ProScale Conference

A method for assessing the toxicological potentials of product systems in a life cycle perspective

Brussels, Hôtel Métropole | 5 October 2017 9.30 to 17.00

WORKSHOP SESSION C

IMPLEMENTING PROSCALE© IN DIFFERENT VALUE CHAINS – PRIORITIES & REQUIREMENTS

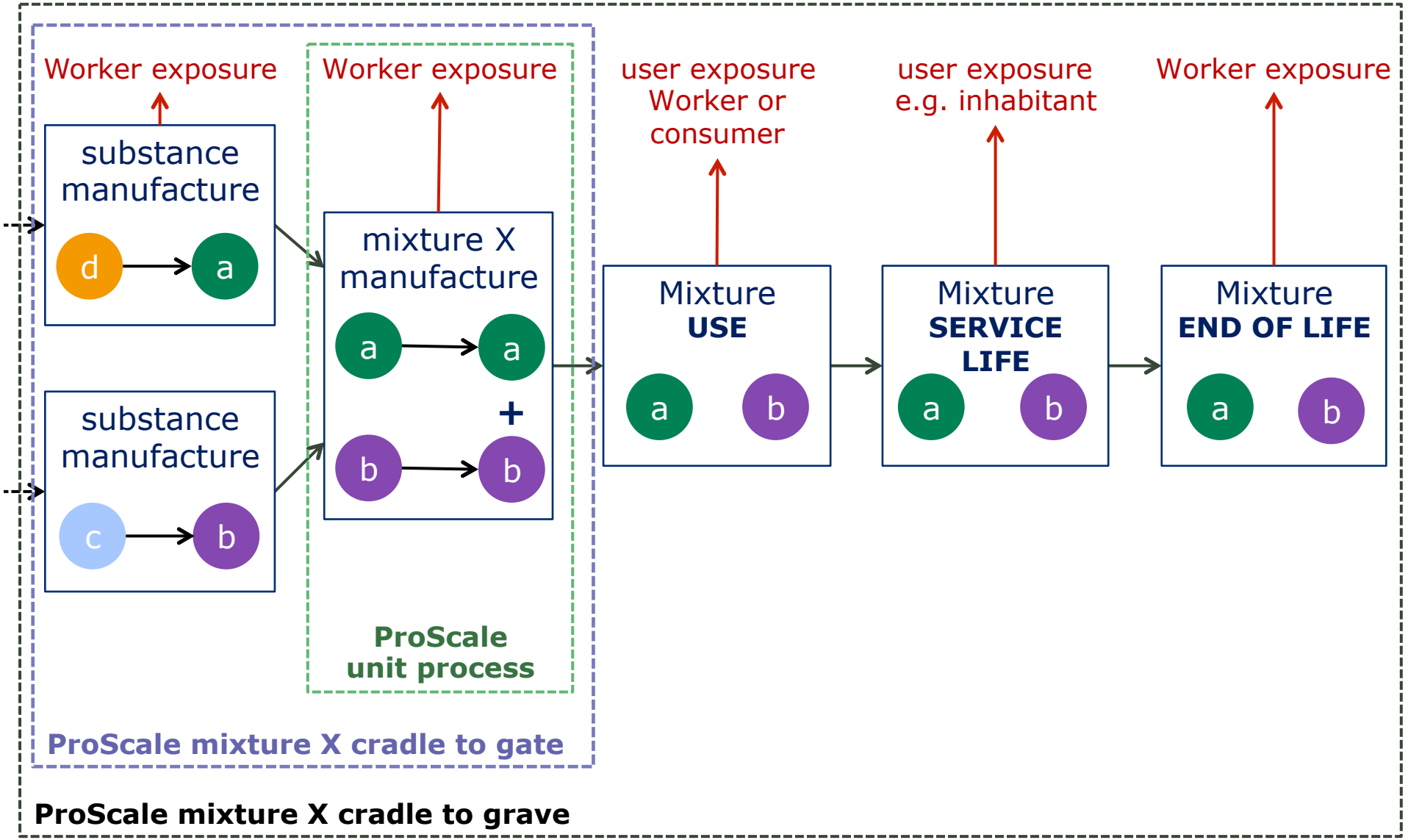
ProScale Conference

Key questions for Workshop session C

- What are priority value chains for which ProScale would bring added value? Which sectors would be interested to apply ProScale?
- Which are the priority basic substances for which generic ProScale data is needed and should be developed?
- How to motivate substance manufacturers to provide required ProScale data?
- How to motivate product/mixture manufacturers to apply the ProScale method?
- *„Hot spot analysis“* vs. *„Benchmarking“*.
  What would you apply?

