

**2B**

# 1<sup>st</sup> iNTeg-Risk Conference



## **Combining LCA and RA for the integrated risk management of emerging risks**

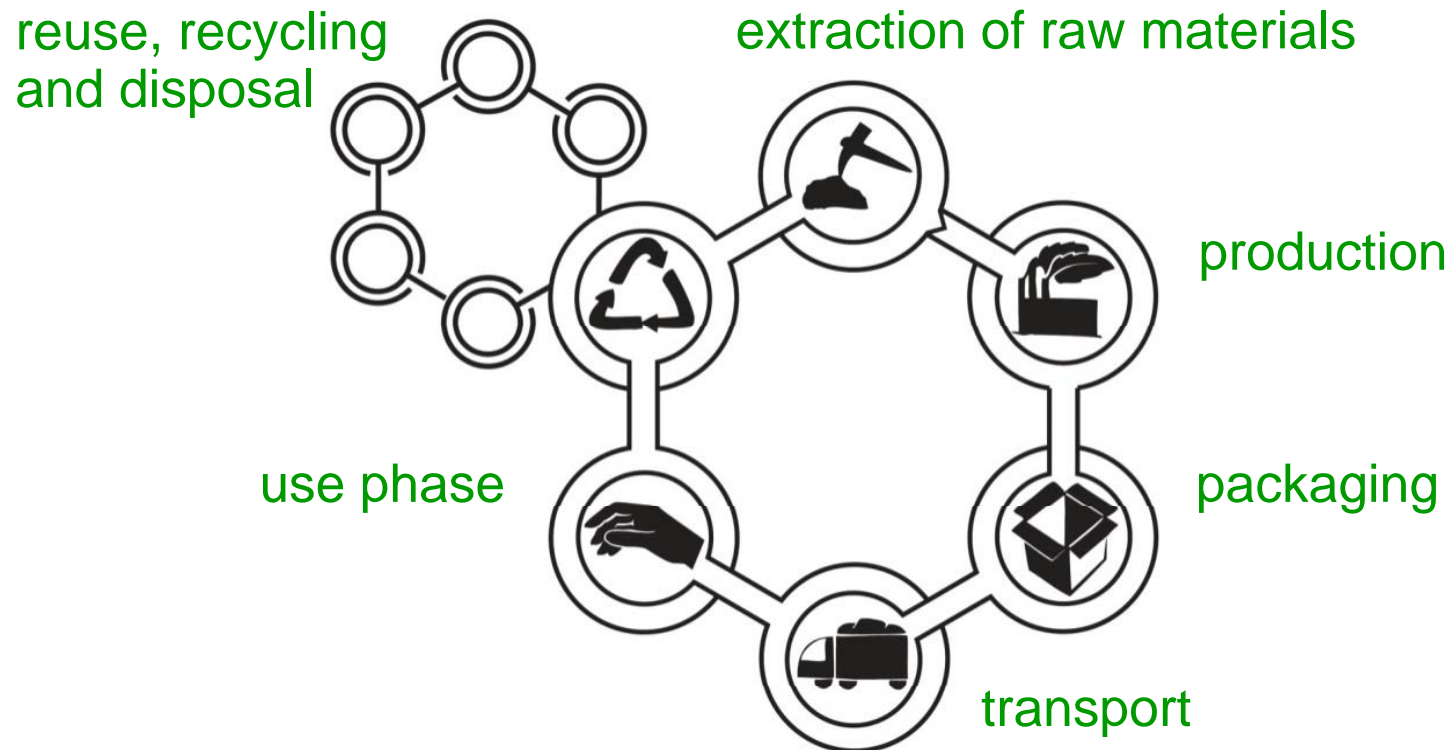
**Leo Breedveld, 2B - Italy (member EU-VRI)**

