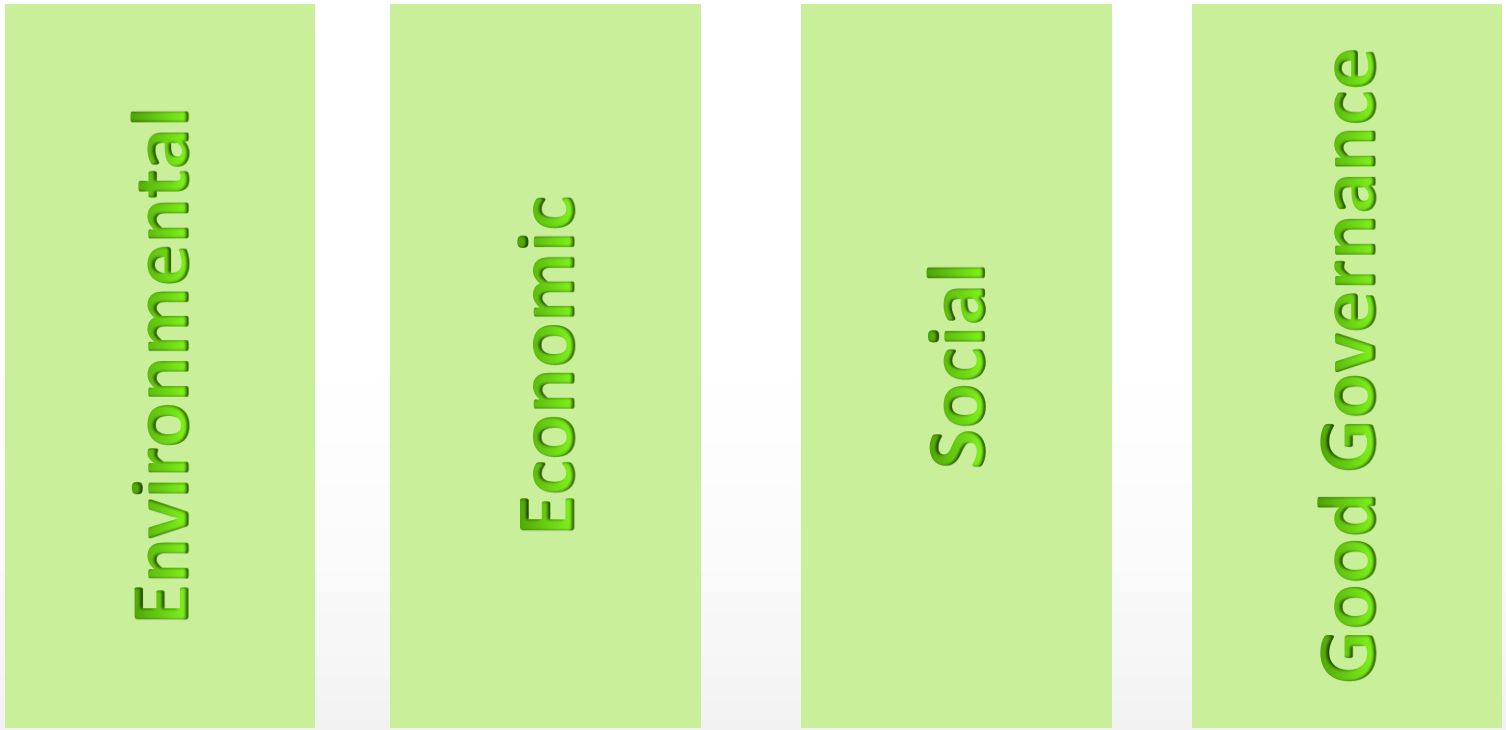
Sustainability metrics for the process industry

