Vehicle industry case study

preliminary results

- Introduction
  - Omniitox
  - Why does Volvo find this interesting?
- Volvo case study
  - LCA study on buses
  - ERA - The risk assessment part

OMNIITOX

Operational Models aNd Information tools for Industrial applications of eco/TOXicological impact assessments

www.omniitox.net

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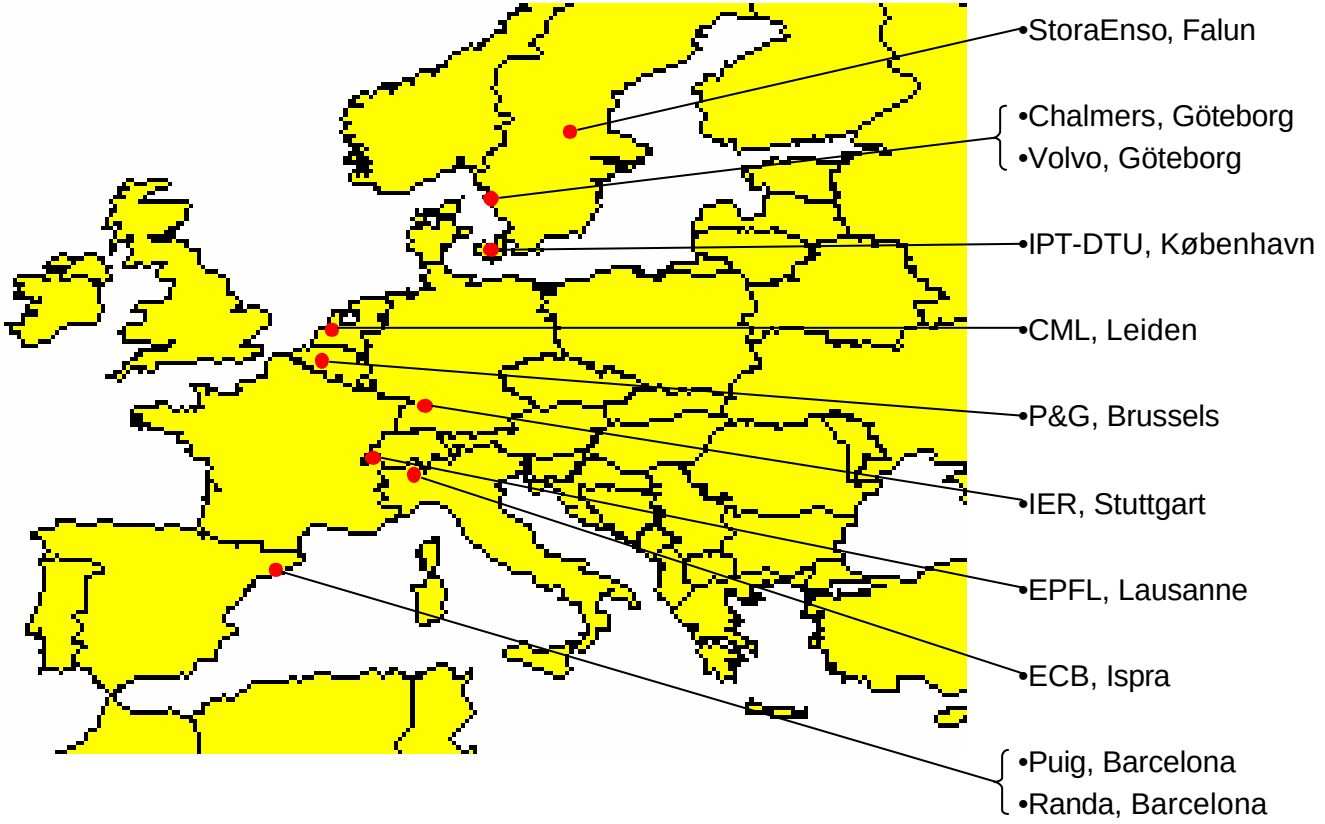
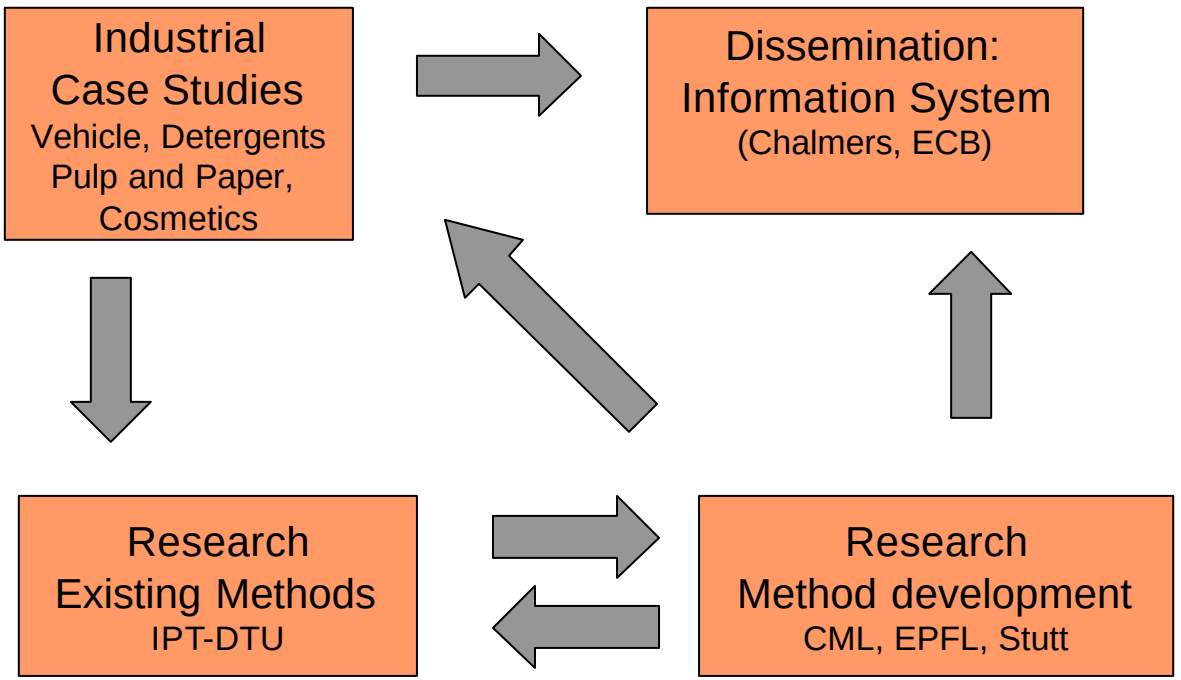
OMNIITOX - Partners across Europe



