



Safe and Sustainable-by-Design: Quo Vadis?

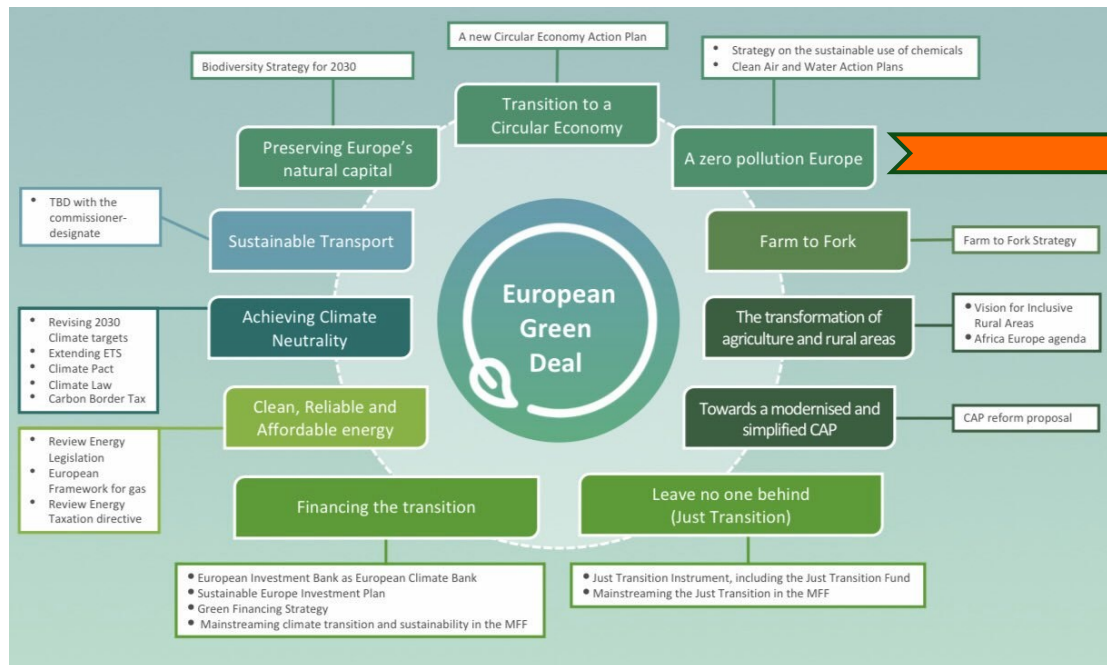
Trilaterale Chemiestrategy – Innovation Summit -
29 September 2025 - Genk

Ann Dierckx
Director Innovation & Circular Economy



What it is & how is it being used?

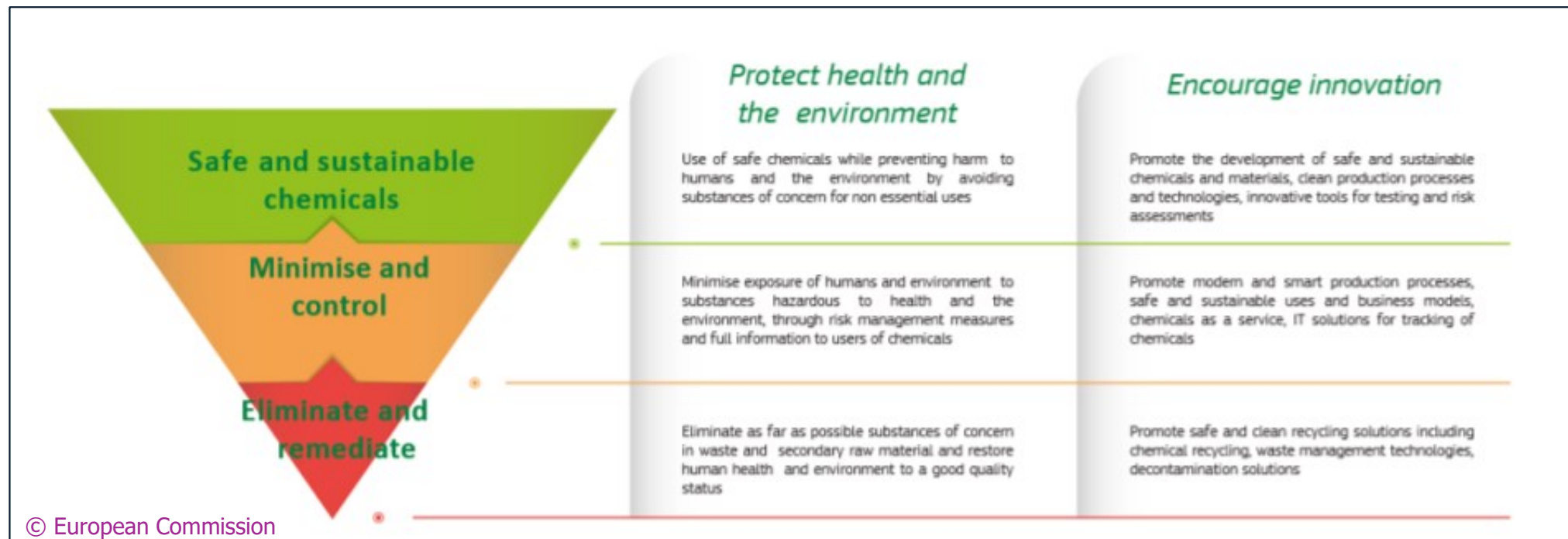
The Chemicals Strategy for Sustainability delivering on the Green Deal goals



The CSS Vision – Towards a toxic-free environment



INTERPLAY OF REGULATORY MEASURES AND INNOVATION SUPPORT



REACH review, ESPR, ...

Safe and Sustainable-by-Design

Initial SSbD definition



At this stage, **safe and sustainable by design can be defined** as a pre-market approach to chemicals and materials design that focuses on providing a function (or service), while **avoiding volumes and chemical and material properties that may be harmful to human health or the environment, in particular groups of chemicals likely to be (eco)toxic, persistent, bio-accumulative or mobile.** Overall sustainability should be ensured by minimising the environmental footprint of chemicals and materials in particular in relation to **climate change, resource use, and protecting ecosystems and biodiversity, adopting a lifecycle perspective** (adapted from EC (2020a)).



