The international ecosystem for accelerating the transition to Safe-and-Sustainable-by-design materials, products and processes

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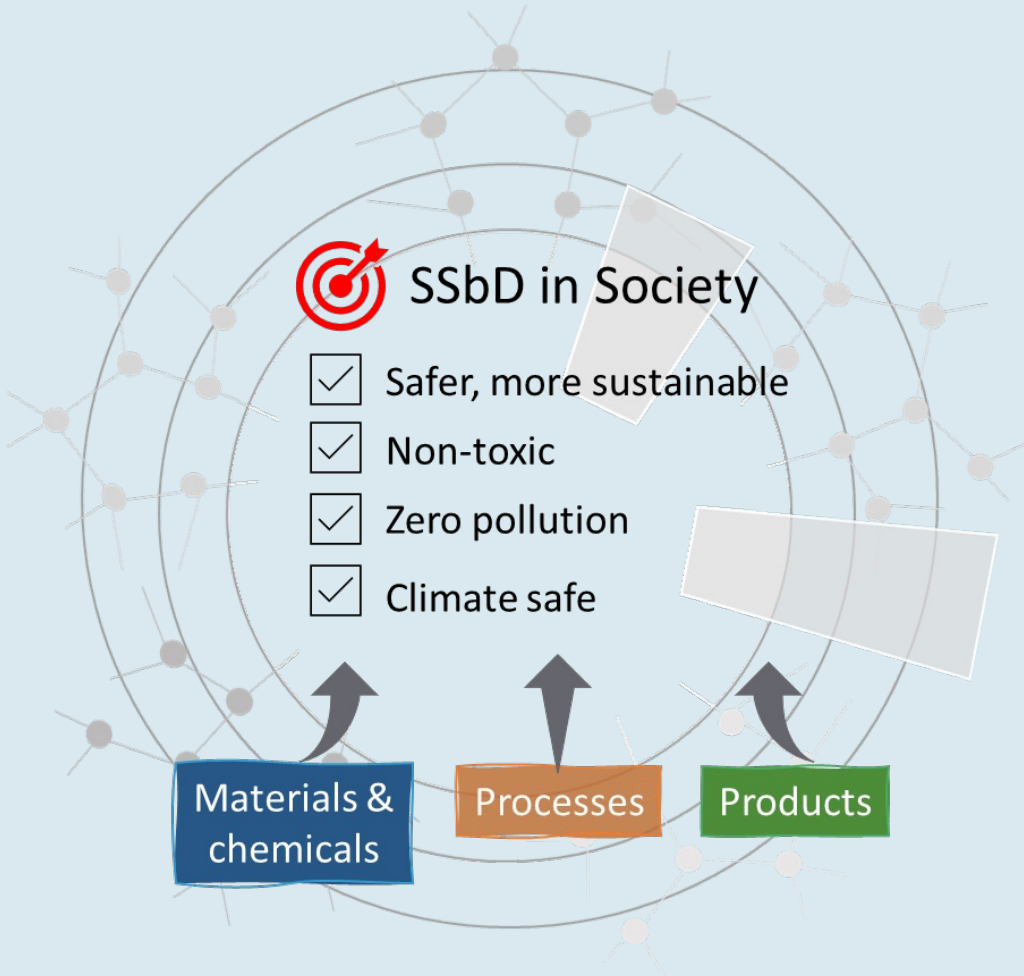
Why – identified needs

The transition to Safe-and-Sustainable-by-Design innovation is a **societal urgency** assuring toxic free environment and preservation of the resources

Identified needs:

