

Strategic perspectives on Life Cycle Assessment

*Finish Society of Industrial Ecology
Annual Conference 2009*

Rupert J. Baumgartner

Agenda

- The meaning and essence of strategy
- Life Cycle Assessment in the context of business management and sustainability
- Coordination mechanism of companies and value/supply chains
- Is there a strategic perspective of Life Cycle Assessment?

Actual state

- Global financial crisis
- Ecological crisis, global warming
- Poverty
- Population growth
- ...

- There is a ***need for Sustainable Development***, but there is ***little progress!***
- ***Lack of strategic relevance and strategic thinking in approaches for Sustainable Development?*** (Robèrt et al. 2002)

The essence of strategy

- Definitions of Strategy
 - „A strategy is a plan of action designed to achieve a particular goal.“ (Wikipedia)
 - “Strategy is the way of using resources and capabilities of an organization.” (Hinterhuber, 2004)
 - “Strategy is concerned with deciding what business an organization should be in, where it wants to be, and how it is going to be there.” (Boddy, 2005)

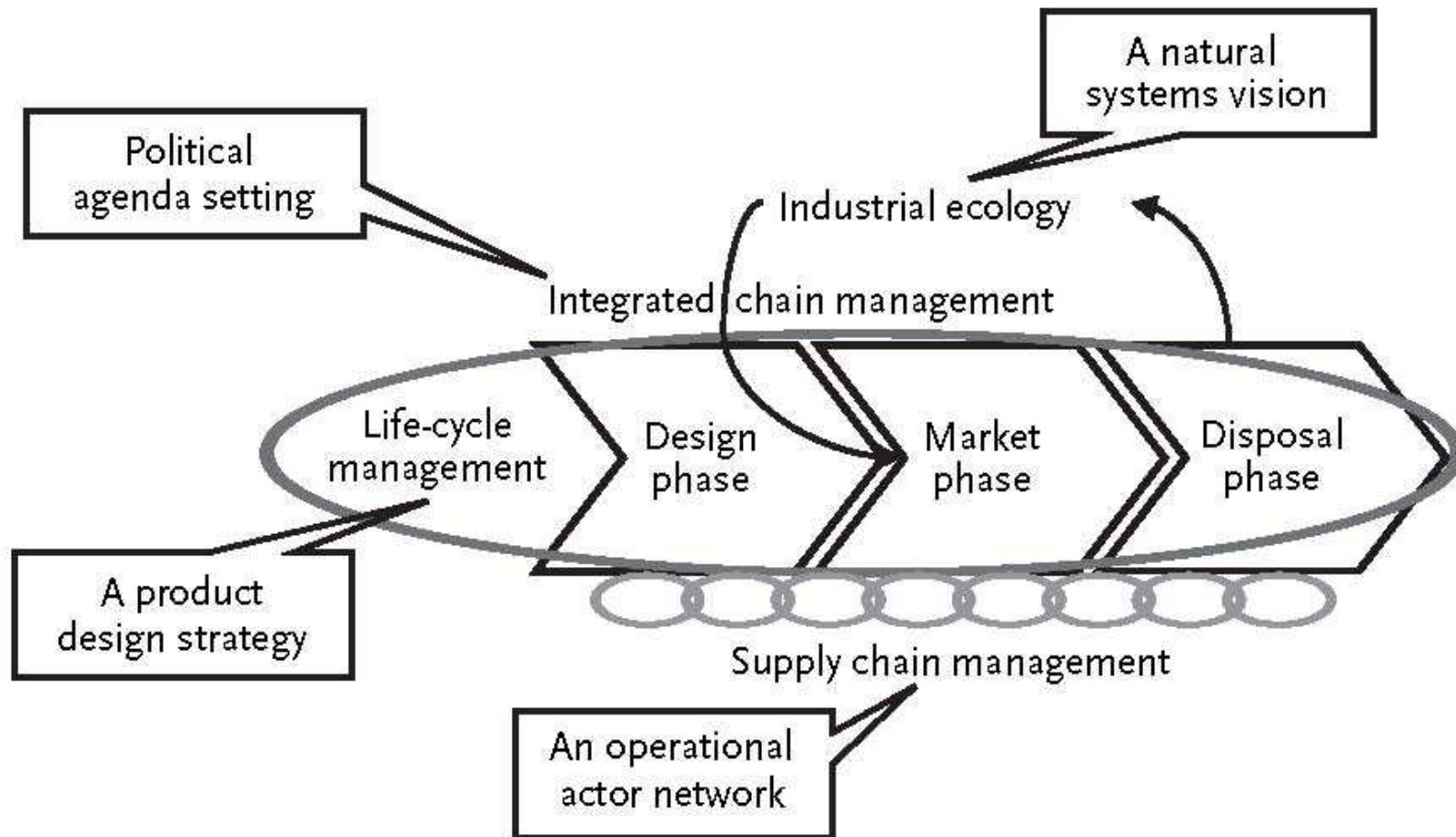
- Approaches in strategic management
 - Market based view (Porter, 1980)
 - Resource based view (Barney, 1991)
 - Emergent strategies (Mintzberg, 1990)