The CSS Vision – Towards a toxic-free environment



SAFE AND SUSTAINABLE-BY-DESIGN

The Commission will:

- develop **EU safe and sustainable-by-design criteria for chemicals**;
- establish an **EU-wide safe and sustainable-by-design support network** to promote cooperation and sharing of information across sectors and the value chain and provide technical expertise on alternatives;
- ensure the **development, commercialisation, deployment and uptake of safe and sustainable-by-design** substances, materials and products through financial support²⁵ – in particular to SMEs – under Horizon Europe, cohesion policy, the LIFE programme, other relevant EU funding and investment instruments and public-private partnerships;
- map and address **safe and sustainable-by-design skills** mismatches and competence gaps, and ensure adequate skills at all levels - including in vocational and tertiary education, research, industry and among regulators;
- establish, in close cooperation with stakeholders, **Key Performance Indicators** to measure the industrial transition towards the production of safe and sustainable chemicals;
- ensure that the **legislation on industrial emissions** promotes the use of safer chemicals by industry in the EU by requiring on-site risk assessments and by restricting the use of substances of very high concern.

Cefic developed its own view and concept as input to the Commission's work



SAFE AND SUSTAINABLE- BY-DESIGN: A GUIDANCE TO UNLEASH THE TRANSFORMATIVE POWER OF INNOVATION

MARCH 2024



SAFE AND SUSTAINABLE-
BY-DESIGN:
BOOSTING INNOVATION
AND GROWTH WITHIN
THE EUROPEAN CHEMICAL
INDUSTRY

OCTOBER 2021



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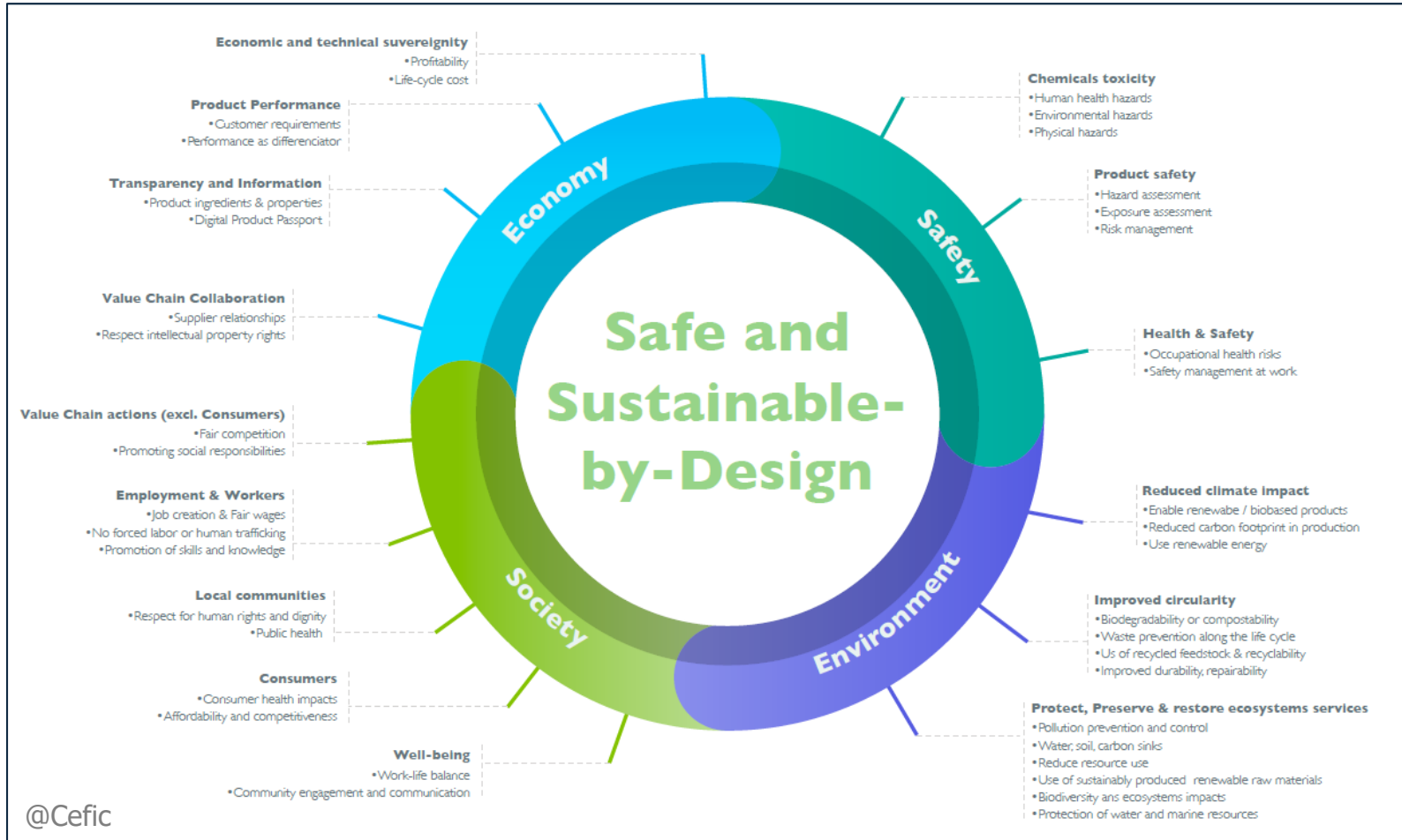
SAFE AND SUSTAINABLE-
BY-DESIGN:
A TRANSFORMATIVE
POWER