ProScale Conference

The value chain and life cycle

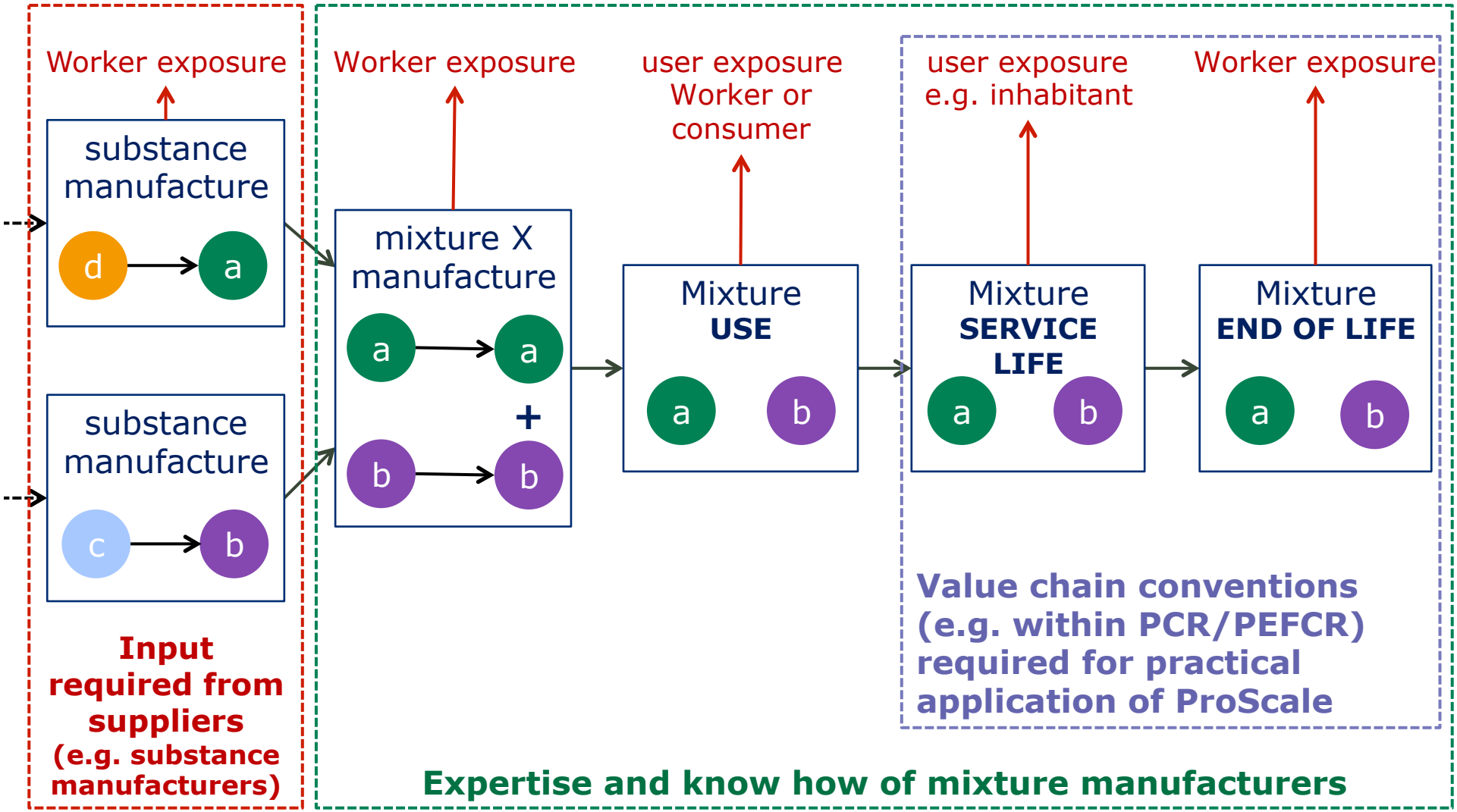


Unit process

b Substance b

ProScale Conference

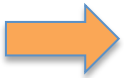
The value chain and life cycle



ProScale Conference

ProScale in the value chain

- Application of ProScale requires know-how about the relevant processes at the different life cycle stages
- Usually the whole value chain and life cycle can not be covered/assessed by one actor in the value chain

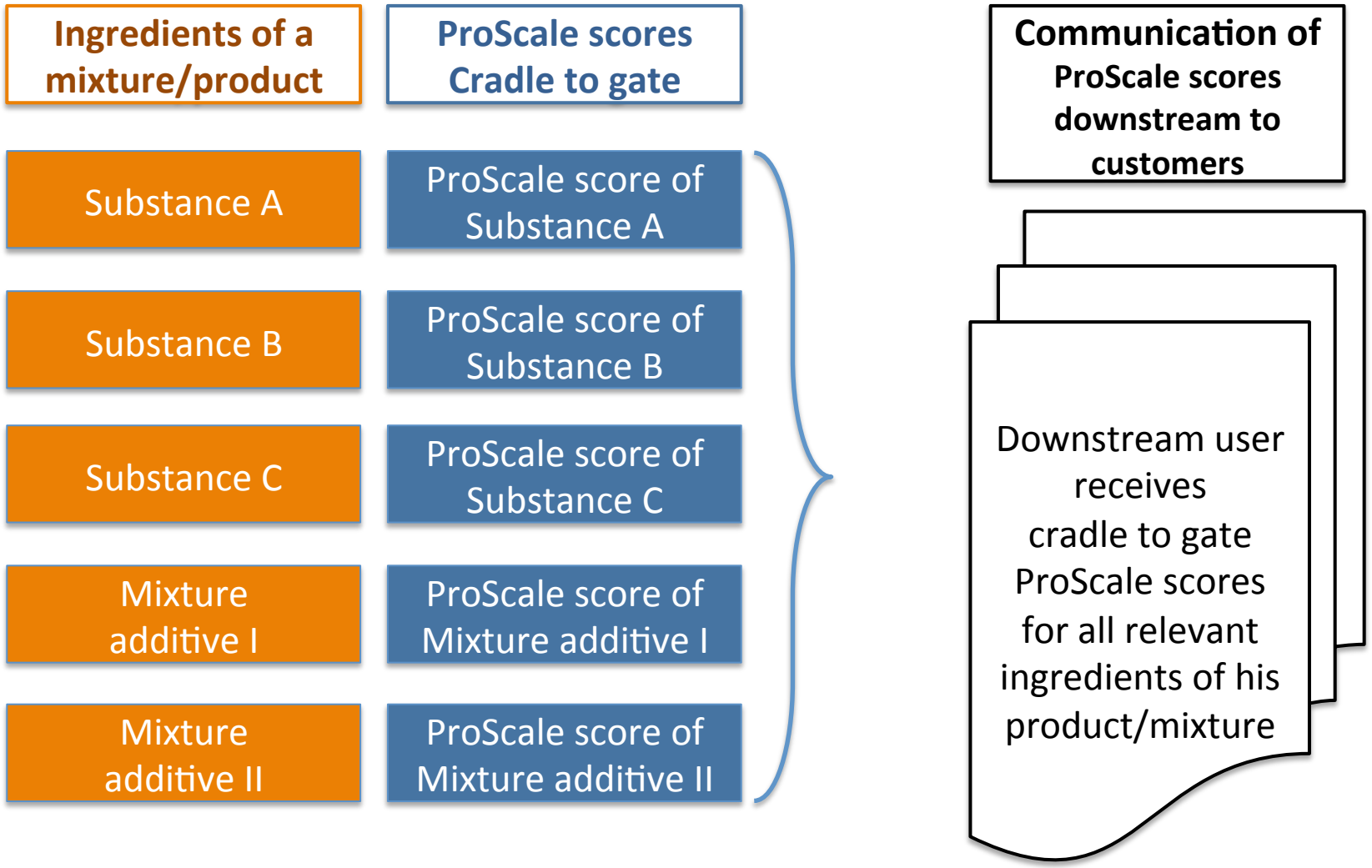


ProScale requires collaboration in the value chains

  - Cradle to gate ProScale scores for „raw material/substances“
  - Communication of ProScale scores in the supply chain
  - Consolidation of ProScale scores at the end of value chain

