

PEER Environmental Technology Seminar

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Parallel session 1b Sustainability Assessment

Integrated assessment challenges

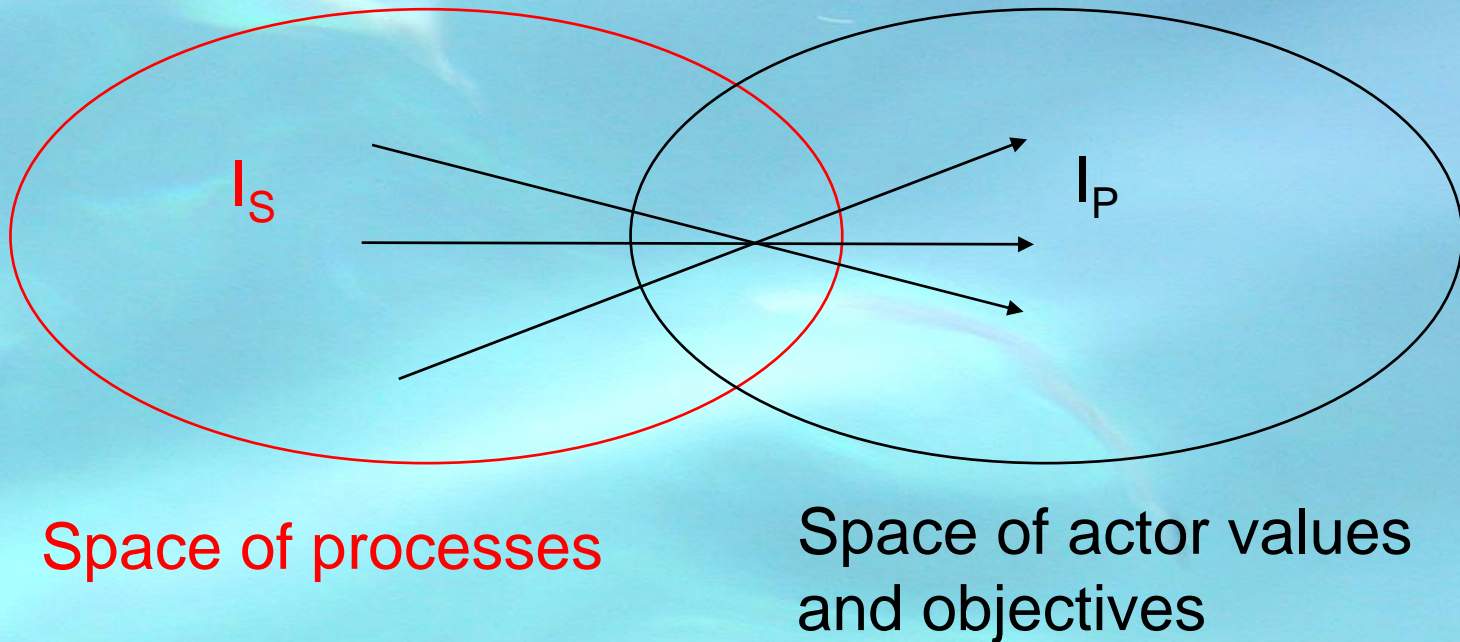
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Overview

- ◆ The overall challenge
- ◆ The space of processes
- ◆ From data to application
- ◆ Conclusions

The overall challenge

The provision of relevant information about complex systems to different actors



The imbalance of information

Potential information about processes (I_S)