APRIL 2022



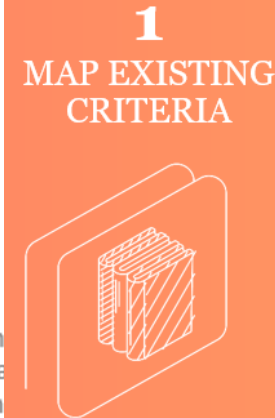
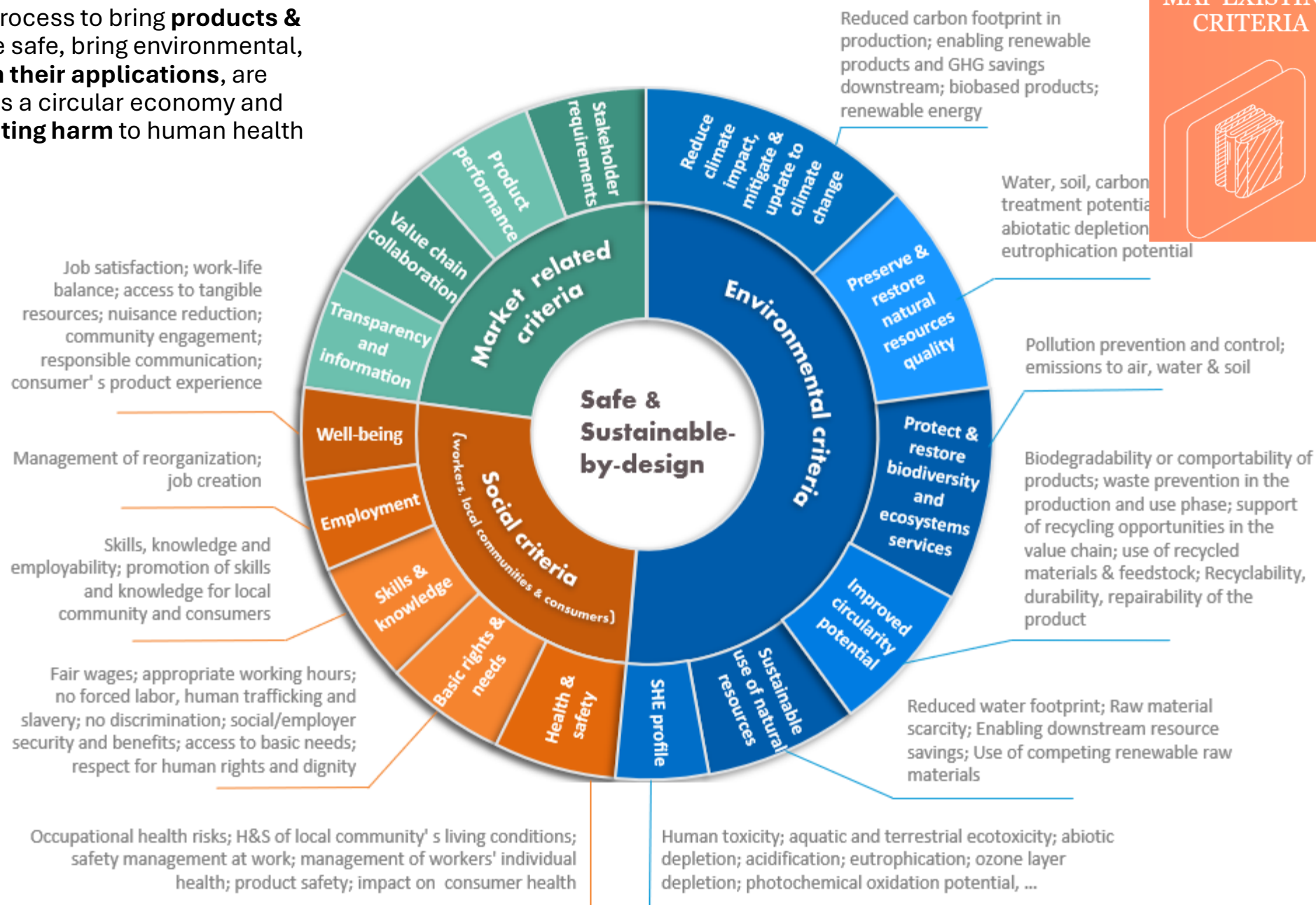
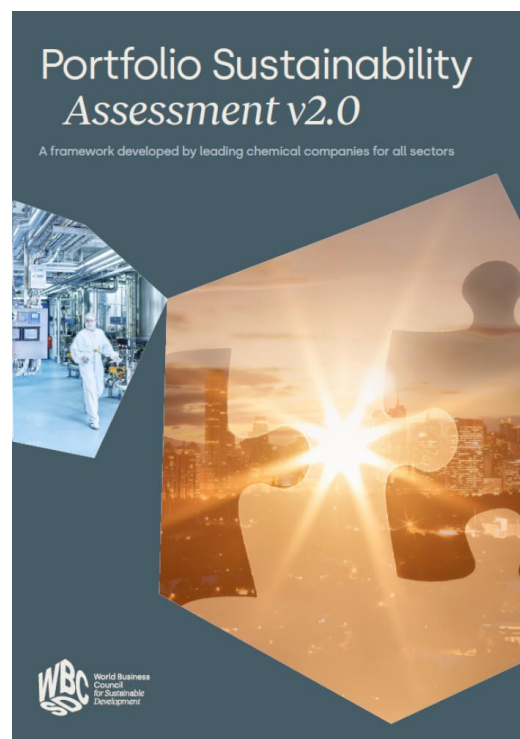
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Safety and sustainability dimensions