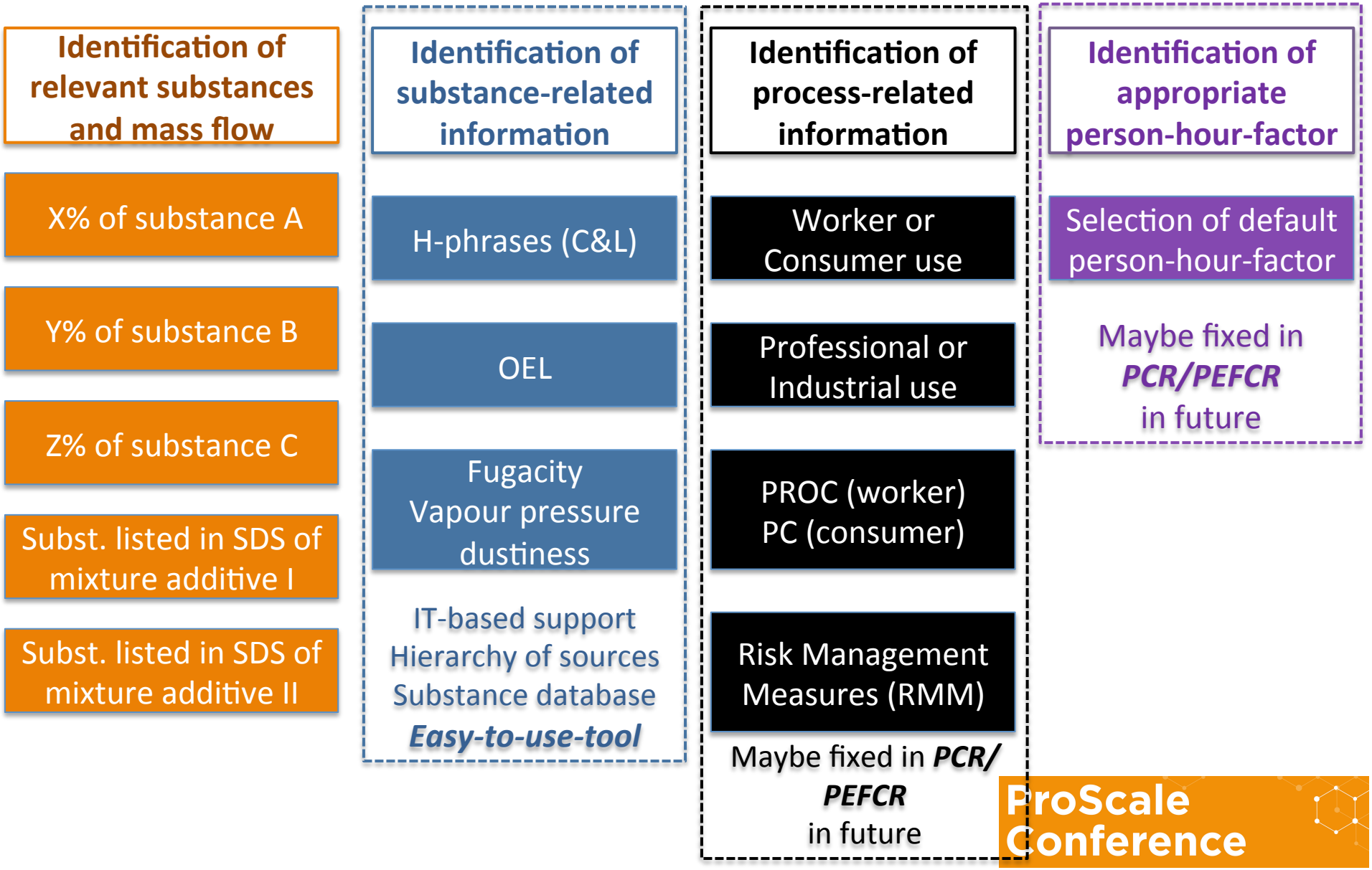
ProScale Conference

ProScale in the value chain



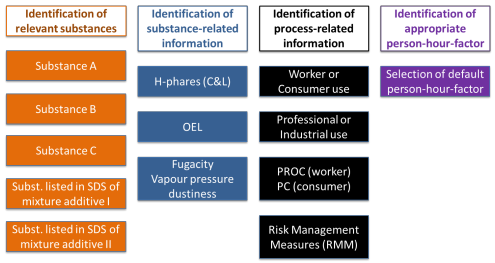
ProScale Conference

ProScale applied by mixture manufacturers



ProScale applied by mixtures manufacturers

Input data for ProScale calculation



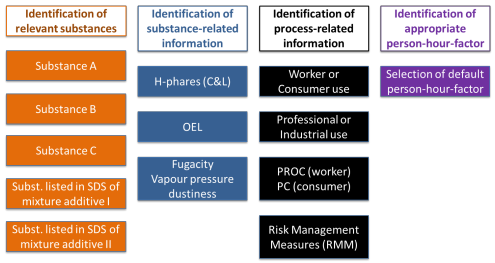
ProScale calculation for downstream life cycle stages

Manufacturing of mixtures	Use phase	Service life	End of life
worker	Worker or consumer	Inhabitant (consumer)	worker
Industrial use	Professional use	----	Professional use
PROC 2	PROC 5, 8a, 10		
RMM, LEV, googles, gloves	RMM googles, gloves		
Person-hour-f. 0.02 h/kg	Person-hour-f. 0.2 h/kg		

ProScale Conference

ProScale applied by mixtures manufacturers

Input data for ProScale calculation



ProScale calculation for downstream life cycle stages

Manufacturing of mixtures	Use phase	Service life	End of life

Calculation of ProScale scores (PSU) via an „*easy-to-use-tool*“

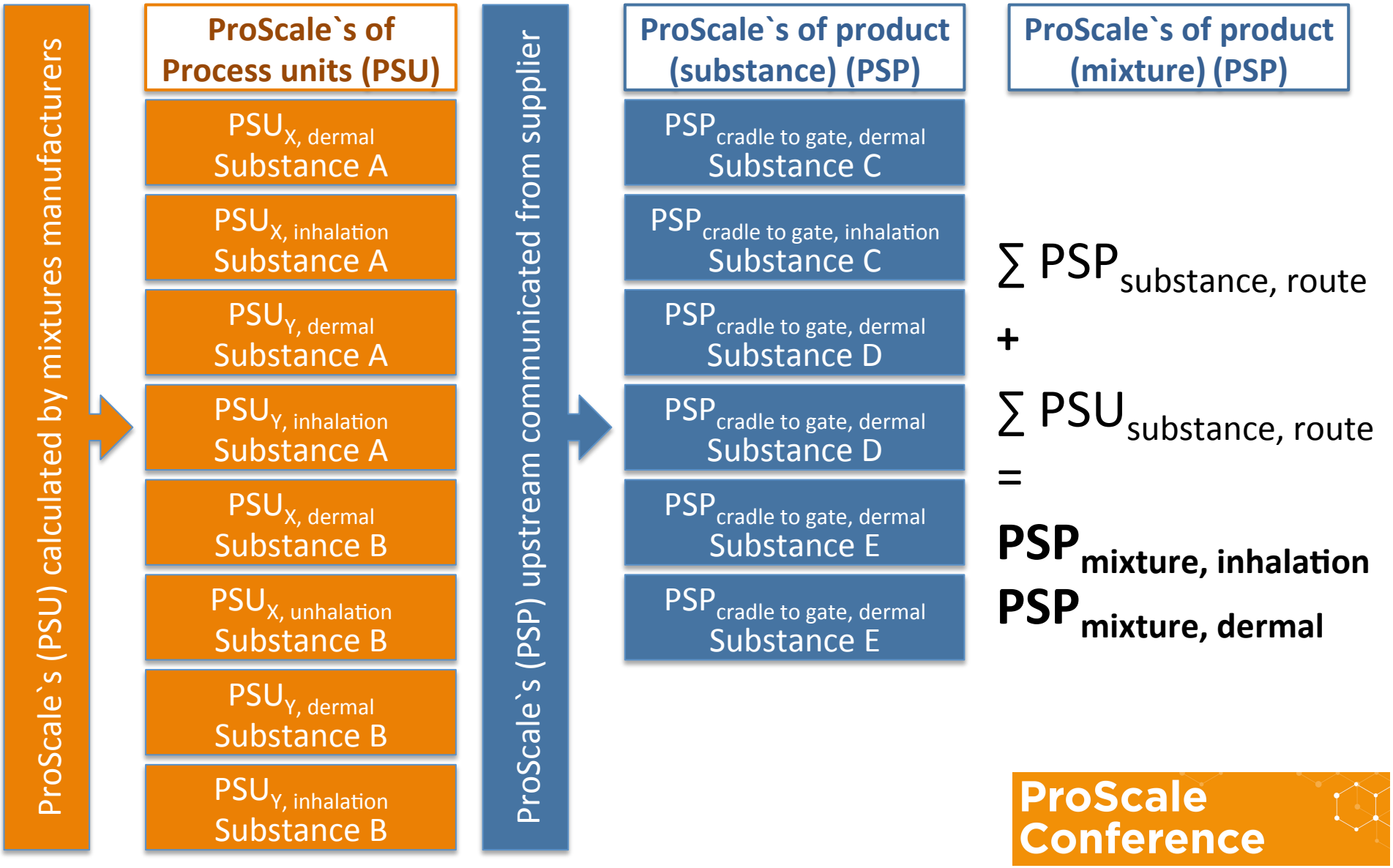
ProScale`s manufacturing	ProScale`s Use phase	ProScale`s Service life	ProScale`s End of life

A lot of ProScale scores (PSU) related to

- All relevant Process units
- All relevant substances
- Relevant exposure pathways (dermal, inhalation, (oral))

ProScale Conference

Aggregation to *ProScale Product (PSP)*



ProScale Conference

How to facilitate the practical application of the ProScale method

- IT-based *„easy-to-use-tool“*
  - Database with required substance-related data (H phrases, OEL, vapour pressure)
  - Hierarchy of data sources implemented
  - Exposure Assessment Tool (ECETOC TRA) implemented
- Generic ProScale`s for basic chemicals
  - Cradle to gate ProScale`s for substances with broader application
  - Databases with generic cradle to gate ProScale`s
- Supplementing of PCR and PEFCR with process-related ProScale data
  - e.g. PROCs, RMMs, person-hour-factor

ProScale Conference

Key questions for Workshop session C

- What are priority value chains for which ProScale would bring added value? Which sectors would be interested to apply ProScale?
- Which are the priority basic substances for which generic ProScale data is needed and should be developed?
- How to motivate substance manufacturers to provide required ProScale data?
- How to motivate product/mixture manufacturers to apply the ProScale method?
- *„Hot spot analysis“* vs. *„Benchmarking“*.
  What would you apply?