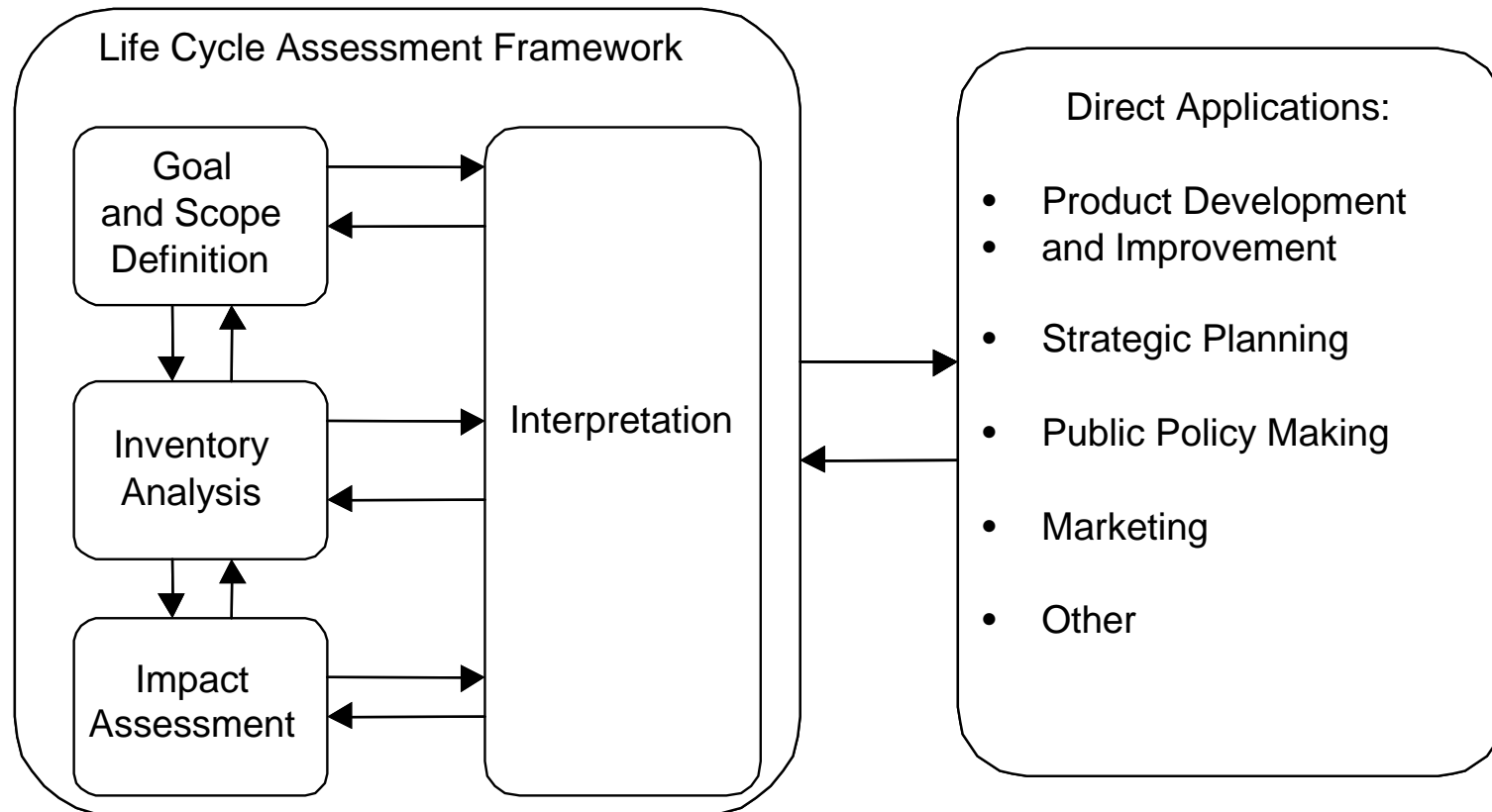
**Stuttgart - June 3<sup>rd</sup> 2009**

