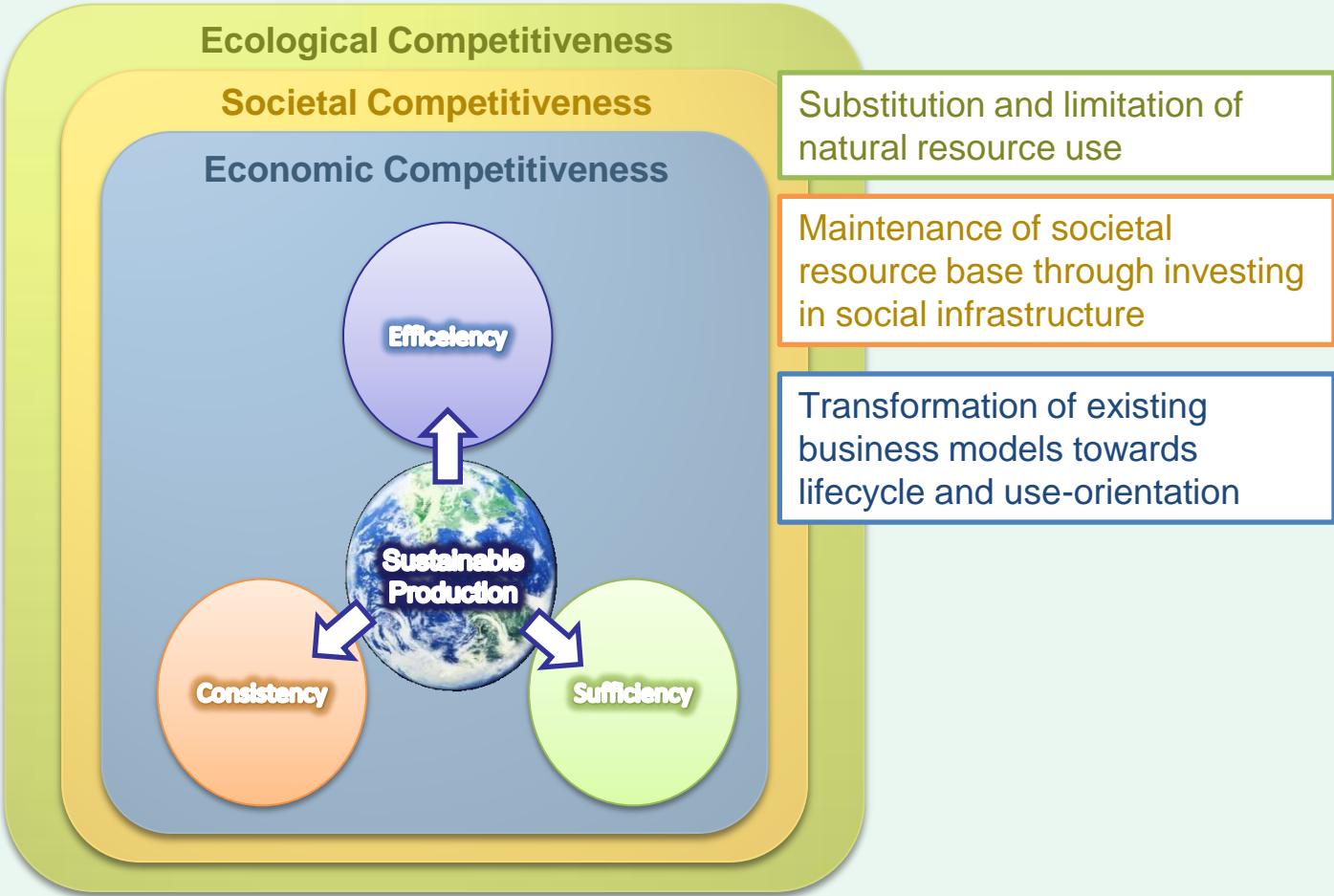
Lifecycle Sustainable Management



Holistic Production System



Strategy Framework for Manufacturing Firms



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Sustainable Value Report 2008



Rolls-Royce
Motor Cars Limited



BMW Group

Group 1: Strategy and Organization (pp. 6-21)

- What understanding of sustainability is employed here (rational, normative, economic centrism, ecological centrism)?
- Evaluate how sustainability is institutionalized within BMW (organizational departments, responsible managers etc.)
- Being a strategy consultant for sustainable Manufacturing Engineering, you have been assigned to further develop BMW's sustainability strategy: what would you suggest? (three key issues)

Group 2: Product Responsibility (pp. 24-36)

- How is lifecycle responsibility integrated within BMW's product strategies?
- What is/are the key sustainability strategy/ies BMW employs on the product level?
- As a product developer consultant from sME & Co., what possible directions for future product strategies can you suggest? (three key issues)

Group 3: Environmental Management (pp. 38-46)

- What are the key sustainability strategies BMW employs on the production level?
- What steps would be necessary to build an "industrial ecology network" for BMW?
- How would you organize product development and production (factory as product) in order to minimize ecological impact of BMW?

General Discussion

- Is BMW a sustainable firm as far as you can tell from the report?
- What can BMW do to increase its sustainability?
- Is this a "good" sustainability report?



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What the fudge is aME?