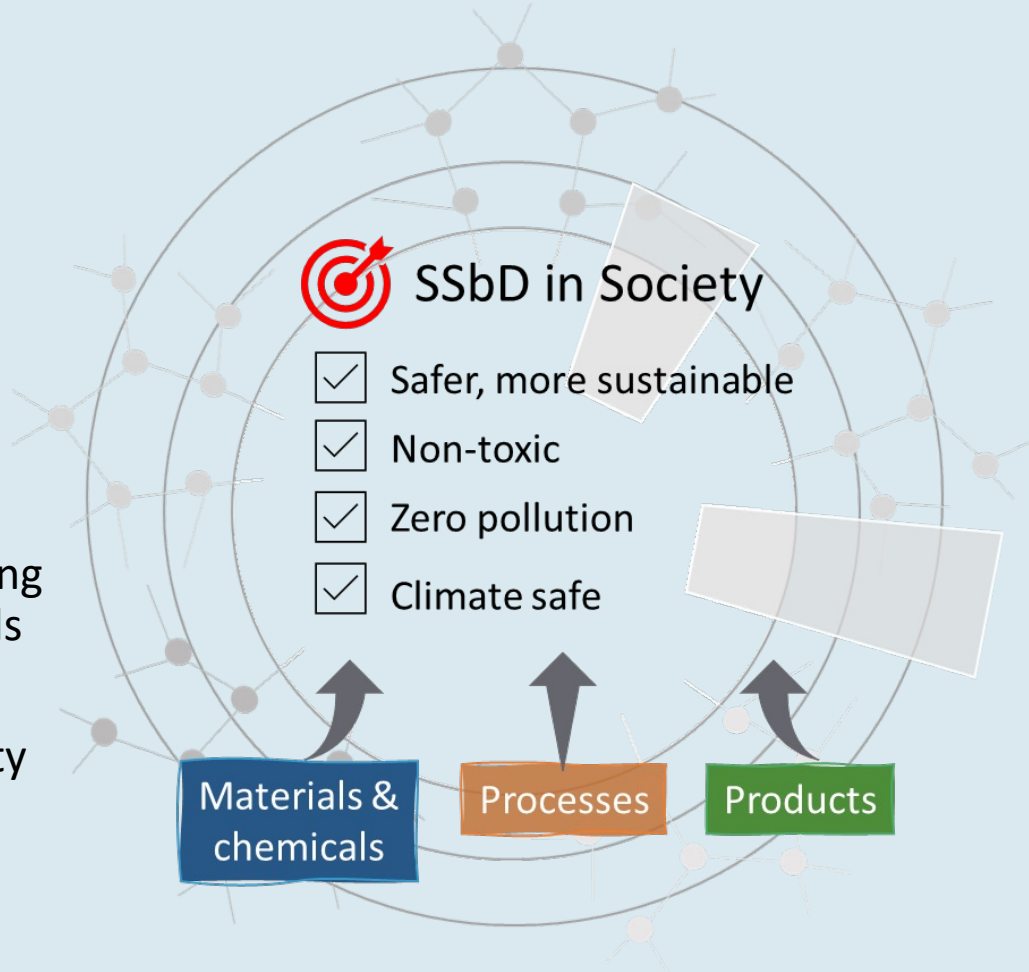
- **Common understanding** of the SSbD concept
- **Criteria and guiding principles** for SSbD (integrating safety, circularity and functionality of materials, products and processes throughout their lifecycle)
- A permanent structure for long-term operation of **established expert's network** with the involvement of wider communities engaged
- Broadly supported and periodically updated **roadmaps** based on state-of-the-art knowledge, identified information gaps and their translation into specific R&D questions and governance needs
- **Support** in implementation of the SSbD framework



What - Scope of the project

The IRISS project aims to connect, synergize and transform the SSbD community in Europe and globally towards a life cycle thinking