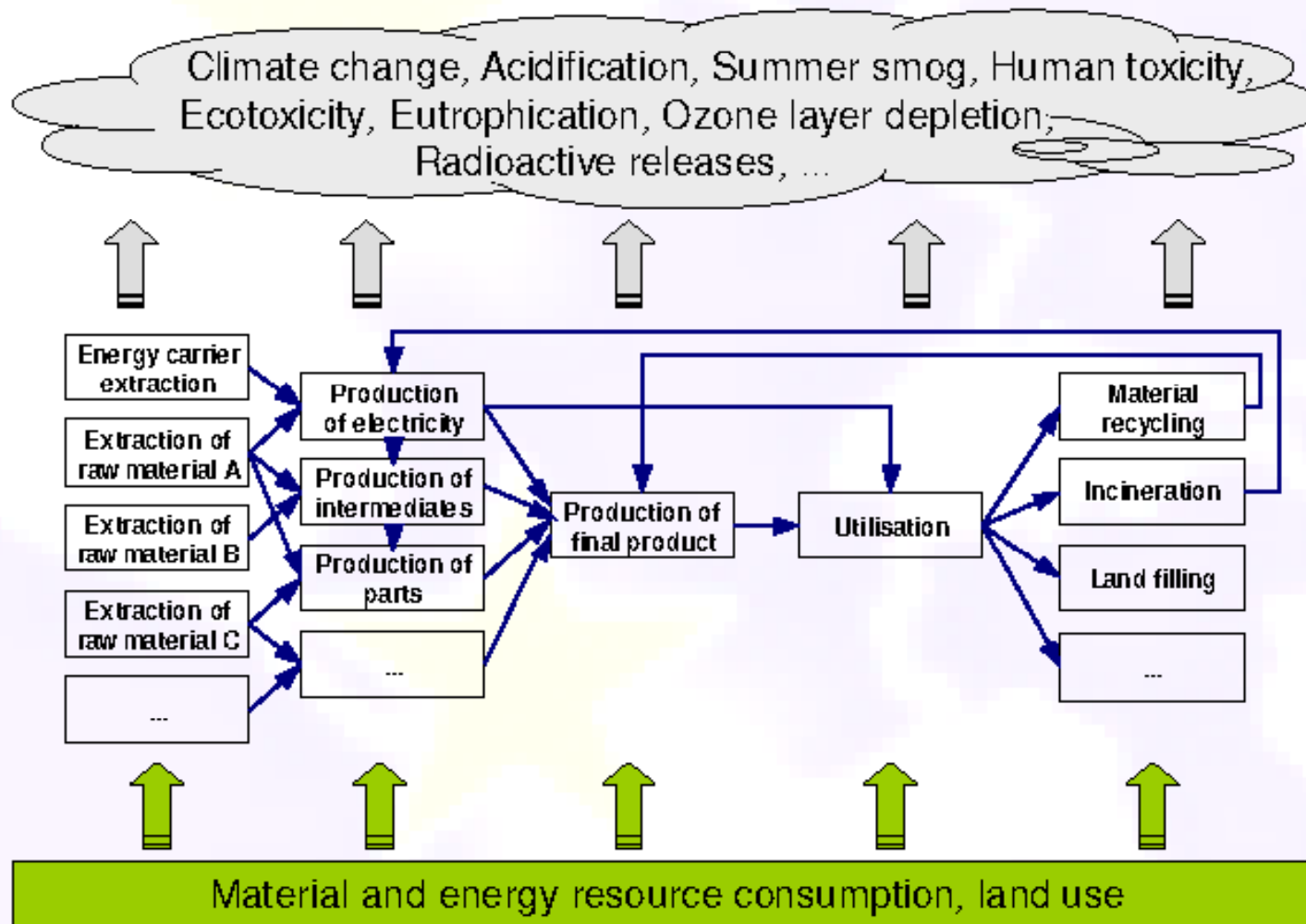


- ✓ Principles of LCA and RA
- ✓ Combining LCA and RA
- ✓ Life-cycle dimension of integrated risk management:
  1. Life-cycle dimension of the new safety paradigm
  2. Procedural approach to identify risks in the life-cycle of innovative technologies (RA in a life-cycle perspective)
  3. LCA as an analytical tool to assess the environmental impact of emerging technologies.
- ✓ Conclusions and further work

LCA (Life Cycle Assessment) is a tool to assess potential environmental impacts of a product, process or service along its entire life cycle (“cradle to grave”).







