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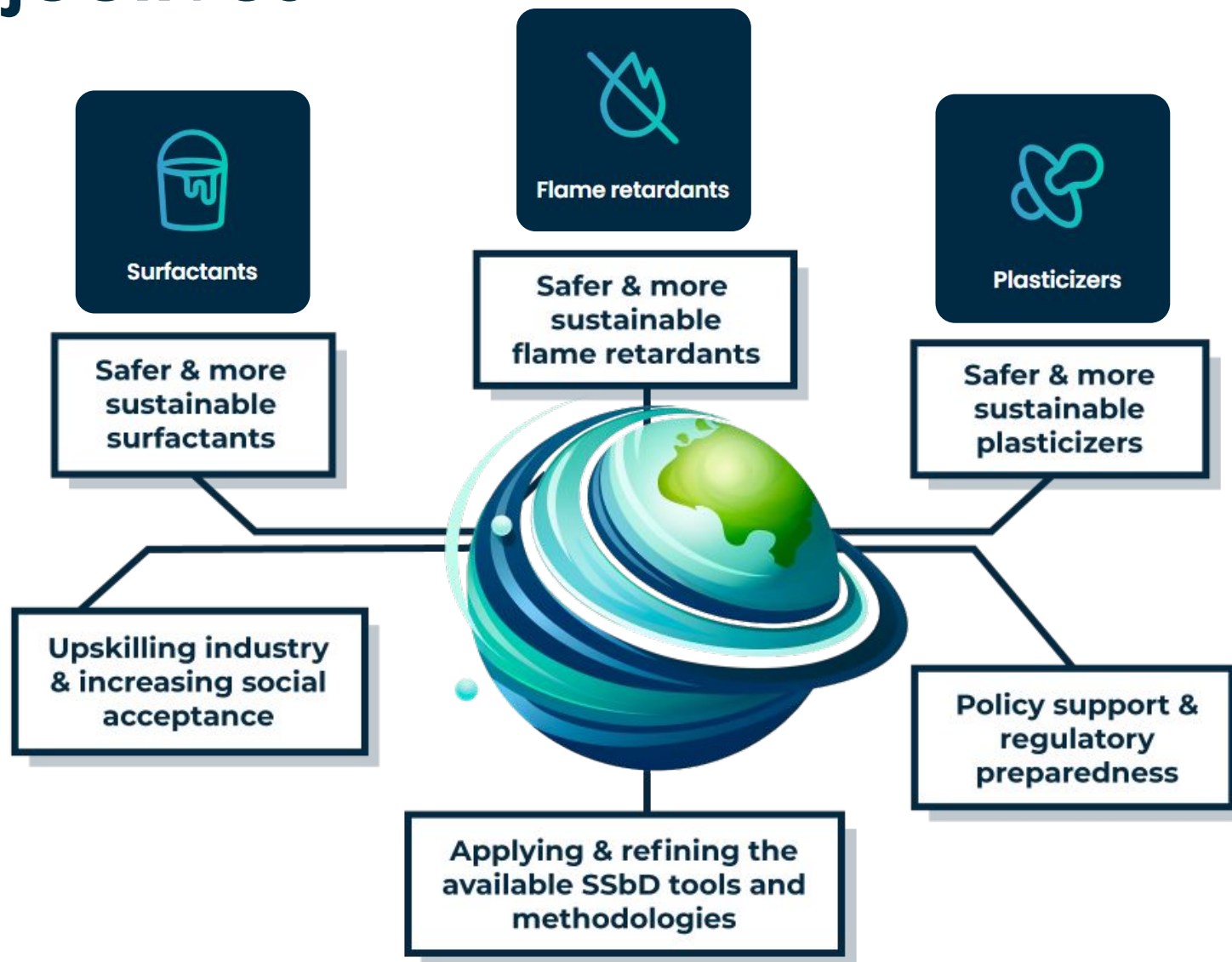
SSbD Training on Scoping & Tier 1

- Carla Caldeira (SQO), Josephine Steck (CEA), Neeraj Shandilya (TNO), Sabine Hofer, Norbert Hofstätter, and Martin Himly (PLUS)



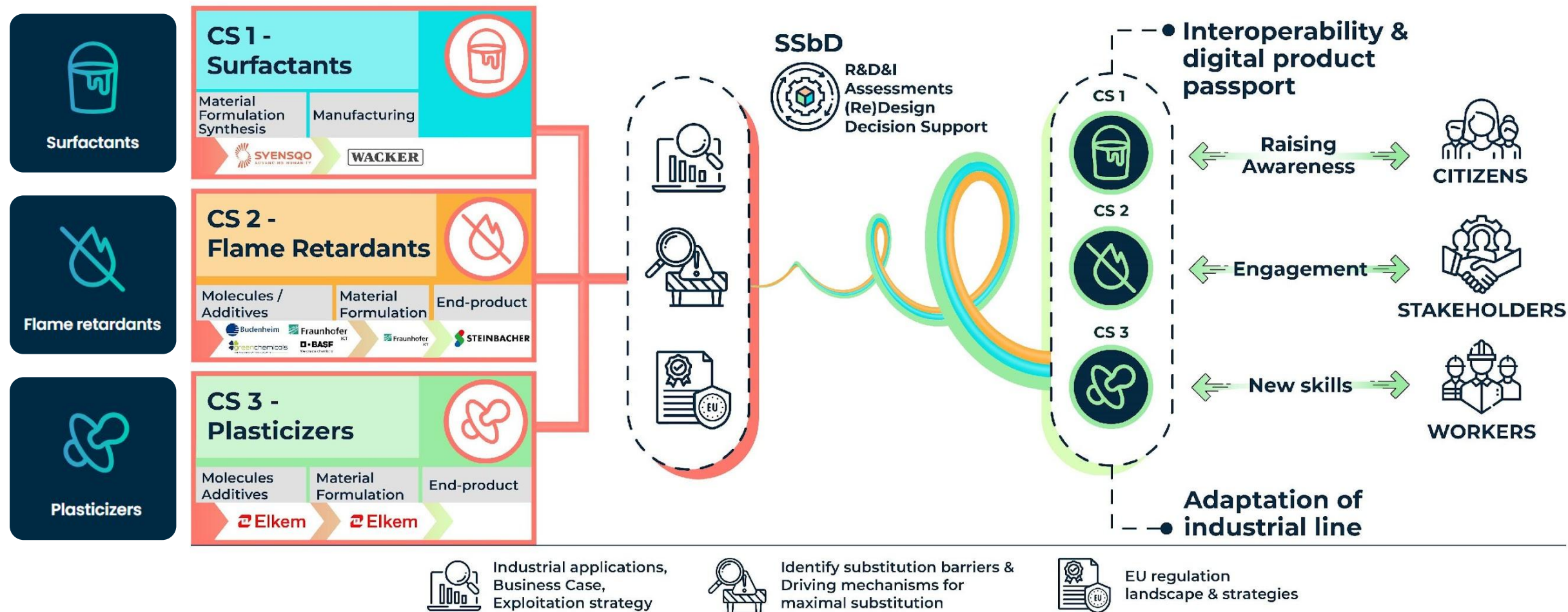
PLANETS' Aim and Objectives

□ Develop **safer**, **eco-friendly**, and **socially** conscious alternatives for three key industrial chemicals while ensuring **economic** viability





PLANETS' Cases



EC Recommendation - European Assessment Framework for SSbD chemicals and materials



SSbD Framework



SSbD EC Recommendation



Case studies and Identification of challenges



Methodological guidance



Revised framework

July 2022

Dec 2022

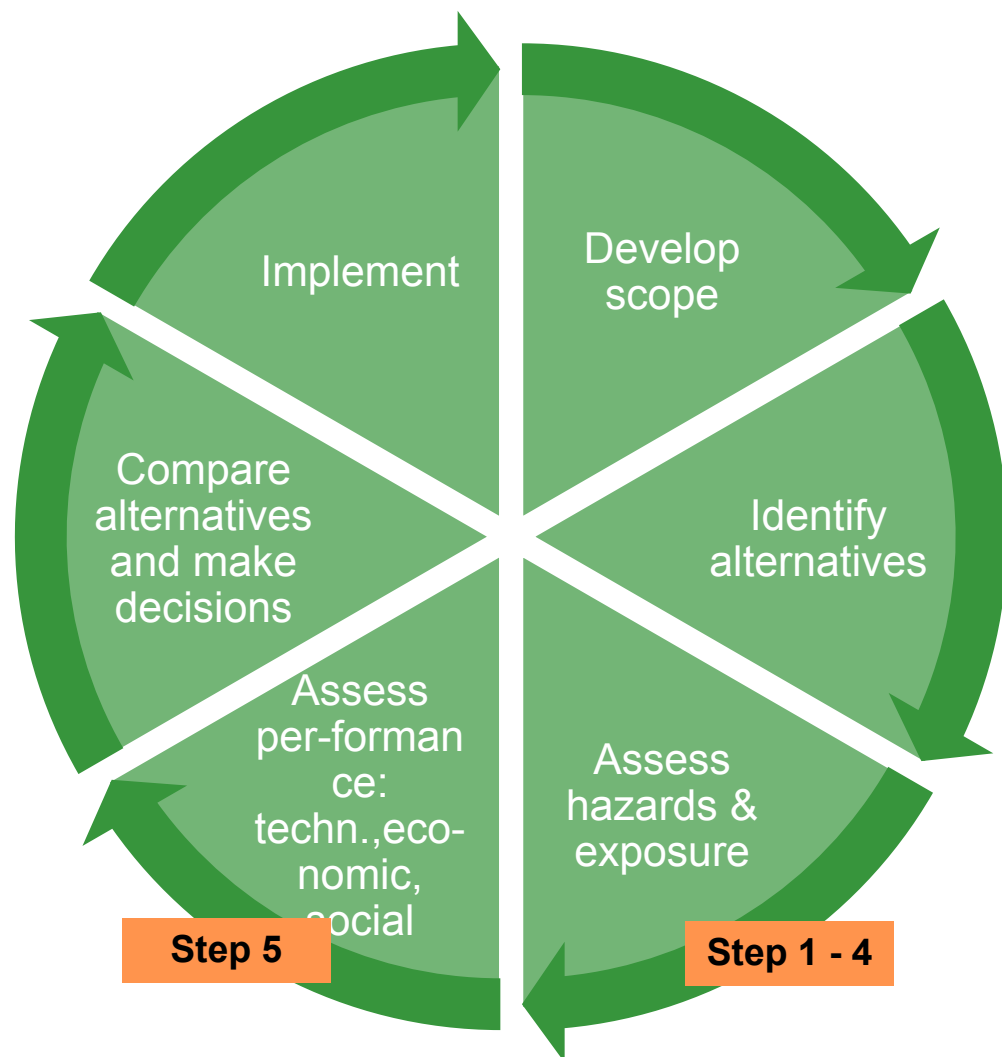
July 2023

May 2024

2026

5 Stakeholders workshops and 2 SSbD Bootcamps

SSbD - generic workflow



SSbD Assessment steps

Step 1: Hazard assessment of chemical/material

Step 2: Human health and safety aspects in the chemical/material production and processing phase