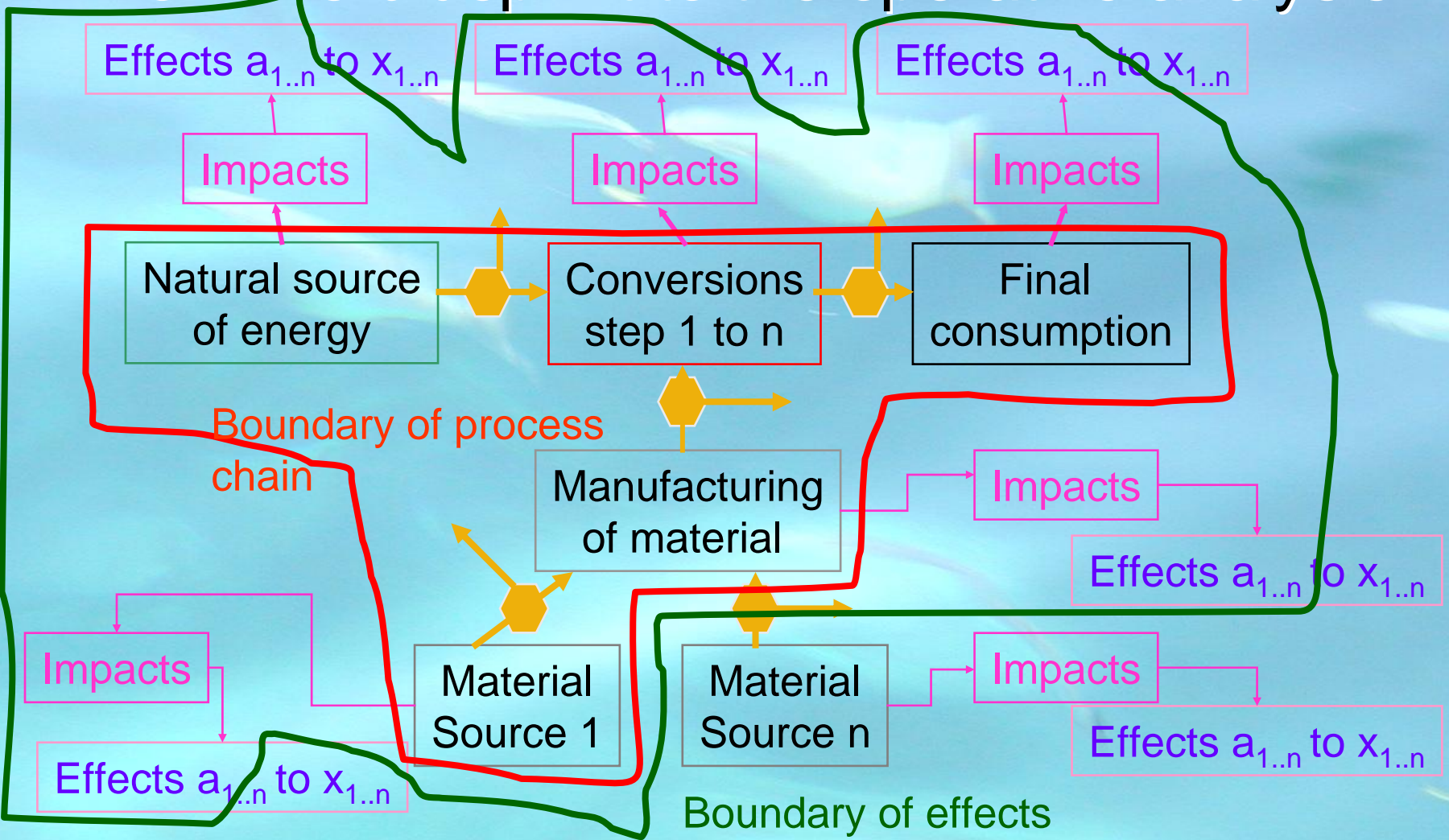
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than the information processing capacity
of actors (I_P)

What is relevant in the space of processes ?

- ◆ How can it be defined ?
- ◆ Is there only one system boundary ?
- ◆ How to deal with functional complementarities?
- ◆ How renewable is renewable?
- ◆ The role of standards (ISO; GRI)