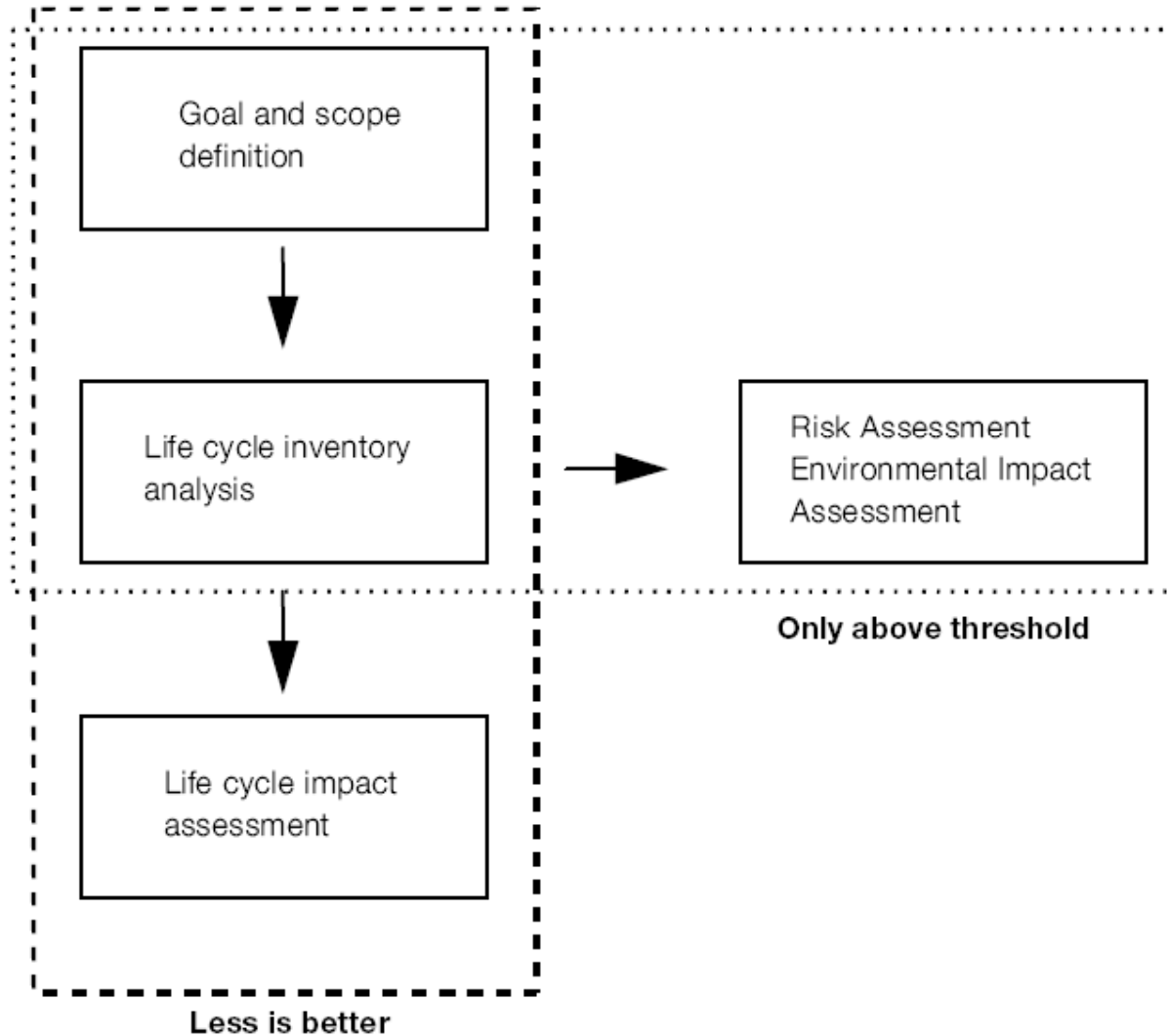


Risk is defined as a measure of probability and severity of adverse effects.

Environmental Risk Assessment (ERA) analyses the risks of substances released to the environment.