Step 3: Human health and safety aspects in the final application phase

Step 4: Environmental sustainability assessment

Step 5: Social and economic sustainability assessment

Dimensions of safety & sustainability

Safety dimension

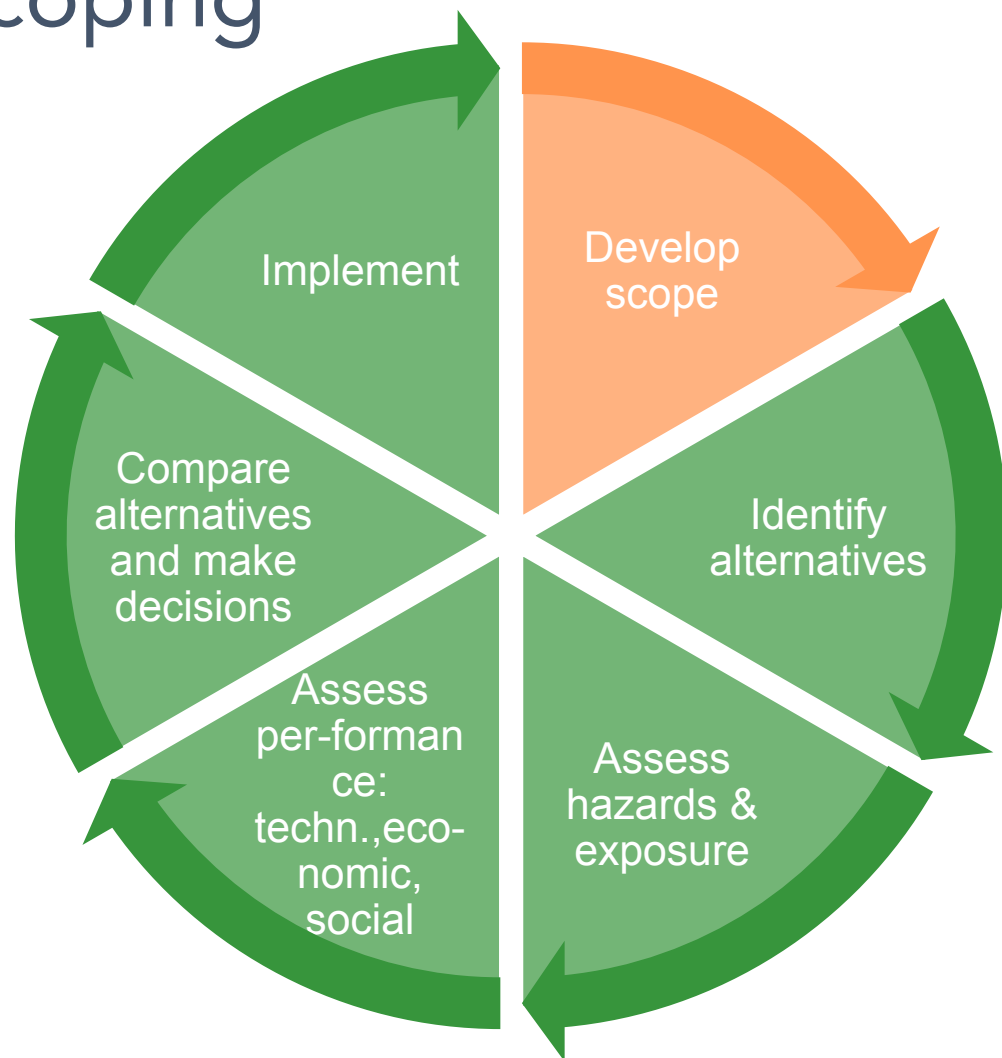
Environmental dimension

Social and economic dimensions



For SSbD you need a plan □

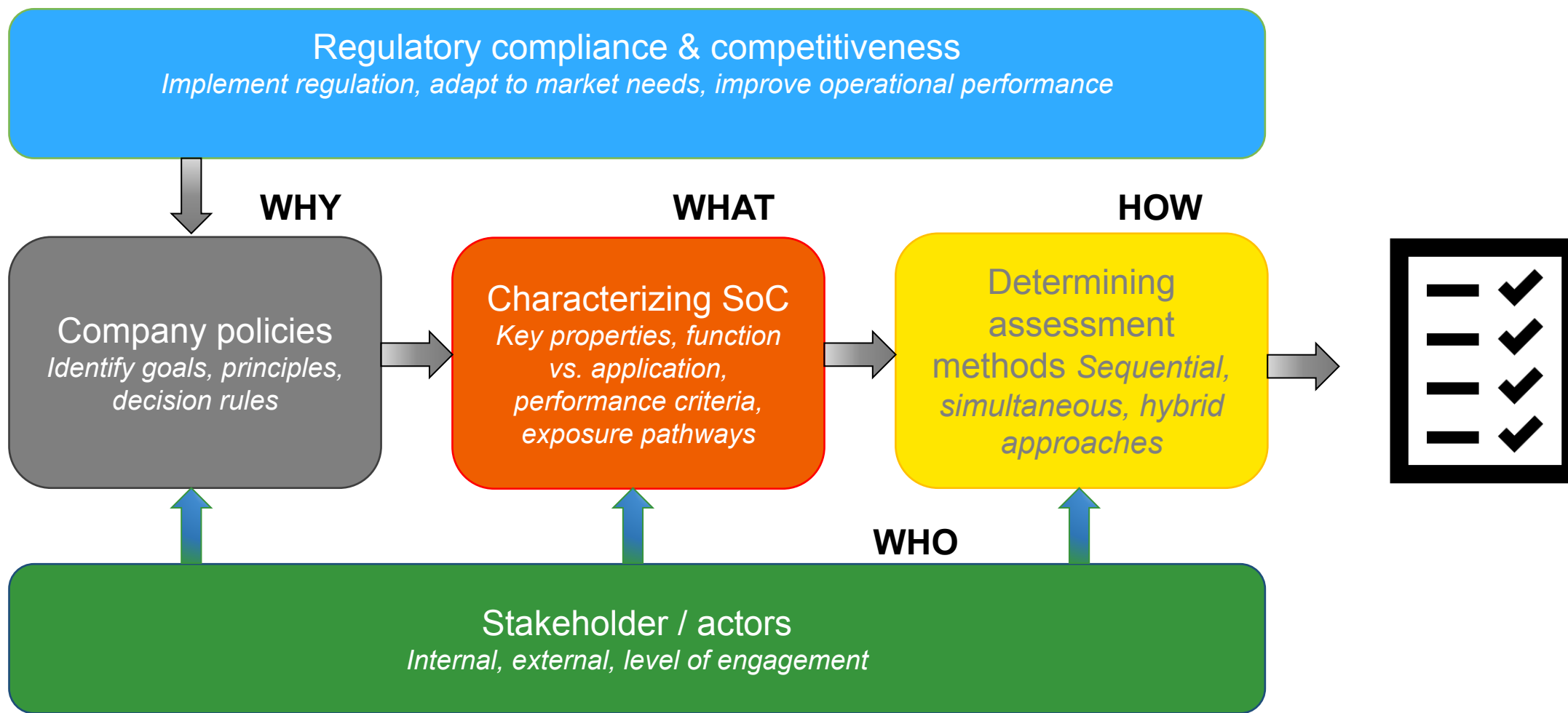
Scoping



The scoping analysis determines the boundaries and provides focus for the SSbD assessment by answering the questions:

- (Re)design definition: **WHY (WHAT)**
- System definition: **WHAT**
- Actors in the life cycle: **WHO**
- The assessment: **HOW**

Scoping: define & integrate your company's perspective



Decide about how to deal with uncertainty and data quality



Strategies	Uncertainty	Effort	Tier
Remaining neutral about data gaps			
Excluding alternatives with missing data			
Penalizing data gaps			
<hr/>			
Additional tools e.g. QSAR			
Quantitative uncertainty analysis			
<hr/>			
Additional tests			
Case studies			
Prototyping			

Acceptable?

Feasible?



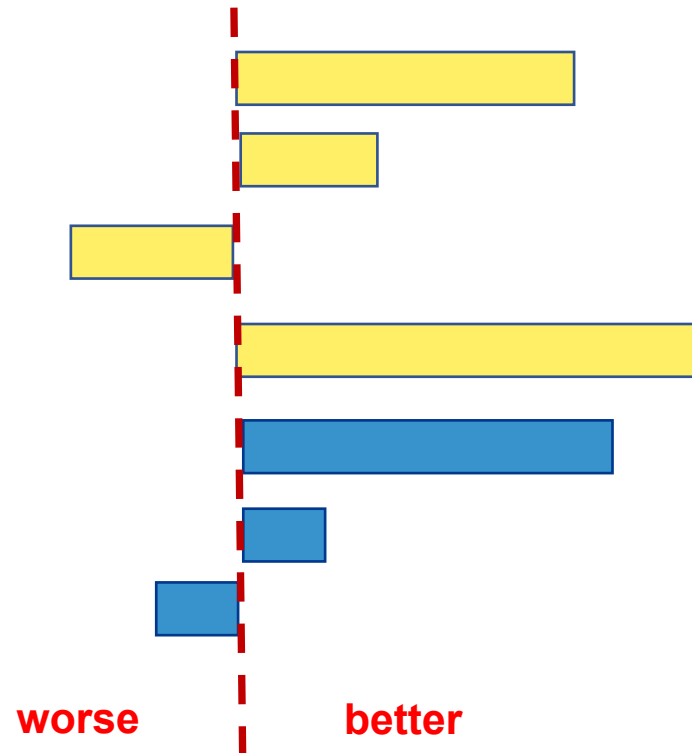
Decision on acceptable alternatives

... a process of integrating information; a multi-criteria approach

Criterion

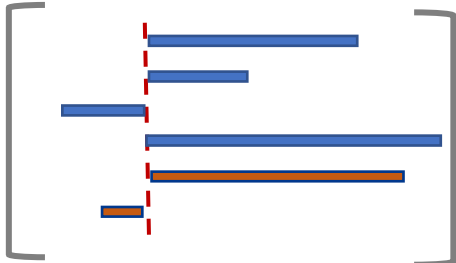
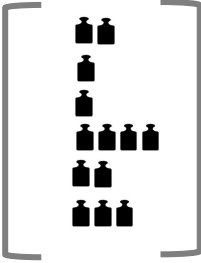
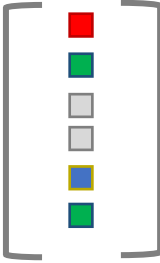
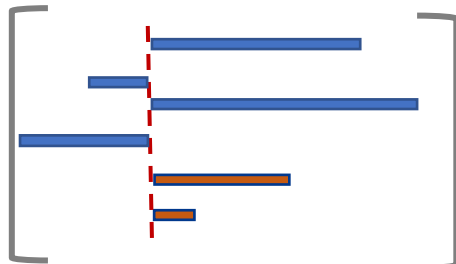
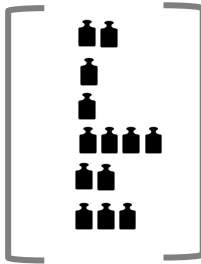
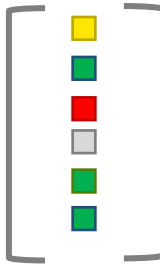
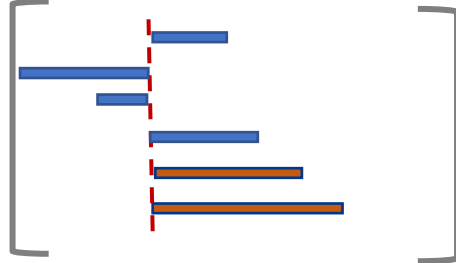
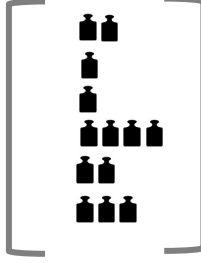
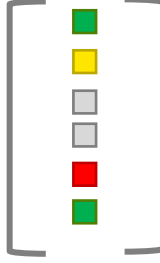
Benchmark

Physiochemical properties
Hazard characteristics
Intrinsic exposure potential
Potential lifecycle trade-offs
Technical feasibility
Economic feasibility
Availability of competences

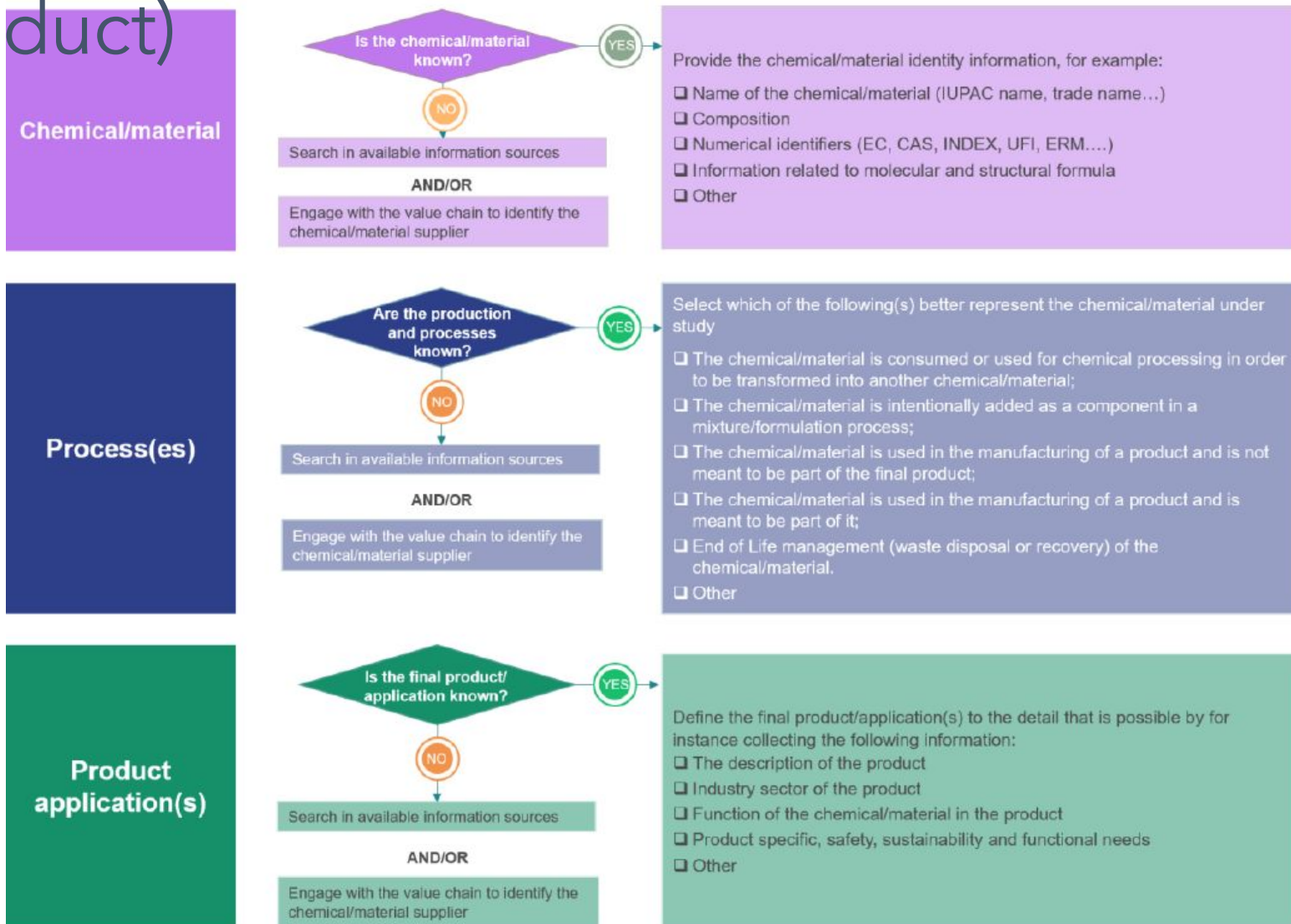


Assessing trade-offs & considering data gaps and quality



Alternative	Evaluation criteria	Weights	Data gaps / quality	Score	Total	Ranking			
A1		<div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div>		<div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div>		<div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div>	<div>1</div> <div>2</div> <div>2</div> <div>0</div> <div>3</div> <div>-1</div>	1	2
A2		<div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div>		<div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div>		<div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div>	<div>3</div> <div>1</div> <div>2</div> <div>-2</div> <div>3</div> <div>2</div>	3	1
A3		<div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div>		<div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div> <div>X</div>		<div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div> <div>=</div>	<div>2</div> <div>-2</div> <div>2</div> <div>0</div> <div>0</div> <div>3</div>	0	3

SSbD system elements (chemical/material, process, product)