The essence of strategy

- “Strategic” means
 - Existence of an overall goal, objective or vision (picture for success)
 - Ability to identify general guidelines and pathways toward the goal

- Criteria to determine the strategic relevance of concepts
 - Does the concept lead towards the direction of the overall goal and vision?
 - Can there any general guidelines or pathways towards the vision be derived from the concept?
 - Is the concept flexible in sense of “keeping the door open” for future changes/progress?
 - Does the concept acknowledge/solve the risk of problem shifting

Life-Cycle Concepts



Seuring 2004

LCA

- LCA approach looks at the function of a product or service (“Functional unit”) from the standpoint of the value chain
 - Forces economic players who usually interface aggressively through markets to work together and to exchange information to integrate an environmental vision in their activities
 - Introduce environmental value in an economic world where the environmental cost does not always factor in an economic cost
- Life cycle thinking is a tool developed to maintain a vision of the public good in supposedly unruly markets
 - But is there a common understanding between nature (governed by natural laws, connected with material flows) and society (governed by economic and societal laws)?

Challenges of LCA (I)

- Is LCA contributing to Sustainable Development?
 - LCA focuses on known environmental impacts, not on the underlying principles and mechanisms that are their causes
 - Spatial, temporal or impact category system boundaries in LCA always exclude dimensions, e.g. because of methodological convenience. Dimensions should, however, be excluded/included not by system boundaries, but through the question and mental model: is this relevant for sustainability?
 - Forecasting vs. backcasting: LCA methodology derives from past, present and known ‘bads’ and their fix, the wrong way to envision a desirable future state of any development

Challenges of LCA (2)

- LCA does not have a business enterprise perspective
 - Quantitative vs. qualitative data: in many business situations (process of radical product or technology innovation, or design for environment/sustainability), we have a lack of data. Nevertheless there is a need for the “right” decisions (decisions which contribute to sustainability and must not violate the sustainability principles).
 - Return on investments: even the most polluting activities can be strategic if they fuel non-polluting activities elsewhere or in future
- What is the optimum for a system?
 - Optimizing function in case of conflicting goals: economic, ecological or societal function
 - The whole may be much more than its parts – what is the societal value of a product/service/material assessed with LCA?

Different Systems

- Micro-economic system of consumption markets
 - LCA was developed for this system
 - These **markets are very competitive** and communication among value chain partners is often poor prior to the introduction of LCA
 - LCA has to deal with the **complexity of the organization of the value chain** and to deal with **the time consequences** that are caused as a consequence of the initial creation of the functional unit
 - LCA does value **negative impacts** and not positive ones
 - It looks at the contribution of **one functional unit**, there is no solution for aggregating impacts due a whole family of products during the time they stay in the market or for aggregating products of several generations together
 - It adds up impacts of the whole value chain **assuming additionality** (true for global impacts, not true for regional impacts)

