



Workshop on **Digital Tools for Social LCA and SSbD**

**Wednesday, September 30th –
10:00-12:00 - Online**

Developed by:

Kveloce



AGENDA

10:00 – 10:15	Welcome and introduction (5 min) MAGNO Project (10 Min)	Alejandra Pita (IDENER)
10:15 – 10:35	Session 1 - How Digital Tools Can Shape LCA-s (20 min)	Alejandra Pita (IDENER)
10:35 – 10:45	Session 2 - Social assessment in SSbD: key updates from the 2025 JRC Framework revision and EC Recommendation 2026 (20 min)	Giulio Bracalente (JCR ISPRA) and Lucia Mancini (JCR ISPRA)
10:55 – 11:05	Session 3 - SO-LCA and product S-LCA as complementary approaches across the innovation cycle (20 min)	Gabriela Munares (Kveloce)
11:05 – 11:25	Debate – Sustainability life-cycle assessment as a driver for acceptance and behaviour change (20 min)	Mod: Gabriela Munares (Kveloce) Alejandra Pita Giulio Bracalente Jutta Hildenbrand Lucia Mancini Maite Ferrando
11:25 – 11:35	Audience Q&A (10 min)	Gabriela Munares (Kveloce)
11:35 – 11:40	Closure (10 min)	Alejandra Pita (IDENER)



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Introduction to the MAGNO Project

Dr. Alejandra Pita

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IDENER



IDENER R&I – Who are we



We are a team of engineers, scientists, and software developers exploring the potential of AI to solve challenging science and engineering problems. We aim to create – **new, better, sustainable** – technologies and business models to ultimately contribute to human development.



H2020 and HEU's projects



Europe's transition to climate neutrality and circularity is strongly dependent on how materials are produced, used, and managed

Packaging is a critical hotspot:

- Represents **44%** of total plastics use in Europe

- Recycling rates remain below the EU target of **55%** by 2030

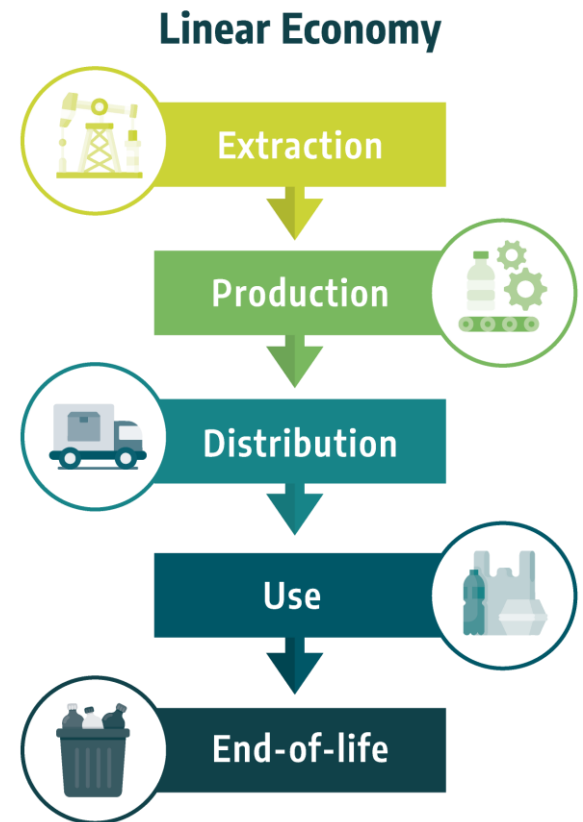
At the same time, packaging is essential for food protection:

- Ensures food quality and safety

- Helps reduce food loss and waste across supply chains

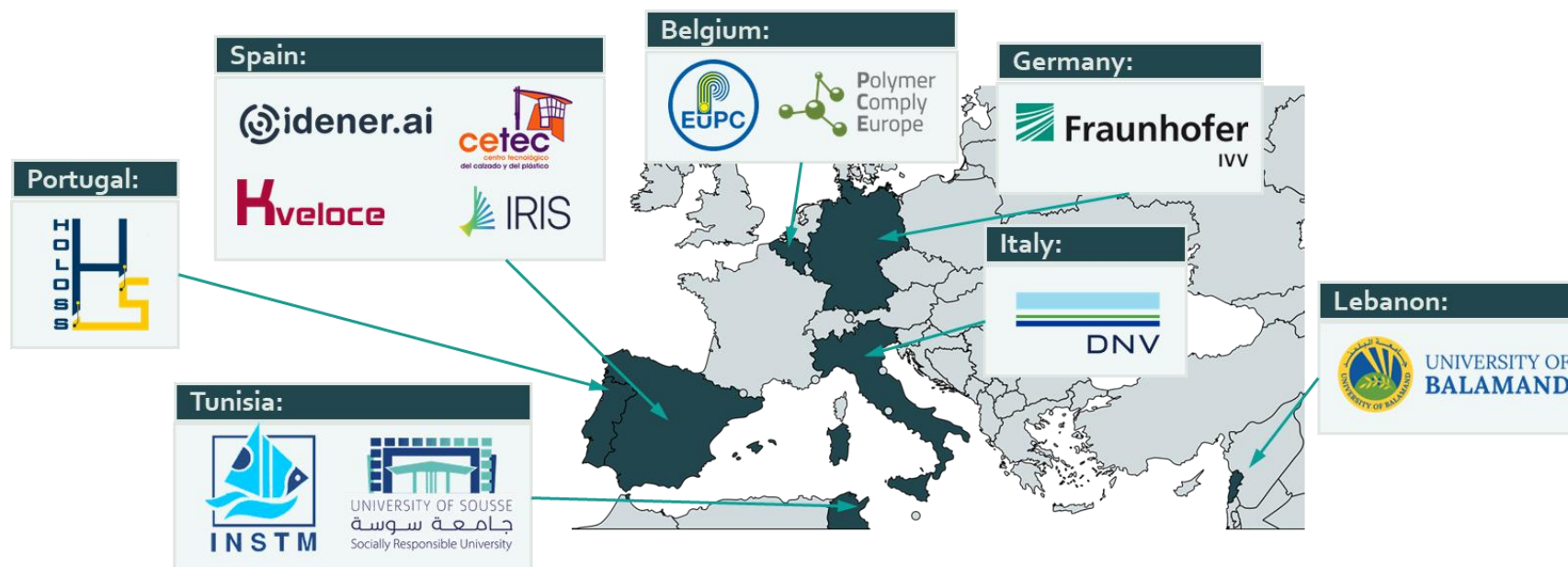
Dual Challenge

Reduce material use and environmental impacts (e.g. waste, pollution) &
Maintain or improve food preservation performance

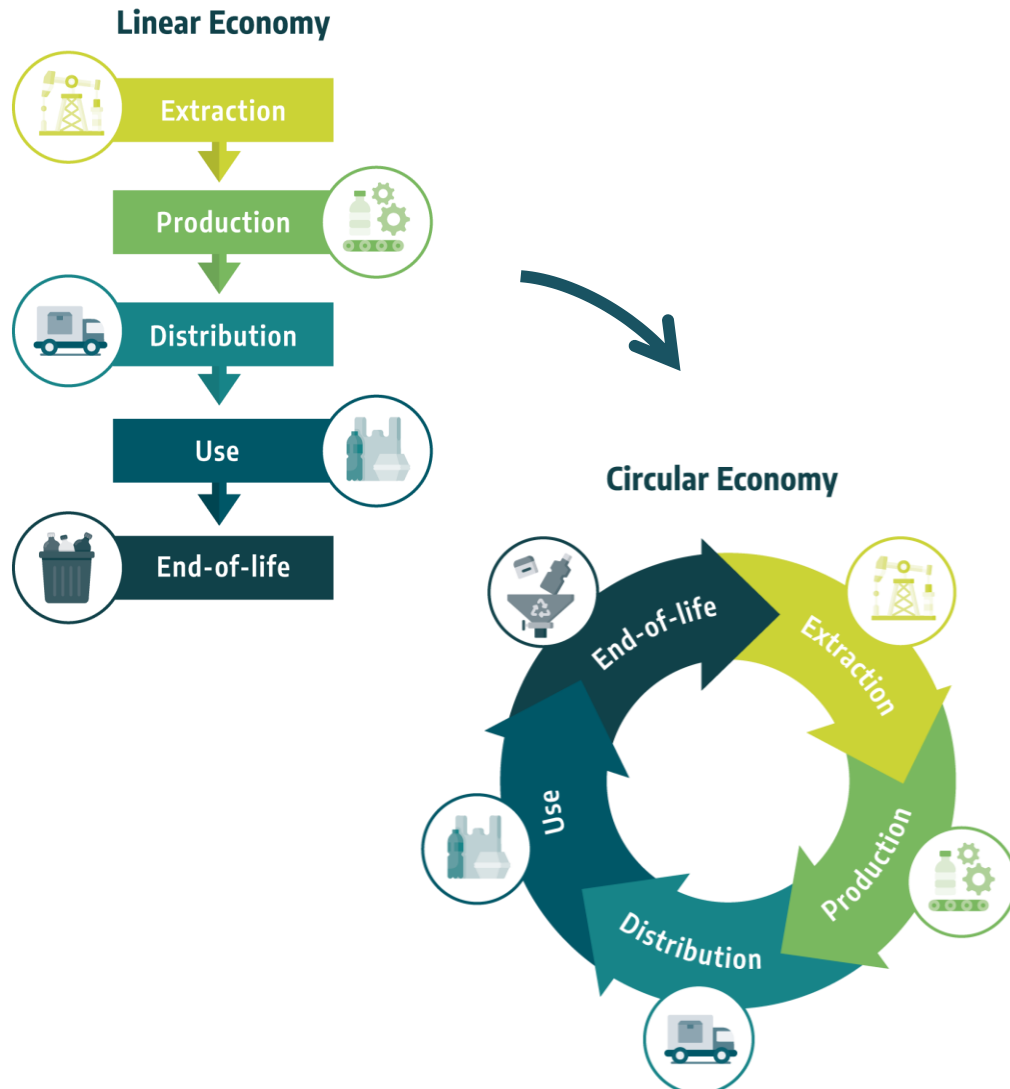


Summary

- **Project name (ID, budget):** MAGNO (ID: 101135258, € 4M)
- **Call:** HORIZON-CL6-2023-ZEROPOLLUTION-01-7 - Strategies to prevent and reduce plastic packaging pollution from the food system
- **Project Start / End:** 01/2024 – 06/2027
- **Coordination:** Dr. Alejandra Pita, Mr. Ignacio Fernández-Pacheco, Dr. Luis Acevedo
- **Contact e-mail:** alejandra.pita@idener.ai
- **Project Website:** <https://magno-project.eu/>
- **Project LinkedIn:** <https://www.linkedin.com/company/magno-eu-project>