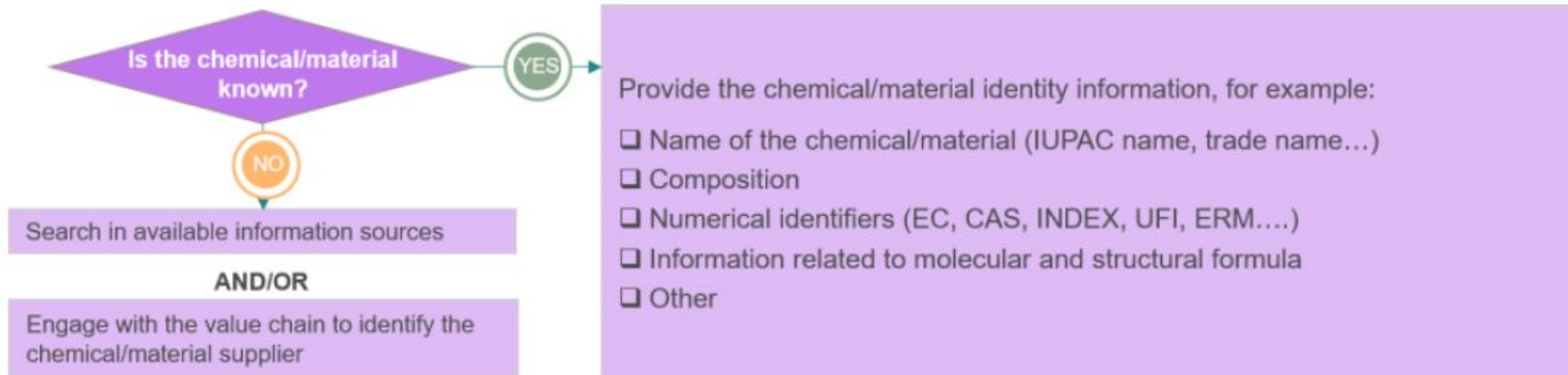


Abbate E., et al., 2024

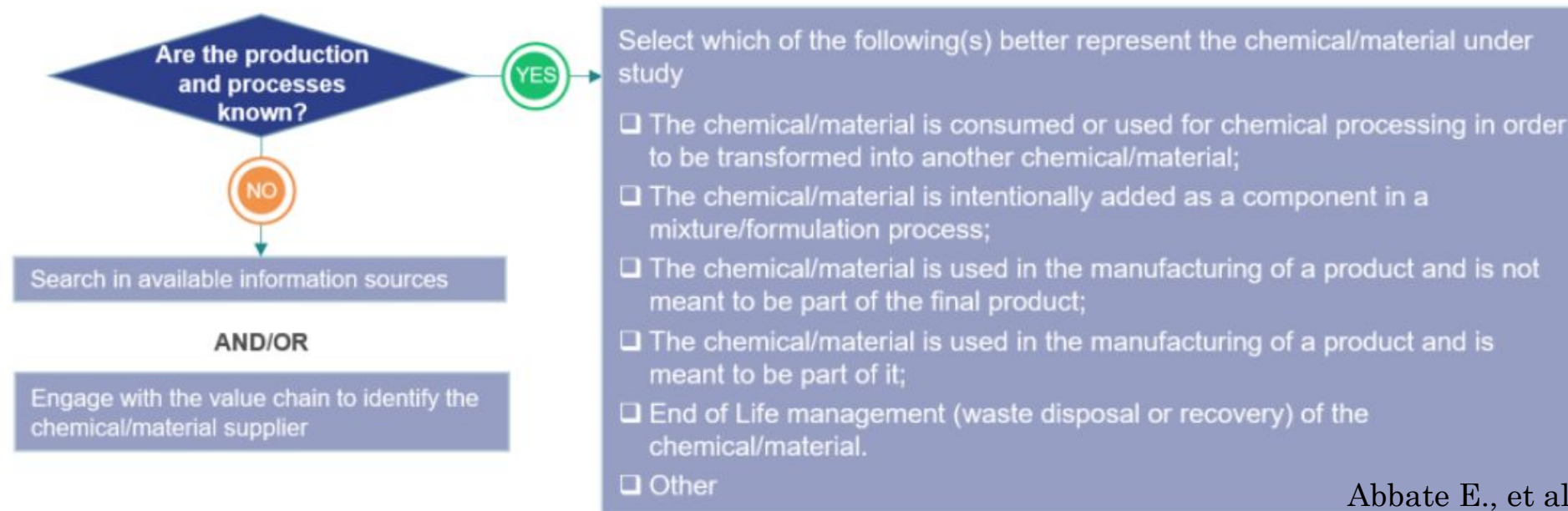
SSbD system elements (chemical/material, process, product)



Chemical/material



Process(es)

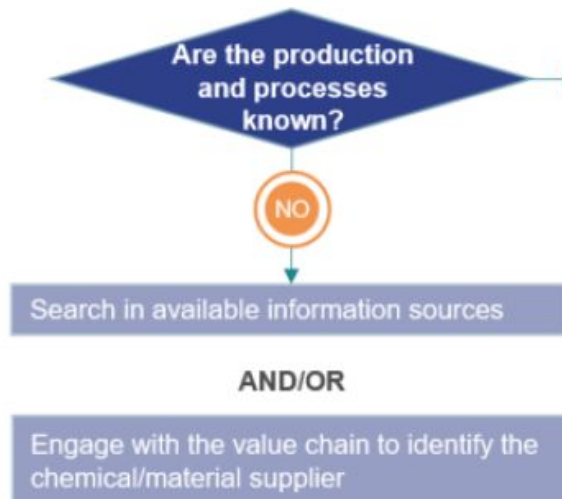


Abbate E., et al., 2024

SSbD system elements (chemical/material, process,



Process(es)



Select which of the following(s) better represent the chemical/material under study

- ☐ The chemical/material is consumed or used for chemical processing in order to be transformed into another chemical/material;
- ☐ The chemical/material is intentionally added as a component in a mixture/formulation process;
- ☐ The chemical/material is used in the manufacturing of a product and is not meant to be part of the final product;
- ☐ The chemical/material is used in the manufacturing of a product and is meant to be part of it;
- ☐ End of Life management (waste disposal or recovery) of the chemical/material.
- ☐ Other

Product application(s)

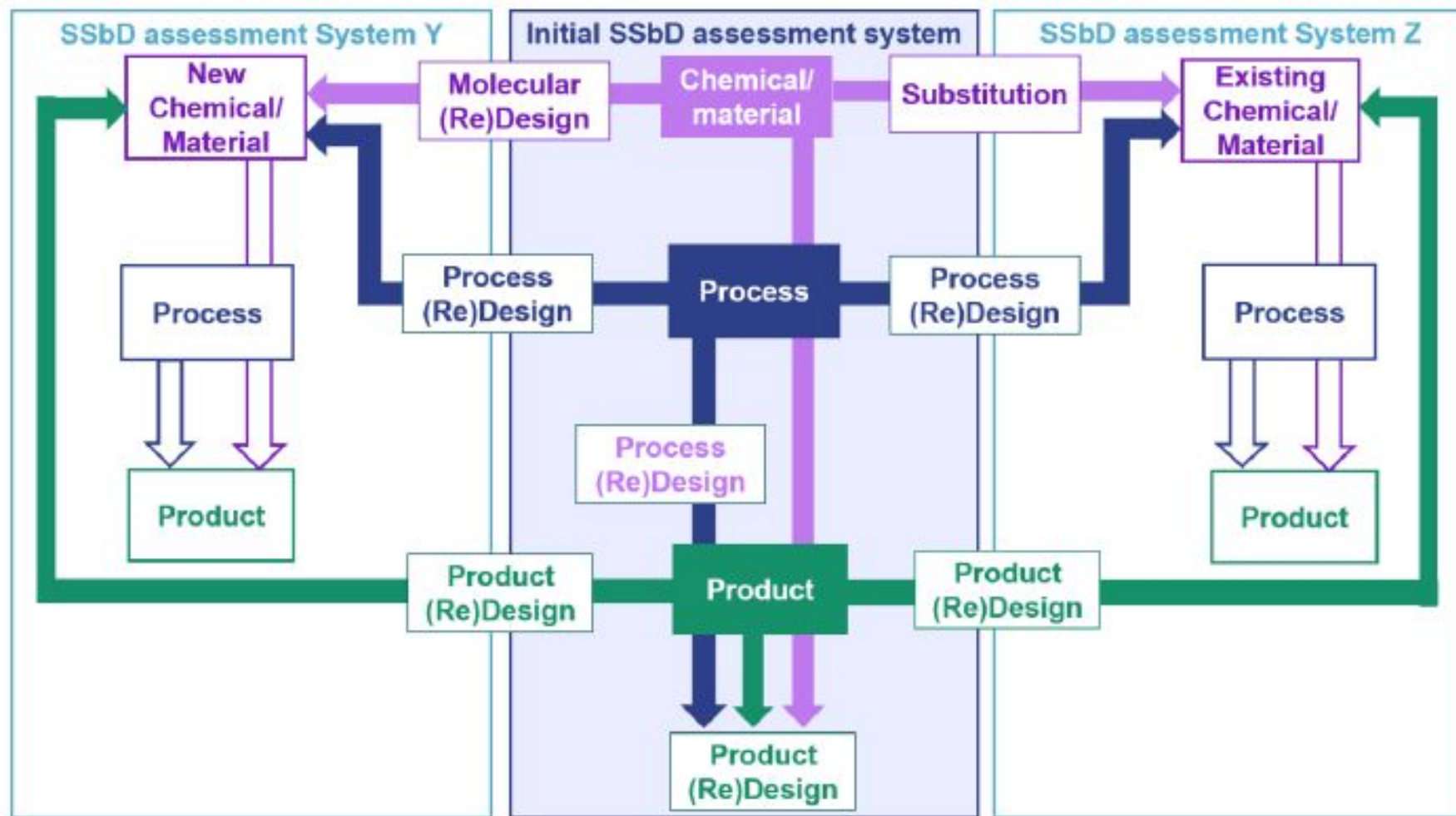


Define the final product/application(s) to the detail that is possible by for instance collecting the following information:

- ☐ The description of the product
- ☐ Industry sector of the product
- ☐ Function of the chemical/material in the product
- ☐ Product specific, safety, sustainability and functional needs
- ☐ Other

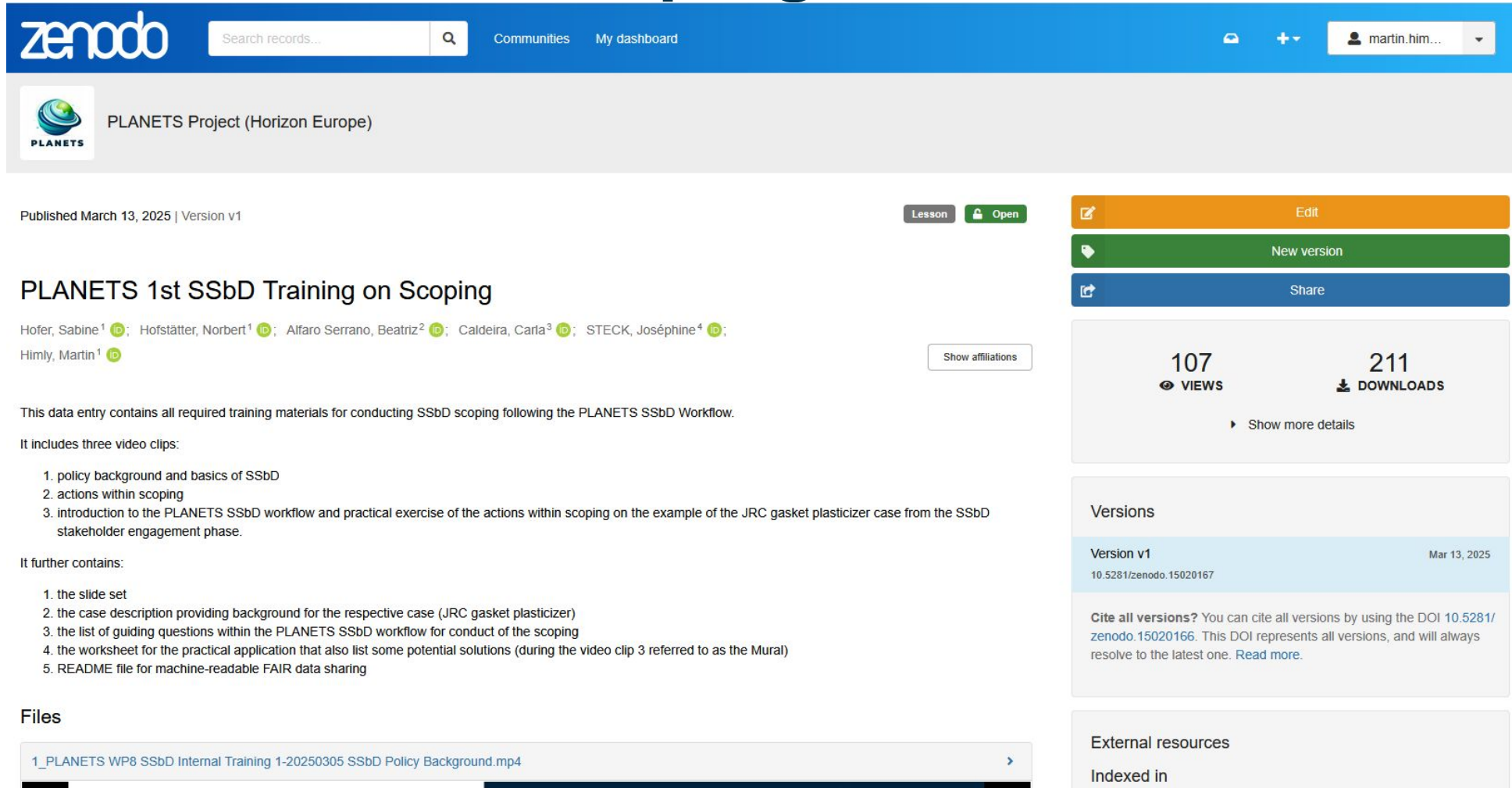
Abbate E., et al., 2024

Changes in the initial SSbD system



Abbate E., et al., 2024

PLANETS' Scoping at Zenodo



The screenshot shows the Zenodo record page for the 'PLANETS 1st SSbD Training on Scoping'. The header includes the Zenodo logo, a search bar, and navigation links for 'Communities' and 'My dashboard'. The user 'martin.him...' is logged in. The record is titled 'PLANETS Project (Horizon Europe)' and was published on March 13, 2025, as version v1. It has 107 views and 211 downloads. The record is described as containing all required training materials for conducting SSbD scoping following the PLANETS SSbD Workflow. It includes three video clips and further contains a slide set, a case description, guiding questions, a worksheet, and a README file for FAIR data sharing. The file list shows '1_PLANETS WP8 SSbD Internal Training 1-20250305 SSbD Policy Background.mp4'. The versions section shows 'Version v1' with the DOI 10.5281/zenodo.15020167. The external resources section is empty.

zenodo Search records... Communities My dashboard martin.him...

PLANETS Project (Horizon Europe)

Published March 13, 2025 | Version v1 Lesson Open

PLANETS 1st SSbD Training on Scoping

Hofer, Sabine¹; Hofstätter, Norbert¹; Alfaro Serrano, Beatriz²; Caldeira, Carla³; STECK, Joséphine⁴; Himly, Martin¹

This data entry contains all required training materials for conducting SSbD scoping following the PLANETS SSbD Workflow.