ProScale Conference

Supplementary slides

Basic Chemicals

Inorganic basic chemicals

- Ammonia
- Bromine
- Calcium carbonate
- Chlorine
- Fluorine
- Hydrogen
- Hydrogen chloride
- Hydrogen fluoride
- Hydrogen peroxide
- Iodine
- Nitric acid
- Oxygen, nitrogen and the rare gases
- Phosphoric acid
- Phosphorus
- Sodium carbonate
- Sodium hydroxide
- Sulfur
- Sulfuric acid
- Titanium dioxide

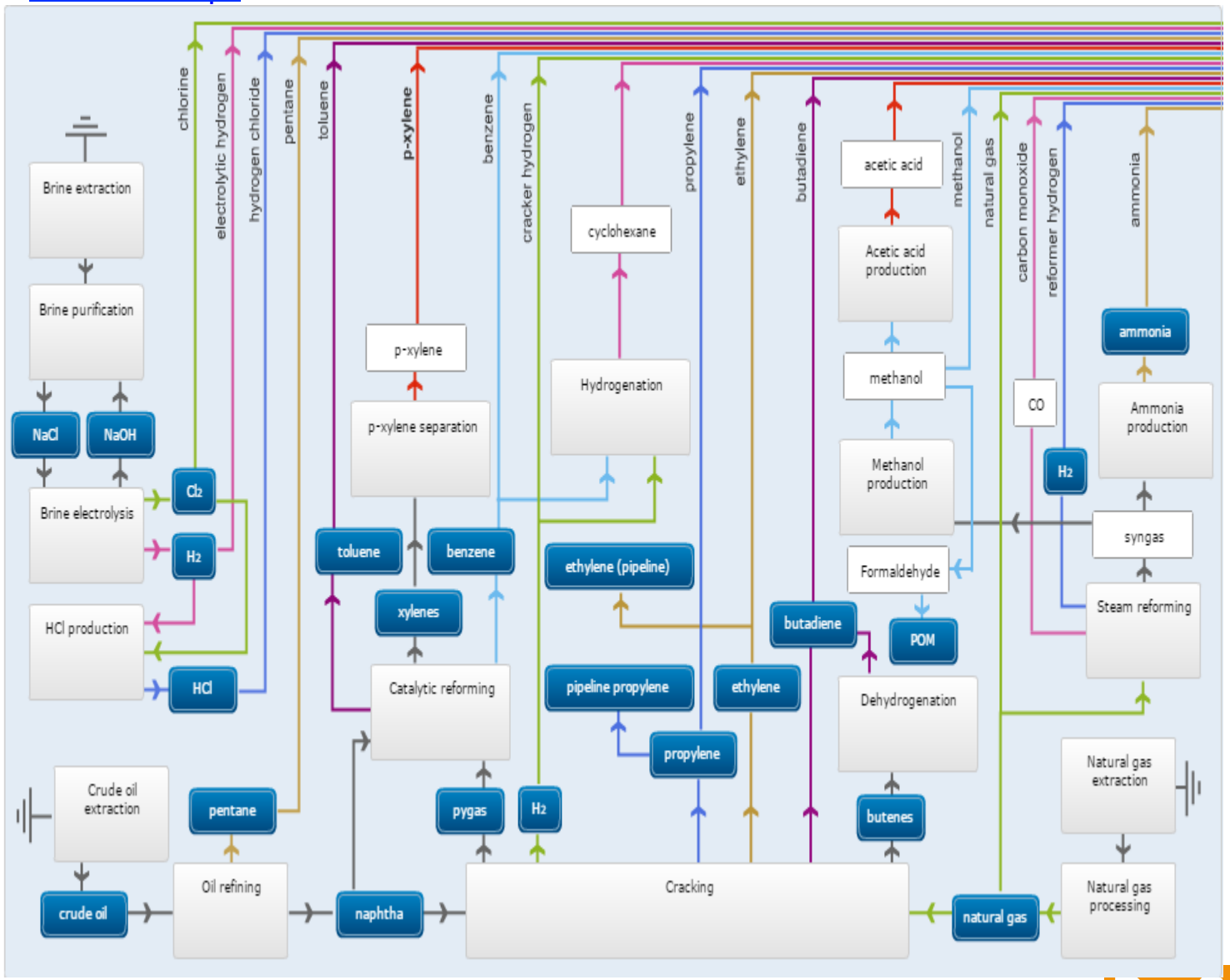
Organic basic chemicals

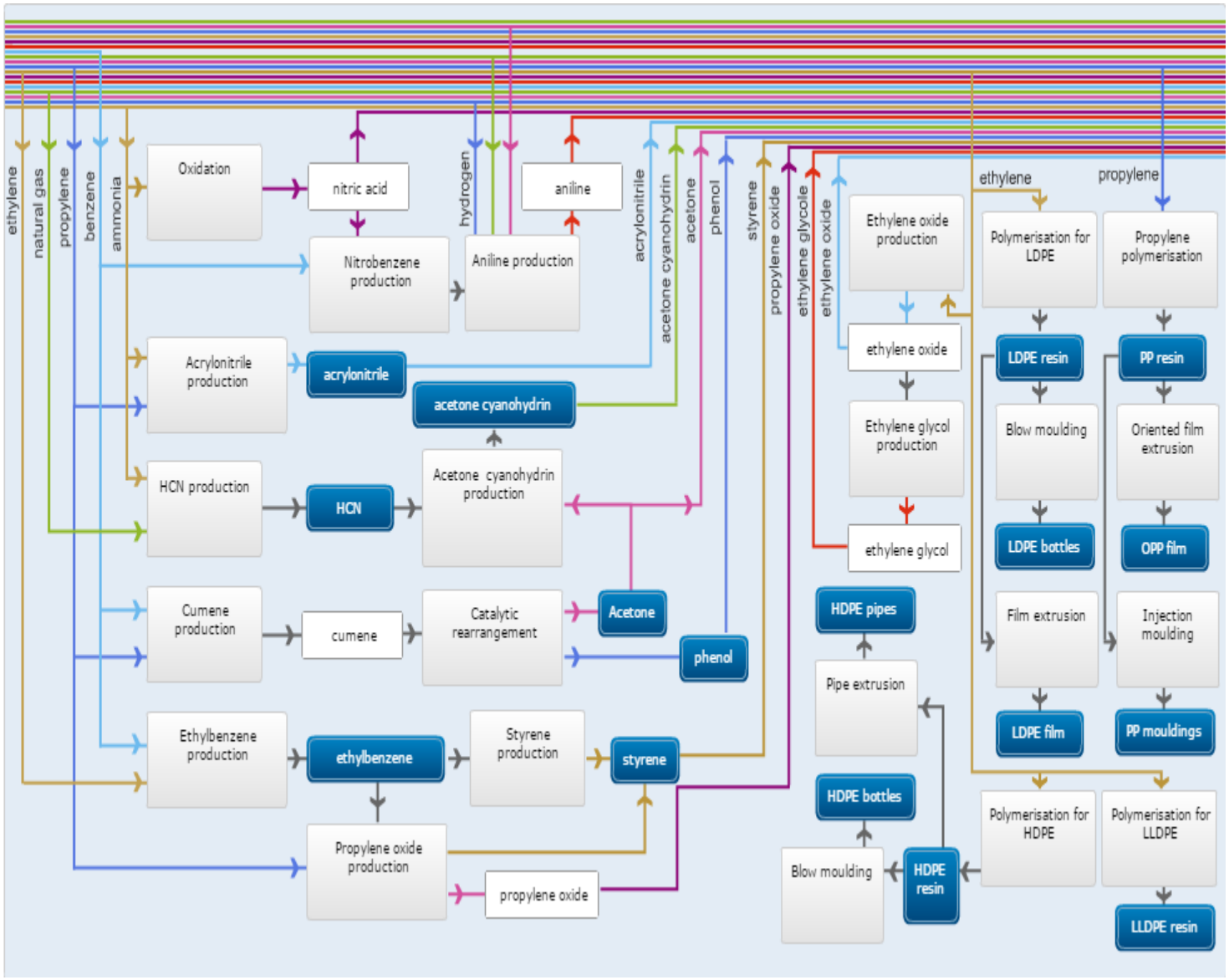
- Benzene and methylbenzenes
- Buta-1,3-diene
- Epoxyethane (Ethylene oxide)
- Ethane-1,2-diol (Ethylene glycol)
- Ethanoic acid (Acetic acid)
- Ethanol
- Ethene (Ethylene)
- Methanal (Formaldehyde)
- Methanol
- Methyl tertiary-butyl ether
- Phenol
- Propanone (Acetone)
- Propene (Propylene)
- Urea