Heinz Stichnothe

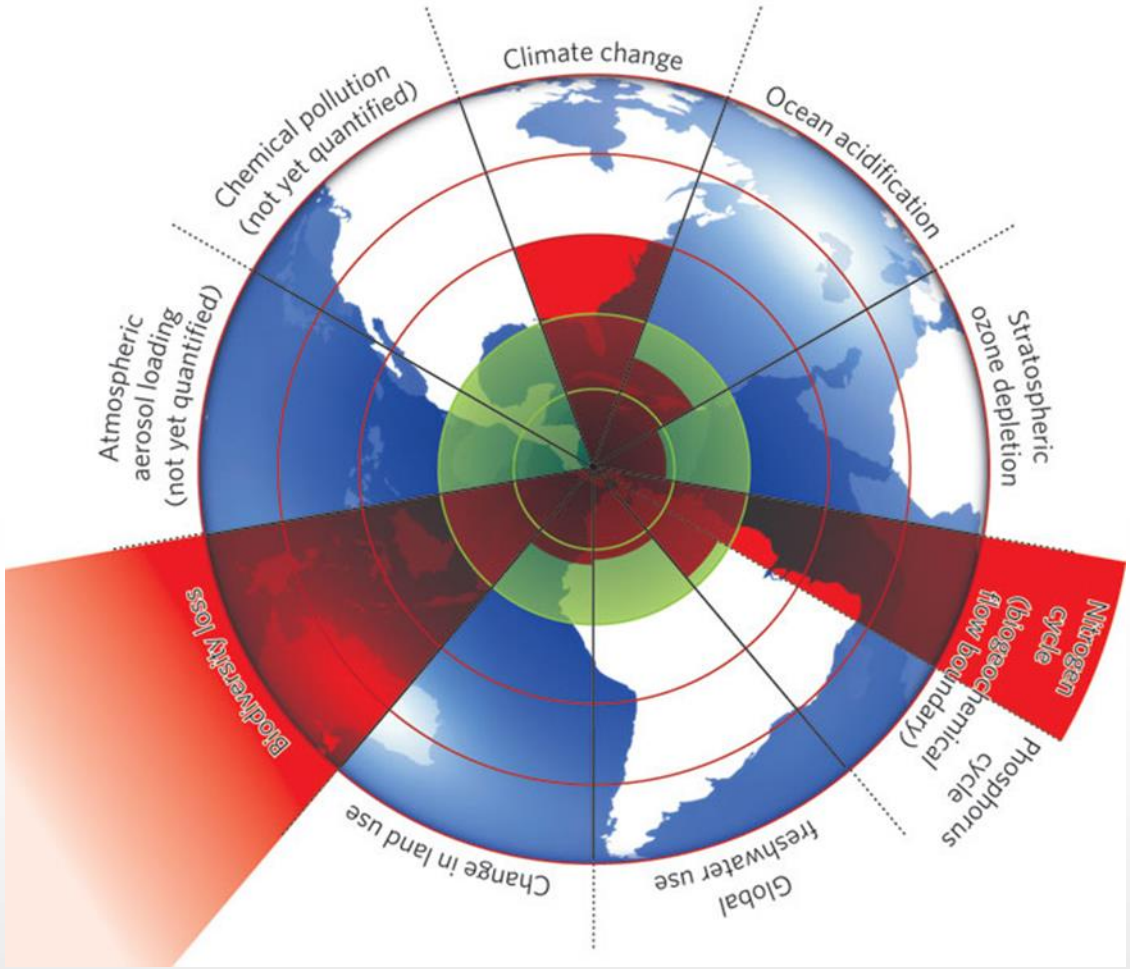
Agenda

- Sustainability as a concept
- Drivers and Pressure
- Short overview of approaches
- Conseptual model for selecting indicators
- Summary
- Next step(s)

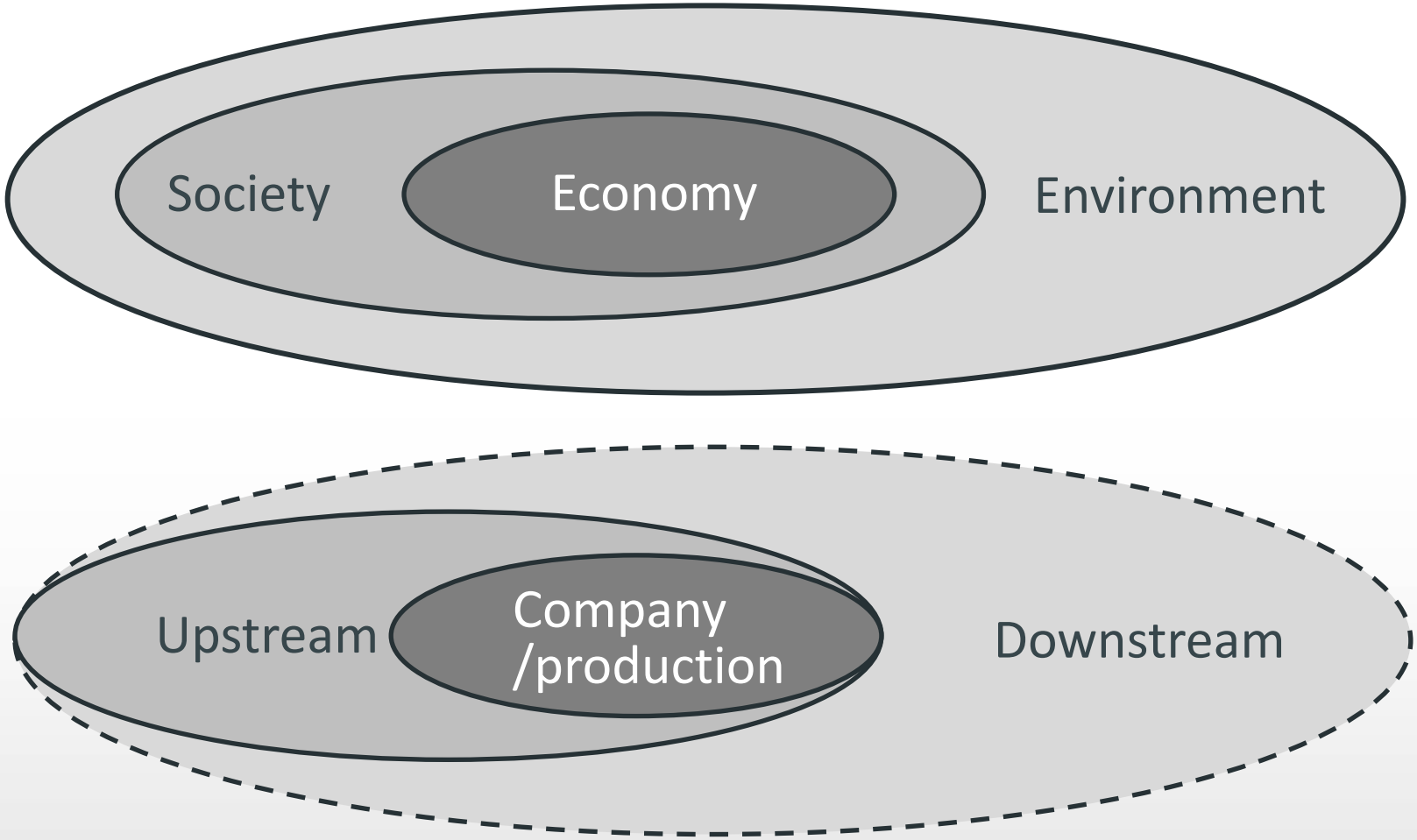
Four (three) dimensions of sustainable development