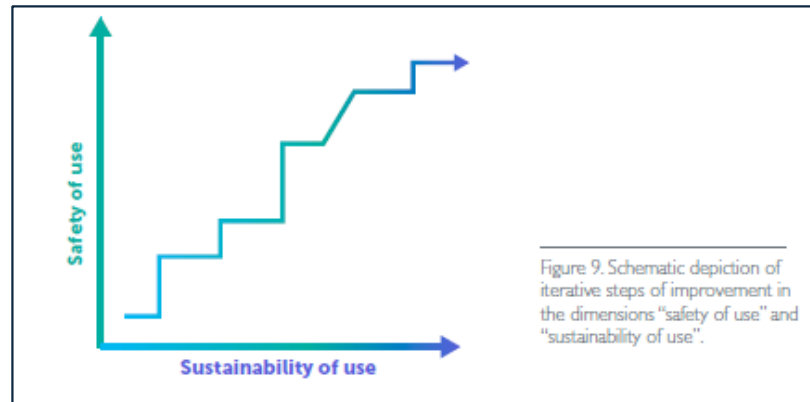
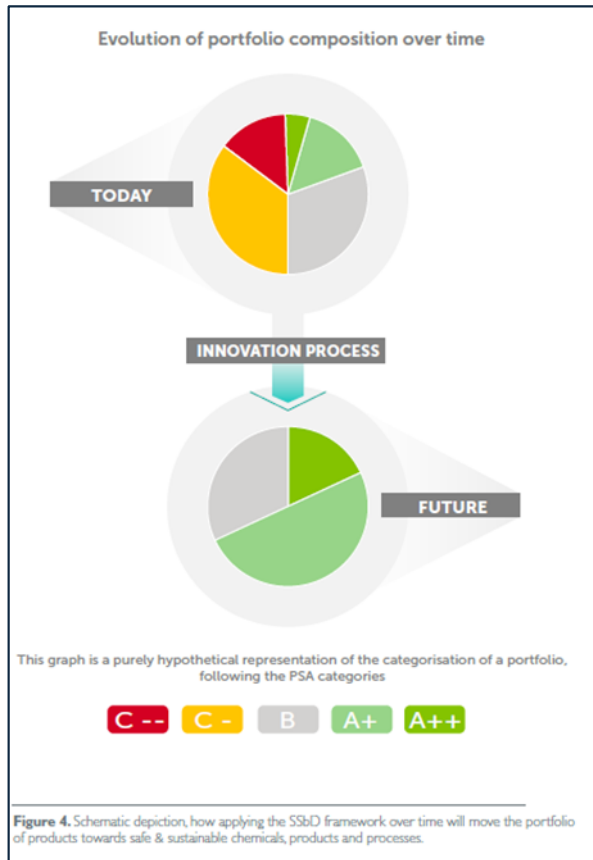


OVERVIEW OF FOCUS DIMENSIONS	
I	Human health hazard
II	Environmental hazard and fate
III	Issues arising from recycling conditions based on specific substances
IV	Climate change
V	Resources and waste
VI	Biodiversity and ecosystems impacts
VII	Emissions into air, water, soil
VIII	Life cycle cost

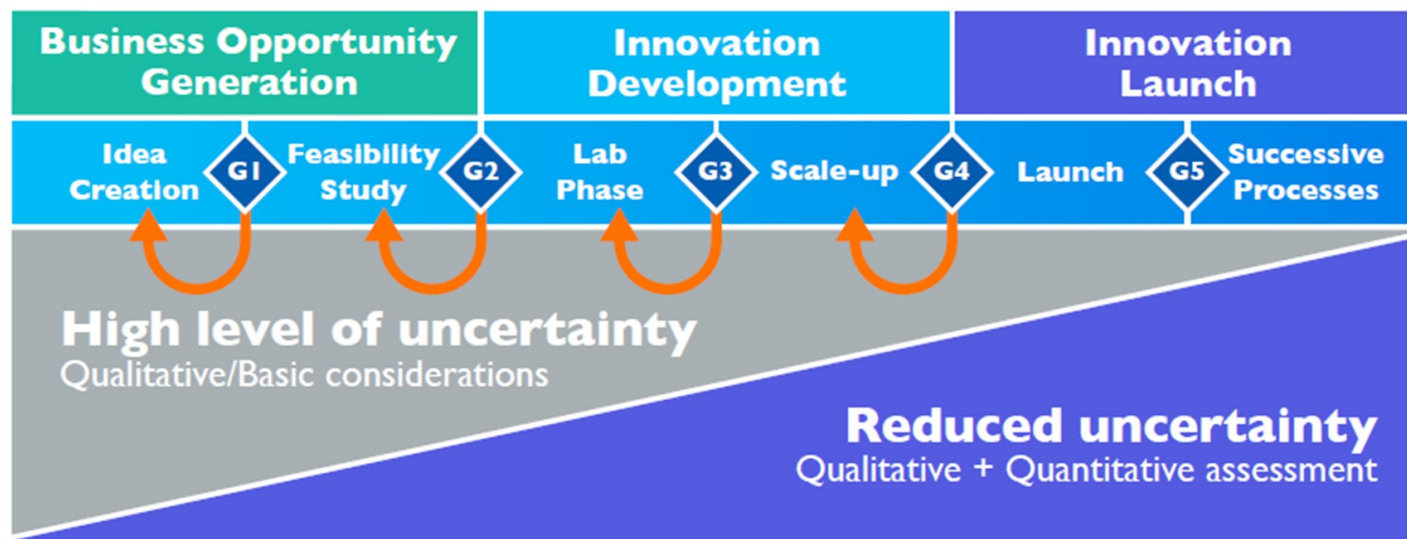
Safe and sustainable by design: process to bring **products & technologies** to the market that are safe, bring environmental, economic and social value **through their applications**, are **accelerating the transition** towards a circular economy and climate-neutral society and **preventing harm** to human health and the environment.