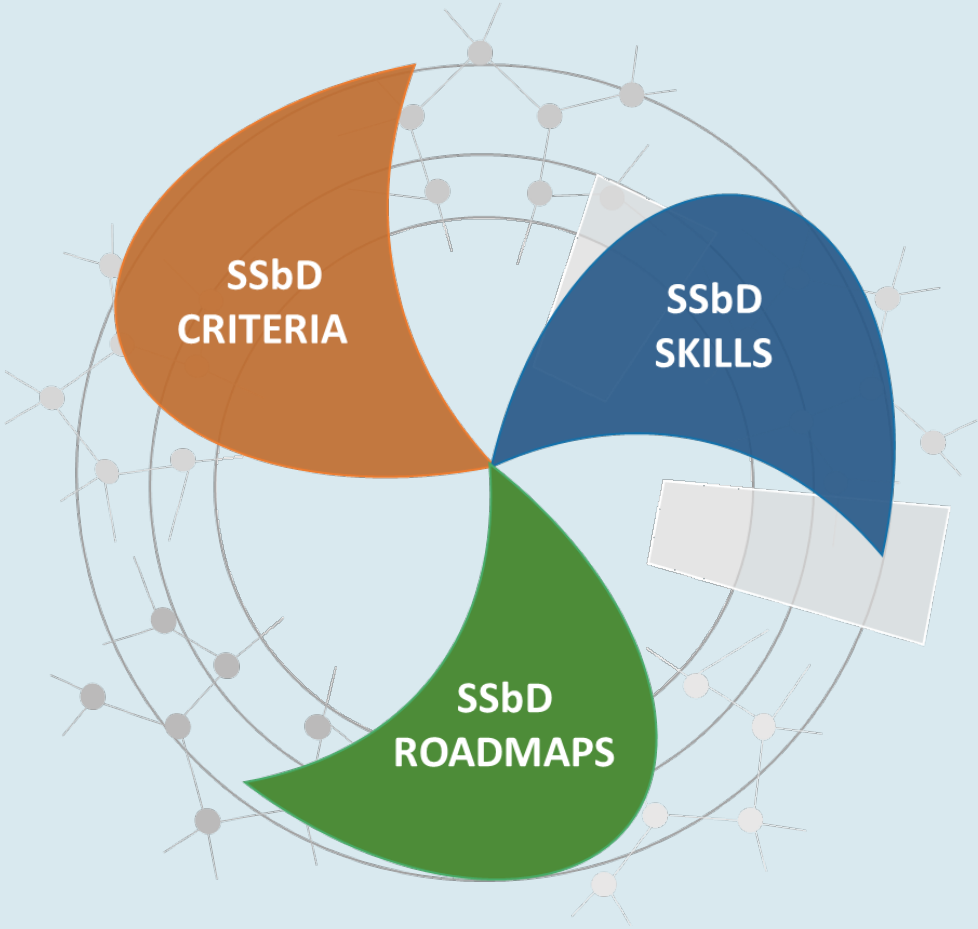
- Develop a **global permanent network** for long term cooperation between the networking members, engaging partners beyond the consortium, throughout and beyond the duration of the project
- Strongly support the **SSbD implementation** in industry **along value chains** to achieve more safe and sustainable products for society
- Focus on **materials including both products and processes**, considering the extensive progress to-date in chemicals and nanotechnology fields
- Establish cooperation mechanisms with relevant international initiatives to **align** and leverage the extensive international community
- Establish **synergy** with industry, EC and the projects that are working with SSbD concepts
- Building, sharing and transferring the **skills and knowledge** on SSbD



How – organisation and activities

Mapping SSbD methods and criteria and Gap analysis

- **Safe-by-design and sustainable-by-design** criteria and methods
  - Methods along the whole **design and innovation processes** (Stage Gate Model) applied in **industry and in R&D projects**
  - **Engineering tools** for the implementation of SSbD principles at design stage
- Existing **sustainability criteria initiatives** (Ecolabels, Ecodesign directive…) and **design for recycling**
- **Existing SSbD frameworks**
- Sustainability **Environmental dimension: LCA** (Life Cycle Assessment), **Social dimension: S-LCA**
- **Skills** for application of SSbD