Omniitox project structure



Environment & Chemistry

A part of Volvo Technological Development Corp

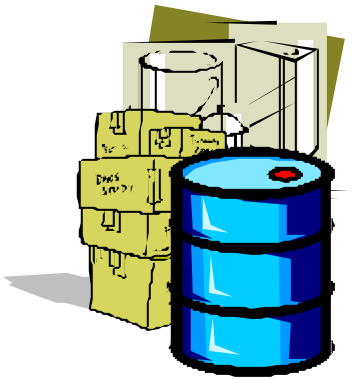
- Approximately 25 persons
- Work on a contract basis
- From long-term research projects in close contact with universities and research institutes, to short-term service tasks.

Our quality system is certified by Lloyd's as conforming to ISO 9001:1994.

Our environmental management system is certified by Lloyd's as conforming to ISO 14001:1996

”Putting scientific results to work”

Raw material
Components

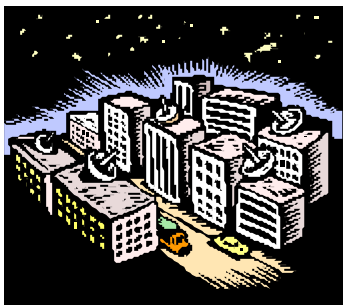


Assessment of chemicals – MOTIV database

Production

Chemical engineering, Workplace air monitoring

Use of products



Engine emissions (PM), Air filtration, LCA, Aftermarket chemicals

Volvo plants

Product Dev.
& Aftermarket

Risk assessment within Volvo

- Work environment
- Hazardous substances in vehicle components
- Industrial emissions to air and water
- Inventories of chemicals used or emitted

- Based on EU-classification, litterature search in toxicological databases, some cases of ecotox-testing (OECD Guidelines)
- Results and recommendations published in corporate reports, databases (MOTIV etc)

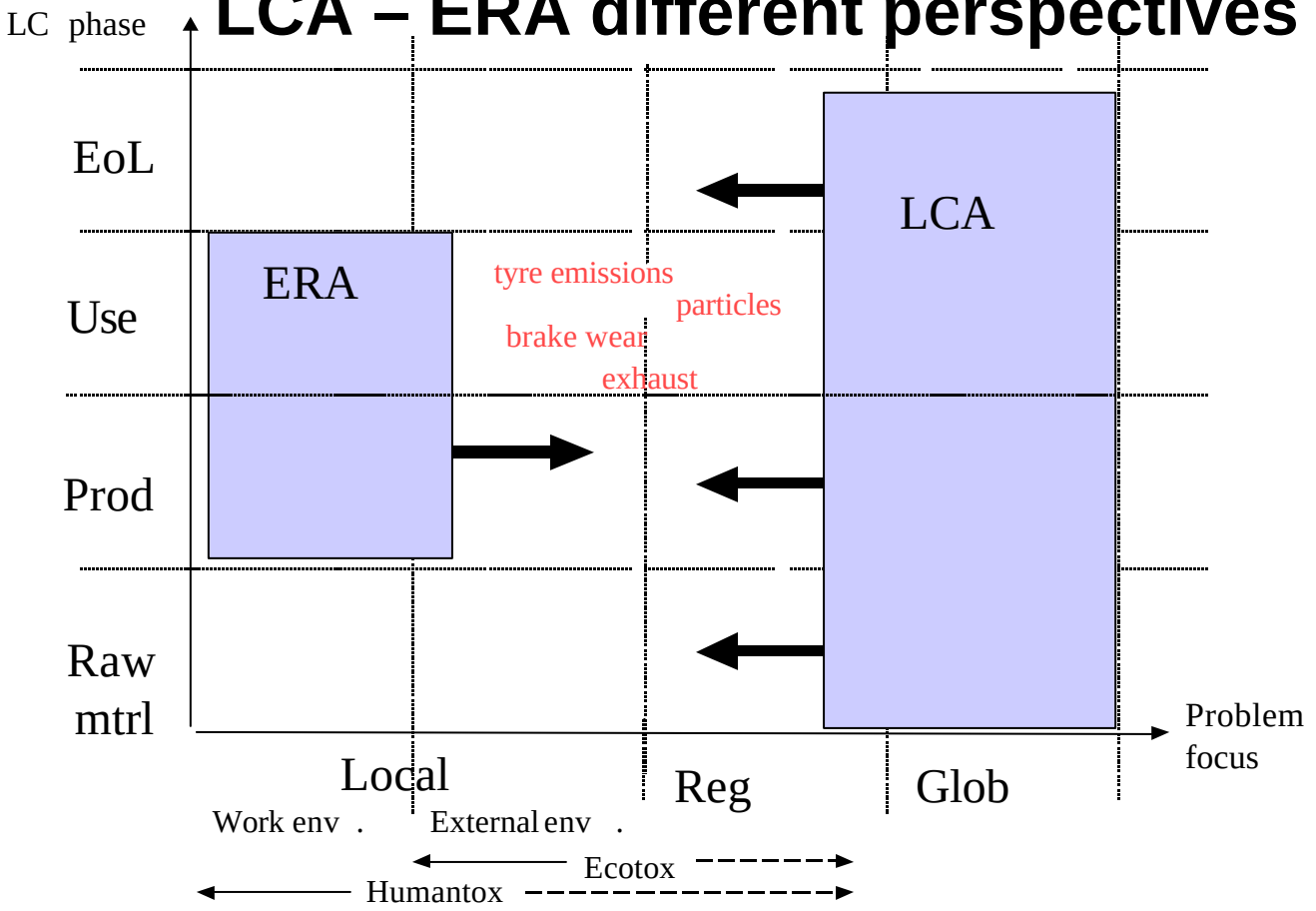
Could be used more often as a complement to LCA-studies!