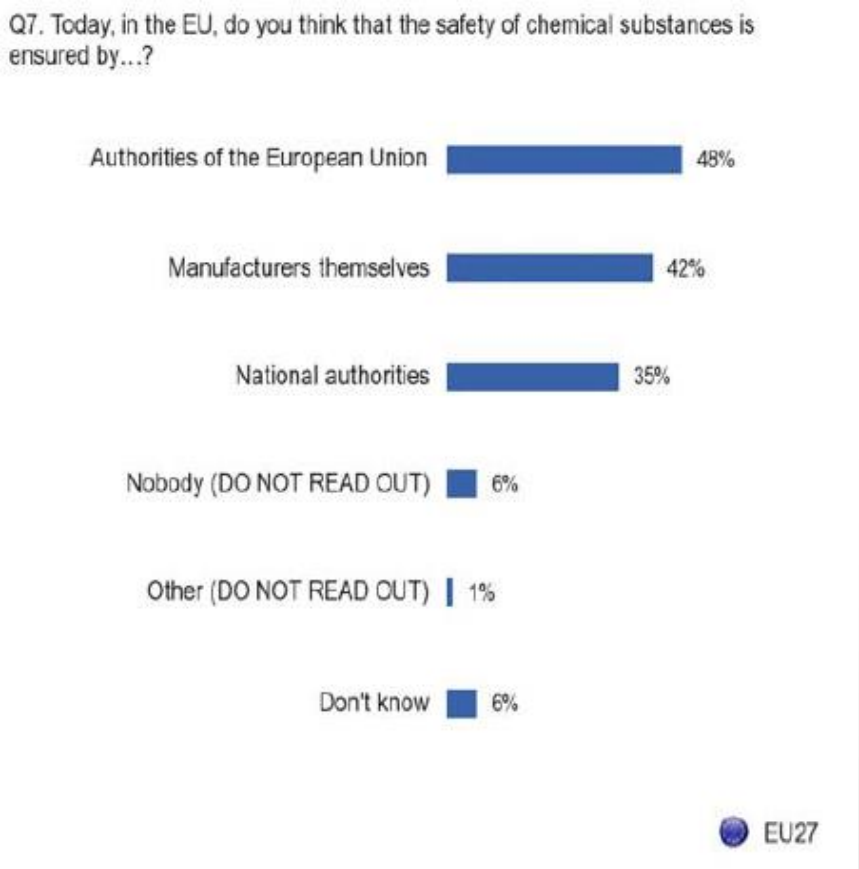
Pressure: Planetary boundary

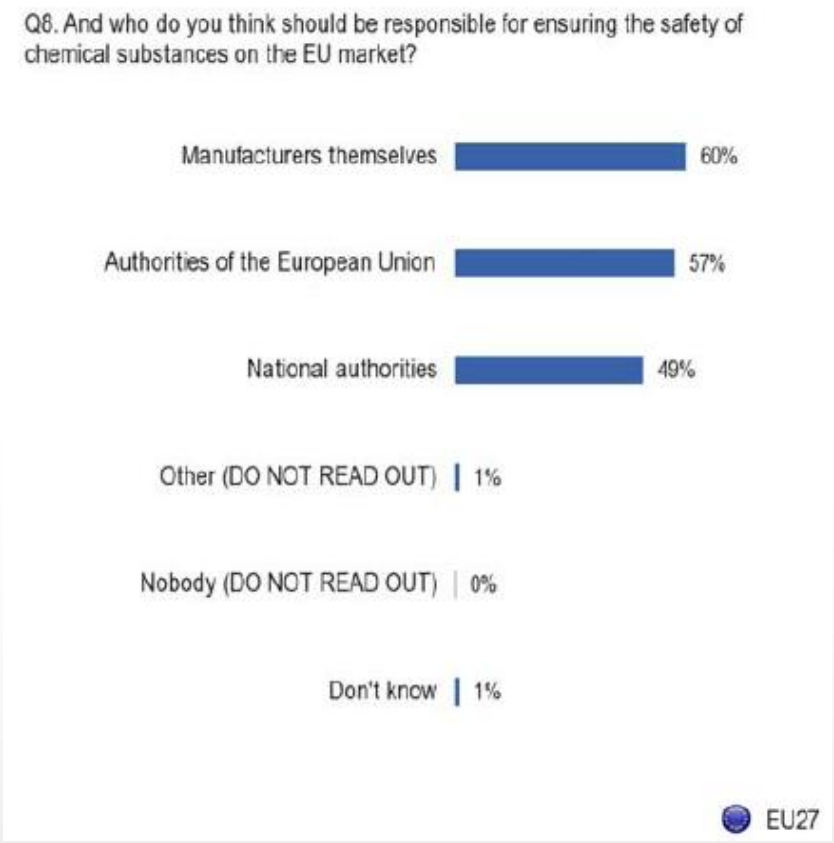


Different scales – approaches -indicators



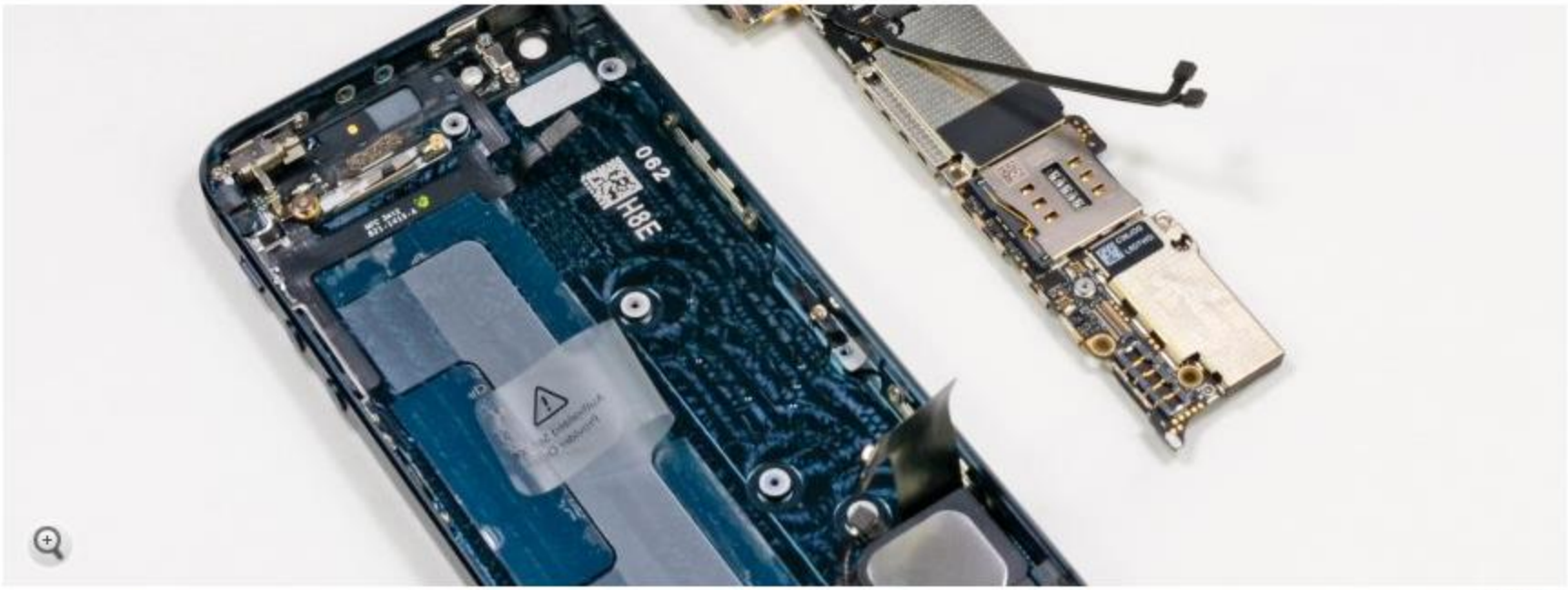
Pressure: Public perception
Eurobarometer 2013, Chemicals





Supply chain pressure – Green become a competetive advantage

iPhone-Produktion: Apple verbietet Verwendung giftiger Chemikalien



REUTERS

Apple-Handy von innen: Produktion künftig ohne giftige Chemikalien

Apple beugt sich dem Druck von Aktivisten: Der Nachrichtenagentur AP zufolge will der Konzern die giftigen Chemikalien Benzol und N-Hexan aus Zulieferer-Fabriken in China verbannen - und in Zukunft "grünere Chemikalien" verwenden.

Source: Spiegel online 14th August 2014

Central question:
Sustaining what, for whom, where, and for how long?

Product environmental footprint (PEF)

Organisation environmental Footprint (OEF)

Green Chemistry Principles

Corporate Social Responsibility CSR)

EHS-report

Supplier demand

Global reporting Initiative (GRI)

Carbon footprint

Integrated Reporting

Regulatory pressure: European Policy

4.5.2013 EN Official Journal of the European Union L 124/1

II

(Non-legislative acts)

RECOMMENDATIONS

COMMISSION RECOMMENDATION

of 9 April 2013

on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations

(Text with EEA relevance)

(2013/179/EU)

Reviews: Measuring Sustainability

http://www.weforum.org/reports/designing-action-principles-effective-sustainability-measurement

Contents lists available at SciVerse ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

A Review of Footprint analysis tools for monitoring impacts on sustainability

Lidija Čuček [a,*], Jiří Jaromír Klemeš [a], Zdravko Kravanja [b]

[a] Centre for Process Integration and Intensification – CPI², Research Institute of Chemical and Process Engineering, Faculty of Information Technology, University of Pannonia, Egyetem u. 10, H-8200 Veszprém, Hungary
[b] Faculty of Chemistry and Chemical Engineering, University of Maribor, Smetanova ul. 17, SI-2000 Maribor, Slovenia

ARTICLE INFO

Article history:
Received 14 September 2011
Received in revised form
27 February 2012
Accepted 28 February 2012
Available online 7 March 2012

Keywords:
Sustainable development
Life cycle assessment
Environmental, social and economic footprints
Footprint evaluation tools