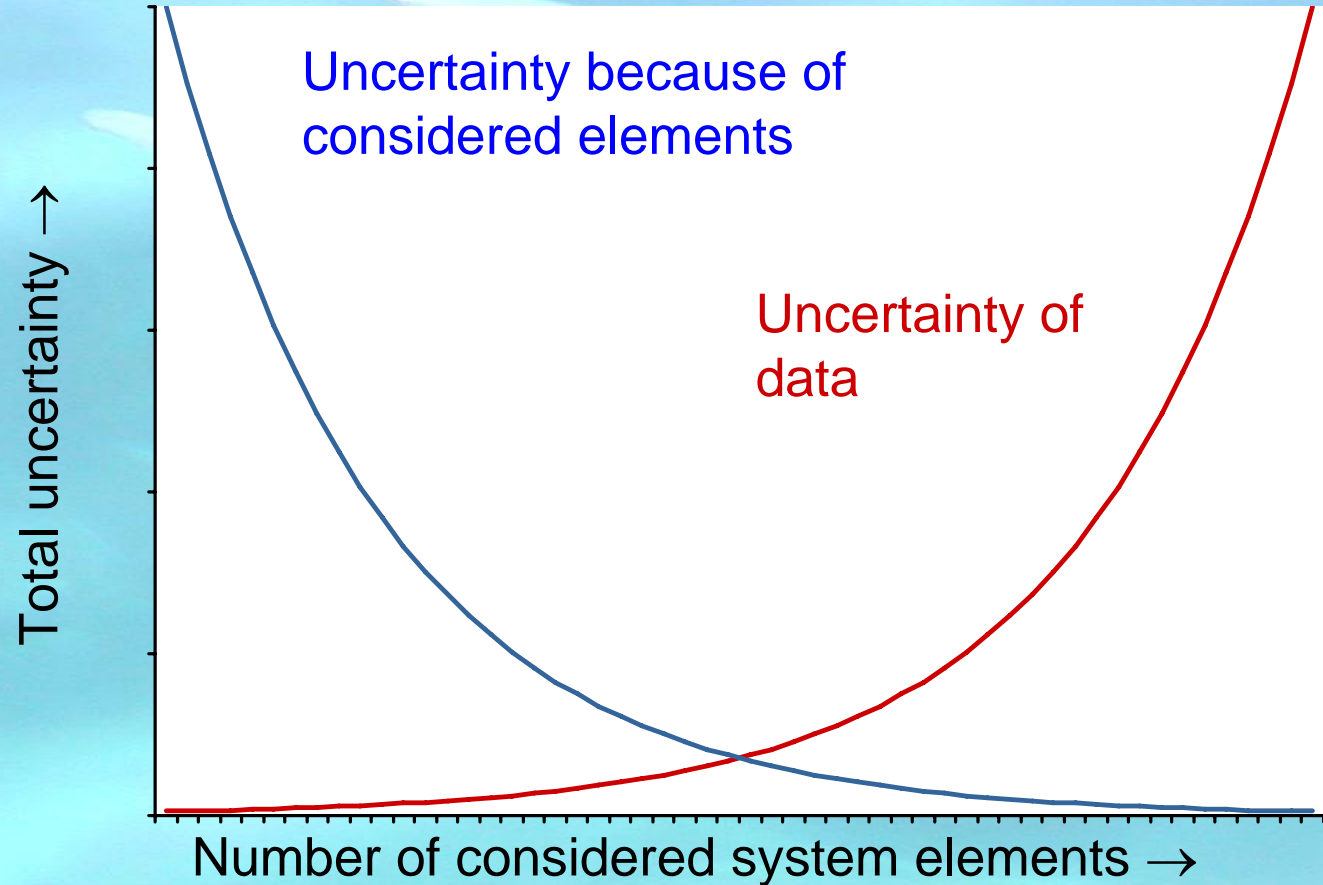
From the blueprint to the operative analysis