It includes three video clips:

1. policy background and basics of SSbD
2. actions within scoping
3. introduction to the PLANETS SSbD workflow and practical exercise of the actions within scoping on the example of the JRC gasket plasticizer case from the SSbD stakeholder engagement phase.

It further contains:

1. the slide set
2. the case description providing background for the respective case (JRC gasket plasticizer)
3. the list of guiding questions within the PLANETS SSbD workflow for conduct of the scoping
4. the worksheet for the practical application that also list some potential solutions (during the video clip 3 referred to as the Mural)
5. README file for machine-readable FAIR data sharing

Files

1_PLANETS WP8 SSbD Internal Training 1-20250305 SSbD Policy Background.mp4

107 VIEWS 211 DOWNLOADS Show more details

Versions

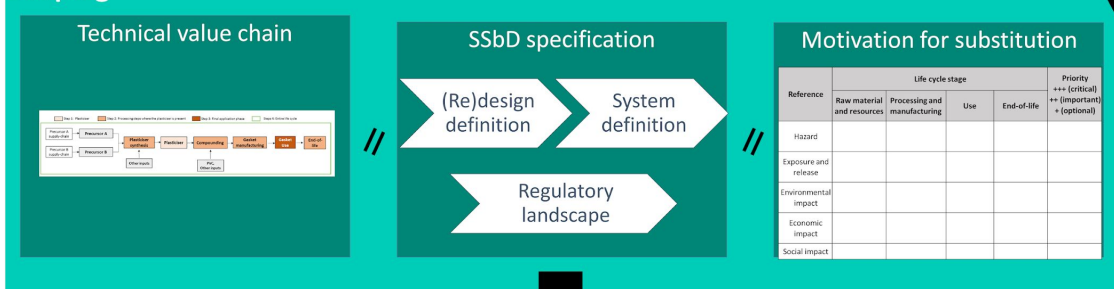
Version v1	Mar 13, 2025
10.5281/zenodo.15020167	

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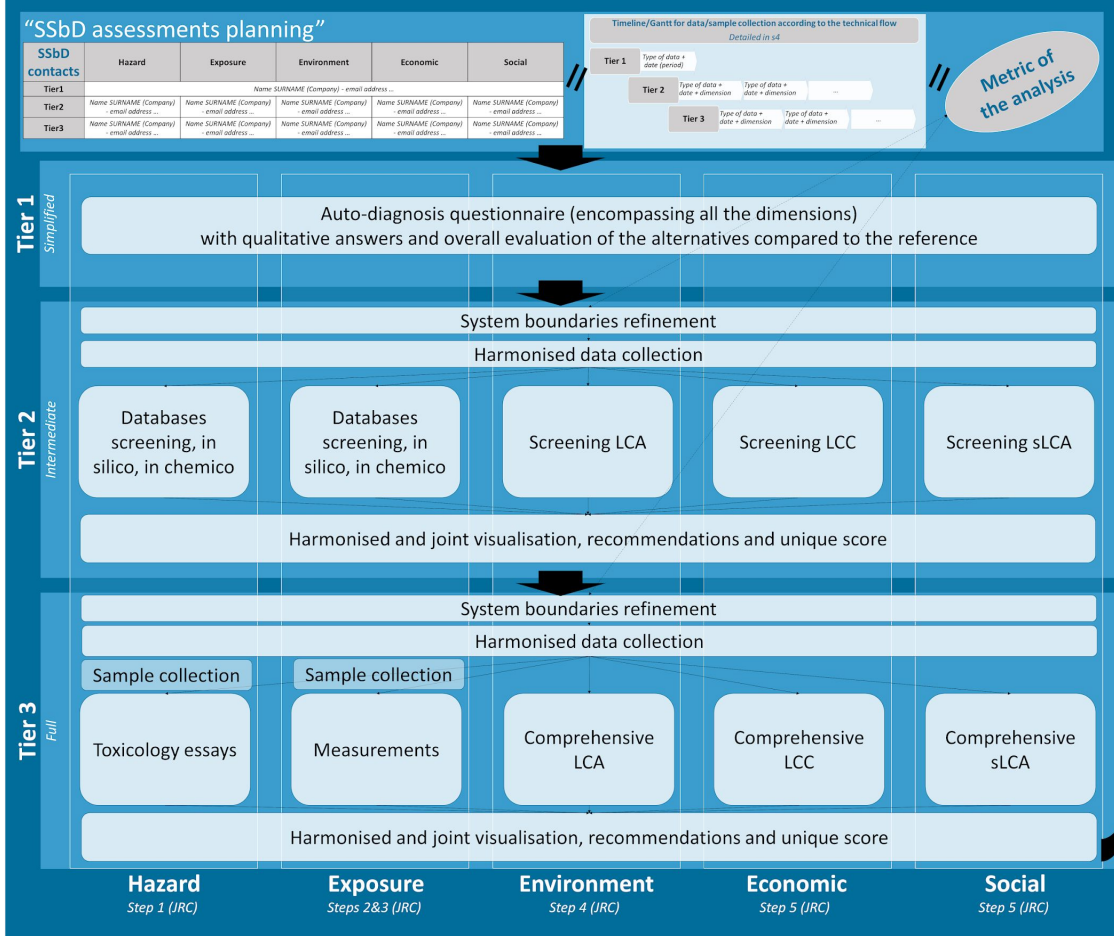
External resources

Indexed in

Hofer, S., Hofstätter, N., Alfaro Serrano, B., Caldeira, C., Steck, J., & Himly, M.
PLANETS 1st SSbD Training on Scoping. <https://doi.org/10.5281/zenodo.15020167>



Assessments



WHY? WHO? WHAT?



How?

The PLANETS generic SSbD workflow

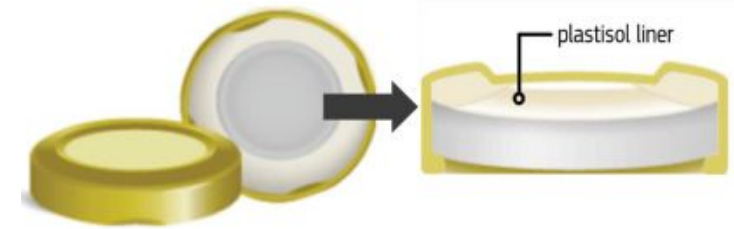
A two phases approach aiming to guide the CS through SSbD:

- **Scoping** – Formalise the system under study to ensure efficient SSbD assessments
- **Assessments** – Conduct evaluations of the alternatives in comparison to a benchmark



Plasticizer in food contact materials □ sealing gaskets for glass jars

- use: 6-48 mo @RT; 7-10 d @+4°C, 2-4 mo -20°C
- content: alcohol, free fat, pH (fruit acids, etc.)
- EoL: single use, end up in municipal waste



Plasticizer add to 35-40% by weight of material □ workability, extensibility, flexibility

Di(2-ethyl-hexyl)phthalate, DEHP (*i.e.* SVHC: toxic for reproduction cat 1B, endocrine disruptor for humans & environment) vs. 2 alternatives (epoxidised soybean oil, ESBO; acetyl tributyl citrate, ATBC)

Action 1 □ Draw the **technical value chain** of the product (10 min)

Action 2 □ Clarify the **motivation for substitution** (15 min)

Action 3 □ Define the **re-design** (identify purposes, SSbD principle, design level: material/chemical - process – product) & conduct the **system boundary definition** (30 min)

Link to material: https://drive.google.com/drive/folders/1wrwO95Z-BVj6BReEBRhJmziWu8XVn_GK

Practical work in break-out teams

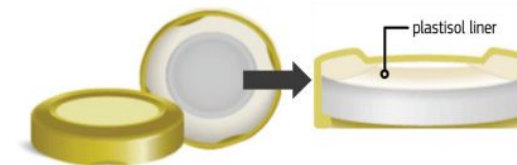


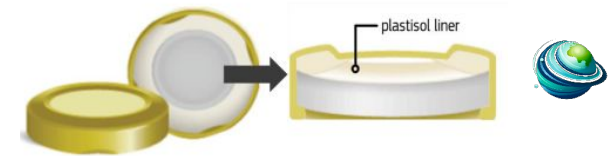
Table 2. Identity information on the plasticisers used in the case study indicating the IUPAC (International Union for Pure and Applied Chemistry) name, CAS (Chemical Abstracts Service) number and EC (European Community) number

Common name	Acronym	IUPAC ⁽²⁾ name	CAS ⁽³⁾ number	EC ⁽⁴⁾ number	Molecular weight (g/mol)
Di-(2-ethyl hexyl) Phthalate	DEHP	Bis(2-ethylhexyl) benzene-1,2-dicarboxylate	117-81-7	204-211-0	390.57
Acetyl Tributyl citrate	ATBC	Tributyl 2-(acetyloxy)propane-1,2,3-tricarboxylate	77-90-7	201-067-0	402.48
Di(2-ethyl hexyl) adipate	DEHA	Bis(2-ethylhexyl) hexanedioate	103-23-1	203-090-1	370.57
Di (2-ethylhexyl) terephthalate	DEHT	Bis(2-ethylhexyl) benzene-1,4-dicarboxylate	6422-86-2	229-176-9	390.56
Di(isononyl) cyclohexane-1,2-dicarboxylate	DINCH	Bis(7-methyloctyl) cyclohexane-1,2-dicarboxylate	166412-78-8	605-439-7	424.67
Epoxidized soybean oil	ESBO	-	8013-07-8	232-391-0	975.41 ⁽¹⁾

⁽¹⁾ Average molecular weight; ⁽²⁾ International Union of Pure and Applied Chemistry, ⁽³⁾ Chemical Abstract Service, ⁽⁴⁾ European Community

Practical work in break-out teams

Di(2-ethyl-hexyl)phthalate, DEHP (*i.e.* SVHC: toxic for reproduction cat 1B, endocrine disruptor for humans & environment):



vs. 2 alternatives

1. epoxidised soybean oil, ESBO:

Vegetable oils may be a promising route to renewable plasticisers since they are **biodegradable** and have **low toxicity**. Different types of vegetable oils from different sources can be used: soybean, linseed, palm, castor bean. Among the different vegetable oils, Epoxidized soybean oil (ESBO) is the most common oleochemical used for PVC compounding. Nowadays, its global production is about 240000 t/year, with a **European production of 90000 t/year**.

ESBO and also other epoxidised vegetable oils are used as stabilisers and plasticisers for PVC, to improve its flexibility and elasticity.

The production process involves soybean oil, an aqueous solution containing **hydrogen peroxide** (H_2O_2) and **formic** or **acetic acid** and **sulfuric** or **phosphoric acid** (Alhanish Abu Ghalia, 2021). The organic acid reacts with hydrogen peroxide to form a peroxy acid, which can diffuse into the oil and epoxidise it. This reaction regenerates the initial organic acid which then acts similarly to a catalyst. The reaction, normally, requires **6-10 hours to be completed keeping the temperature between 60 and 75°C**.

The reaction is **highly exothermic** ($\Delta H = -55 \text{ kcal/mol}$ for each double bond), which requires to slowly add the mixture of H_2O_2 and formic or acetic acid to the mixture of oil and acid catalyst, to avoid a steep increase in temperature (Alhanish Abu Ghalia, 2021). For this reason, the reaction takes place in pulse-fed-batch or fed-batch reactors in industry, by gradually adding the oxidants to the oil that allows to control the reaction temperature. The reaction is followed by hydrogen peroxide decomposition step, by using **sodium hydroxide and a neutralization step** (Kralisch et al., 2012). Afterwards, the aqueous phase is separated and the product is washed and filtered.

Di-(2-ethyl hexyl) Phthalate (DEHP) is an organic compound, liquid at room temperature, transparent and soluble in oil. It is the **diester of the phthalic acid and 2-ethylhexanol**. It is one of the most common plasticisers in the global market, especially for PVC application.

The production of DEHP is done through an esterification process in **two steps**. The first reaction between the phthalic anhydride and the 2-ethylhexanol gives the ester mono-2-ethylhexyl phthalate and water as a by-product. The equilibrium of this reaction leads to complete conversion of the reactants. The second reaction is the formation of the DEHP, to push the equilibrium of this reaction towards the product as much as possible, the **water is eliminated before the second reaction by distillation** and the reactor works with an excess of alcohol.

The **reactors operate at medium (140-160°C) or high temperatures (200-250°C)** depending on the catalyst used. After the second reactor, the **unreacted alcohol is recovered with a distillation column and fed back to the reactors** (COWI et al., 2009).

ATBC:

Citric acid plasticisers are considered the first choice as nontoxic and safe plasticisers in many applications such as food packaging, medical equipment, and toys for children (Jia et al., 2018). Its basic raw material of, **citric acid, is obtained via fermentation process of organic biomass**.

ATBC is **partly a bio-based** plasticiser, due to the presence of citric acid. It has various uses: as plasticiser in food packaging film, for biomedical and biodegradable materials (Fang et al., 2018).

ATBC is produced via a two-step reaction. In the first step, **Tributyl Citrate (TBC)** is produced by the reaction of citric acid and **n-butanol** at the presence of a catalyst (H_2SO_4) (Osorio-Pascuas et al., 2015). The reaction conditions are **120°C of reaction temperature, and 0.5-1.5% of catalyst concentration**.

Afterwards, ATBC can be produced through direct esterification of TBC with **acetic acid** (Sakakura, Nakagawa, et al., 2007) or through acetylation with **acetic anhydride** (Sakakura, Kawajiri, et al., 2007). The latter synthesis route produces **acetic acid as a by-product** and it was used to model the reaction.

The acetic acid produced was considered as part of the **wastewater** sent to treatment, since its low concentration makes it difficult to recover it.

Practical work in break-out teams

Plastisol production:

Table 3. Summary of the composition of the gasket for each of the selected plasticisers

Component of the gasket	DEHP	ATBC	ESBO
Substitution factor	1	1.06	1.1
Plasticiser	35.8%	37.2%	38.0%
PVC	47.8%	46.8%	46.1%
Blowing Agent (sodium bicarbonate)	0.6%	0.6%	0.6%
Stabiliser (zinc stearate)	1.2%	1.2%	1.2%
Lubricant (stearic acid)	4.1%	4.0%	3.9%
Pigment (TiO ₂)	0.6%	0.6%	0.6%
Filler (calcium carbonate)	10.0%	9.8%	9.7%

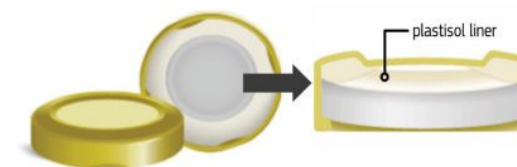
Plastisol is a colloidal suspension of small dispersed PVC particles, with a diameter of 0.1–5 µm, in a liquid plasticiser matrix (Saeki Emura, 2002). A description of its production steps and operation conditions is reported hereunder.