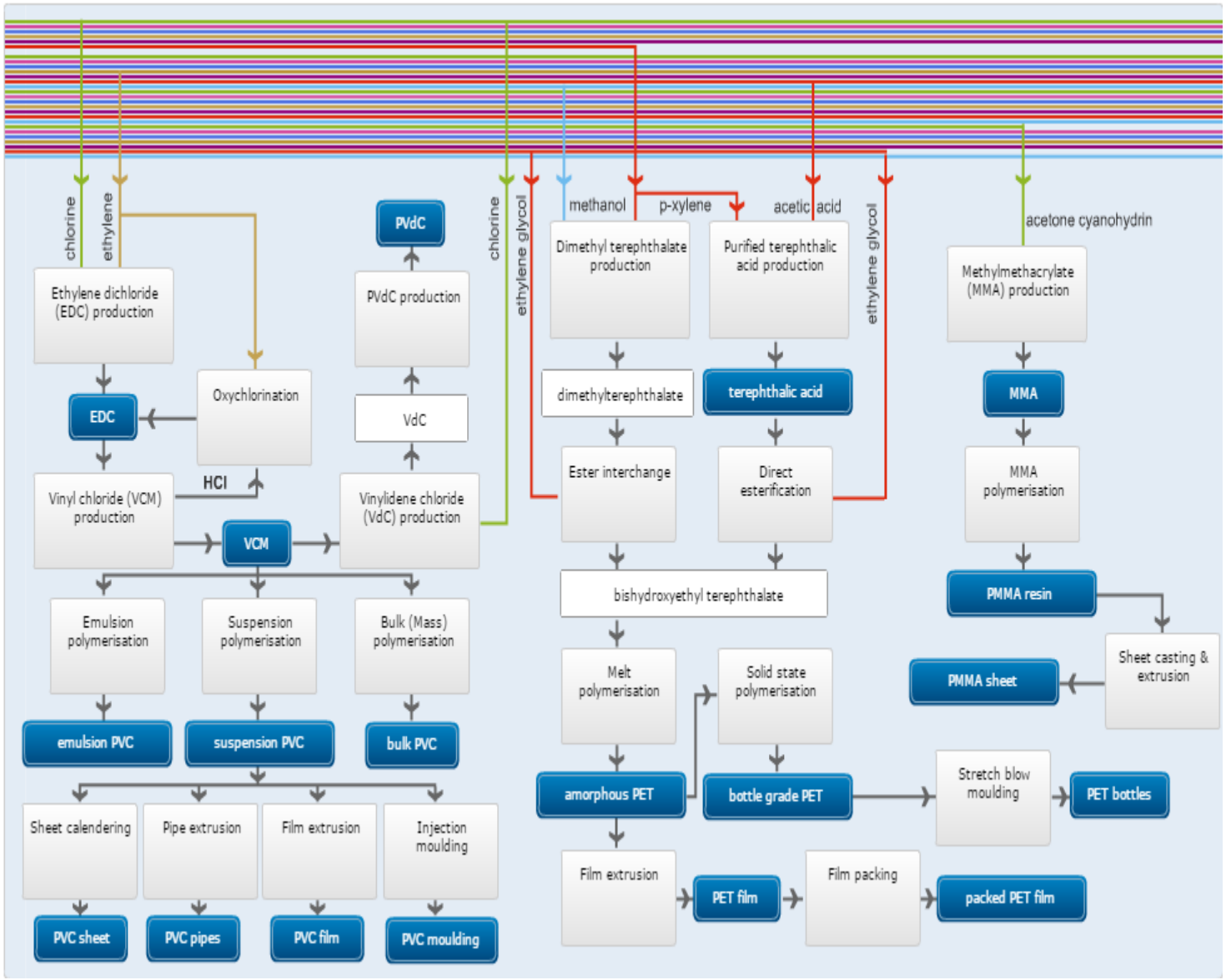
Source of public process data :