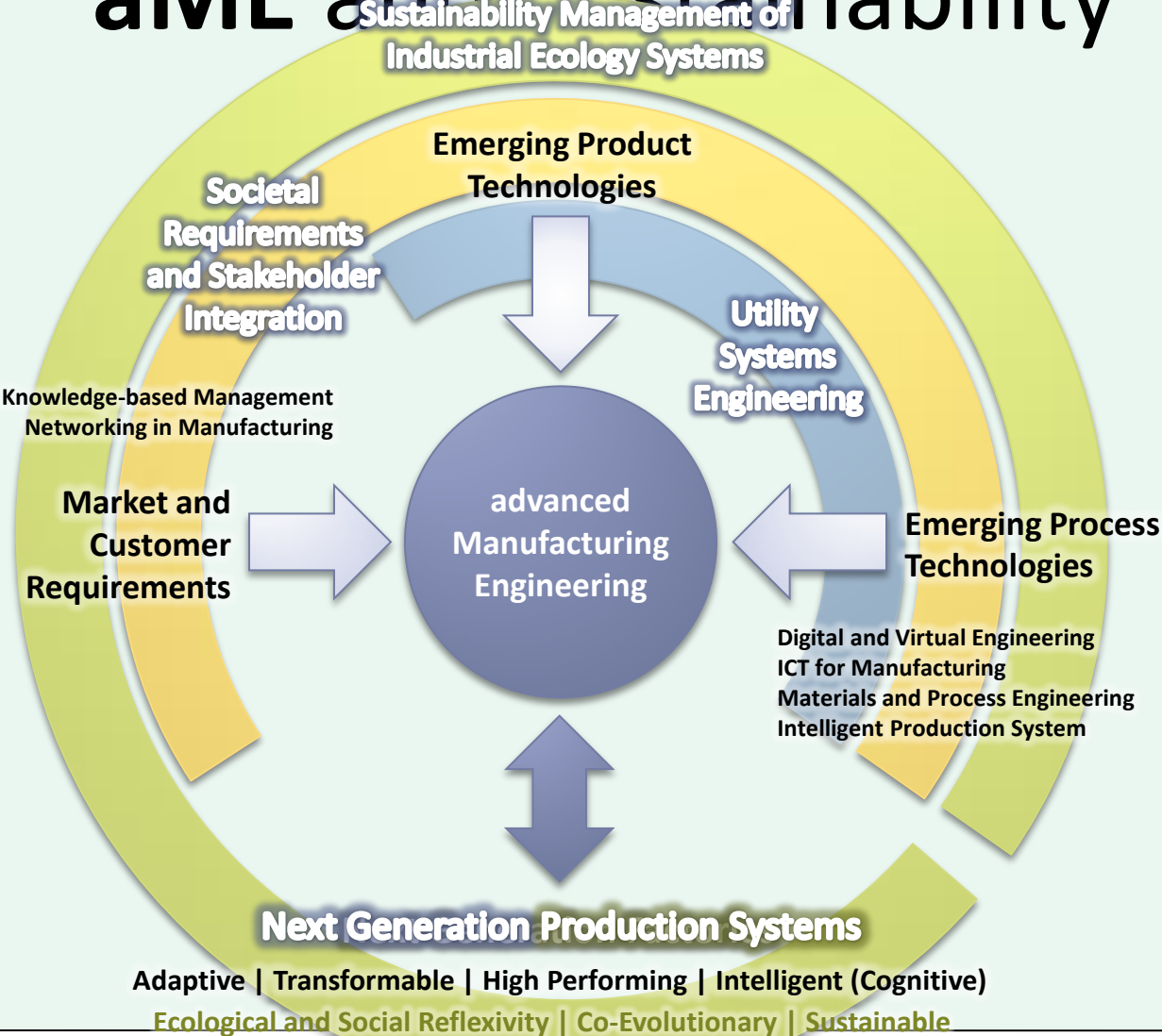
- „Advanced Manufacturing Engineering is envisioned as a **socio-technical system** oriented towards permanent best of class **usage of resources** by fast implementation of **innovative solutions**.“
- „[AME is supporting] the **transformability of the manufacturing enterprises' structures and resources** (technical, human and information based) orchestrated within the so-called Stuttgart Enterprise Model.“
- Core Elements of aME:
 - Multi-scale hierarchical „System Theory“
 - New Taylorism „Scientific Management“
 - Global competition and standardized manufacturing
 - Lifecycle sustainable management



Sustainability within the aME/SUM framework

	1. Systems Theory	2. New Taylorism	3. Global Competition and standardized Manufacturing	4. Lifecycle Sustainable Management
Strategy				<ul style="list-style-type: none"> • Visions, concepts and actions to achieve long-term sustainability: Corporate Sustainability Management • Corporate/Entrepreneurial Responsibility • Inter- and Transdisciplinarity: Economy, Ecology, Society, Technology, Communication, Culture. • Stakeholder orientation • Values and emotions
Structure				<ul style="list-style-type: none"> • Open production • Co-production with customers/stakeholders • Production 4.0
Employees				<ul style="list-style-type: none"> • “Cooperationability” • Human issues in factories/production systems • Motivation beyond economics
Technology				<ul style="list-style-type: none"> • Lifecycle orientation: absolute reduction of ecological impacts of “long-tail” production • Smart products (energy efficiency, use optimization) • Sustainable product design • Sustainability Assessment • New materials • Remanufacturing /De-production systems

aME and Sustainability



Sustainable Management



*manufacturing as if
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Literature

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- More sources available @ www.andrereichel.de