In the plastisol production, the PVC used is an emulsified PVC (E-PVC) (Saeki Emura, 2002). E-PVC and the other additives (e.g. stabilisers, fillers, pigments, etc.), which are reported in Table 3, are all added into a blender, named Banbury mixer, along with a plasticiser, by forming a paste (Yalcin, 2015). During this process that can last about 60 min, the intensive mixing applied can cause a temperature increase. To avoid this issue of heating-up to 50–75°C, the blender is cooled with an external jacket fed with water (Graham, 1973).

The material formed by this step is a paste, named plastisol. It has the properties of a visco-elastic liquid at room temperature.

In most cases, plastisols are de-aerated after mixing and stored at controlled temperatures, preferably below 23°C, to prevent heat-induced viscosity increase and other changes in their desired rheology caused by aging (Wilkes et al., 2006).

When combined with PVC, plasticisers convert the rigid, intractable resins into workable compounds which can exhibit a wide range of properties depending on the type and concentration of plasticisers used (Arkema, 2013).



Gasket manufacturing:

Figure 1

The gasket production involves the following steps: i) pre-heating the plastisol, then ii) the plastisol is injected into the article (i.e. metal cap) and finally iii) it becomes solid when cured in the oven and the gasket is formed.

During the pre-heating, the plastisol produced in the previous stage (the compounding step) is heated up to 70–110°C at which the gelation process happens: the adsorption of plasticiser by PVC particles takes place because of an increase of the temperature and/or a drastic ageing (Marcilla et al., 2017). Once the pre-heating step is completed, plastisol is then injected into the metal cap and it is casted in the final step. Data are not available for this process, therefore the energy consumption for injection was estimated as part of the heating of the material, since the energy consumed in injecting a viscous liquid is mostly transformed in heat and therefore in temperature increase of the material.

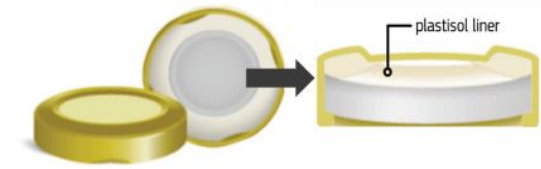
The final step is the curing of the material by passing through an oven (Graham, 1973). In this step fusion mechanism takes place, thus the PVC particles and the plasticiser melt together to form a homogeneous material with the desired mechanical properties when it is cooled down (Marcilla et al., 2017). Temperature varies from 150°C to 190°C (Graham, 1973). The energy requirement for this step, has been estimated from a previous work, in which a similar mixture is cured in a high-velocity hot-air tunnel oven (Boluk et al., 1990).

Heat-treatment: what kind of thermal treatment is used and for how long, considering that shelf-stable foods are subject to sterilising treatment to eliminate all spores and vegetative bacteria able to grow in the food, so that they can be stored at ambient temperature while sealed (Koutsoumanis et al., 2021).

Time: based on the study of McCombie et al. (2012), most of the sampled products showed significant plasticiser migration from one to four years from the end of their shelf-life. Furthermore, compliance of the product should be tested at the end of the shelf life. Therefore, three scenarios can be considered (or a combination of the first with the other two):

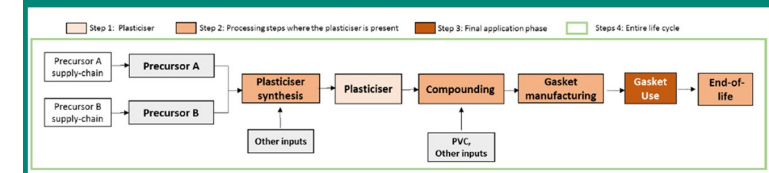
- For 6, 12, 24, 36 or 48 months unopened glass jar at ambient temperature (to be selected in the step 3);
- 7, 10 days in the fridge (4°C) as opened package;
- 2, 4 months in the freezer (–18°C) opened glass jar.

Other relevant properties of the food such as alcohol content, free fat content and pH.



Objective 1: Define the technical value chain

Technical value chain

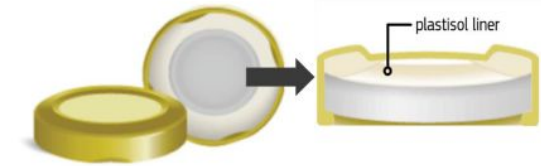


The technical value chain refers to the **series of interconnected processes and stakeholders that contribute to the creation, development, and delivery of the final product.**

It defines the **roles of technical actors** and **outlines their contributions at each stage of the product life-cycle**, from initial concept through design, production, and maintenance. Each link in the chain adds technical value by refining processes, improving efficiency, and ensuring the quality and functionality of the end product.

Link to material: https://drive.google.com/drive/folders/1wrwO95Z-BVj6BReEBrhJmziWu8XVn_GK

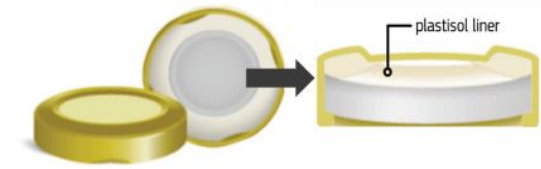
Objective 2: Motivation for re-design



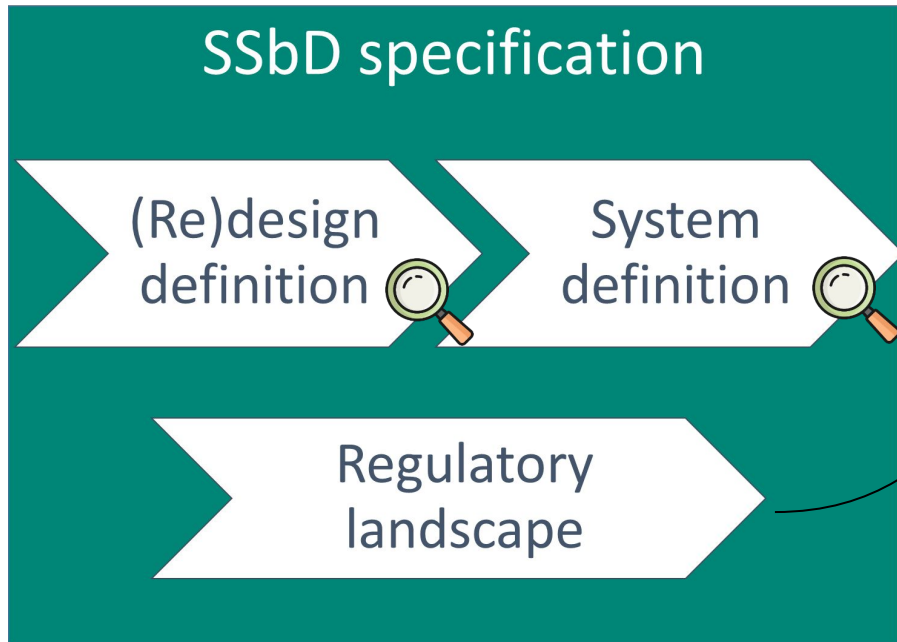
Motivation for substitution					
Reference	Life cycle stage				Priority +++ (critical) ++ (important) + (optional)
	Raw material and resources	Processing and manufacturing	Use	End-of-life	
Hazard					
Exposure and release					
Environmental impact					
Economic impact					
Social impact					

Reference	Life cycle stage				Priority +++ (critical) ++ (important) + (optional)
	Raw material and resources	Processing and manufacturing	Use	End-of-life	
Hazard					
Exposure and release					
Environmental impact					
Economic impact					
Social impact					

Link to material: https://drive.google.com/drive/folders/1wrwO95Z-BVj6BReEBRhJmziWu8XVn_GK



Objective 3: (Re)Design and system boundaries definition



Hierarchy of norms

General EU legislative acts

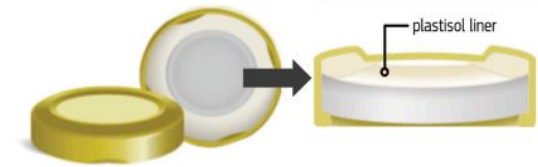
Sector-dependant legislative acts

Non-mandatory standards or labels

REACH Registration, Evaluation, Authorization and restriction of Chemicals Regulation (EC) No 1907/2006	CLP Classification, Labelling and Packaging of substances and mixtures Regulation (EC) No 1272/2008	CSRD Corporate Sustainability Reporting Directive Directive (EU) 2022/2464
General regulation	General regulation	General description
CS specific Regulated substances and Limits	CS specific	CS specific

Substance related <i>Description of the substance</i>	Sector/end product related <i>Description of the sector and end-product</i>
Directive No... + description Regulation No...+ description	Directive No... + description Regulation No...+ description

ISO standards	Labels
ISO No... + interest	Name of label + interest



Objective 3: (Re)Design and system boundaries definition



1/3

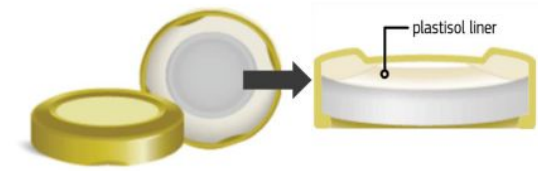
Purposes

What are the goals of your innovation:

- Development of a new chemical /material
- Finding of chemical /material alternative(s)
- Developing a new process
- Improvement of the production processes
- Developing a new product
- Improving the functionality of the product /application
- Other

- Reduction of the hazard properties of the chemical /material
- Increase of the safety of production and processing of the chemical /material
- Increase of the safety of the chemical /material during the application
- Improvement of the environmental sustainability of the chemical /material
- Improvement of the socio-economic sustainability of the chemical /material
- Other

Link to material: https://drive.google.com/drive/folders/1wrwO95Z-BVj6BReEBRhJmziWu8XVn_GK



Objective 3: (Re)Design and system boundaries definition



2/3

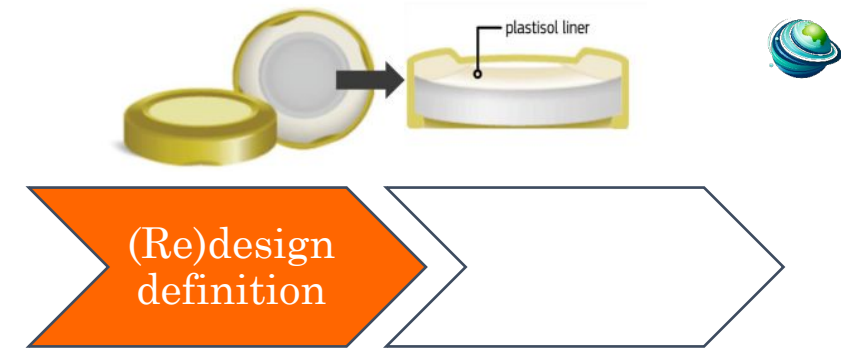
Principles

What are the SSbD principles relevant for your CS that should be assessed:

- Material efficiency
- Minimise the use of hazardous chemicals or materials
- Design for energy efficiency
- Use renewable sources
- Prevent and avoid hazardous emissions
- Design for end of life
- Consider the whole life cycle
- Other principles (please specify)

Link to material: https://drive.google.com/drive/folders/1wrwO95Z-BVj6BReEBRhJmziWu8XVn_GK

Objective 3: (Re)Design and system boundaries definition



3/3

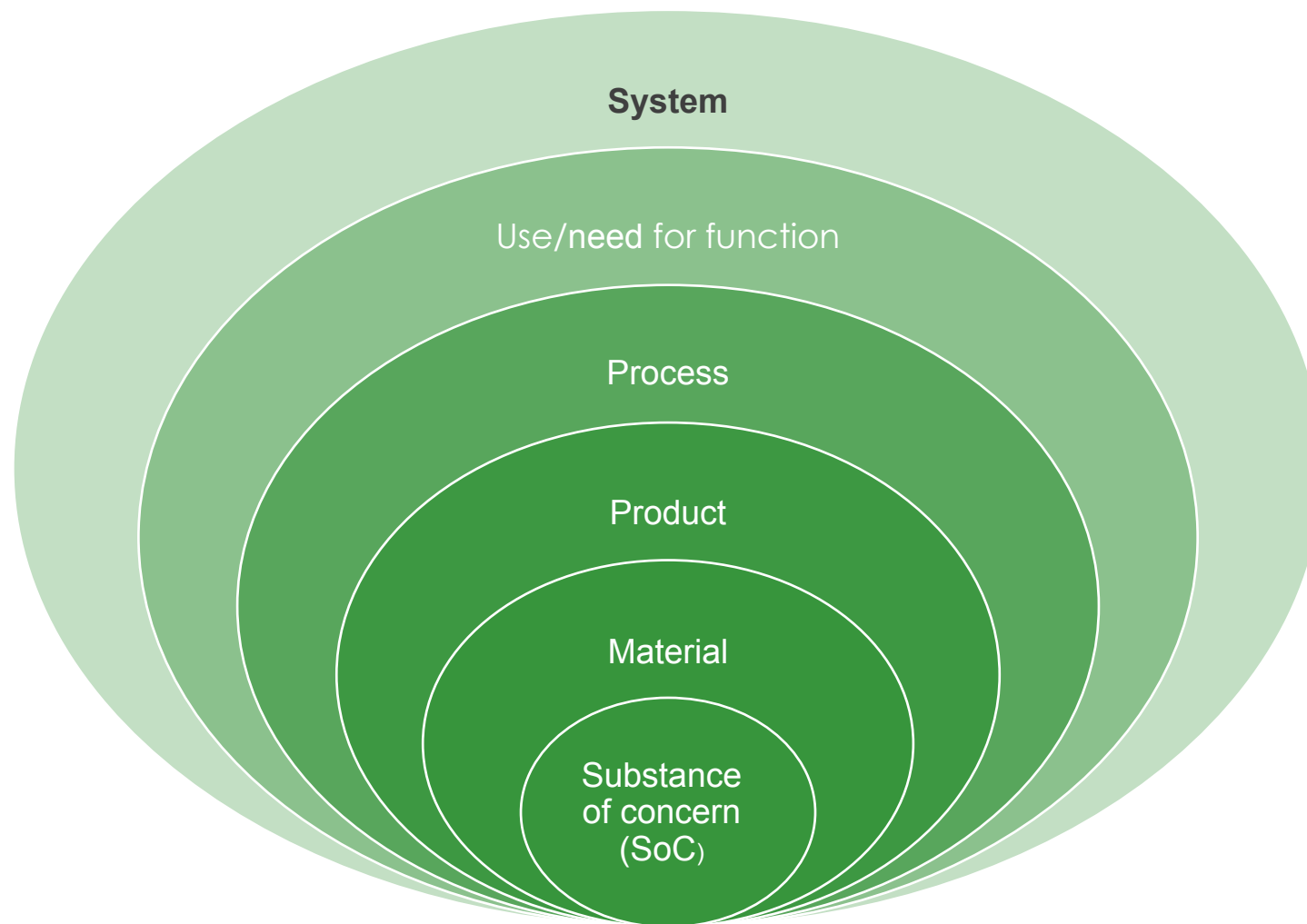
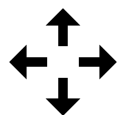
Molecular (re)design	Process (re)design	Product (re)design
<p>Is there any existing chemical/material that can be used as a reference to compare the results of the SSbD study?</p> <p>If no reference chemical/material has been selected, the reference might be chosen with one of the following aspects:</p> <ul style="list-style-type: none"> • Chemical/material with similar structure • Chemical/material fulfilling the same function • Representative Chemical/material as for the definition of Representative Product in the PEF method • Other criteria to define the benchmark <p>At which Technology Readiness Level (TRL) is chemical/material under development?</p>	<p>Does the improvement of the process require a new technology?</p> <p>If yes, at which Technology Readiness Level (TRL) is the new technology(ies) for the process improvement?</p> <p>Provide information about the new technology needed for the improvement of the process, for instance the characteristics, the energy and auxiliaries consumed, its emissions and waste generated...</p>	<p>Does the (re)design of the product/application involve a new application?</p> <p>If yes, at which Technology Readiness Level (TRL) is the new technology(ies) for the process improvement?</p> <p>Provide information about the new technology needed for the improvement of the product/application</p>