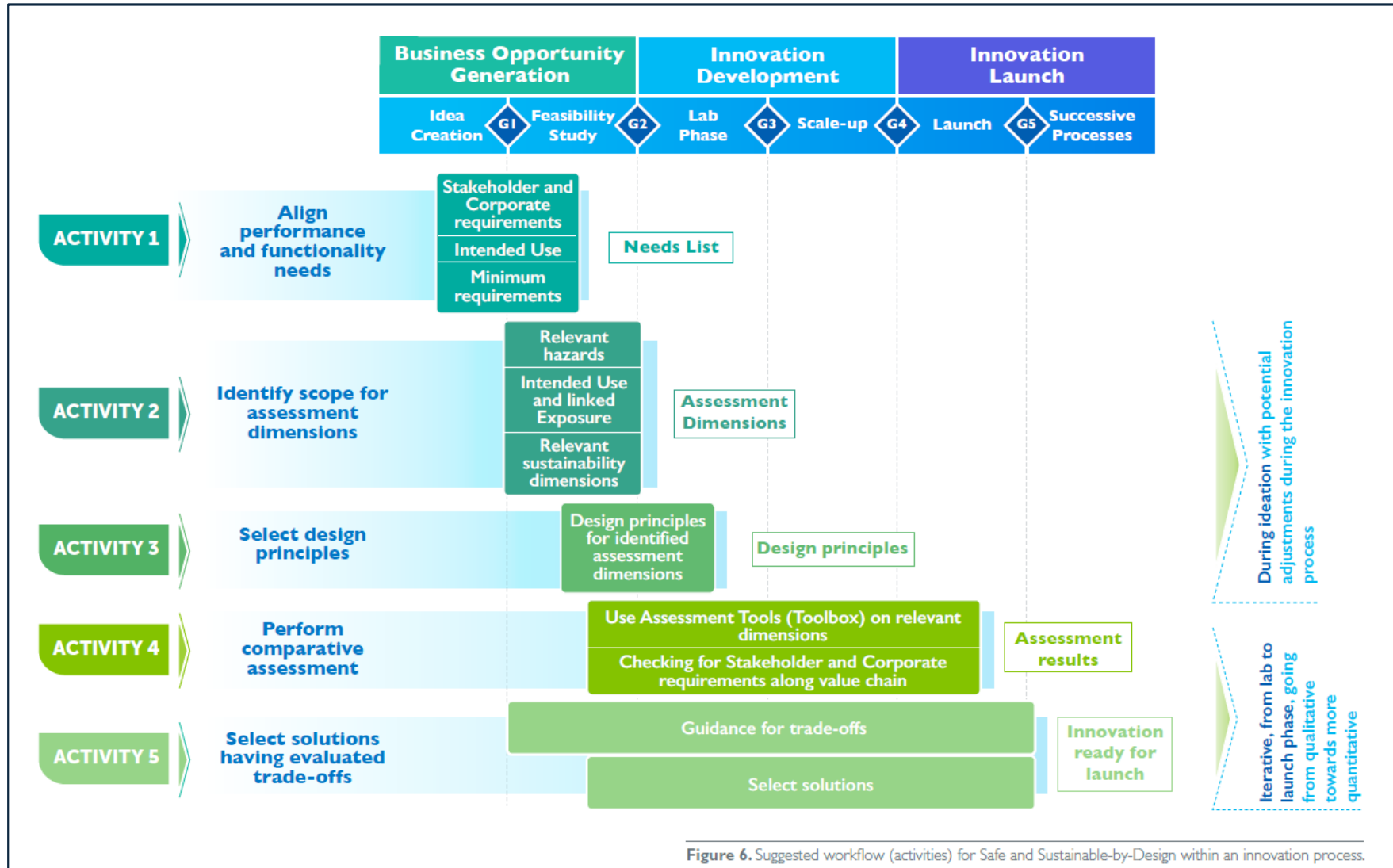
We are talking about an innovation journey!



Fail fast principle!



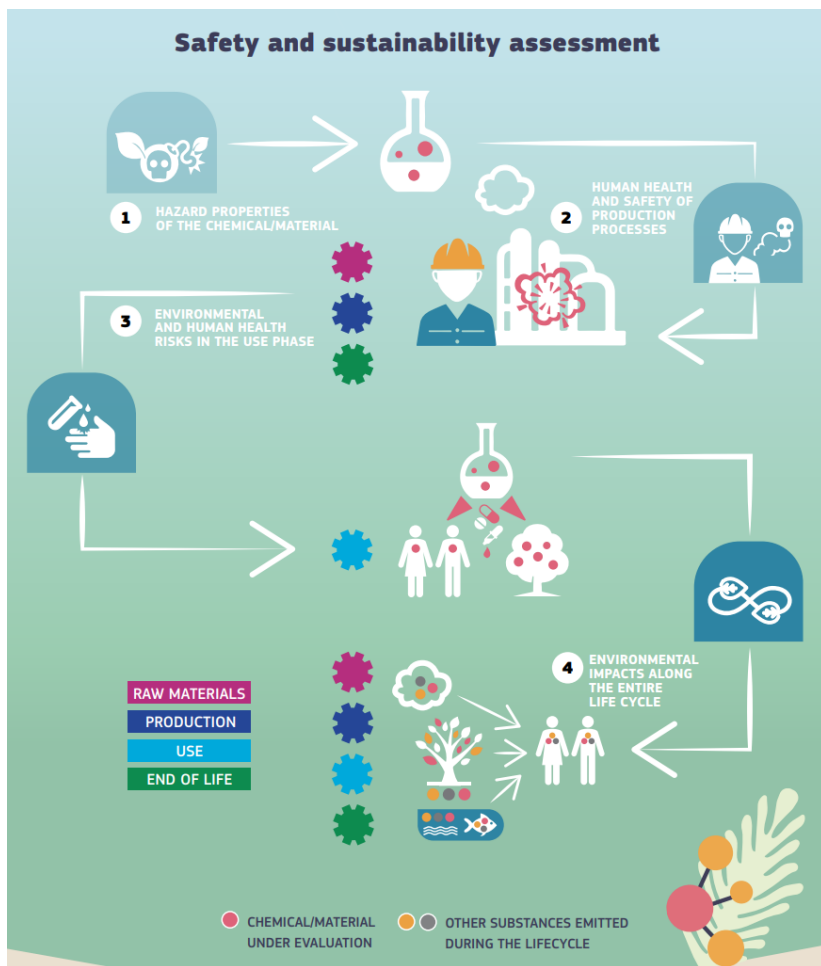
What to do when in the innovation process?







Design principles + Assessment methodology



Step 1

Hazard properties of the chemical/material

Step 2

Human health and safety of production processes

Step 3

Environmental and human health risks in the use phase

Step 4

Environmental impacts along the entire life cycle

(Step 5

Socioeconomic assessment → under development)

Recommendation calling upon Industry, academia and RTOs

Not hard law !