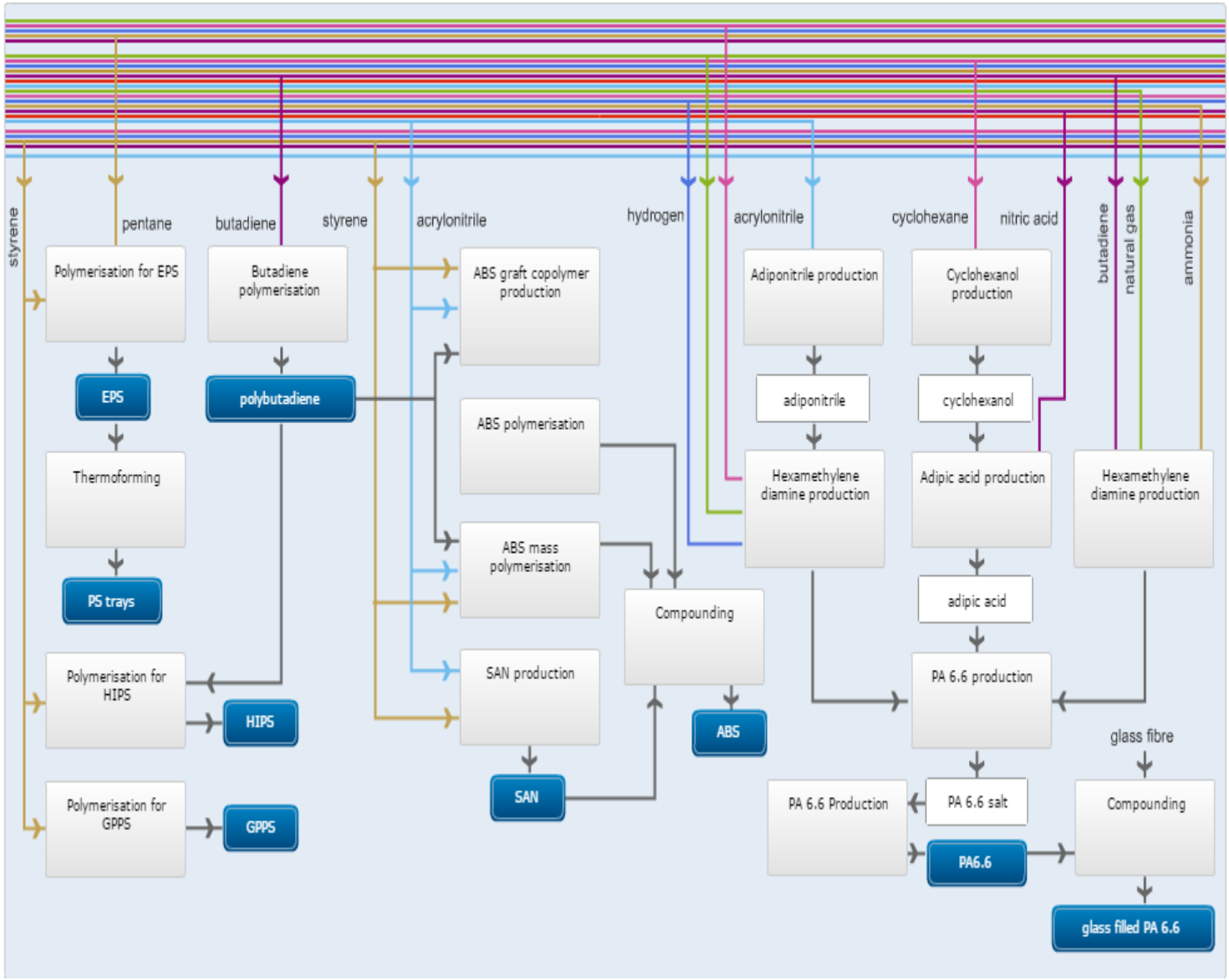
- Ecoinvent, Unit processes
- Associations (ex: PlasticsEurope)
- Encyclopedia
- http://www.essentialchemicalindustry.org/chemicals.html

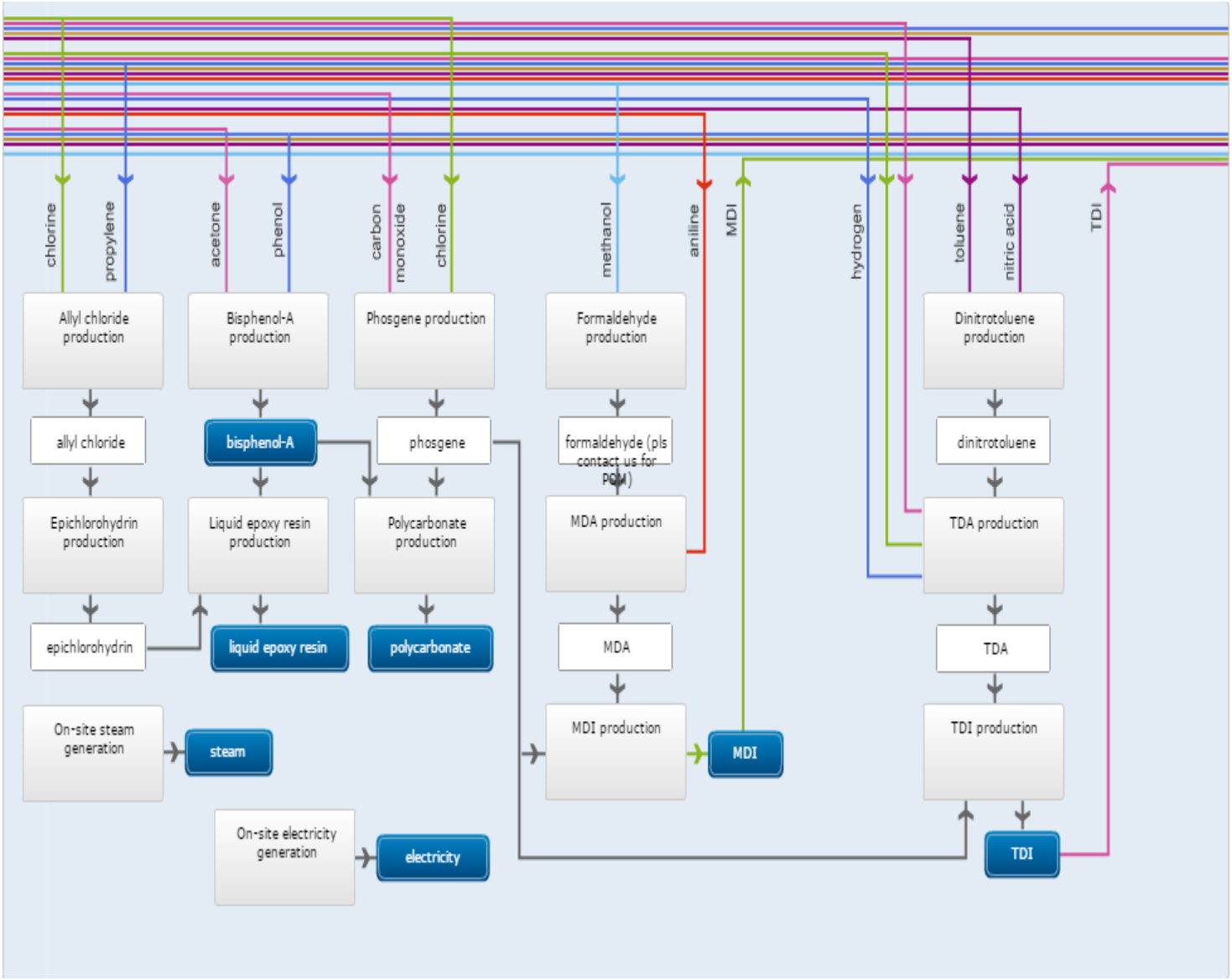
http://www.plasticseurope.org/plastics-sustainability-14017/eco-profiles/browse-by-flowchart.aspx