	LCA	ERA
Principle	Less is better	Above treshold
Goal	Assessment of potential impacts	Estimation of environmental risks
Scope	Life-cycle perspective	Substances released to the environment
Dimensions	Time and space independent	Time and space dependent
Focus	Mass	Concentrations
Approach	Realistic estimates for product comparison	Worst-case for initial risk assessment

## Combining LCA and RA





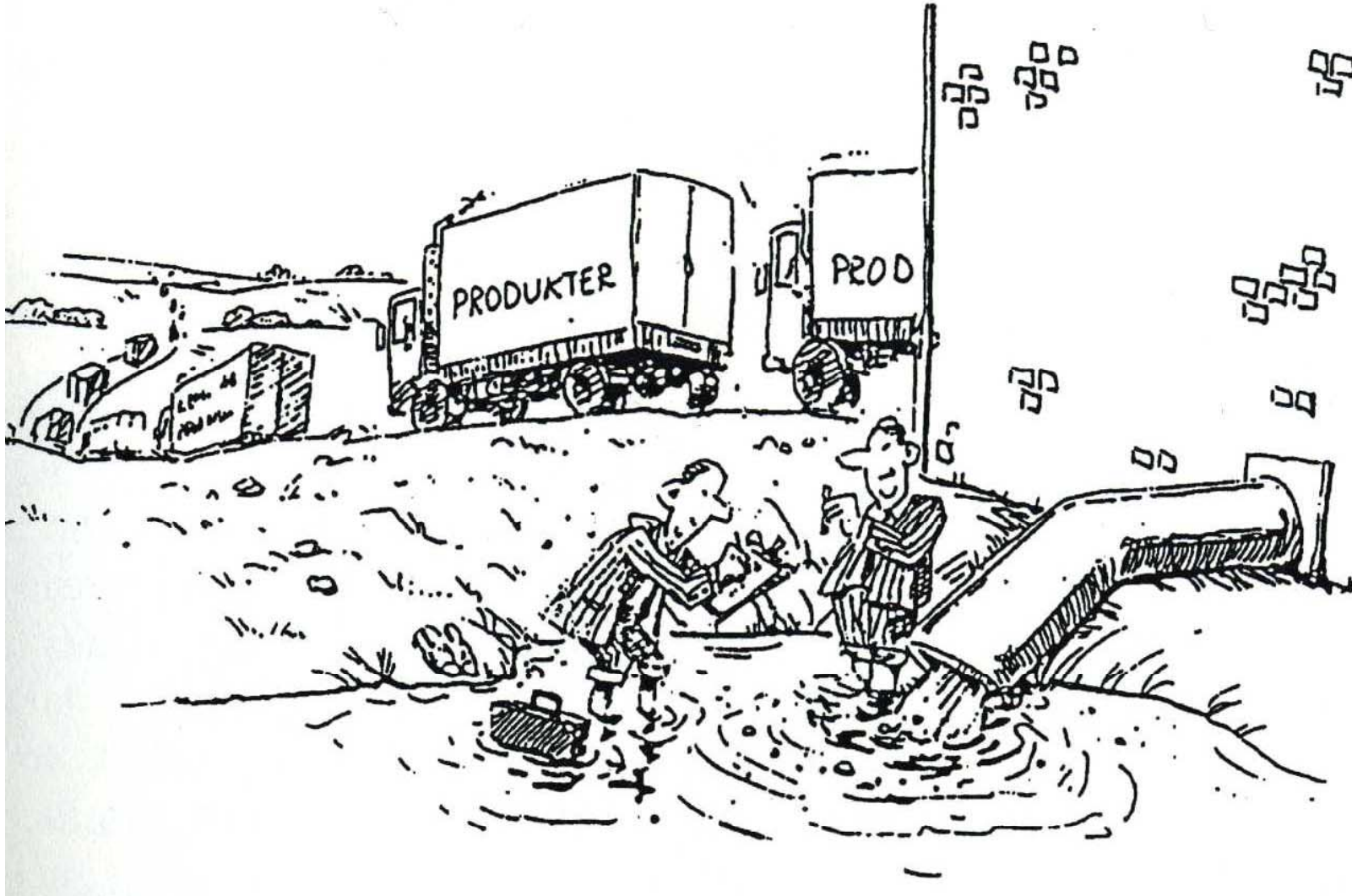
### Keywords from the DOW:

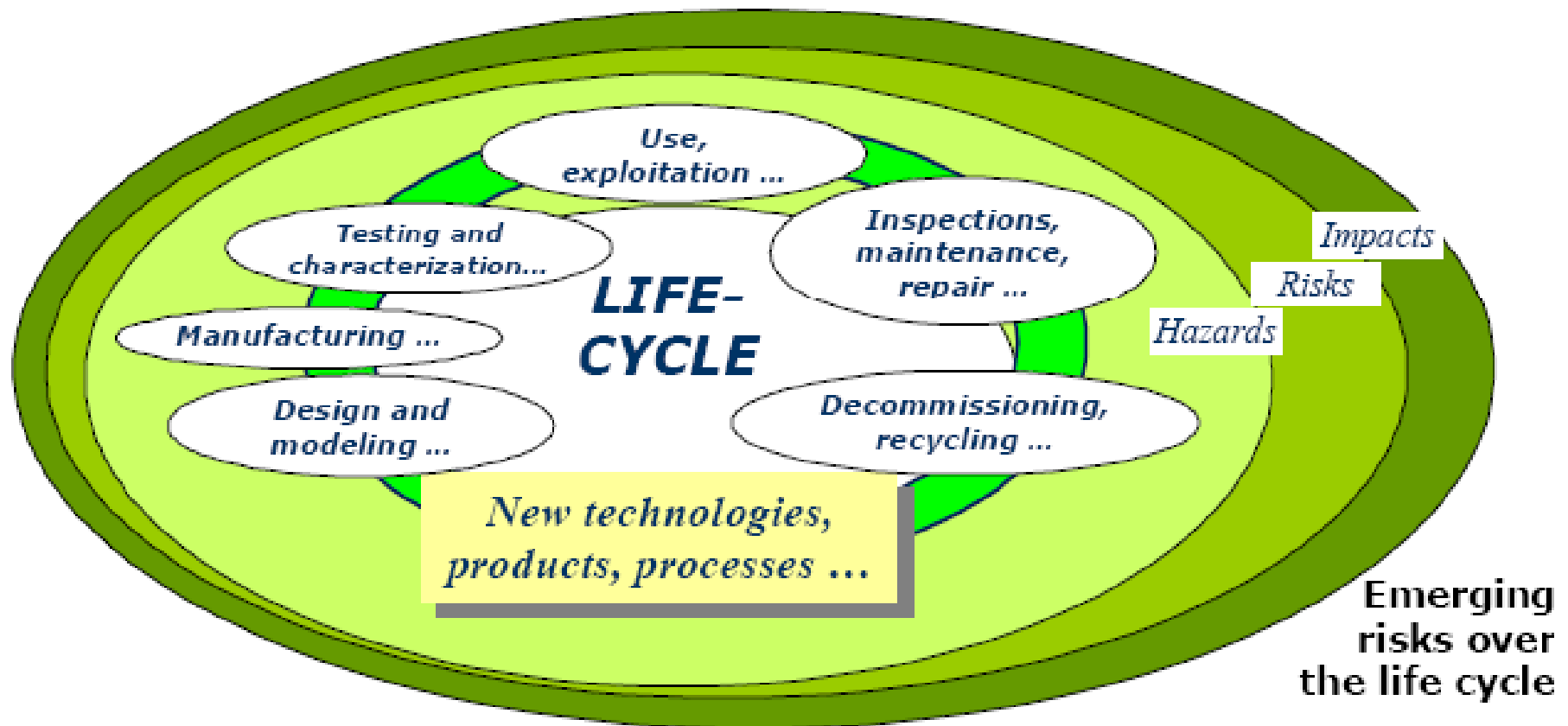
Life cycle perspective, life cycle responsibility, corporate social responsibility, sustainability, metrics, hazards, risks and impacts, precautionary principle, risk reduction.

### Life cycle perspective:

Integration over all dimensions\* of emerging risks along the life cycle of new technologies and products in order to prevent and reduce adverse effects and avoid problem shifting.