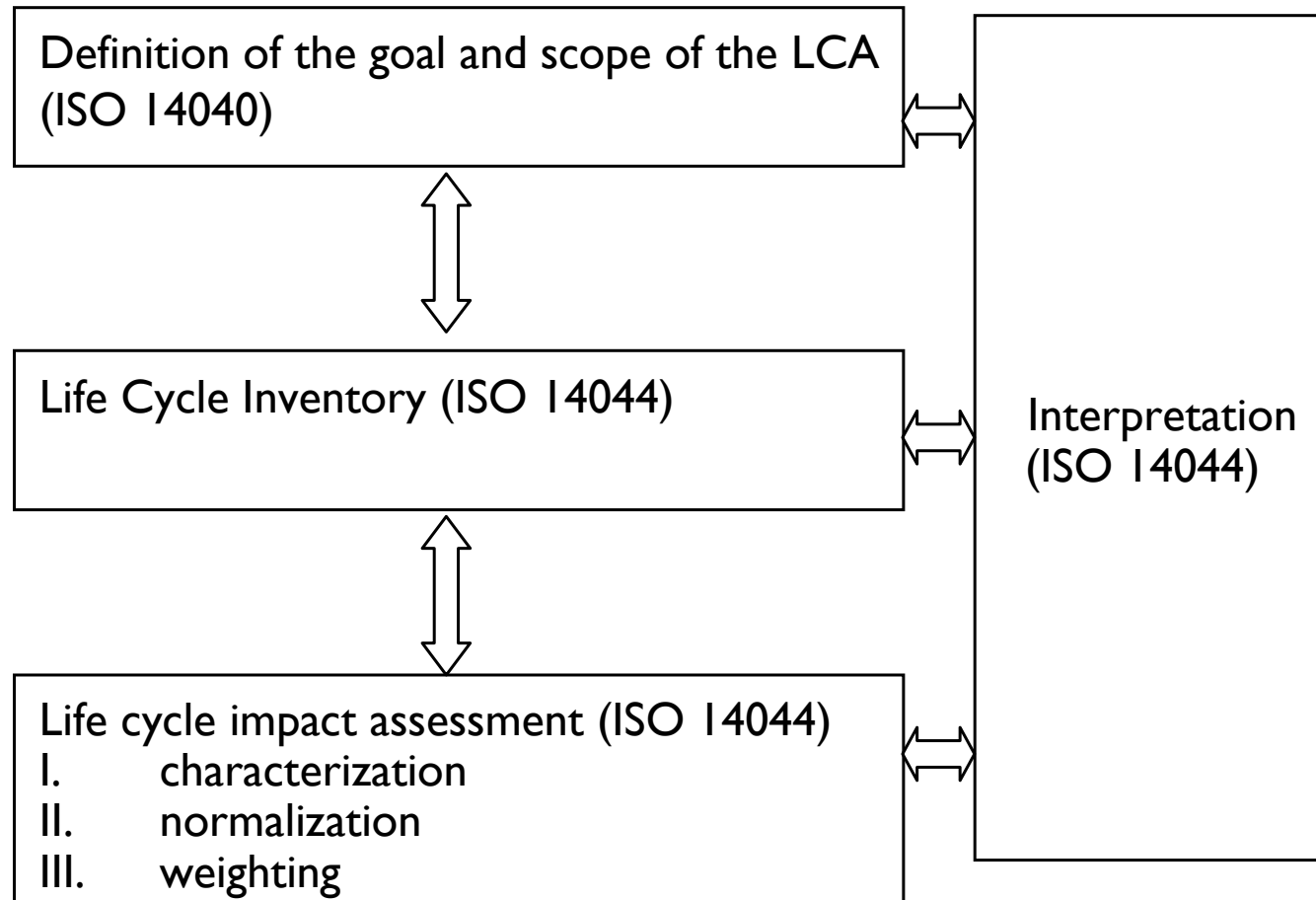
Different Systems

- Macro-economic systems, aggregation like for
 - Total national or world market for the functional unit (FU) (relevant for estimating the impact of the FU)
 - Total energy market
 - renewables, non-renewable, mixed (nuclear power for hydrogen?)
 - Total material market
 - primary and secondary materials
 - Major (metals, concrete, wood...) vs. minor (platinum, lithium) materials: **minor are essential for sustainable technologies, but scarce!**
- Time dimensions/temporality systems
 - LCA is usually static
 - Future studies (will there be cars in 50-80 years?)
- Ecological system
 - Can we really measure all impacts on a scientific basis?
- Social system: Is there a world without that product/service/material?

Strategic Management - Coordination mechanism

- **Coordination (actions, strategies,..) of a company**
 - Culture
 - Structure
 - Processes
 - Information
- **Coordination of a value chain**
 - Supply chain management
 - SCOR-model (Supply-Chain Operations Reference), consists of
 - Process Modeling
 - Performance Measurements
 - Best Practices