Link to material: https://drive.google.com/drive/folders/1wrwO95Z-BVj6BReEBRhJmziWu8XVn_GK

SSbD assessment system



Change

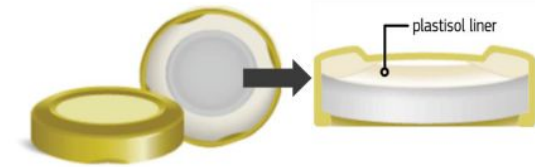


Eliminate /
Substitute

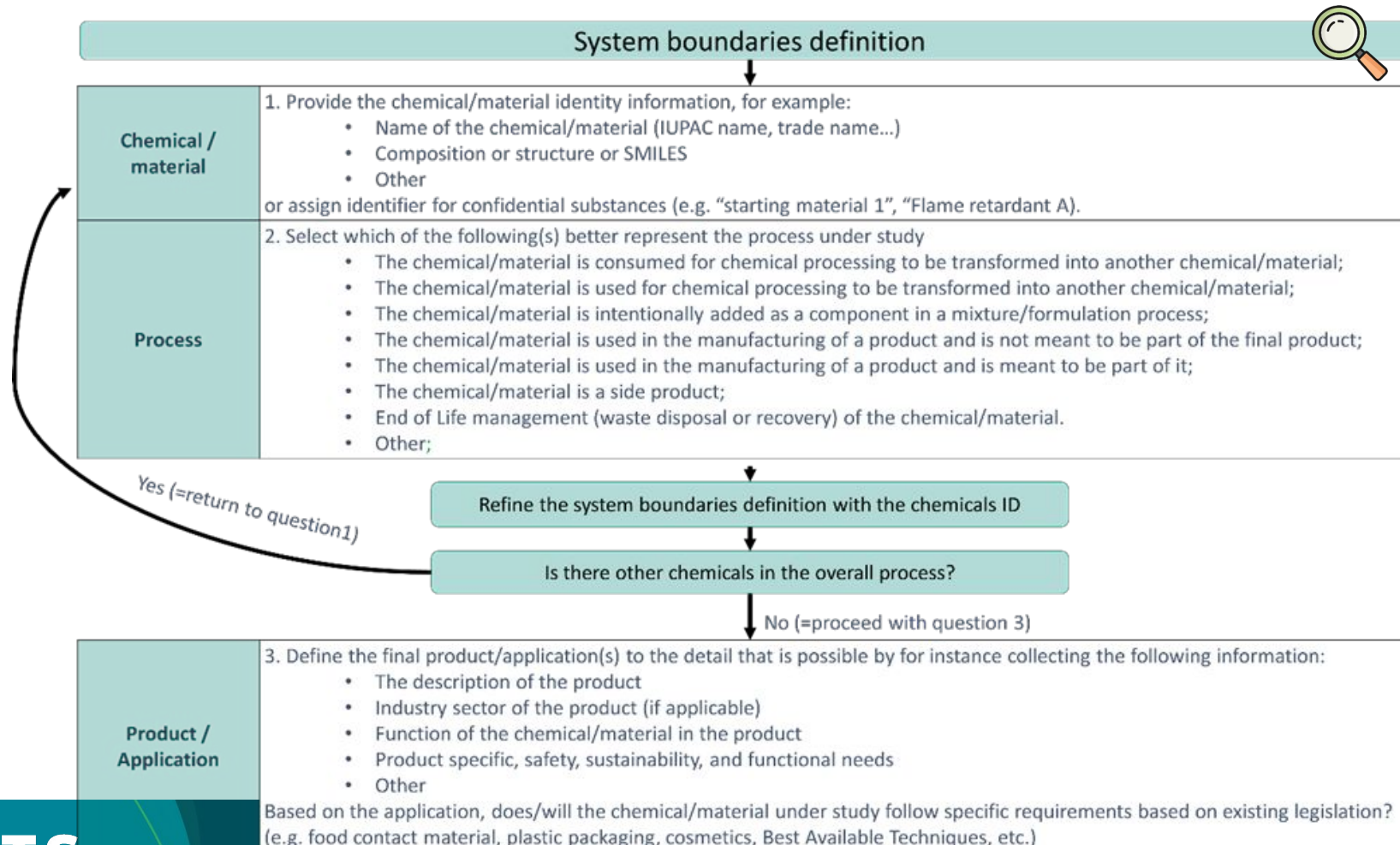


Re-Design





Objective 3: (Re)Design and system boundaries definition



Hands-on Tue afternoon

Objective 3: (Re)Design and system boundaries definition

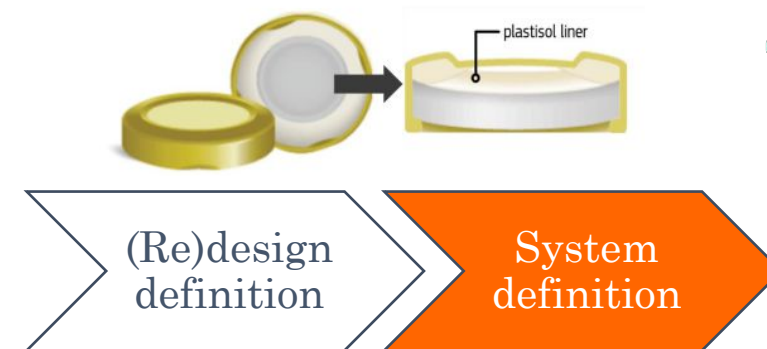
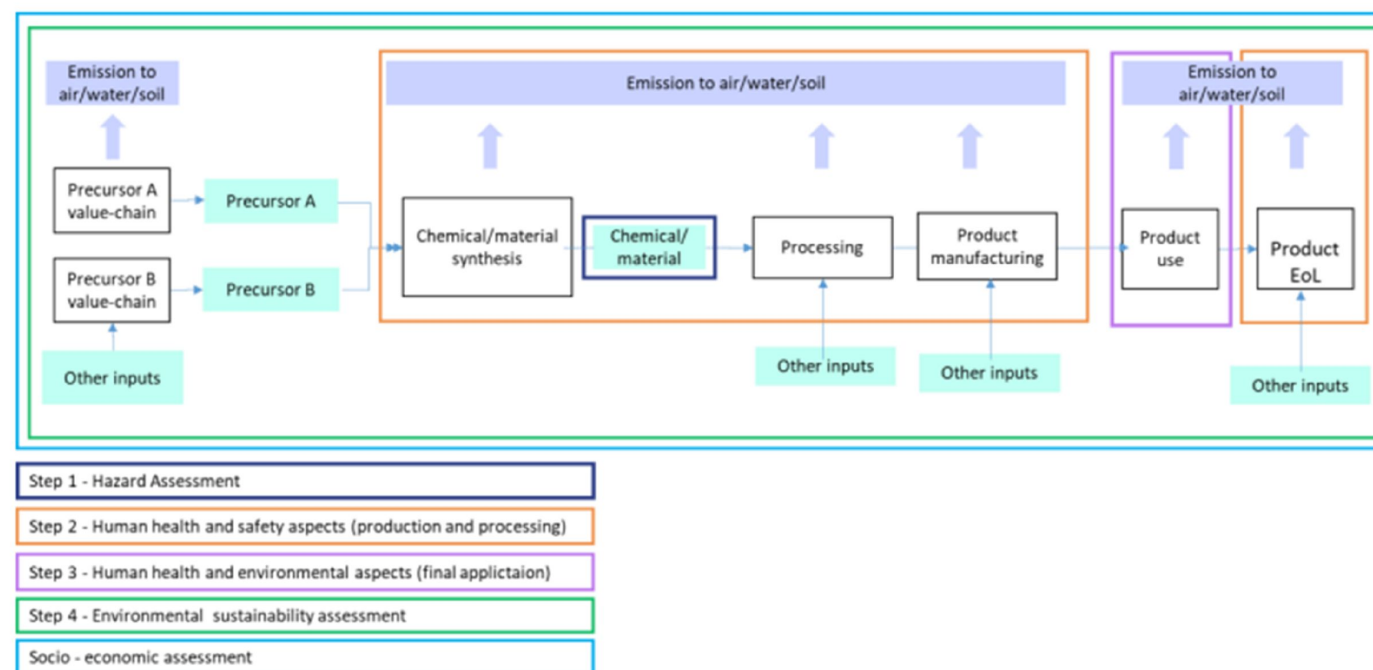


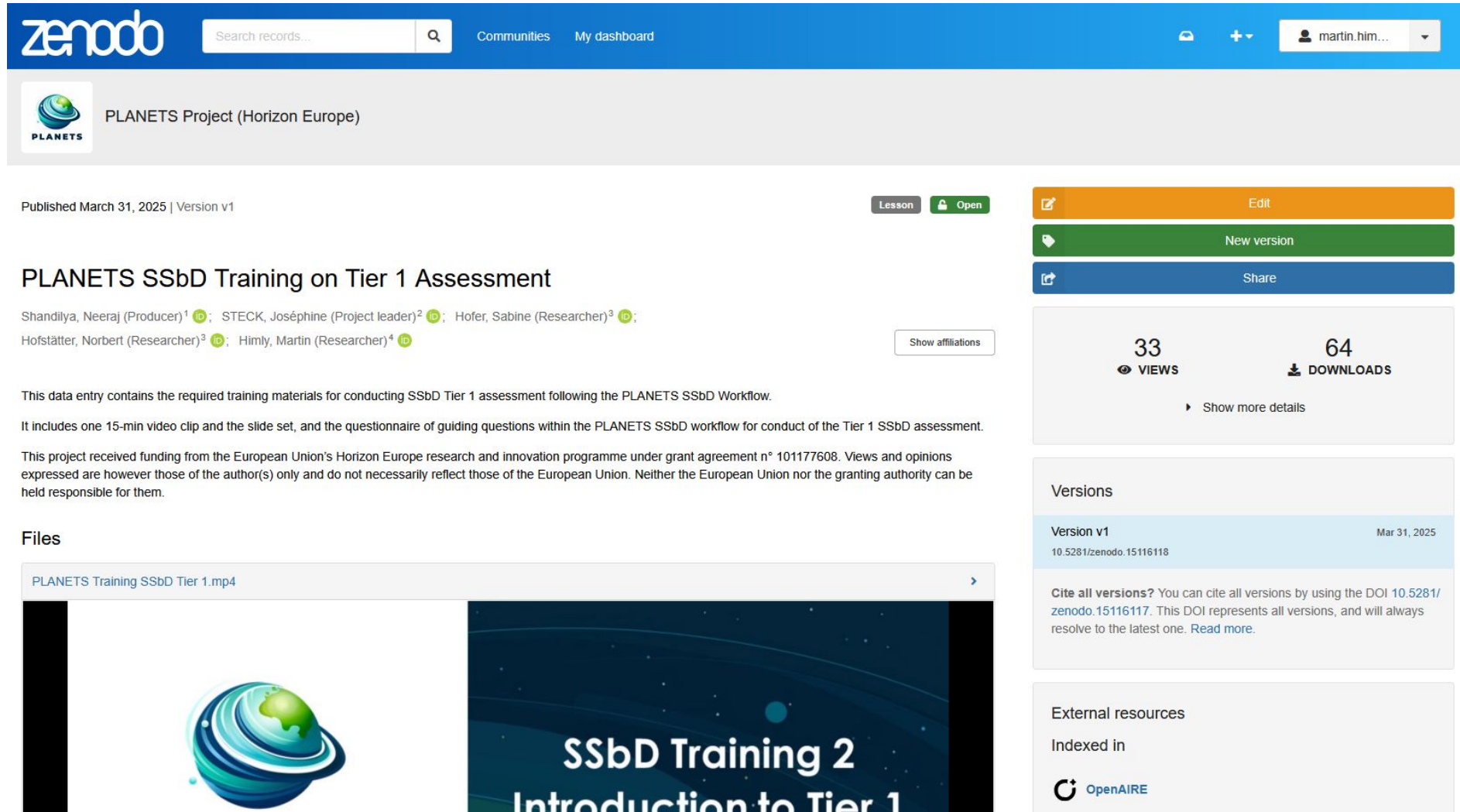
Figure 10. Representation of the alignment between the chemical/material life cycle and the progressive required broadening of the SSbD assessment steps and boundaries (boxes in white are processes stages, coloured boxes are inputs and outputs of the processes). [EoL: end of life]



System boundaries definition

from European Commission, Joint Research Centre, Abbate, E., Garmendia Aguirre, I., Bracalente, G., Mancini, L., Tosches, D., Rasmussen, K., Bennett, M.J., Rauscher, H. and Sala, S., Safe and Sustainable by Design chemicals and materials - Methodological Guidance, Publications Office of the European Union, Luxembourg, 2024, <https://data.europa.eu/doi/10.2760/28450>, JRC138035.