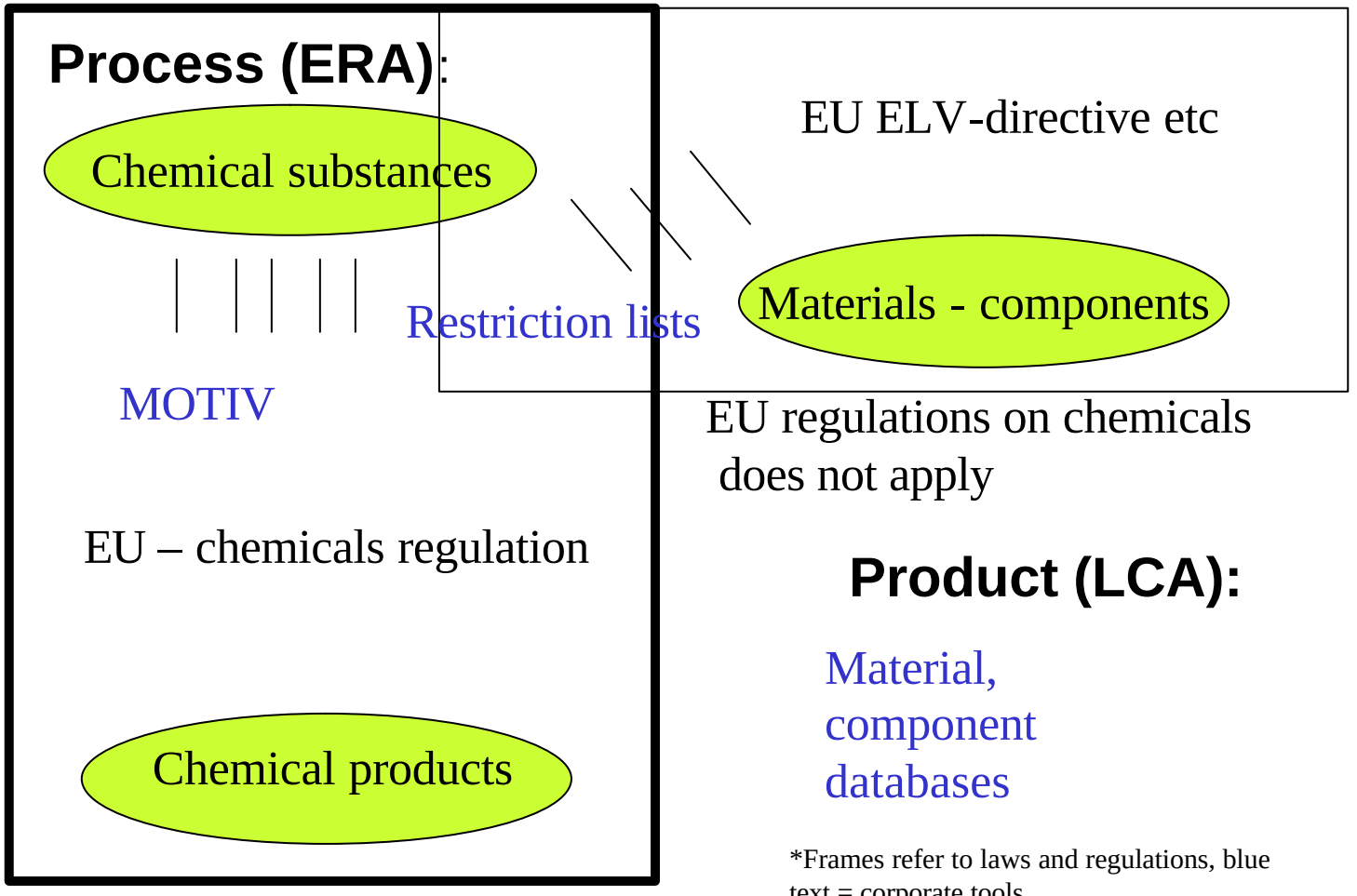
LCA at Volvo

- Using the LCA-IT software
- Performing studies according to the ISO 14040-series
- Internal database with datasets documented according to the SPINE format
- Using Impact Assessment to identify hot-spots and for comparative studies (mainly EPS)
- Corporate LCA reports produced since 1990

ERA aspects of toxicity – ecotoxicity poorly integrated

LCA – ERA different perspectives





*Frames refer to laws and regulations, blue text = corporate tools

LCA case study - Bus body:

Comparing light weight concepts with a standard aluminium concept

- Functional unit:
  One bus body including all supporting structure.

- Supporting structure:
  Roof, floor, walls and bottom plates as well as the frame.

System boundaries

- Extraction and production of raw materials.
- Production (assembly of the body)
- Use phase (including production of fuel and exhaust emissions)
- End of life (recycling of metals are included)
- Components which were thought to be the same for the different concepts were excluded from the study, such as windows.

Focus of the study

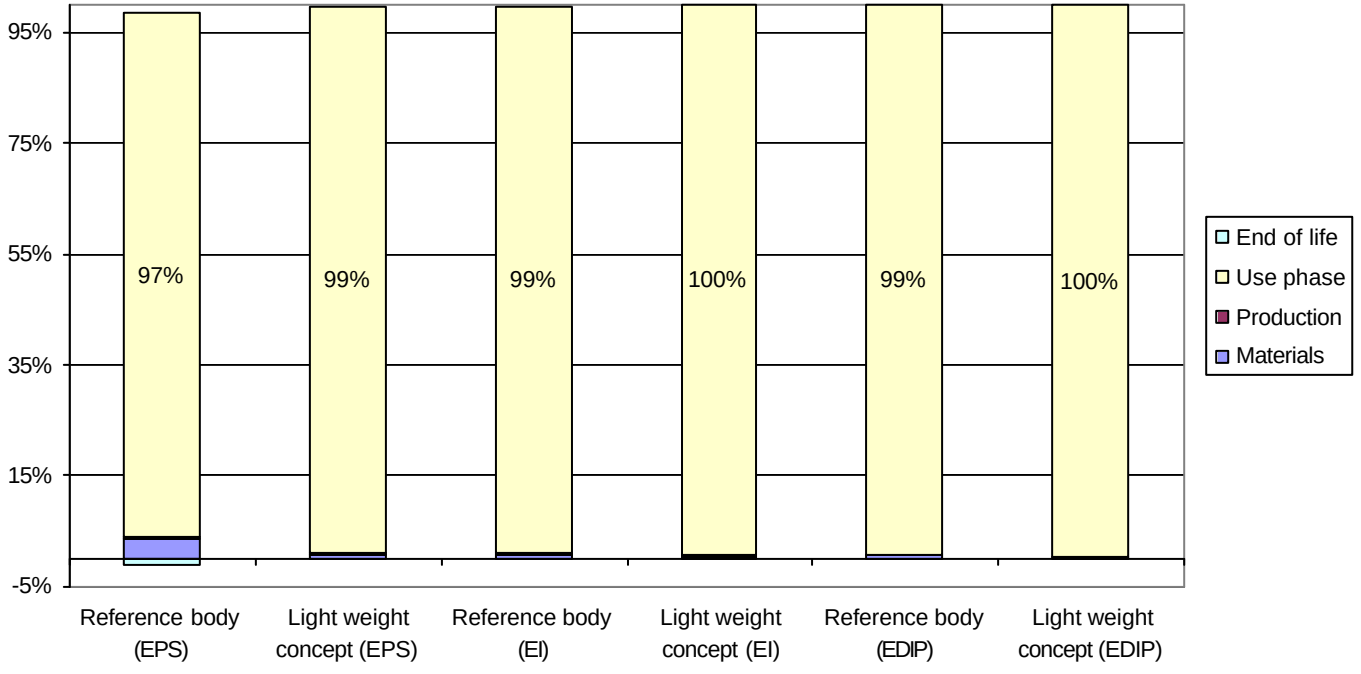
- Material composition of the different body concepts. (For the extraction and production of the raw materials, mainly existing data was used.)
- The environmental impact from the production site (assembly) including energy demand and emissions (mainly regulated).