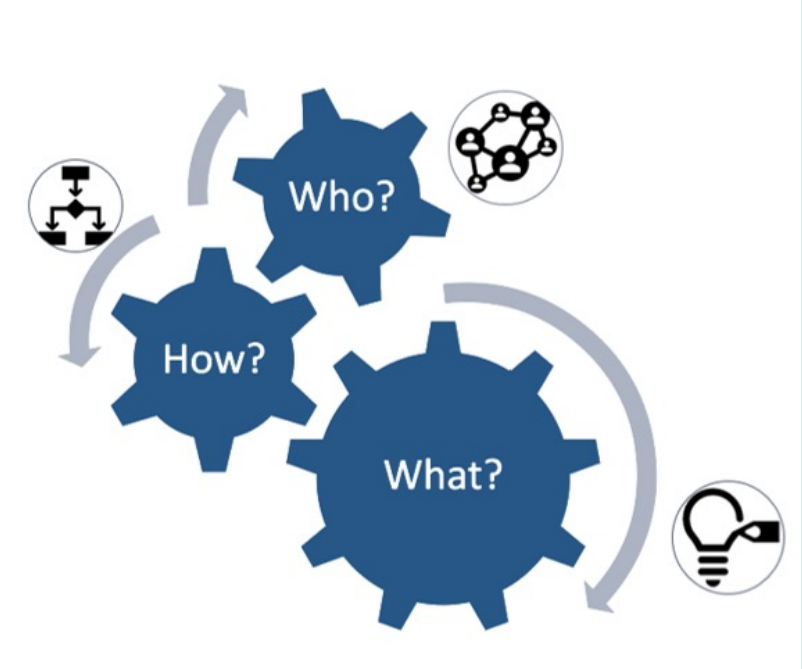


How - Supportive Roadmap and Value chains SSbD ecosystem

- Development of a broadly supported **SSbD Roadmap**
  - Aligning research needs to the innovation process
  - Skills, competences and education needs, and
  - Knowledge and information sharing needs

- Value chain **analysis**
- Value chain SSbD criteria **gap analysis**
- **Uptake** of the SSbD approach by the value chains
- **Value chain-specific** research and innovation roadmaps
- **Engagement** with additional value chain networks, internationalization and integration in the permanent structure

- **Case studies** for implementation of the SSbD framework



Establishment of an EU Led International permanent network

- A structure for continuous **co-creation, cooperation and services** to network members and other stakeholders with interests in SSbD
- Strengthen **collaboration and information exchange** between relevant actors along the value chains
- Build a **platform containing services** addressed to different key target groups
  - Training service for SMEs
  - Service for start-ups to boost business collaboration with industry
  - Co-creation service to establish hubs for specific value chains
  - Knowledge exchange services
  - Knowledge sharing services

Towards an efficient science-policy-industry interface

Building structural and efficient information sharing process and network

Science:

Initial steps on operationalization of SSbD

- **IRISS-NSC collaboration**
- **IRISS-PARC collaboration**
- **IRISS-ongoing H2020 and HE projects**

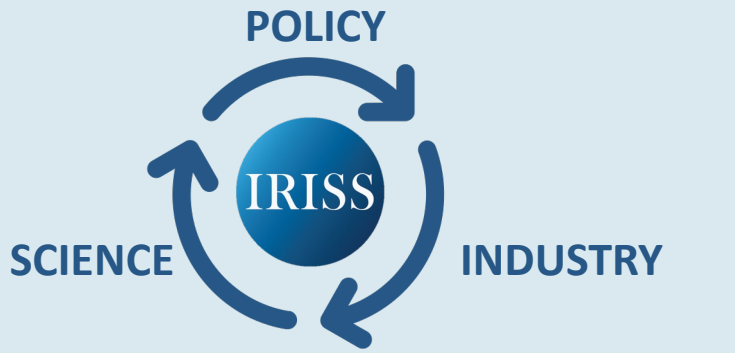
Bringing science to harmonization and standardization

- **IRISS-OECD synergies**

Policy:

IRISS structural dialogue with:

- **EC RTD**
- **EC JRC**



Science-Policy-Industry Interphase

Industry:

Cefic coordinates SusChem NTPs and 7 value chains representatives

- **Packaging** (IPC; Industrial Technical Centre for Plastics and Composites)
- **Textiles** (ETP; EU Technology Platform for the Future of Textiles & Clothing)
- **Construction chemicals** (EFCC; European Federation for Construction Chemicals)
- **Automotive** (CLEPA; European Association of Automotive Suppliers)
- **Energy materials** (EMIRI; Energy Materials Industrial Research Initiative)
- **Electronics** (INL; International Iberian Nanotechnology Laboratory)
- **Fragrances** (IFRA; The International Fragrance Association)

Major findings

- The Safe-and-sustainable-by-design (SSbD) is central in the EC Chemicals Strategy for Sustainability, but a **common understanding on the SSbD concept** and what it is in practice is still needed
- Preservation of previously generated **SbD knowledge** and ensuring its effective **transfer to SSbD** is necessary
- **SbD toolboxes** should be useful for SSbD, especially after their sufficient refinement, adaptation, and organization along the stage-gate mode
- Further development of **computational SSbD tools** that can operate under data and time constraints to truly operationalize SSbD - such tools require creation of relevant models that depend on physical tests
- **Case studies** from the sectors of chemical safety, sustainable and green chemistry, and benign-by-design should be explored further

Key results (missing in SSbD):

- Accounting for **material functionality** is important = can bridge gap between industrial and policy SSbD approaches

- Generally, most frameworks focus on production stage of lifecycle in detail to align with the 'by-design' (stage-gate or early innovation) concept = **need to combine stage-gate model and lifecycle approaches**

Skills and knowledge

Industrial perspective

- A clear **distinction between safety and sustainability** - high chemical safety related skillset - must comply with safety legislation for a long time, i.e., with REACH and CLP as well as sector-specific ones
- Focus on safety **largely varies between value chains** and production stages (for example worker safety, user safety or environmental safety)
- **Sustainability** - a more recent concept, and is much less established or integrated - lack of regulation - **market demand** is the major driver of sustainability efforts

Skills and knowledge

Training needed

- Training services on **sustainability aspects** - skills related to performing an LCA (mostly environmental, but also social and economic) and applying appropriate tools
- Better understanding of the **SSbD framework and its implementation** - at present the framework is **too complex** for companies (SME especially) to comprehend and work with and often difficult to translate to specific sectors
- Necessity for **knowledge-transfer along the value chain** - collaboration needed to share the relevant data or information for the whole product life cycle
- **Education** on SSbD needs to be encouraged within companies

Collaboration

- State of the art SSbD knowledge sharing – Harmonization - International scientific collaboration
- Pool of experts for implementation of the SSbD framework
- Experience from case studies from the 7 value chains
- Support through seminars and webinars
- Services through the platform - Support industrial understanding
- Visibility in SSbD community (IRISS network) – direct use for industry
- Connection with other initiatives (for example ISC3, Change Chemistry (former GC3), AMI2030)
- International collaboration on environmental, ethical and societal aspects of chemicals and materials