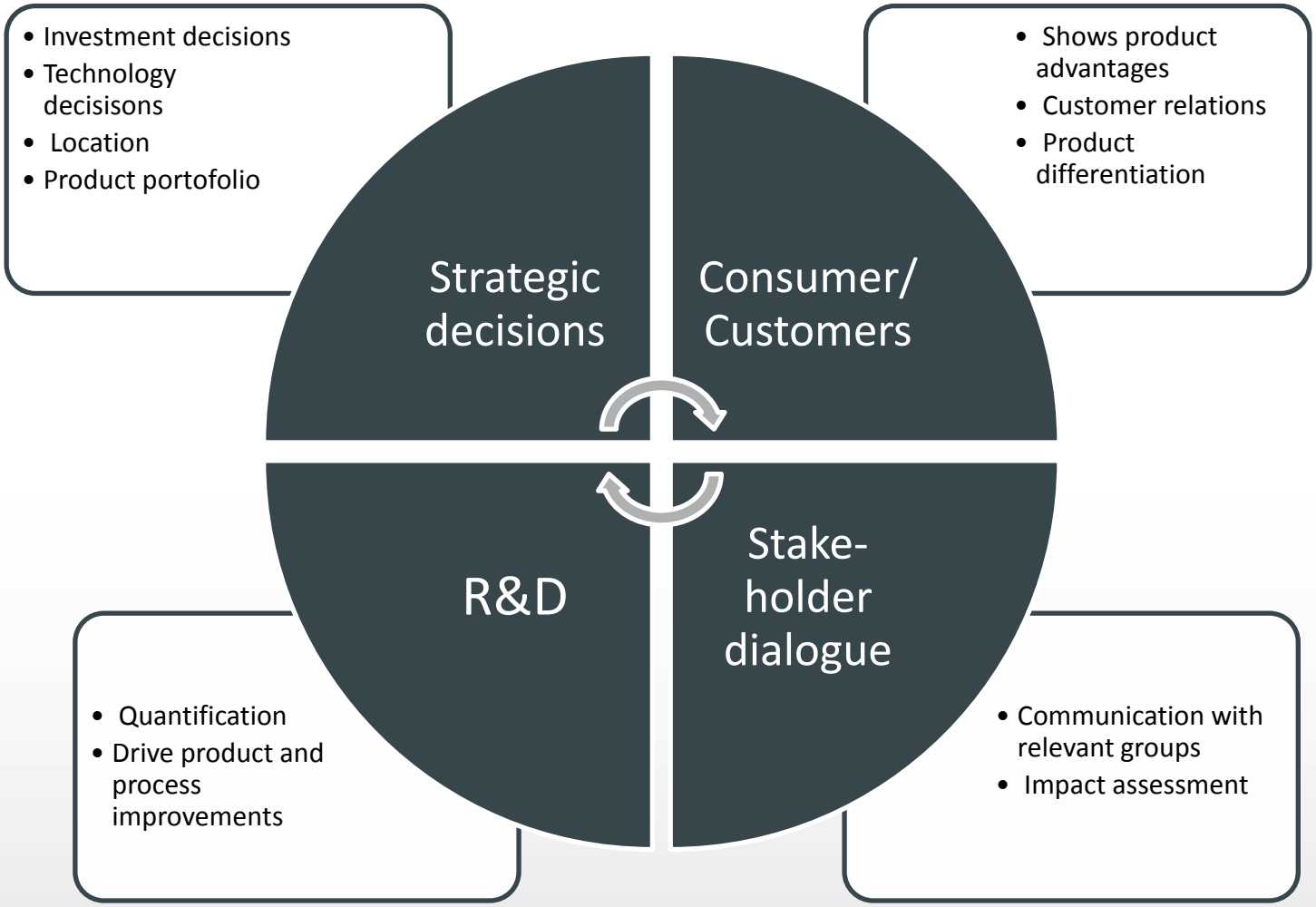
ABSTRACT

This study presents an overview of footprints as defined indicators that can be used to measure sustainability. An overview of the definitions and units of measurement associated with environmental, social, and economic footprints is important because the definitions of footprints vary and are often expressed unclearly. Composite footprints combining two or more individual footprints are also assessed. These combinations produce multi-objective optimisation problems. Several tools for footprint(s)' evaluation are presented, including some of the numerous carbon footprint calculators, available calculators for other footprints, some ecological footprints-based, graph-based, and mathematical programming tools. A comprehensive overview is offered of footprint-based sustainability assessment.

WEF – Main conclusions

1. Sustainability measurement systems are effective when they are embedded firmly in management and decision-making processes that promote learning.
2. There are many approaches to assessing sustainability and the field is evolving rapidly. Current thinking identifies characterizing the functioning of physical, ecological and social systems that support human life, and the interaction of these systems, as especially important.
3. Ultimately, sustainability can only be achieved on a global scale, across all sectors, over very long time frames. But it is important to recognize progress towards this ultimate goal.

Sustainability assessment: What for?



Sub-summary

Increasing attention regarding sustainability in chemical industry

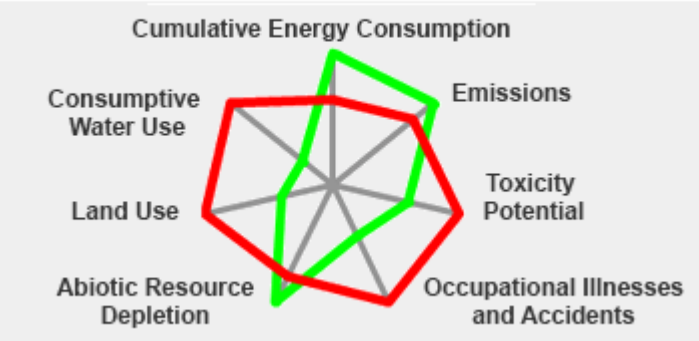
Different purposes, e.g. Reporting, labelling, DfE, etc.