PLANETS' Tier 1 at Zenodo








The screenshot shows the Zenodo record page for the PLANETS SSbD Training on Tier 1 Assessment. The header includes the Zenodo logo, a search bar, and navigation links for Communities and My dashboard. The user profile is martin.him... The record is titled "PLANETS SSbD Training on Tier 1 Assessment" and was published on March 31, 2025, as version v1. The authors listed are Shandilya, Neeraj (Producer), STECK, Joséphine (Project leader), Hofer, Sabine (Researcher), Hofstätter, Norbert (Researcher), and Himly, Martin (Researcher). The record includes a video clip and a slide set, and the questionnaire of guiding questions within the PLANETS SSbD workflow for conduct of the Tier 1 SSbD assessment. The record has 33 views and 64 downloads. The file "PLANETS Training SSbD Tier 1.mp4" is listed. The video player shows the PLANETS logo and the text "SSbD Training 2 Introduction to Tier 1". The right sidebar contains buttons for Edit, New version, and Share, as well as a section for Versions (Version v1, Mar 31, 2025) and External resources (Indexed in OpenAIRE).

zenodo Search records... Communities My dashboard martin.him...

PLANETS Project (Horizon Europe)

Published March 31, 2025 | Version v1 Lesson Open

PLANETS SSbD Training on Tier 1 Assessment

Shandilya, Neeraj (Producer)¹ ; STECK, Joséphine (Project leader)² ; Hofer, Sabine (Researcher)³ ; Hofstätter, Norbert (Researcher)³ ; Himly, Martin (Researcher)⁴  Show affiliations

This data entry contains the required training materials for conducting SSbD Tier 1 assessment following the PLANETS SSbD Workflow.

It includes one 15-min video clip and the slide set, and the questionnaire of guiding questions within the PLANETS SSbD workflow for conduct of the Tier 1 SSbD assessment.

This project received funding from the European Union's Horizon Europe research and innovation programme under grant agreement n° 101177608. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Files

PLANETS Training SSbD Tier 1.mp4

SSbD Training 2
Introduction to Tier 1


33 VIEWS 64 DOWNLOADS Show more details

Versions

Version v1	Mar 31, 2025
10.5281/zenodo.15116118	

Cite all versions? You can cite all versions by using the DOI [10.5281/zenodo.15116117](https://doi.org/10.5281/zenodo.15116117). This DOI represents all versions, and will always resolve to the latest one. [Read more](#).

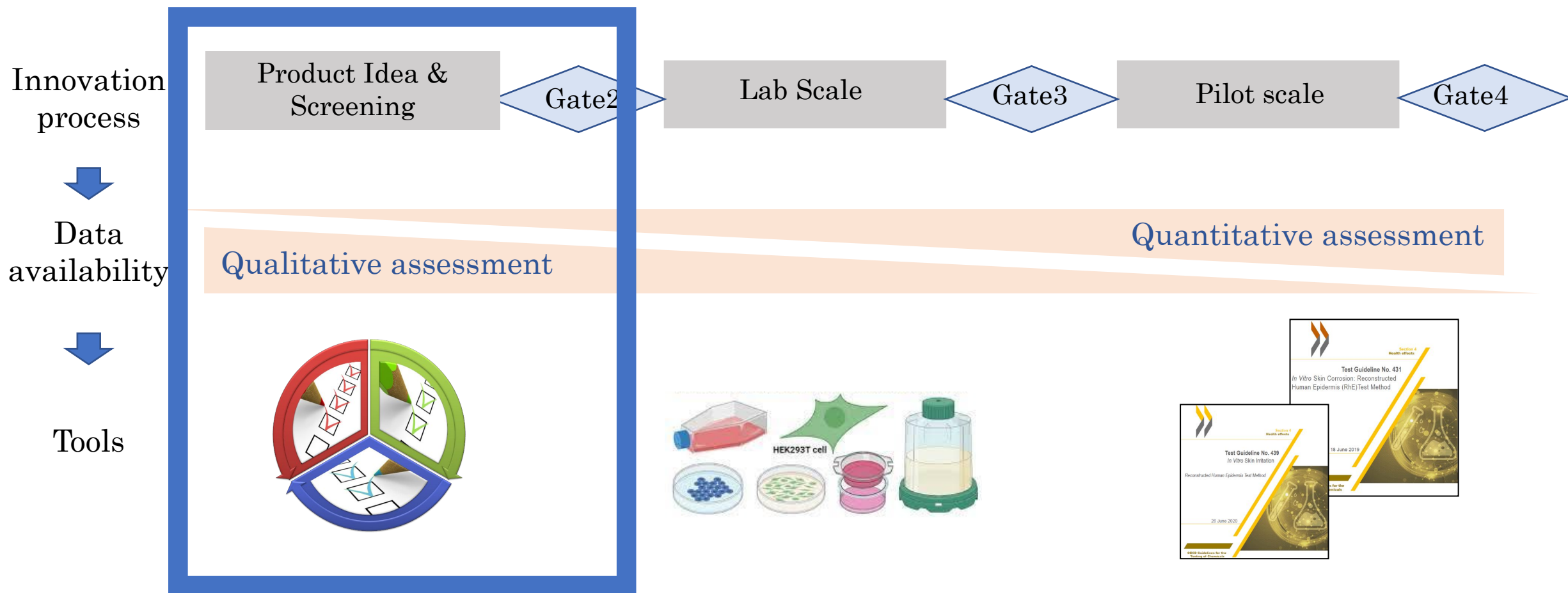
External resources

Indexed in  OpenAIRE

Shandilya, N., Steck, J., Hofer, S., Hofstätter, N., & Himly, M.
PLANETS SSbD Training on Tier 1 Assessment. <https://doi.org/10.5281/zenodo.15116118>

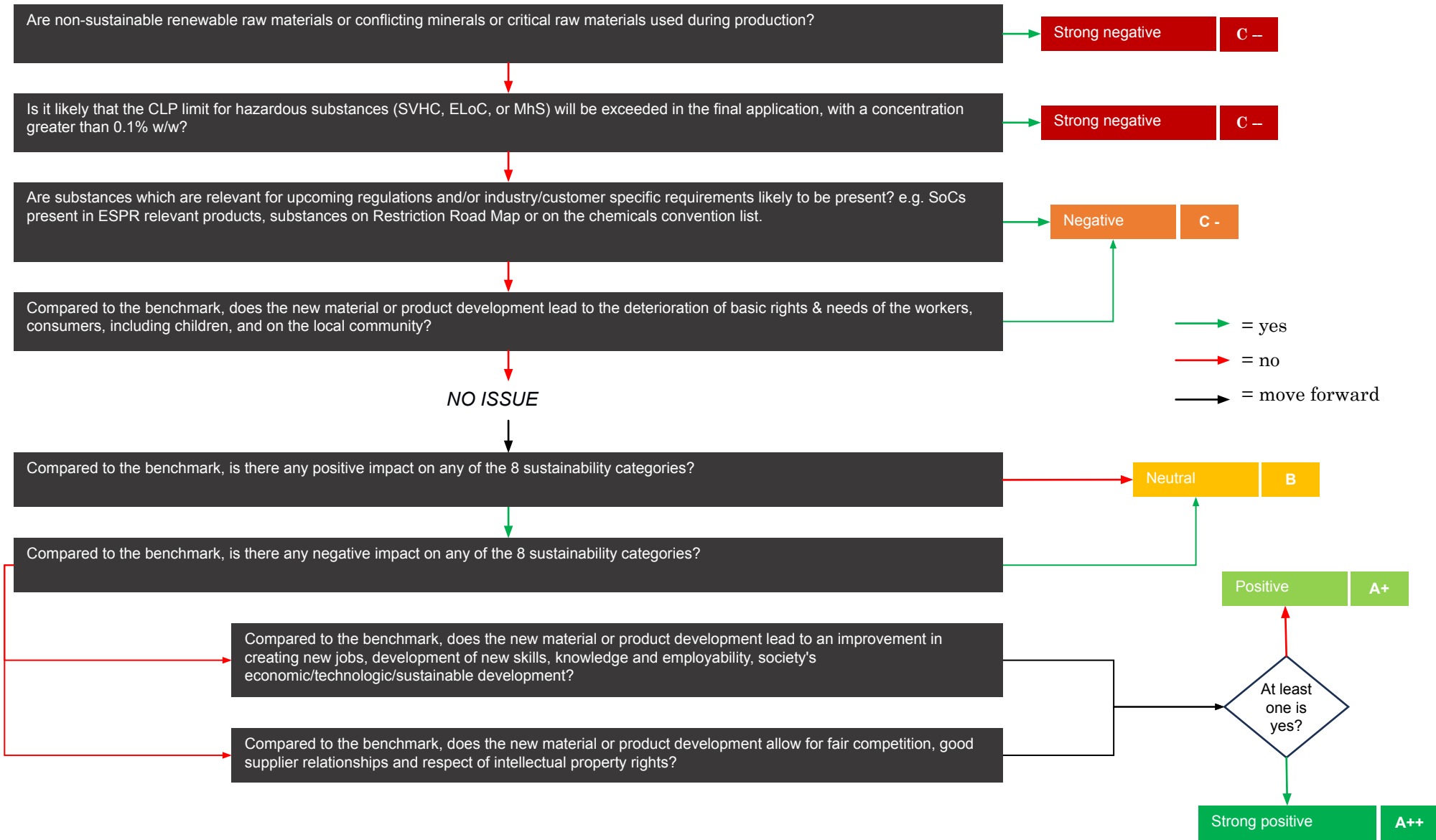


Tier 1 assessment





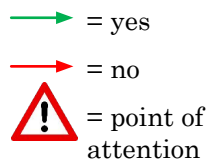
Tier 1 assessment decision scheme





Points of attention

- No “show-stoppers”
- Make innovators aware of the potential SSbD issues
- Each PoA triggers a higher tier assessment



Are human and/or environmentally hazardous substances (SVHC ELoC, MhS, SoC or hazard band C, D or E) used at any life cycle stage of the product?

Is human exposure or environmental release of these hazardous substances likely?

Potential human and/or environmental exposure to hazardous substances used or released throughout the products life cycle



At any life cycle stage, is your material or product in powder form and/or is it possible that dust or aerosols are released ?

Does your material contain rigid, persistent fibers (length > 5 µm and diameter < 3 µm)?

Material may be hazardous to humans



Human exposure via inhalation and environmental release likely



At any life cycle stage, is your material or product in a liquid/vapour (with vapour pressure > 1 Pa) and/or is it possible that vapours are released ?

Is your material or product multi-component?

Potential exposure to released forms and components of the material, which may cause synergistic or additive hazardous effects



Is there a possibility of substantial material breakdown during production, use and/or end of life?

Human and environmental exposure to transformed and/or released forms likely



Is there a possibility of (in)direct contact with worker and/or consumer skin?

Dermal occupational and/or consumer exposure likely

Is there a possibility of oral consumer exposure?

Oral consumer exposure likely



Are there any exposure prevention measure(s) applied at the workplace?

Worker exposure likely



Is the marketability of the new material or product better or equal to the benchmark due to, for instance, improved or new functionality or a clear image advantage?

Is the (expected) purchase price per unit of the new material or product lower or equal to the benchmark?

Economic performance might suffer or limited economic opportunities



Are the capital expenditures and operational costs (e.g. maintenance, energy use) during the production and/or use phase of the new product or application lower or equal to the benchmark?

Is the Probability of Success (technical and commercial) of the new product >10%?

Is the foreseen market potential of the new material or product ≥ 1M€ in Europe?

Is the foreseen production tonnage of the new material or product ≥ 1 tonne per year? Calendar year is from 1 Jan to 31 Dec.

If applicable to the product category, REACH Regulation (EC 1907/2006) compliance mandatory



Ensure in which tonnage band does the produced material or product falls and fulfil REACH tiered requirements accordingly