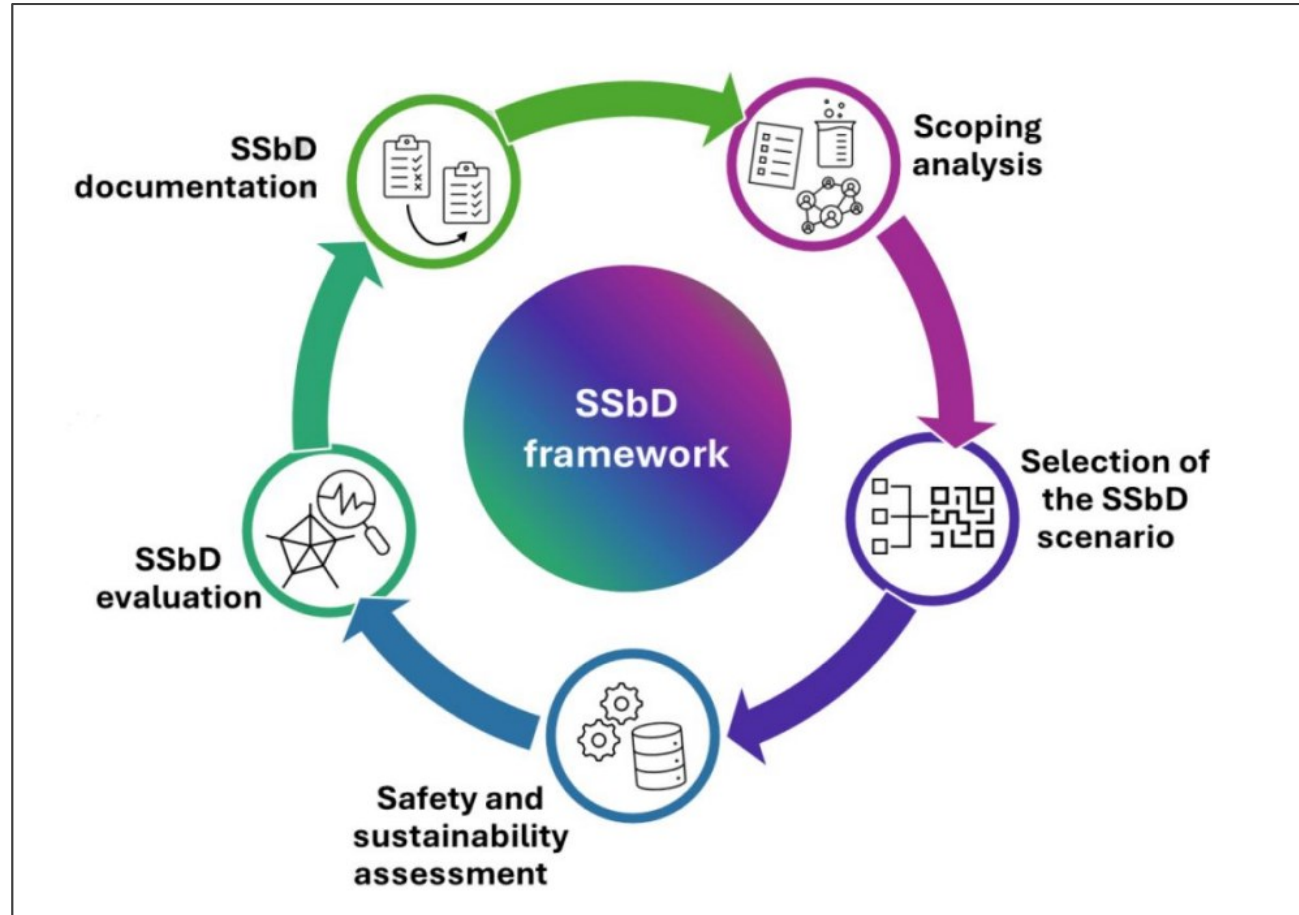
Industry (including SMEs), academia and RTOs are encouraged to:

- 3.1. **Use** the framework in their R&I processes for developing chemicals or materials, thereby supporting the testing period.
- 3.2. **Make available high-quality FAIR data** for assessing safety and sustainability, without flouting intellectual property rights and, if relevant, security considerations.
- 3.3. **Support the development** and making available of new assessment methods, models and tools that can be integrated into the framework to improve the assessment of safety and sustainability.
- 3.4. Support the development of professional **training and educational** curricula to ensure the teaching of the skills required to implement the framework.

Member States are encouraged to:

- 2.1. **Promote** the framework in their national R&I programmes, thereby supporting the testing period with applications and use cases.
- 2.2. **Increase the availability of high-quality FAIR data** for assessing safety and sustainability by incorporating this aspect into their national R&I programmes and into related policies when relevant.
- 2.3. **Support the improvement** of assessment methods, models and tools, and make new ones available, to integrate into the framework in order to improve the assessment of safety and sustainability.
- 2.4. **Support the development** of educational curricula to ensure that the skills required to implement the framework are taught.