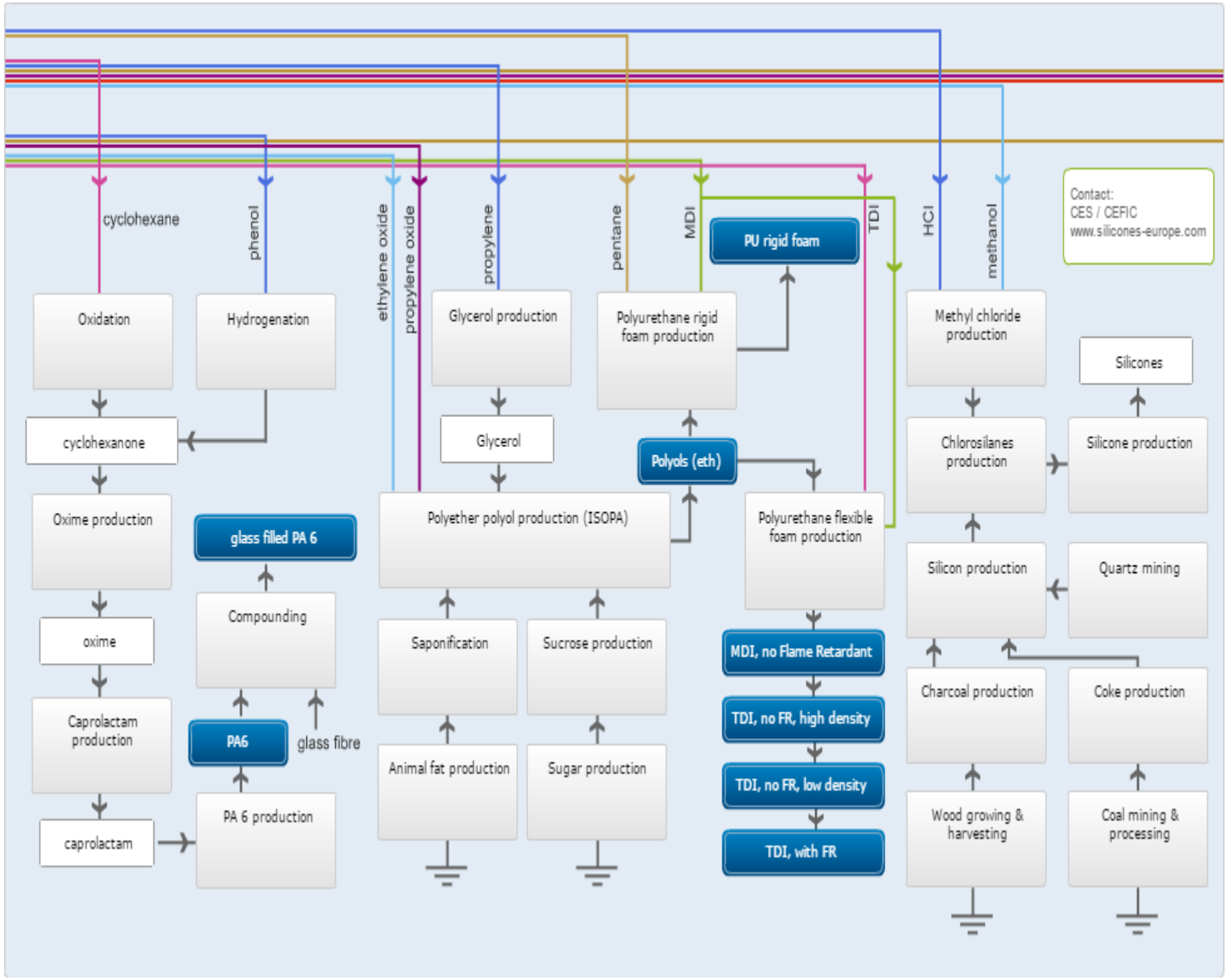


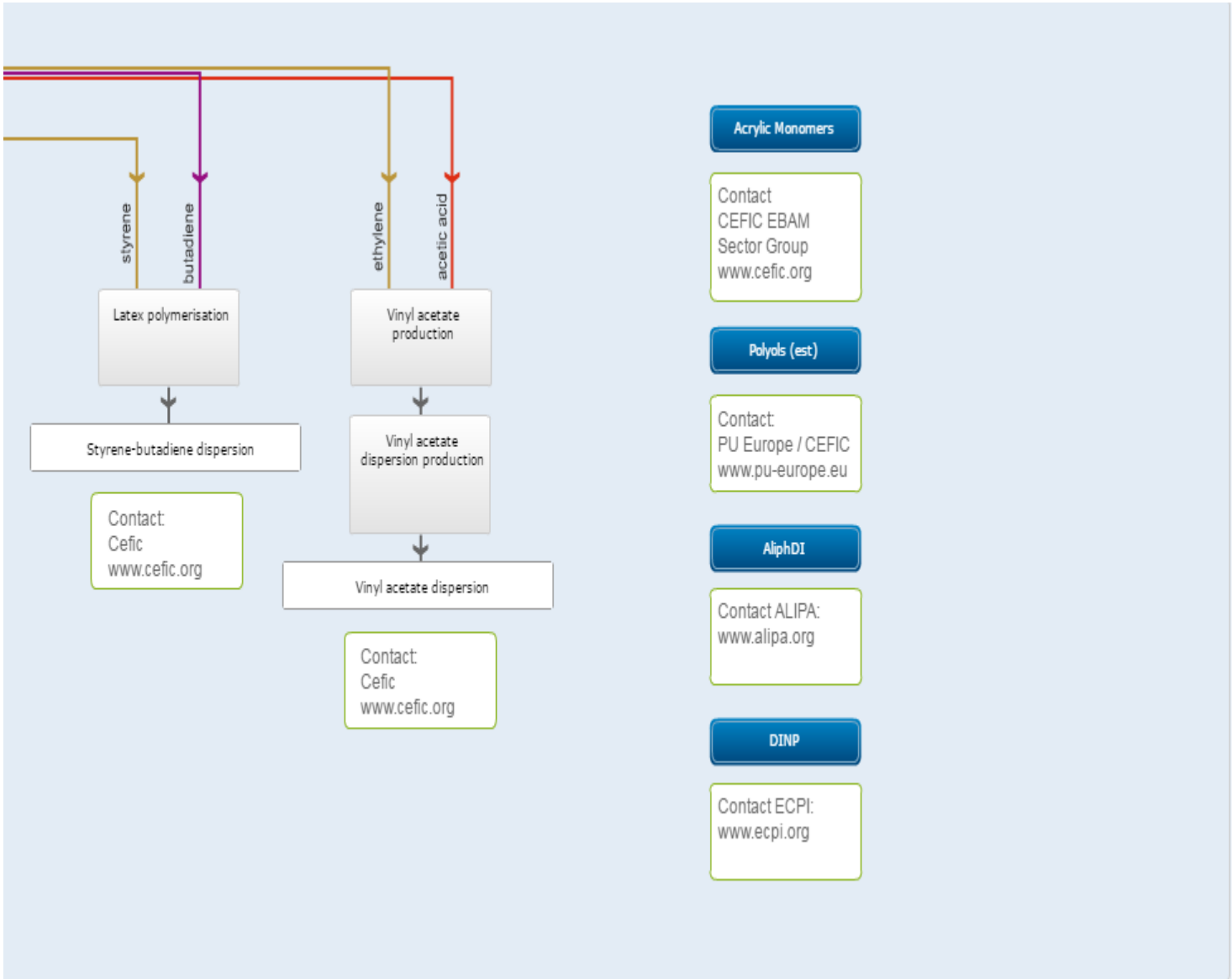

ethylene
natural gas
propylene
benzene
ammonia
Oxidation
nitric acid
Nitrobenzene production
hydrogen
aniline
Aniline production
acrylonitrile
acetone cyanohydrin
acetone
phenol
styrene
propylene oxide
ethylene glycole
ethylene oxide
Acrylonitrile production
acrylonitrile
acetone cyanohydrin
HCN production
HCN
Acetone cyanohydrin production
Cumene production
cumene
Catalytic rearrangement
Acetone
phenol
Ethylbenzene production
ethylbenzene
Styrene production
styrene
Propylene oxide production
propylene oxide
Ethylene oxide production
ethylene oxide
Ethylene glycol production
ethylene glycol
ethylene
propylene
Polymerisation for LDPE
Propylene polymerisation
LDPE resin
PP resin
Blow moulding
Oriented film extrusion
LDPE bottles
OPP film
Film extrusion
Injection moulding
LDPE film
PP mouldings
HDPE pipes
Pipe extrusion
HDPE bottles
Blow moulding
HDPE resin
Polymerisation for HDPE
Polymerisation for LLDPE
LLDPE resin