Tier 1 assessment tool

Dimension		Reference	Alternative 1	Alternative 2	Alternative 3
1: Hazard					
1.1	Is the human and/or environmental release of hazardous substances (Substances of very high concern, Equivalent level of concern, Substances of concern, or hazard band C, D, or E) likely at any stage of the product's life cycle?	Yes	Unknown	No	No
1.2	Is it likely that the CLP limit for hazardous substances will be exceeded in the final application, with a concentration greater than 0.1% w/w?	Unknown	No	No	No
1.3	Are substances which are relevant for upcoming regulations and/or industry/customer specific requirements likely to be present? e.g. SVHCs present in ESPR relevant products, substances on Restriction Road Map (https://ec.europa.eu/docsroom/documents/49734) or on the chemicals convention list.	No	Yes	No	Unknown
2: Release and exposure					
2.1	Do you identify the potential use/applicability of the final material/product?	No	Yes	Yes	Unknown
2.2	At any life cycle stage, is your material or product in powder form and/or is it possible that dust or aerosols are released?	No	No	Yes	No
2.2a	If yes, does your material contain rigid, persistent fibres (length > 5 µm and diameter < 3 µm)?	Unknown	Unknown	Unknown	No
2.3	Is your material, product, multi-component?	Yes	Unknown	No	Yes
2.4	At any life cycle stage, is your material or product in a liquid/vapour (with vapour pressure > 1 Pa) and/or is it possible that vapours are released?	No	Yes	No	Yes
2.5	Is there a possibility of substantial material breakdown during production, use and/or end of life?	No	Yes	No	Yes
2.6	Is there a possibility of (in)direct contact with worker and/or consumers/kin?	No	No	Yes	Yes
2.7	Are there any exposure prevention measure(s) applied at the workplace?	No	Yes	Yes	Unknown
2.8	Is there a possibility of oral consumer exposure?	Unknown	Unknown	Unknown	Unknown
3: Environmental impact					
3.1	Are non-sustainable/renewable raw materials or conflicting minerals or critical raw materials used during production?	Equal	No	Yes	No
3.2	What is the impact of the new material or product compared to the conventional material or product on the following sustainable development category: Climate change mitigation & energy conservation? (Click on this cell for more information)		Equal	Equal	Positive
3.3	What is the impact of the new material or product compared to the conventional material or product on the following sustainable development category: Circular economy? (Click on this cell for more information)		Negative	Unknown	Unknown
3.4	What is the impact of the new material or product compared to the conventional material or product on the following sustainable development category: Resource efficiency? (Click on this cell for more information)	Unknown	Unknown	Unknown	Unknown
3.5	What is the impact of the new material or product compared to the conventional material or product on the following sustainable development category: Pollution reduction? (Click on this cell for more information)	Equal	Equal	Equal	Negative
3.6	What is the impact of the new material or product compared to the conventional material or product on the following sustainable development category: Water protection? (Click on this cell for more information)	Negative	Equal	Equal	Positive
3.7	What is the impact of the new material or product compared to the conventional material or product on the following sustainable development category: Biodiversity protection? (Click on this cell for more information)	Equal	Equal	Equal	Equal
3.8	What is the impact of the new material or product compared to the conventional material or product on the following sustainable development category: Health safety? (Click on this cell for more information)	Equal	Equal	Unknown	Unknown
4: Economic performance					
4.1	Is the marketability of the new material or product better or equal to the benchmark due to, for instance, improved or new functionality or a clear image advantage? (Click on this cell for more information)	Unknown	Yes	No	No
4.2	Is the foreseen production tonnage of the new material or product ≥ 1 tonne per year? Calendar year is from 1 Jan to 31 Dec		No	Yes	No
4.3	Is the foreseen market potential of the new material or product ≥ 1M€ in Europe?		Unknown	Unknown	Yes
4.4	Is the (expected) purchase price per unit of the new material or product lower or equal to the benchmark?	No	No	No	Yes
4.5	Are the capital expenditures and operational costs (e.g. maintenance, energy use) during the production and/or use phase of the new product or application lower or equal to the benchmark?	No	No	Yes	No
4.6	What is the aggregated probability of success to manufacture of the new product on a commercial scale?	>50%	10% to 50%	10% to 50%	<10%
5: Social					
5.1	Compared to the benchmark, does the new material or product development lead to the deterioration of basic rights & needs of the workers, consumers, including children, and on the local community? (Click on this cell for more information)	Yes	No	No	No
5.2	Compared to the benchmark, does the new material or product development lead to an improvement in creating new jobs, development of new skills, knowledge and employability, society's economic/technological/sustainable development?		Yes	No	Unknown
5.3	Compared to the benchmark, does the new material or product development allow for fair competition, good supplier relationships and respect of intellectual property rights?		No	Yes	Yes
5.4	What is the impact on the following sustainable development category: zero hunger? (Click on this cell for more information)	Unknown	Unknown	Equal	Positive

Topic	Alternative 1	Alternative 2	Alternative 3
Release of hazardous substances			
CLP limit exceeded			
Upcoming regulation relevant substances			
HAZARD			
Applicability			
Dust or aerosol generation			
Persistent fibres			
Multi-component			
Vapour release			
Substantial material breakdown			
Skin (in)direct contact			
Workplace exposure measures			
Oral consumer exposure			
EXPOSURE and RELEASE			
Non-sustainable/renewable or critical raw materials or conflicting minerals			
Climate change & energy			
Circular economy			
Resource efficiency			
Pollution reduction			
Water protection			
Biodiversity			
Health safety			
ENVIRONMENT			
Marketability			
Production tonnage			
Financial market potential			
Expected purchase price			
Capital expenditures and operational costs			
Probability of success			
ECONOMY			
Human basic rights and needs			
New jobs, knowledge and skills			
Fair competition and IP rights			
Zero hunger			
SOCIAL			

Corresponding questions	SCORE	Alternative 1	Alternative 2	Alternative 3
3.1 and 3.2	C-		Strong negative	
3.3 and 3.4	C-	Negative		Maybe Negative
3.2 to 3.8 and 5.4	B			
5.2 and 5.3	A+			
5.2 and 5.3	A++			Maybe strong positive
Conclusion to be written by the SSBD expert in charge of the assessment				
Points of attention!!				
Human and/or environmental exposure to hazardous substances used or released is Unknown				
Uncertain potential exposure to released forms and components of the material, while human exposure via inhalation and environmental release likely				
Human and environmental exposure to transformed and/or released forms likely				
Dermal occupational and/or consumer exposure is uncertain				
Potential economic performance or economic opportunities are uncertain due to uncertainty				
Economic performance might suffer or limited economic opportunities due to high price				
Economic performance might suffer or limited economic opportunities due to high price				

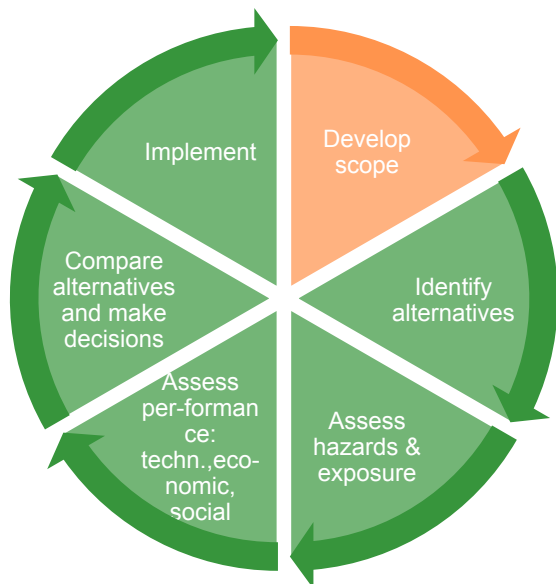
SSbD Hands -on



	Monday, 9 th June	Tuesday, 10 th June CA22143 EuMiNE Training Day 1	Wednesday, 11 th June CA22143 EuMiNE Training Day 2	Thursday, 12 th June	Friday, 13 th June
Location	Auditorium Santa Margherita of Università Ca' Foscari Venezia				
Time					
08:30-09:00		Arrival, Check-in, Registration			
09:00-10:30		Welcome to the School Setting the scene: Latest advancements in SSbD Intrinsic hazard properties characterization	Environmental life cycle assessment	Integrating functionality into SSbD workflows Multidimensional analysis and decision-making tools	Philosophical reflections on SSbD Award giving for pitch talks Presentations & discussions of results of Case Study 1 & 2
10:30-11:00		Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:00-12:30		New Approach Methodologies for risk assessment In silico modeling approaches	Group work: Focus groups on SSbD in Intermediate/Late Innovation Stages <ul style="list-style-type: none"> Focus 1: Safety Focus 2: Sustainability 	Group work: Focus groups on MCDA for Case Study 1 & 2 – linking safety and sustainability with functionality	Continuation of Case Study 1 & 2 results discussion DPP Spotlight Presentation & Plenum Discussion
12:30-14:00		Lunch	Lunch	Lunch	Feedback - Closing Remarks
14:00-15:30		Group work: Focus groups on SSbD in Early Innovation Stages <ul style="list-style-type: none"> Focus 1: Safety Focus 2: Sustainability 	Continuation group work	Continuation group work	
15:30-16:00		Coffee Break	Coffee Break	Coffee Break	
16:00-18:00		In vitro vs. in vivo studies Risk assessment Pitch presentations – Slot 1 by Training School participants	Socio-economic life cycle assessment FAIR data Pitch presentations - Slot 2 by Training School participants	Co-creation workshop: Science2Policy, Science2Industry, Science2Citizens Publishing ethics Pitch presentations - Slot 3 by Training School participants	
	Welcome Reception & Networking starting at 17:30	Social Program: Guided Walking Tour of Venice		Social Dinner & Networking starting at 19:30	

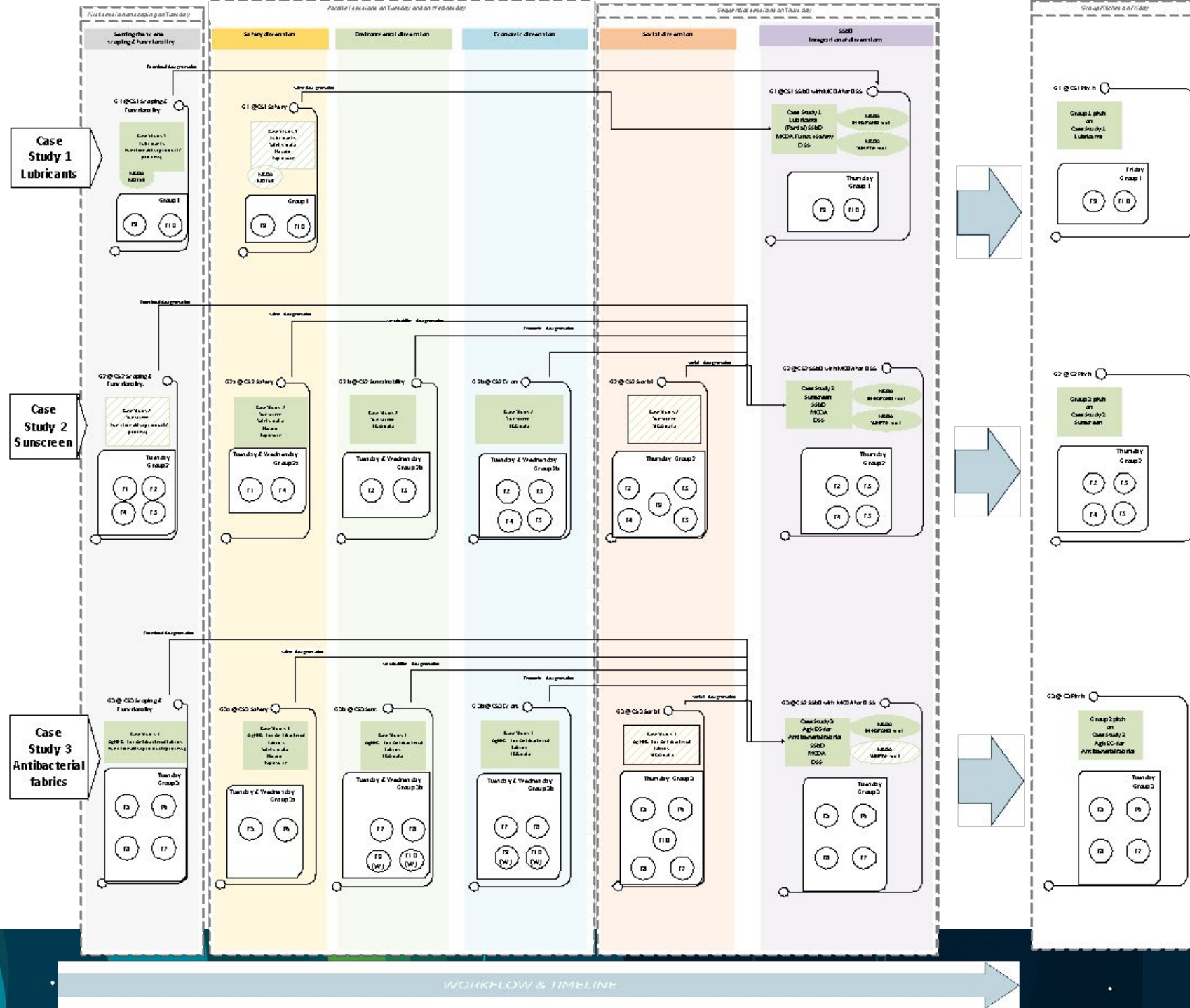


SSbD Hands-on



https://drive.google.com/drive/folders/17eIfy6OB5WCB1ldo_O0SCEPSRHWxQHKQ

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Funded by
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This project received funding from the European Union's Horizon Europe research and innovation programme under grant agreement n° 101177608. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Technical value chain incl. potential stakeholders

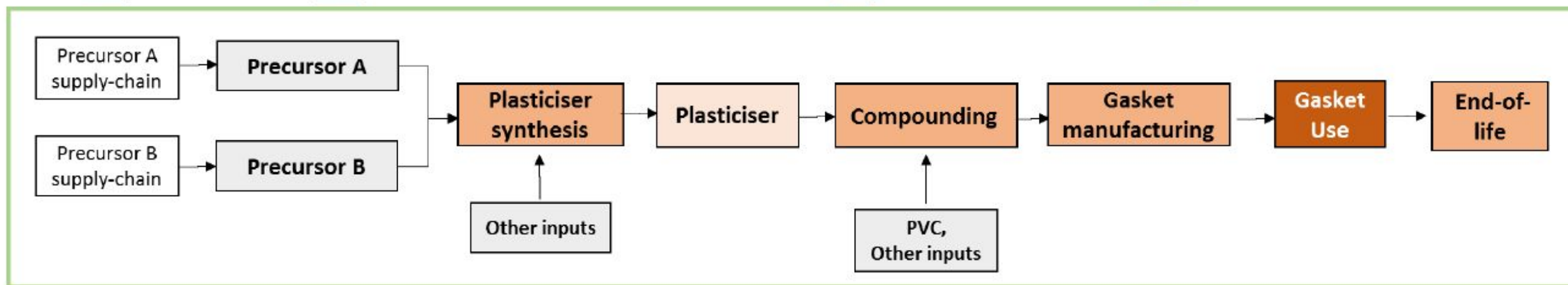


- Plasticizer in food contact material

Figure 2. Description of the case study system and sources of information for each step

System under assessment and coverage of the framework steps

Step 1: Plasticiser Step 2: Processing steps where the plasticiser is present Step 3: Final application phase Steps 4: Entire life cycle



Organizations contacted:

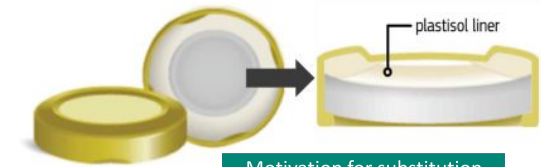
CEFIC/ European Plasticisers
PlasticsEurope/ECVM

European Council of the
Paint, Printing Ink and
Artists' Colors Industry

European Plastic
Converters

Metal Packaging
Europe

FoodDrinkEurope



Objective 2: Motivation for re-design

Motivation for substitution					
Reference	Life cycle stage				Priority +++ (critical) ++ (important) + (optional)
	Raw material and resources	Processing and manufacturing	Use	End-of-life	
Hazard					
Exposure and release					
Environmental impact					
Economic impact					
Social impact					

Reference	Life cycle stage				Priority +++ (critical) ++ (important) + (optional)
	Raw material and resources	Processing and manufacturing	Use	End-of-life	
Hazard		Repro tox + endocrine disrupt.	Repro tox + endocrine disrupt.	Material burnt	+++
Exposure and release			May be released into food by time		+++
Environmental impact					
Economic impact					
Social impact					