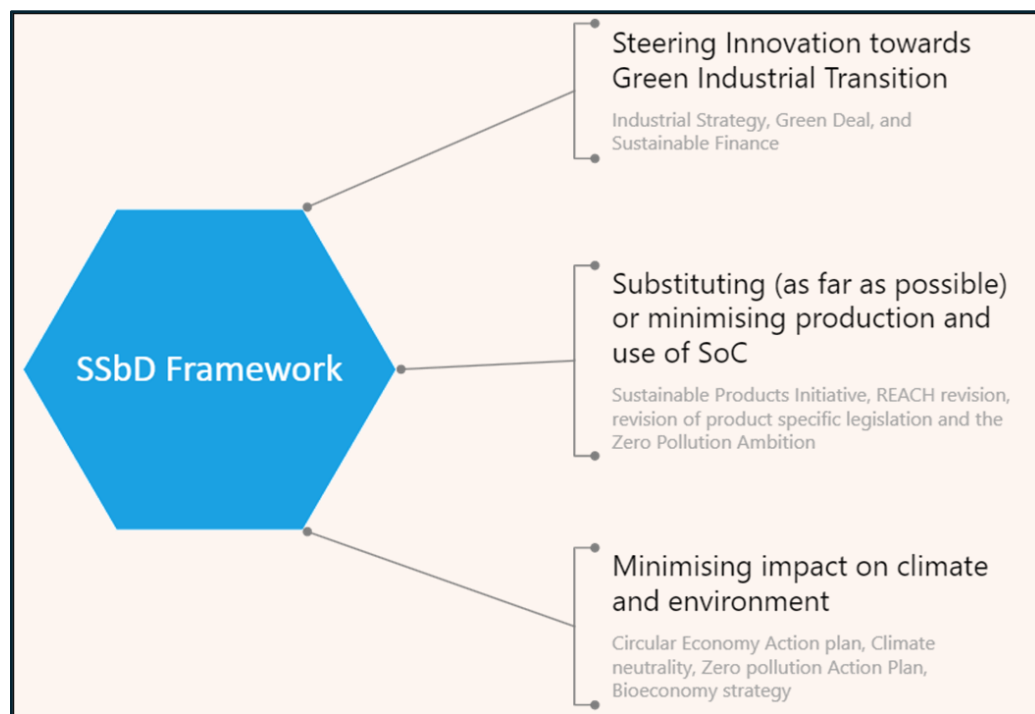
Draft revised framework





Embedding the concept in policies

BEFORE



After JRC publication on « Framework for the definition of criteria and evaluation procedure for chemicals and materials

AFTER

- **Clean Industrial Deal**
 - No explicit reference to Safe and Sustainable by Design (SSbD)
 - Mentions circularity and sustainable products, among other aspects
- **Chemical Industry Action Plan**
 - Integration of SSbD within the EU Innovation and Substitution Hubs
 - Emphasis on the substitution of chemicals



02

What's next?





Company examples (deleted)

Why is SSbD (still) a good approach?







European Commission's views

Figure 1. Contributions of the SSbD framework to the EU industrial competitiveness.



Source: Own elaboration

Business case?



Views from our downstream users...



Rethink:

Why sustainable product
design is the need of the hour

#GetTheFutureYouWant

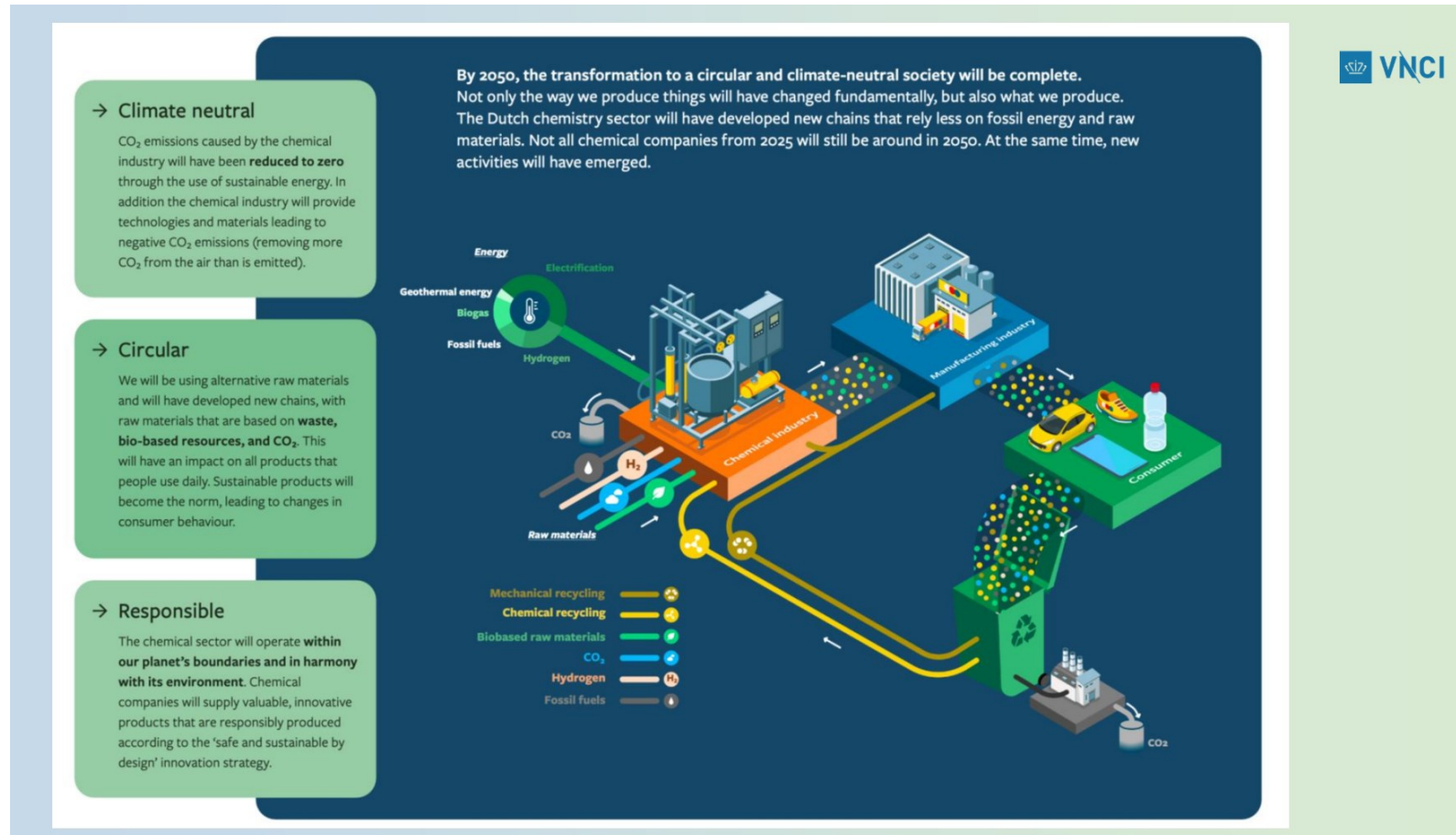
Capgemini 
RESEARCH INSTITUTE



Findings in report on “why?”

- Improved environmental performance
- Help meeting SDGs
- Higher rates of revenue growth
- Increased ability to attract capital
- Increased customer satisfaction
- Increase in employee engagement
- Regulatory pressure

VNCl Strategy 2025 – 2029 identifies SSbD as one of their strategic (long term) pillars



What are the success factors?