Impact assessment methods used in the study

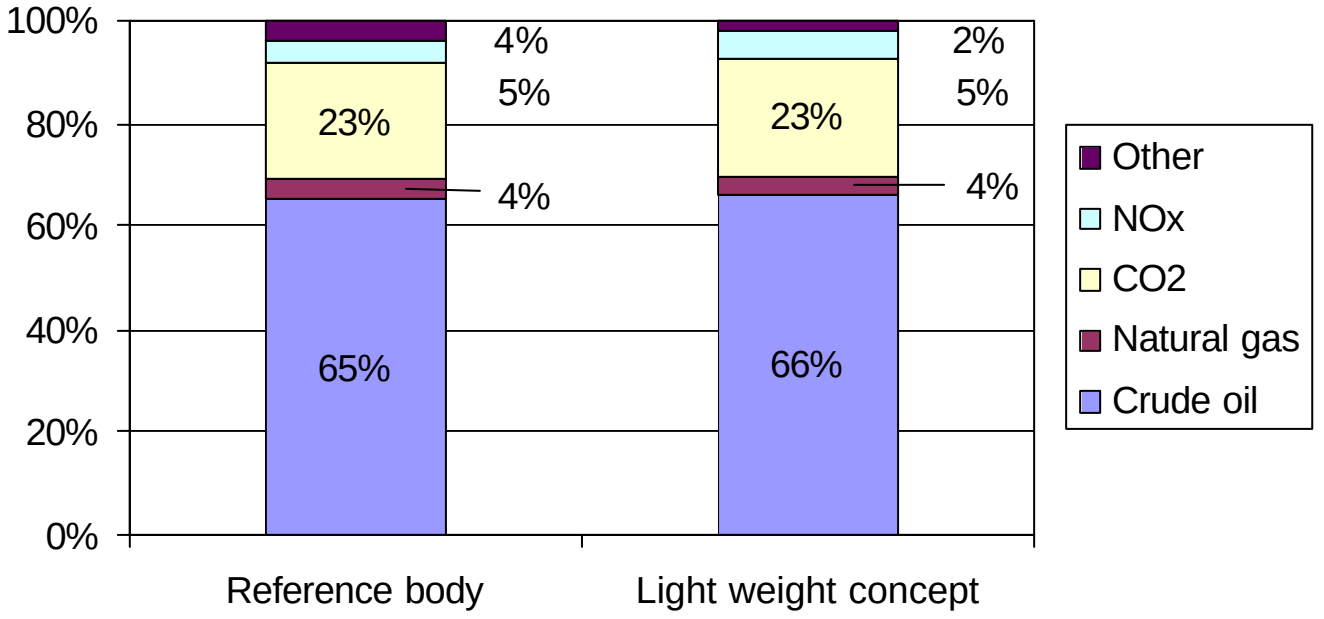
- EPS (Environmental Priority Strategies in Product Development)
- Eco-Indicator99
- EDIP

- Use phase dominates in all three methods
- Similar distributions of impact results in all phases