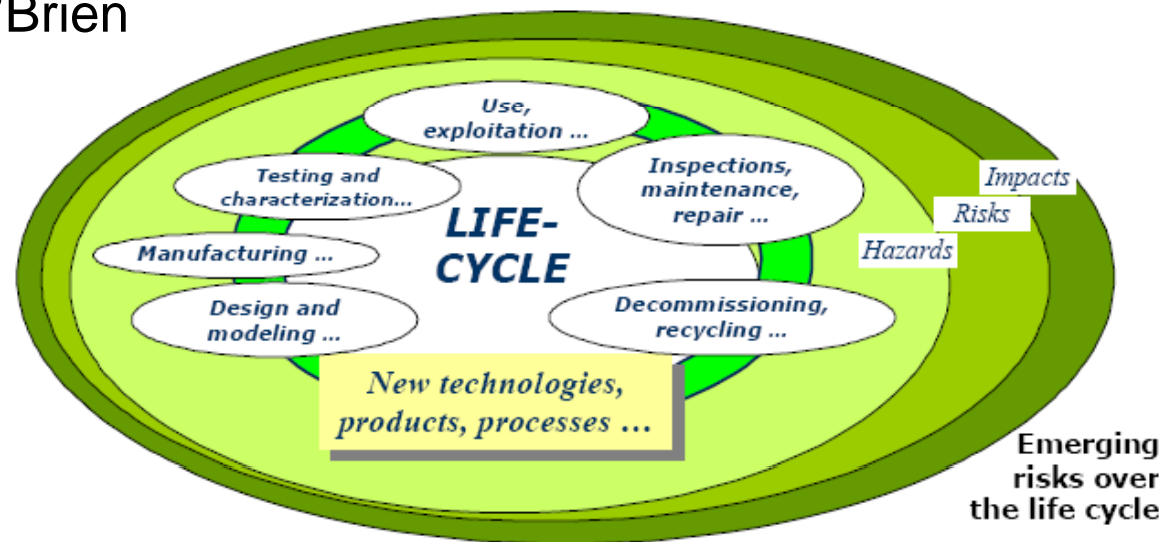
- \* environment, economy and society (SA);
- hazards, risks and impacts (RA, LCA);
- health, safety and the environment (HSE);
- technology, communication, human, regulation (TCHR)





- ✓ The life-cycle perspective offers a *procedural* approach to analyse the risks of innovative technologies along their entire life-cycle
- ✓ In combination with RA, the life-cycle perspective can provide scientifically sound information for the early assessment of potential impacts on HSE
- ✓ New technological systems should be designed so that they can be modified if negative impacts emerge
- ✓ Adaptive management involves monitoring of both local and systematic impacts of emerging technologies in a life cycle perspective
- ✓ Some examples: Potting, Sonnemann, Wardak, Shatkin.

- ✓ LCA offers an *analytical* tool to quantify the environmental impact of emerging technologies
- ✓ LCA according to ISO 14040-14044 and/or simplified LCA approaches
- ✓ Some examples: Graedel, Huppel, Clift, Geldermann, Breedveld, O'Brien



- ✓ Emerging risks of innovative technologies require proactive assessments in order to guarantee that their future materials and products will not result in adverse effects on health, safety and the environment.
- ✓ Combining Life Cycle Assessment (LCA) and Risk Assessment (RA) offers an early-stage identification system to assess potential hazards, risks and impacts of new technologies.

The objective of the task "Life-Cycle Methods and Tools for Emerging Risks" is to integrate two different schools: LCA and RA, creating a common language, developing guidelines and implementing case studies in the ERRAs, aiming at the incorporation of life cycle concepts (methods and tools) in the field of emerging risks.

Task activities (start month 6):

- ✓ Literature review combining LCA and RA
- ✓ Draft guidelines for LCA methods and tools for emerging risks
- ✓ Case studies in ERRAs (where possible and requested)
- ✓ Procedural approach to identify risks in the life-cycle (base-line)
- ✓ Analytical LCA to assess new technologies (experimental)
- ✓ Final guidelines (month 30)

For any further information...



- ✓ Leo Breedveld - 2B (breedveld@to-be.it / www.to-be.it)
- ✓ You're welcome at our office close to Venice!