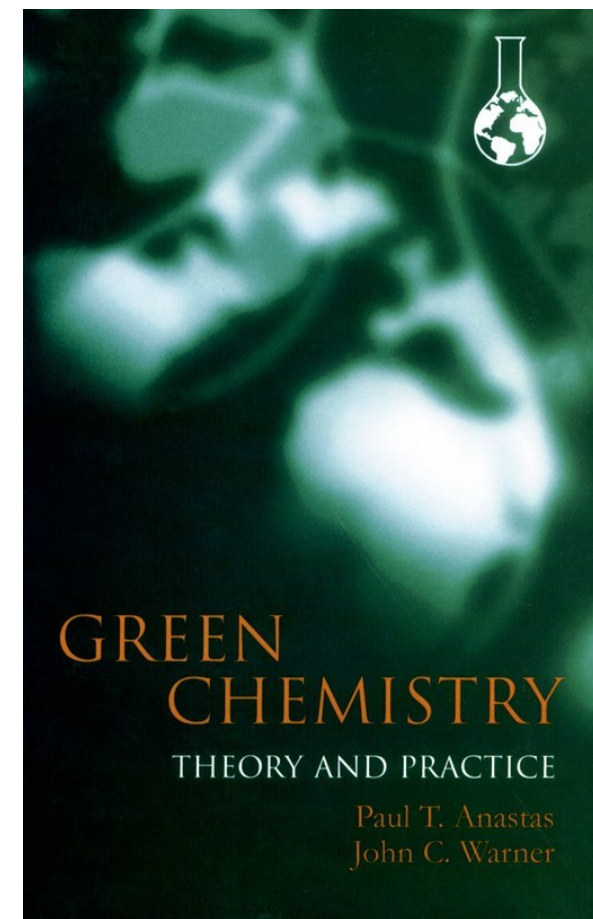
Success factors



- Company strategy
- Value chain approach
- Multi-disciplinary teams
- Thriving ecosystem
- Access to data
- Knowledge management system
- Skills



Education and training !



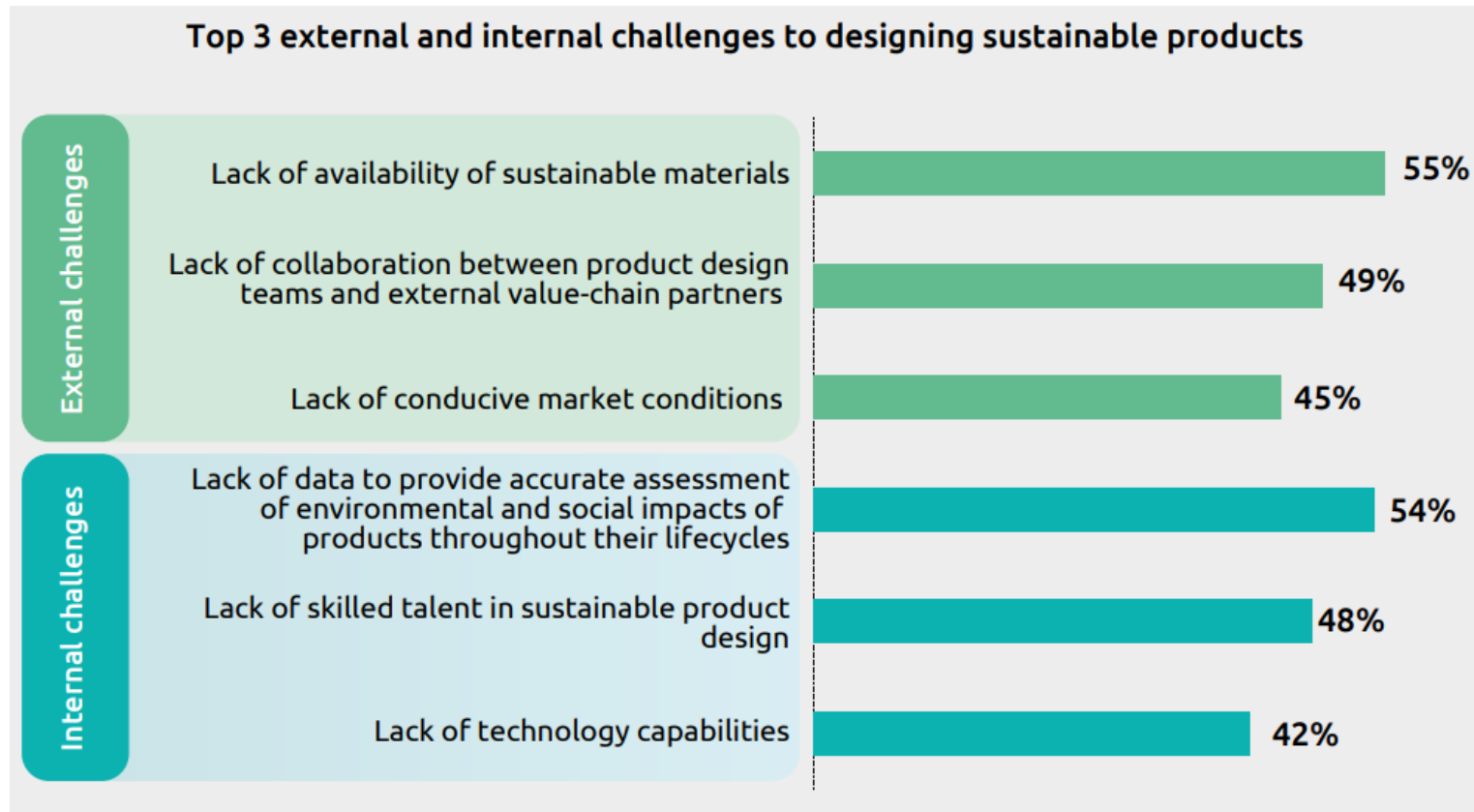
Where do you see hurdles?







Still many hurdles observed...



Source: Capgemini Research Institute, sustainable product design survey, April–May 2022, N=900 organizations.

Where do you need support? And from whom?