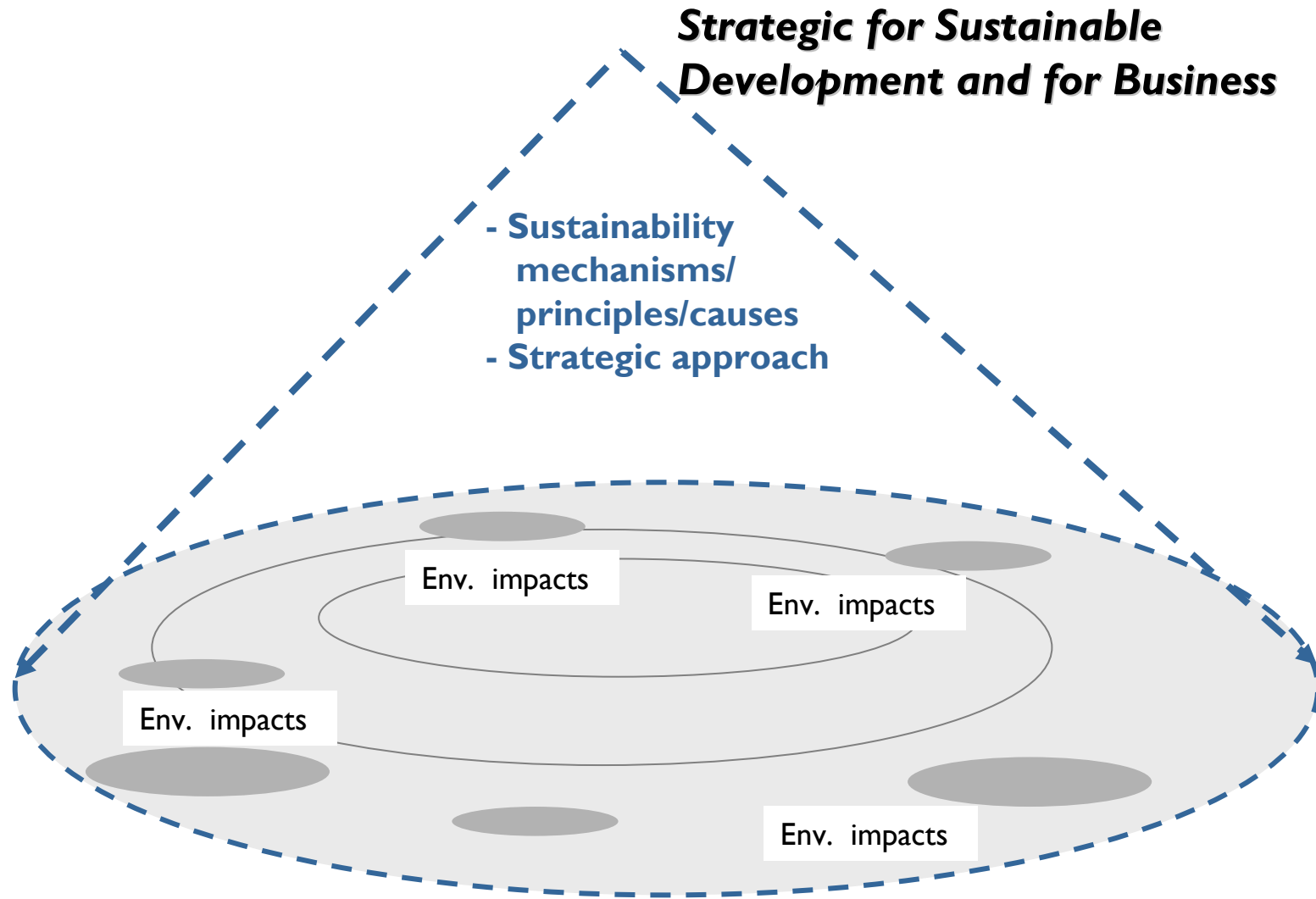
LCA according to ISO



LCA: Strategic relevance of phases

- Definition of the goal and scope of the LCA
 - System boundaries (spatial, temporal)
 - Connection to strategic questions of company!
- Life Cycle Inventory
 - Allocation rules
 - Data availability
 - Data quality
- Life cycle impact assessment
 - Methodologies for impact assessment
- Interpretation
 - Link to strategic decisions