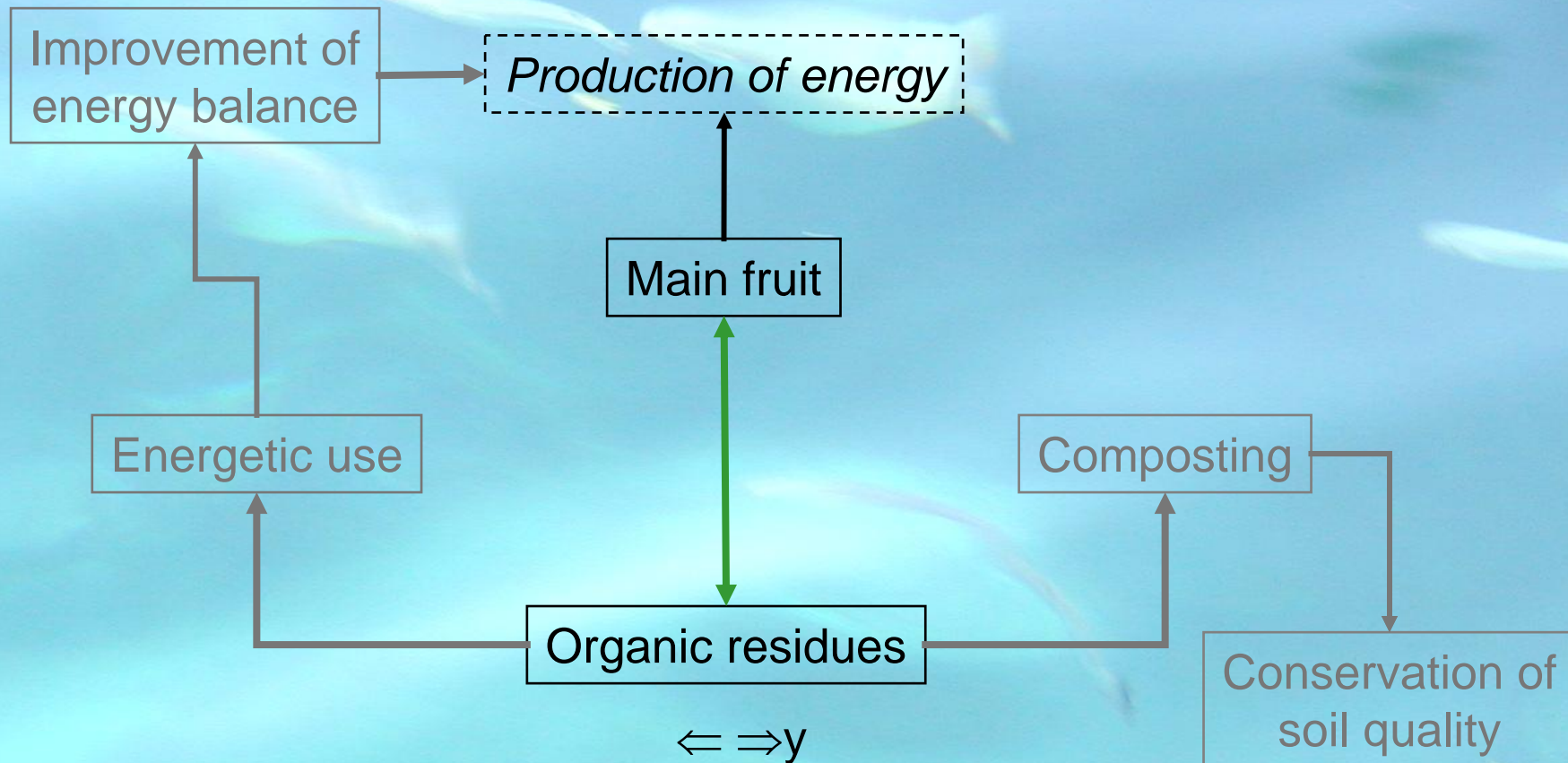
Some methodical principles

- ◆ The blueprint should be developed on the basis of the knowledge about processes
- ◆ Check the availability of data and information about the processing chain and their accuracy
- ◆ Define the boundary of the process chain
- ◆ Check the availability of data and information about impacts and effects and their accuracy
- ◆ Define the boundary of effects
- ◆ Modular approaches are recommended to avoid error transformations and to maintain the adaptability to modifications of the processing chain

Definition of boundaries by optimisation



Functional complementarities – example energetic use of biomass



Renewable – the existing paradigms

- ◆ Energy: Renewable – solar, wind, geothermic energy, waves, tides and biomass;
Non-renewable – fossil fuels
- ◆ Materials: Renewable – organic material;
Non-renewable – inorganic material.

Renewable – the peculiarities of biomass

- ◆ The reproduction of biomass depends on the continuity of genetic reproduction in interdependence with environmental conditions.
- ◆ Ecosystems are providing basic services for the existence of human life.
- ◆ Hence, biomass is only reproducible within the bandwidth of ecological conditions.
- ◆ The exploitation of biomass is only sustainable within the (narrower) bandwidth of functional carrying capacity.

Renewable – the challenge of inorganic material

- ◆ The use of inorganic material causes in general no losses of mass.
- ◆ But the use of inorganic material causes changes of entropy.
- ◆ Hence, an important measure for sustainability is not the balance of masses but the change of entropy within ecosystems (including human dominated systems!).
- ◆ How we can indicate this? One approach could be the evolution criterion ($d_x \sigma \leq 0$).