IRISS: Value chains SSbD ecosystem : working together

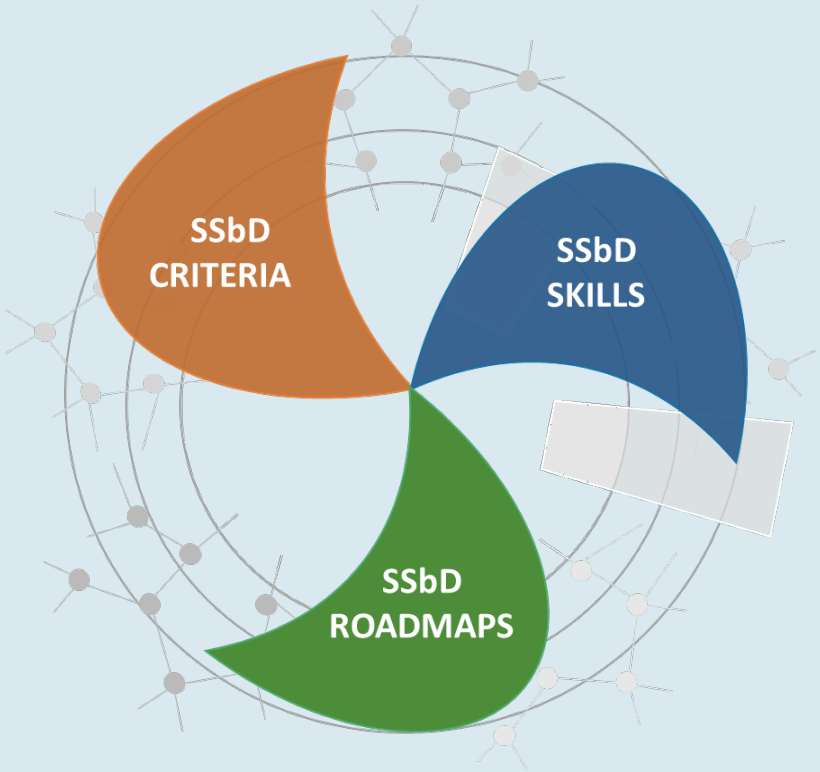
- **Value chain perspective**
  - **Analysis & challenges** (D4.1 and D4.8)
  - **Skills needs – gaps** (D4.4 and D4.10)
  - **Baseline analysis of SSbD criteria** - specificities and common grounds (D4.
  - SSbD criteria gap analysis (D4.

- Uptake of the SSbD approach by the value chains : **SMEs** as a target .

- **Value chain-specific research and innovation SSbD roadmaps**

- Engagement with additional value chain networks, internationalization and integration

- **Case studies for implementation of the SSbD framework (2nd year testing phase)**



Take away on Value Chains from 1,5 year of IRISS

- SSbD more understood by the Chemical Industry especially in Chemicals substitution and larger companies with resource for safety and sustainability evaluations.
- Downstream industry stakeholders relying on suppliers for information .
- Current SSbD framework fits Chemicals substitution better than complex articles .
- SMEs find it challenging to integrate SSbD into Design/Innovation processes ; collaboration with national platforms like SusChem and SMEs networks is vital
- Many Sustainable Chemistry Initiatives : IRISS and International connections

Publications

- *Learning from Safe-by-Design for Safe-and-Sustainable-by-Design: Mapping the Current Landscape of Safe-by-Design Reviews, Case Studies, and Frameworks*, Environment International
- *Safe-and-sustainable-by-design: State of the art approaches and lessons learned from value chain perspectives*, Current Opinion in Green and Sustainable Chemistry
- *The Safe-and-Sustainable-by-Design concept provides guiding principles for a more sustainable future*, to be submitted

Events

Second training will take place on

28 June 2024

Workshop for stakeholders from H2020 and HE projects related to SSbD - SSbD Solutions Day at NanoSafe and NSC-2023 Event

Follow-up workshop for HE projects

10 November 2023

Events

- Webinar – Change Chemistry (GC3)/SusChem Sweden/MistraSafeChem/IRISS, 31 August
- Chemical watch, Brussels 16- 17 October
- First ECOSYSTEX Conference – 19-20 October, Barcelona, Spain
- IRISS workshop: Internationalization of the application of SSbD in materials and chemicals, 26 October
- AMI2030 workshop, 21 November 21, San Sebastián, Spain
- Product Sustainability Summit EU, 29-30 November 2023, Cologne, Germany (online contribution)
- ANTHOS 2024, 4-6 March 2024, Vienna
- SETAC Europe 34th Annual Meeting, 5-9 May 2024, Seville, Spain
- 8th Green & Sustainable Chemistry Conference, 13-15 May 2024, Dresden, Germany

Who - Our partners

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Member of Basque Research & Technology Alliance

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CLEPA
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EMIRI

IPC

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INL
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APRE
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IRISS – International SSbD network

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