Strategic perspective on LCA



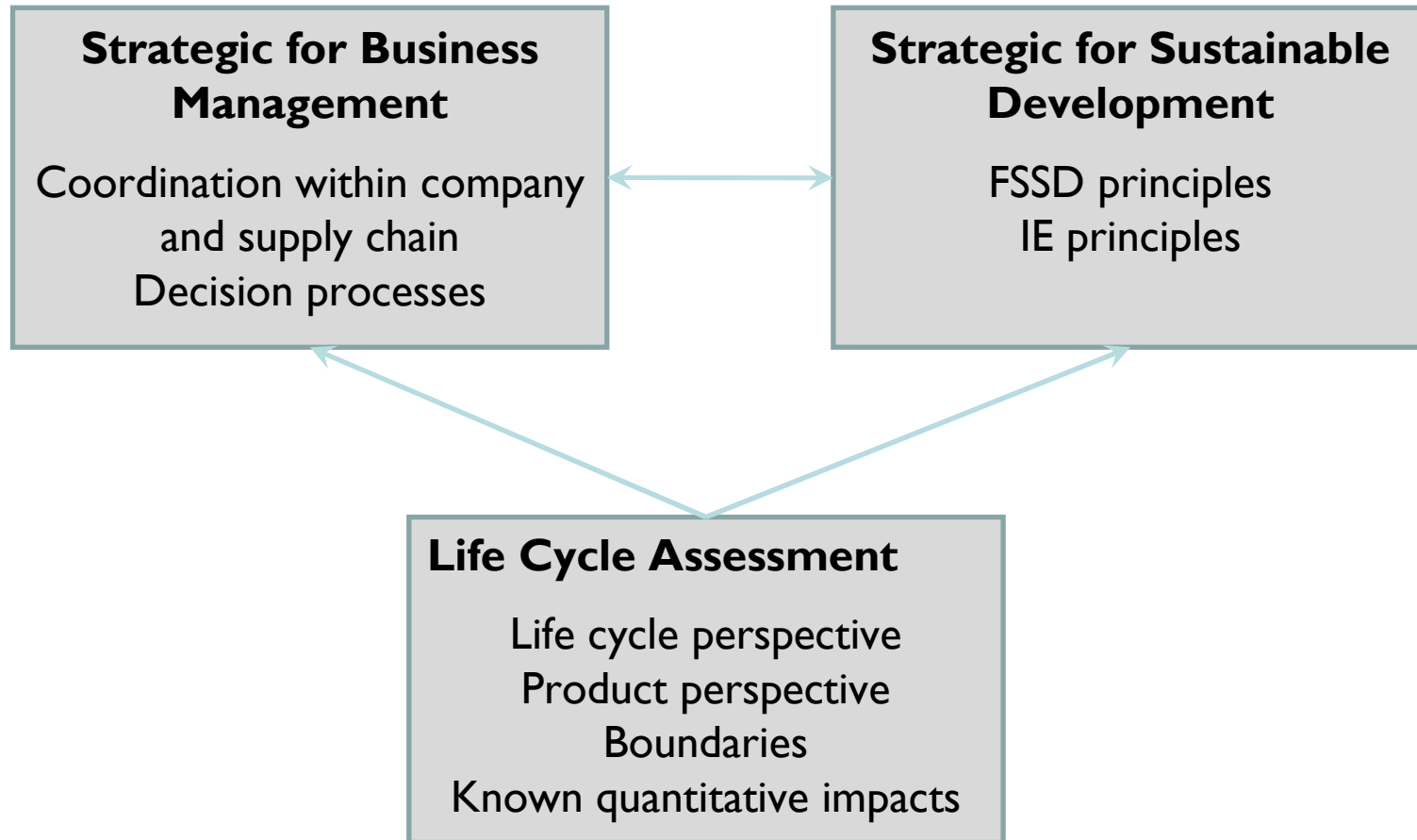
Strategic perspective on LCA

- **Two Central Aspects**
 - LCA should contribute to **Sustainable Development**
 - LCA should be relevant for **Strategic Management**

- **Sustainability principles to make LCA strategic for Sustainable Development**
 - FSSD
 - IE principles (roundput, diversity, locality, symbiosis)

- **Focus on decision processes and coordination mechanism to make LCA relevant for Strategic Management**

Strategic perspective on LCA



References

- Barney, J.B. (1991): Firms Resources and Sustained Competitive Advantage. In: Journal of Management, Vol. 17, Nr. 1, pp. 98-120.
- Birat, J.-P. (2009): Materials, beyond Life Cycle Thinking. 24. Aachener Stahlkolloquium, Vortrag I.3
- Boddy, D. (2005): Management; Prentice Hall/Financial Times
- Hinterhuber, H., (2004), Strategische Unternehmensführung (strategic management), 4. ed., de Gruyter
- Korhonen, J. (2004). Theory of industrial ecology. Progress in Industrial Ecology – An International Journal. Volume 1, Nrs. 1-3, pp. 61-88.
- Mintzberg, H. (1990): Strategic Formation: Schools of Thought. In: Fredrickson, J.W. (Ed.): Perspectives on Strategic Management. New York: Longman Higher Education, pp. 105-235.
- Porter, M.E. (1980): Competitive Strategy. New York: Free Press.
- Robèrt, K.-H, et al. (2002): Strategic sustainable development - selection, design and synergies of applied tools. In: Journal of Cleaner Production, Vol. 10, Nr. 3, pp. 197-214
- Seuring, S. (2004): Emerging Issues in Life-Cycle Management. In: Greener Management International, Vol. 45, pp. 3-8