chlorine
ethylene
Ethylene dichloride (EDC) production
EDC
Oxychlorination
HCl
Vinyl chloride (VCM) production
VCM
Vinylidene chloride (VdC) production
PVdC
PVdC production
VdC
Emulsion polymerisation
Suspension polymerisation
Bulk (Mass) polymerisation
emulsion PVC
suspension PVC
bulk PVC
Sheet calendering
Pipe extrusion
Film extrusion
Injection moulding
PVC sheet
PVC pipes
PVC film
PVC moulding
chlorine
ethylene glycol
methanol
p-xylene
acetic acid
ethylene glycol
Dimethyl terephthalate production
Purified terephthalic acid production
dimethylterephthalate
terephthalic acid
Ester interchange
Direct esterification
bishydroxyethyl terephthalate
Melt polymerisation
Solid state polymerisation
amorphous PET
bottle grade PET
Stretch blow moulding
PET bottles
Film extrusion
PET film
Film packing
packed PET film
acetone cyanohydrin
Methylmethacrylate (MMA) production
MMA
MMA polymerisation
PMMA resin
Sheet casting & extrusion
PMMA sheet


styrene
pentane
butadiene
styrene
acrylonitrile
hydrogen
acrylonitrile
cyclohexane
nitric acid
butadiene
natural gas
ammonia
Polymerisation for EPS
Butadiene polymerisation
ABS graft copolymer production
Adiponitrile production
Cyclohexanol production
EPS
polybutadiene
adiponitrile
cyclohexanol
Thermoforming
ABS polymerisation
Hexamethylene diamine production
Adipic acid production
Hexamethylene diamine production
PS trays
ABS mass polymerisation
Compounding
adipic acid
Polymerisation for HIPS
HIPS
SAN production
ABS
PA 6.6 production
glass fibre
Polymerisation for GPPS
GPPS
SAN
PA 6.6 Production
PA 6.6 salt
Compounding
PA6.6
glass filled PA 6.6


chlorine
propylene
acetone
phenol
carbon monoxide
chlorine
methanol
aniline
MDI
hydrogen
toluene
nitric acid
TDI
Allyl chloride production
Bisphenol-A production
Phosgene production
Formaldehyde production
Dinitrotoluene production
allyl chloride
bisphenol-A
phosgene
formaldehyde (pls contact us for pcm)
dinitrotoluene
Epichlorohydrin production
Liquid epoxy resin production
Polycarbonate production
MDA production
TDA production
epichlorohydrin
liquid epoxy resin
polycarbonate
MDA
TDA
On-site steam generation
steam
MDI production
MDI
TDI production
On-site electricity generation
electricity
TDI

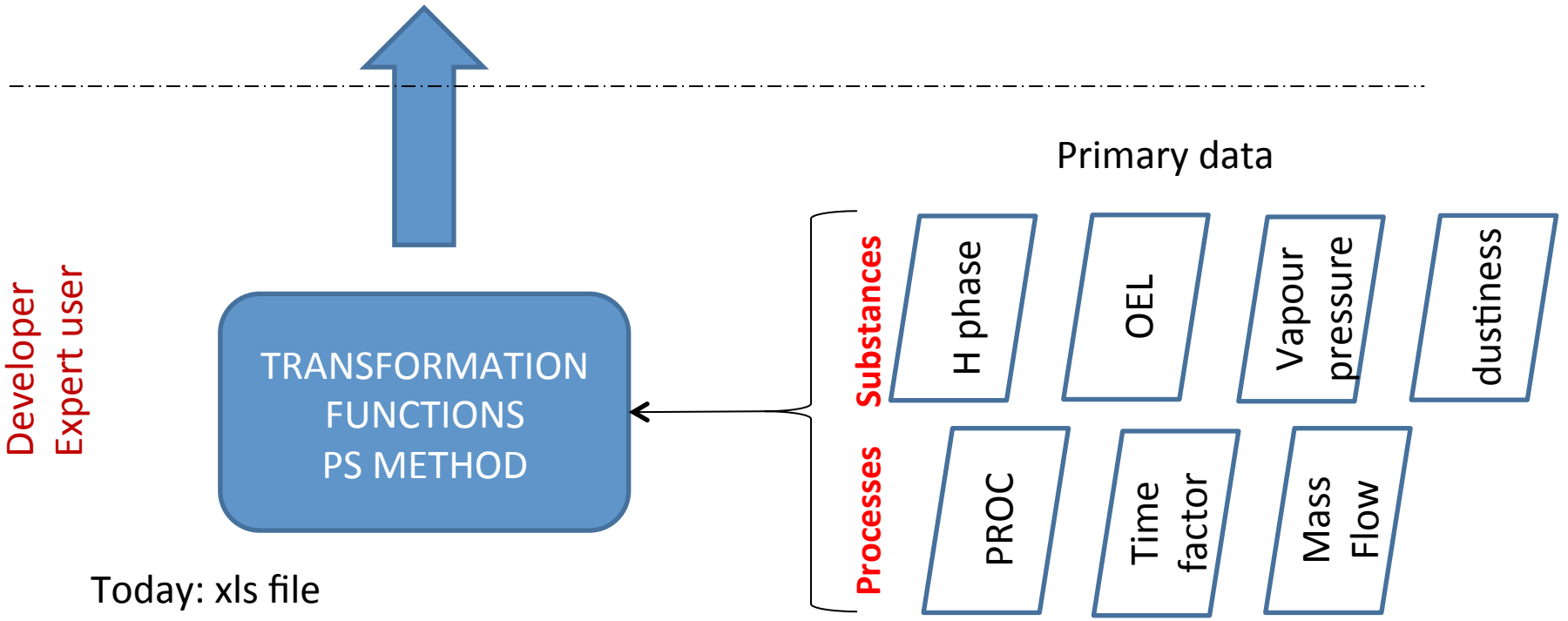

cyclohexane
phenol
ethylene oxide
propylene oxide
propylene
pentane
MDI
PU rigid foam
TDI
HCl
methanol
Contact:
CES / CEFIC
www.silicones-europe.com
Oxidation
Hydrogenation
Glycerol production
Polyurethane rigid foam production
Methyl chloride production
Silicones
cyclohexanone
Glycerol
Polyols (eth)
Chlorosilanes production
Silicone production
Oxime production
glass filled PA 6
Polyether polyol production (ISOPA)
Polyurethane flexible foam production
Silicon production
Quartz mining
oxime
Compounding
Saponification
Sucrose production
MDI, no Flame Retardant
Charcoal production
Coke production
Caprolactam production
PA6
glass fibre
Animal fat production
Sugar production
TDI, no FR, high density
TDI, no FR, low density
Wood growing & harvesting
Coal mining & processing
caprolactam
PA 6 production
TDI, with FR


styrene
butadiene
ethylene
acetic acid
Latex polymerisation
Vinyl acetate production
Styrene-butadiene dispersion
Vinyl acetate dispersion production
Vinyl acetate dispersion
Contact:
Cefic
www.cefic.org
Contact:
Cefic
www.cefic.org
Acrylic Monomers
Contact
CEFIC EBAM
Sector Group
www.cefic.org
Polyols (est)
Contact:
PU Europe / CEFIC
www.pu-europe.eu
AliphDI
Contact ALIPA:
www.alipa.org
DINP
Contact ECPI:
www.ecpi.org

Two levels of data and tools

	Product Name	CAS	PS
PROC			
Worker			
Consumer			

Table for User (LCIA database like)



Today: xls file
Tomorrow: specific software

PROC

PROC	Description
1	Use in closed process, no likelihood of exposure
2	Use in closed, continuous process with occasional controlled exposure
3	Use in closed batch process (synthesis or formulation)
4	Use in batch and other process (synthesis) where opportunity for exposure arises
5	Mixing or blending in batch processes (multistage and/or significant contact)
6	Calendering operations
8a	Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
8b	Transfer of chemicals from/to vessels/ large containers at dedicated facilities
9	Transfer of chemicals into small containers (dedicated filling line)