→many approaches for sustainability assessment

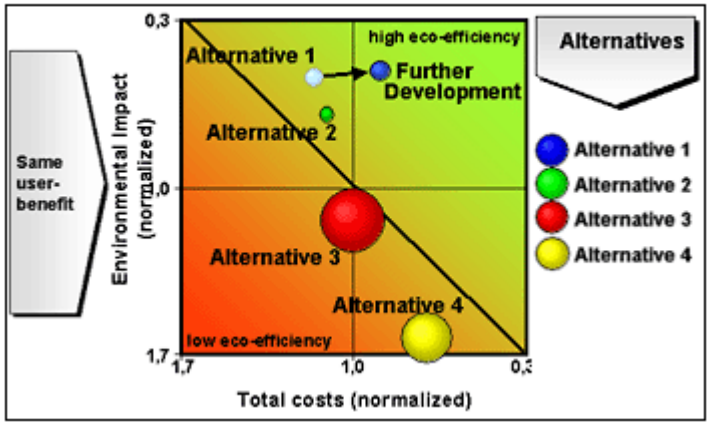
Need for meaningful metrics to detect sustainability progress without forcing undue burdens

BASF – Generic SEE-Balance; specific AgBalance

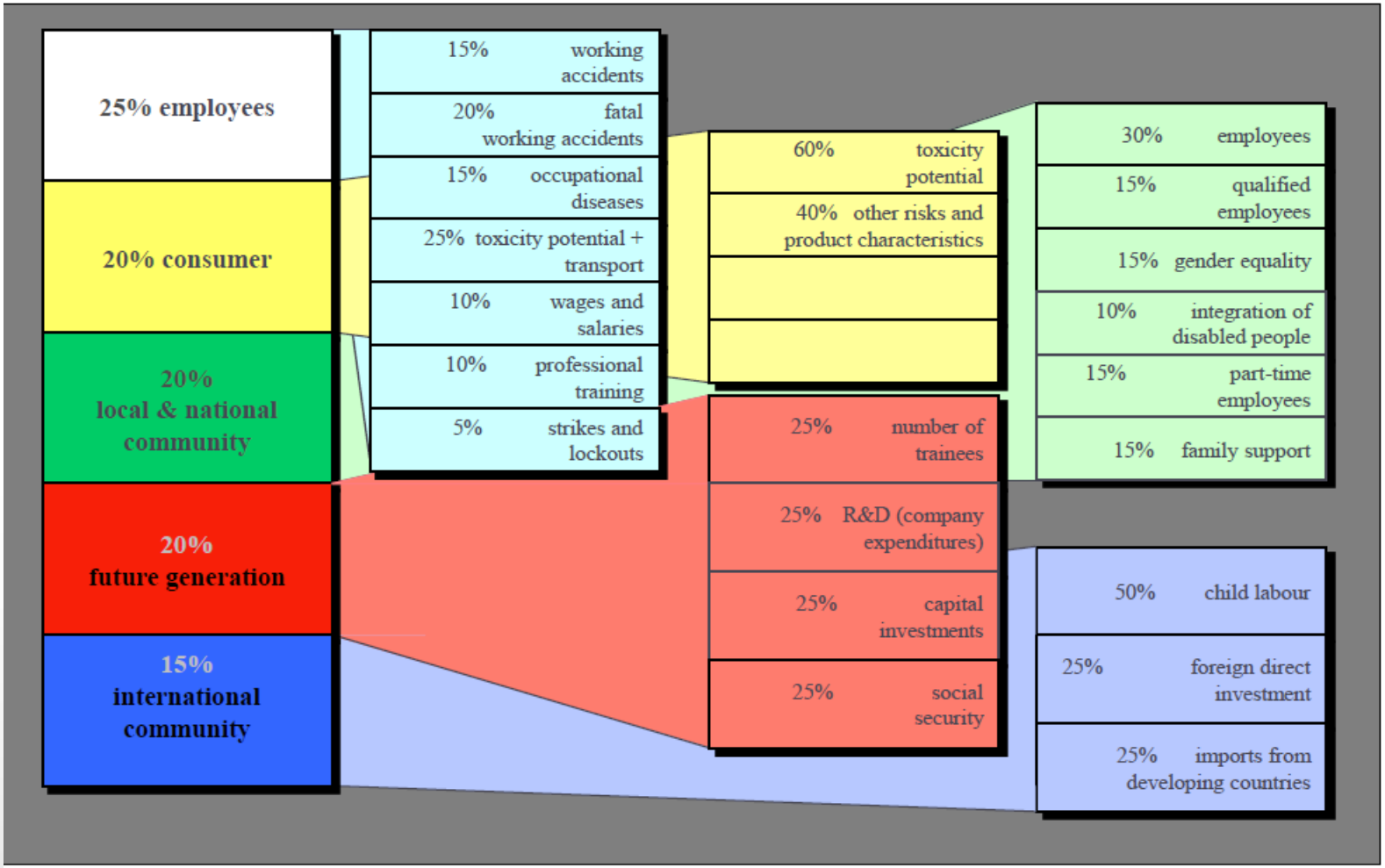
Ecological Fingerprint:



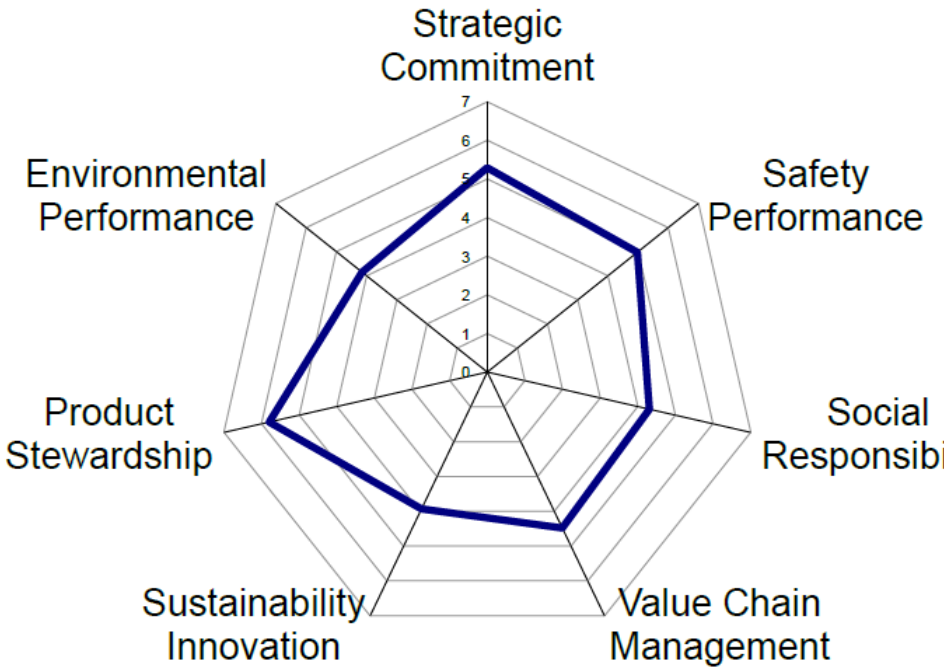
Eco-efficiency portfolio:



Social assessment: categories, indicators and their weighting

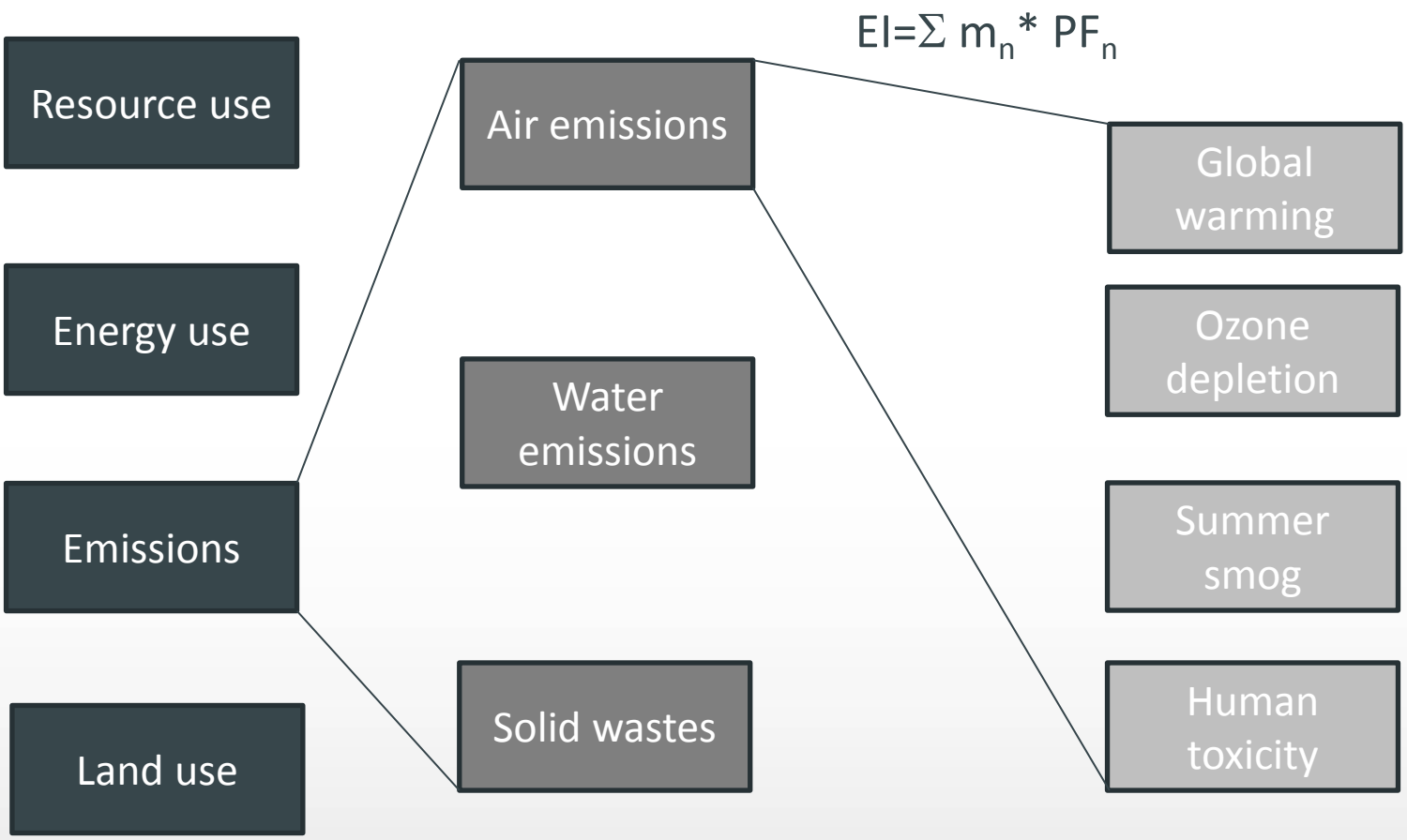


Ifs (Technical Community of AIChE): Sustainability Index



http://www.aiche.org/ifs/resources/sustainability-index

Level of detail



IChemE: The sustainability metrics

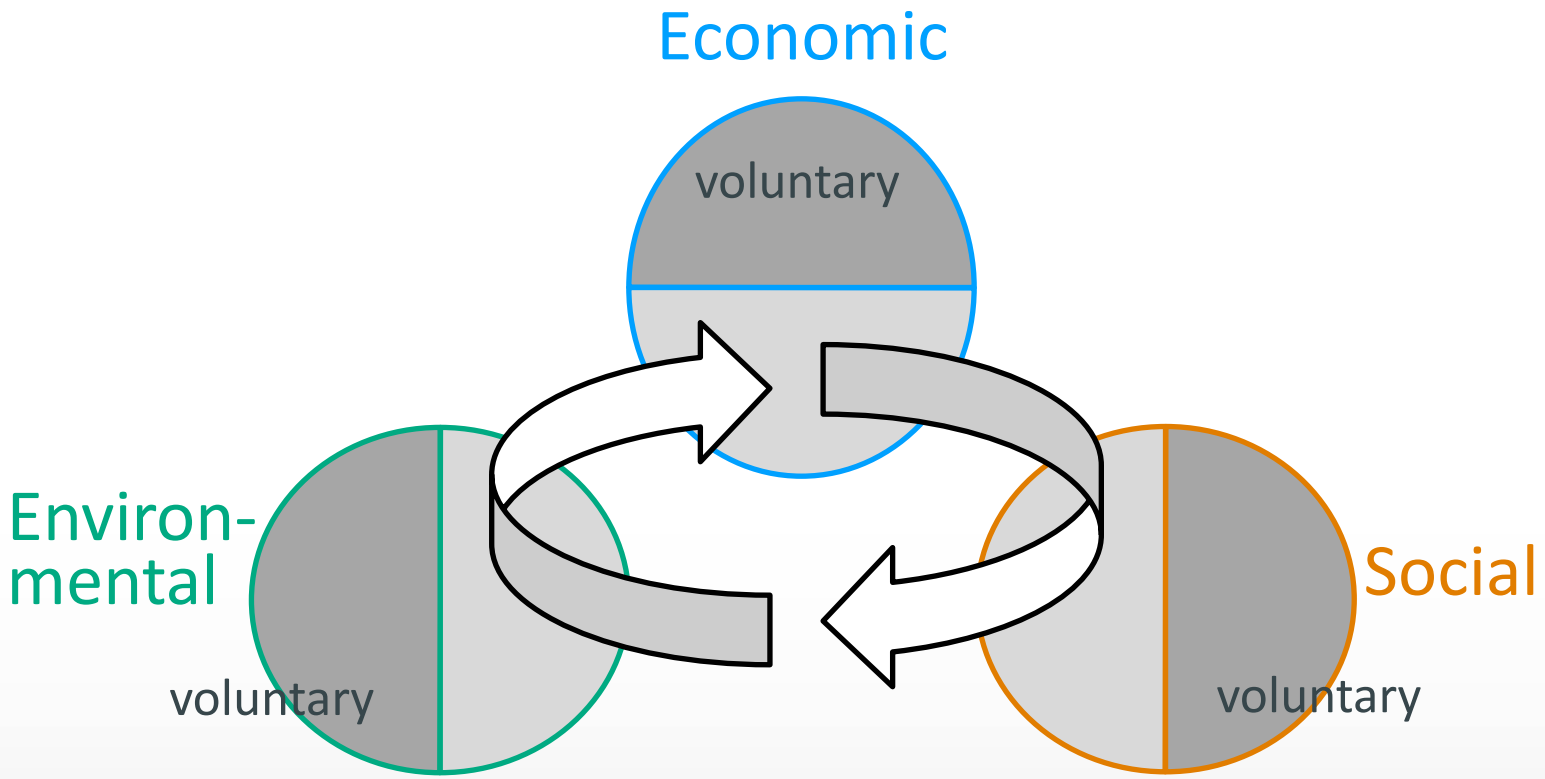
The metrics in the three groups
3.1 Environmental
3.2 Economic
3.3 Social indicators

Expressed as
unit of … per … value,
mass as %

Existing metrics‘ relevant for the chemical Industry

	Environm.	Economic	Social		
			Workplace /company	Society	Human rights
GRI	17+13	7+2	9+5	8+2	9+2
Ifs (AIChE)	4	→	3	13	
IChemE	11	14	7	4	
BASF (SEE-Balance)	7 (Categories)		14	8	
PEF/OEF	15	-	-	-	-

Life cycle based approach
Conceptual model of indicator selection



If social and ecological actions are not economic than the whole process is not sustainable

Summary

Challenges:

- **Limited knowledge - Evolving concepts**
- **Sustainable is requirement although no willingness to pay**

Sustainability Roadmap : Fixed metrics or stepwise adaptation to evolutinary concepts?

Agreement to streamline – tiered approach

What is already applied?

Next step

Questionnaire to be send to companies via

- Federations (EFCHE, VCI, etc.)
- International cooperation (IEA Task42)
- Personal contact (direct and indirect)

Volunteers are most welcome

Many thanks for your patience!

Contact: heinz.stichnothe@ti.bund.de

Thünen Institute of Agricultural Technology
Bundesallee 50
38116 Braunschweig
Germany