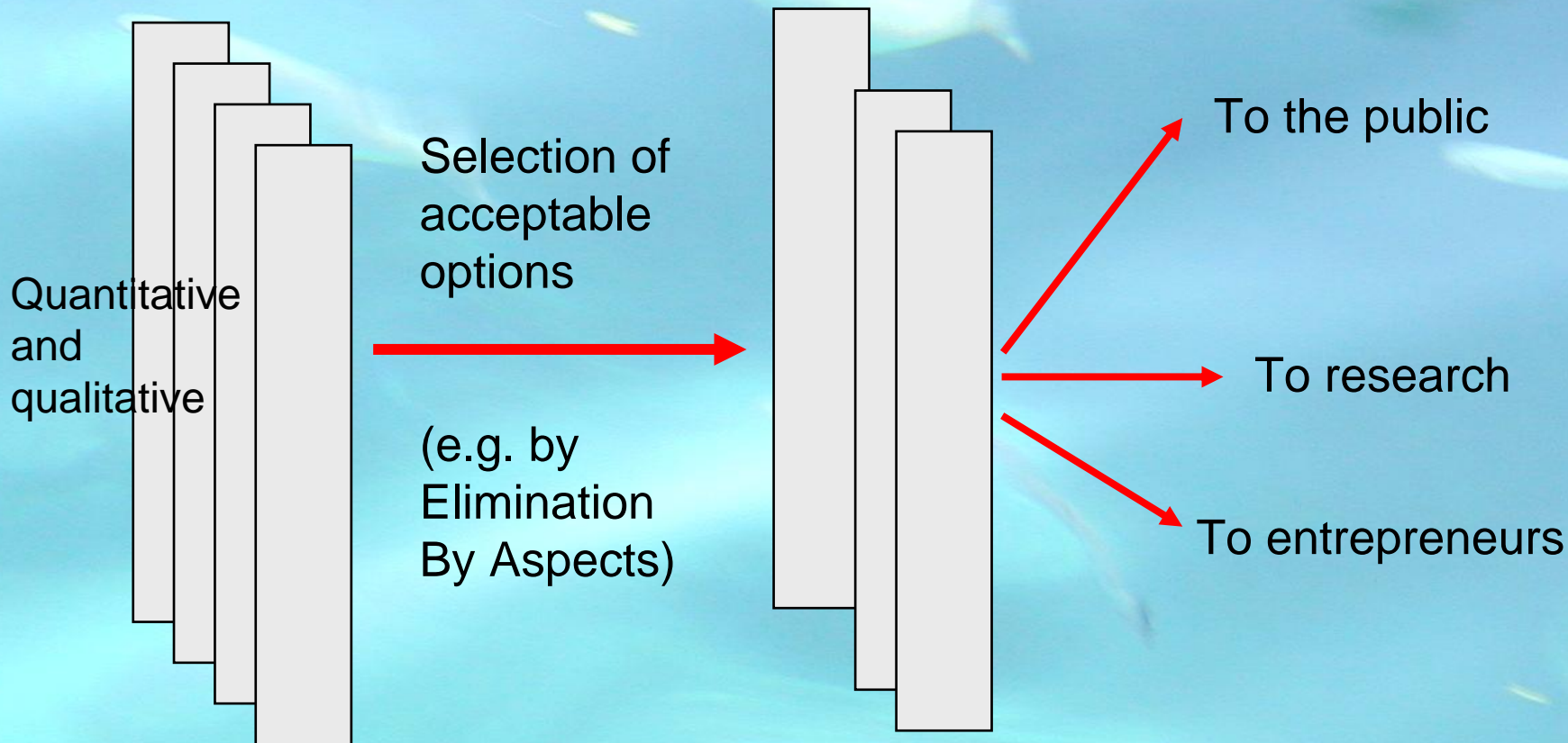
The role of standards

- ◆ Helpful for the comparability of parameters and parameter sets
- ◆ In some cases helpful for comparability of primary effects
- ◆ However, they can not overwhelm the variability of production chains
- ◆ They bear some risks to camouflage particular critical effects
- ◆ Highly variable processes can not really be standardised

From data to application

Lists of effect weighted aspects per option

Aspects related to objectives per option (indicators)