Internal distribution of environmental impact



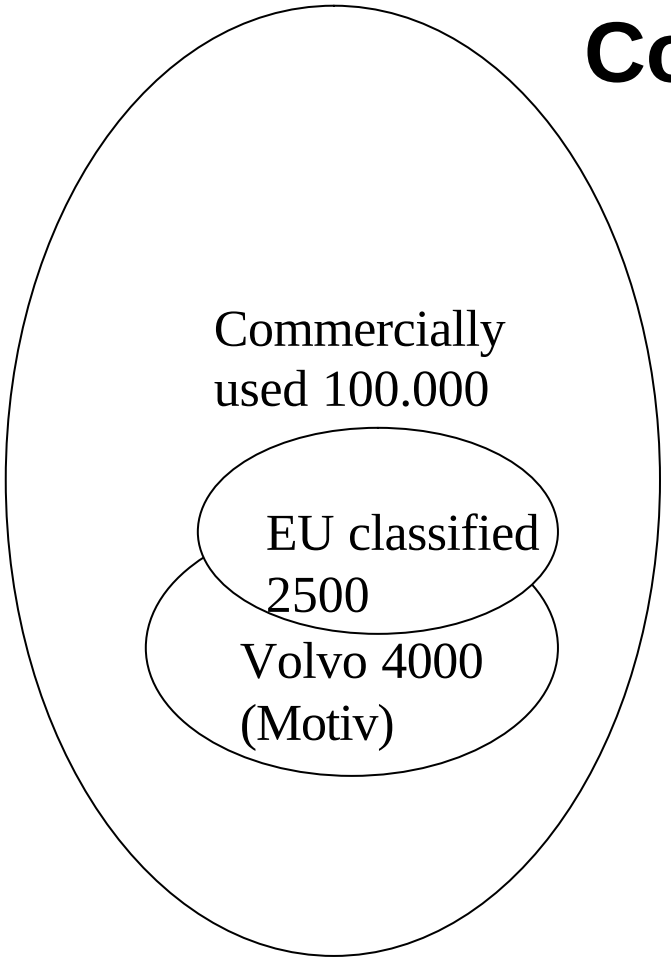
Distribution between significant aspects (EPS)



ERA - Bus case study

- Need to include toxic and ecotoxic concerns
- Working Environment Screening Tool (WEST)
- 40 products used in plant
- Sample top coat:
  - Fluorinated polymer, organic polysiloxane, trimethylbenzene, ethylbenzene, cycloalkylmethacrylate, n-propylbenzene, 2-methylaminoethanol, toluene, butylacetate, Methylmetacrylate, xylene, propylmethacrylate, piperidineester, ethoxyethylacetate, 2-ethoxyethylacetate, petroleumnaphta, solventnaphtha, benzotrizolester, undecanoic acid

Complications



Substances in CAS
– 19,701,947
(Fri May 10 2002)

- Volvo uses 5000 chemical products – each with 5-20 substances
- Environmental behavior of substances are very different for metals, organics, inorganic substances

Complications 2

- Data for modelling:
  - piperidine-ester – search in 20 databases no data found!!
  - xylene
    - Henrys constant: 7.68xE-3 (calculated - IUCLID)
    - 7.0xE-3 (experimental - HSDB)
    - 0.2160xE-0 (measured – o-xylene)
  - Which value should be used??
  - Toxicity-ecotoxicity – LC50 algae, LC50 fish, NOEC nitrification, LC50 rat
  - How do we know that the tests have been properly performed? Which one to prefer?

Conclusion: Industrial need

Establishment of new plant

Design of new product

Marketing of products

- LCA
- EPD
- Risk Assessment
- Ecotoxicity
- Toxicology
- Working Environment

Conclusions:

Bus case study:

- LCA, use phase dominant, no significant impact from toxic emissions
- ERA, not concluded yet
- Second phase – new evaluation applying the future developed Omniitox models

Hopes and expectations:

- Toxicity and ecotoxicity impact factors in LCA will widen the scope of our LCA-studies
- New and improved risk assessment models could be used by our risk assessment experts
- Internationally commonly used models and data sources for impact assessment saves time and cost and will give us more reliable results