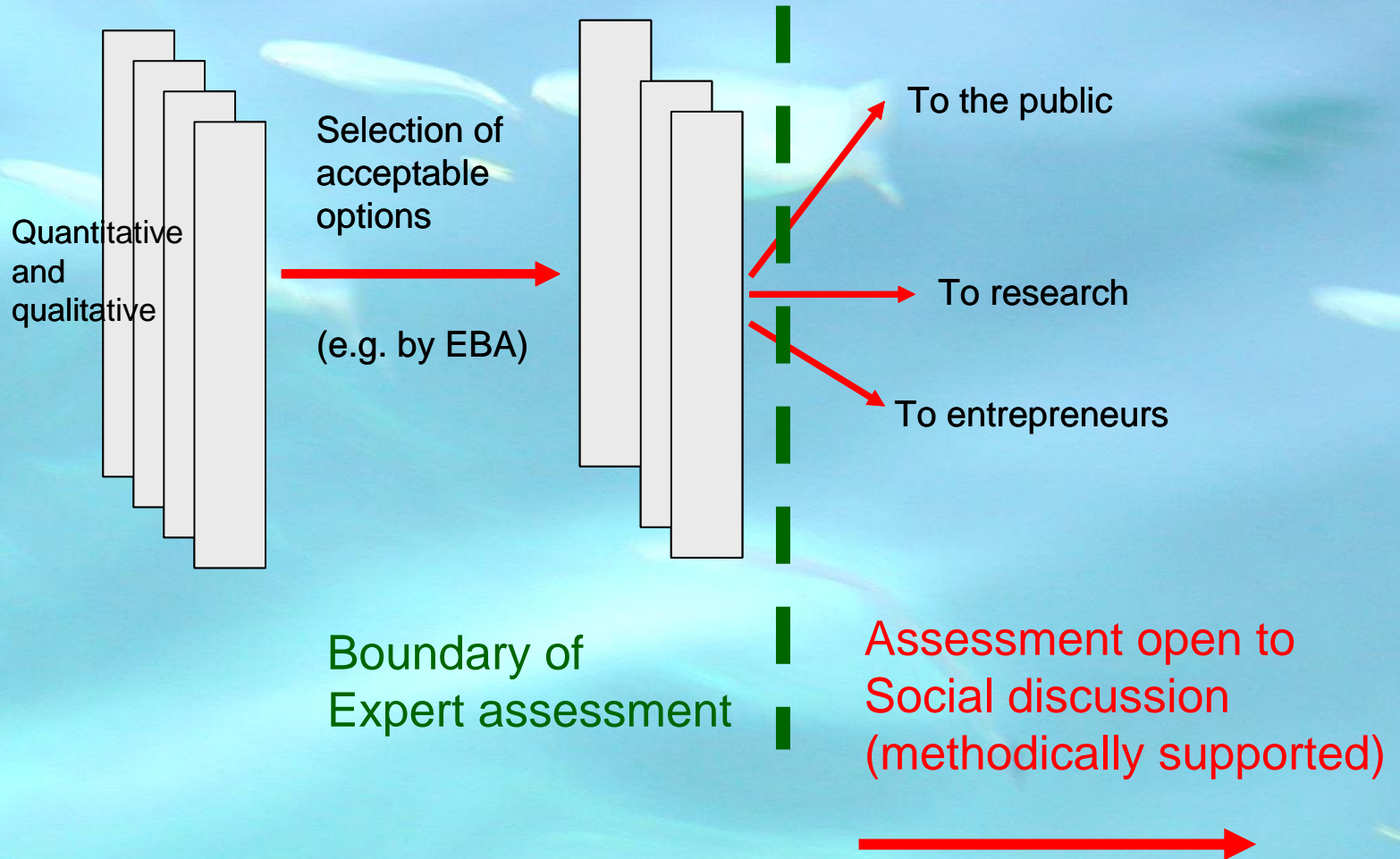
The challenge of different decision approaches and weights

- ◆ The influence of the context,
- ◆ the influence of objectives,
- ◆ the influence of knowledge,
- ◆ the influence of individual values,
- ◆ the influence of culture and ethics,
- ◆ are causing different decision approaches and weights in different actors.

Some characteristics of different actor approaches

- ◆ Public actors have a high variability of approaches because of the heterogeneity of the group.
- ◆ Scientific actors and entrepreneurs will use the subjective expected utility (SEU) approach, but with different utility values.
- ◆ Hence, the accepted assessment results will differ among actor groups despite of similar basic values of indicators.
- ◆ And there is some risk that lobbyists will try to “adapt” the indicator sets according to their expectations.

Consequences for assessment procedures



Requirements on basic information for social assessment

- ◆ Transparency
- ◆ Comparability
- ◆ Clarity
- ◆ Accuracy
- ◆ Neutrality
- ◆ Completeness

Integrated assessment for sustainable development is part of feedback loops

REQUIREMENTS

- Observation of system conditions
- Extraction of relevant information
- Decision for actions
- Realisation of the decisions

METHODS

Data
Models
Knowledge
Social Interactions

INSTRUMENTS

- **MONITORING**
- **ASSESSMENT**
- **DECISION**
- **PROGRAMMES**
- **PROJECTS....**

Conclusions

- ◆ Integrated assessment is not a mechanistic procedure
- ◆ Integrated assessment is very sensitive to basic assumptions and data quality
- ◆ Integrated assessment without consideration of human perception produces artefacts

Never forget:
Methods are only successful if humans will be convinced