MAGNO's Objectives



Criteria for strategies to prevent and reduce plastic packaging pollution from the food system:

- Innovative renewable and recyclable and/or biodegradable materials
- Design for circularity to reduce material consumption and increase reuse and recycle (physical and/or chemical design)
- Substitution of harmful substances in packaging formulations
- Smart solutions to monitor food quality and extend product shelf life

Specific objectives:

- Identify effects and impacts of littered plastic food packaging
- Develop and validate innovative business strategies
- Include government and society in food packaging system loop

Overview of MAGNO



The project focuses on the whole **food packaging value chain**, starting from raw materials production up to waste management – and back

Our goals are:

- Identify effects and impacts of food packaging **production**, **use** and **end of life**, with a particular focus on plastics
- Develop innovative **circular business strategies** and validate these with an **ecosystem Digital Twin**
- Include **public**, **private sectors** and **consumers** in food packaging system loop



MAGNO

Transforming EU food systems with innovative
strategies for sustainable packaging



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Session 1- How Digital Tools Can Shape Life Cycle Assessment

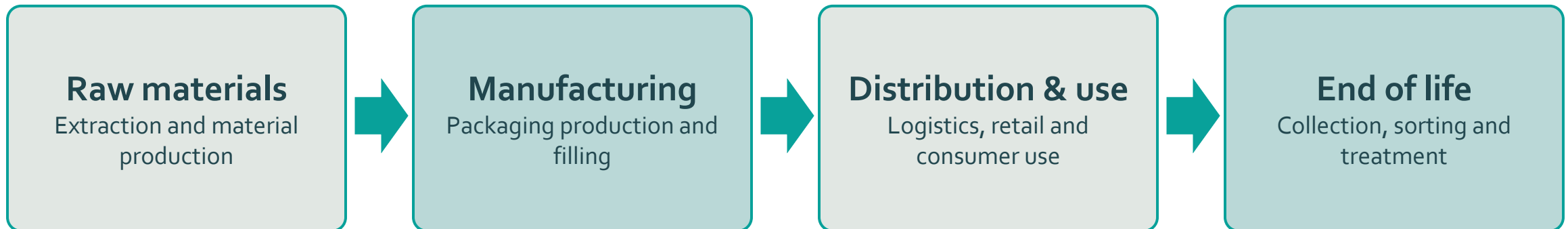
Dr. Alejandra Pita

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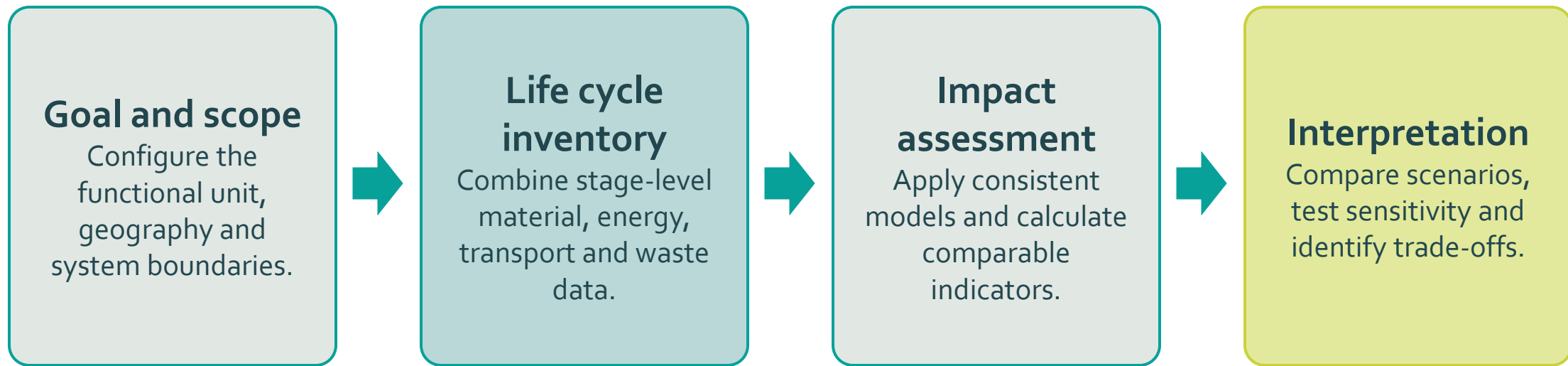


LCA quantifies the potential environmental impacts of a product system across its life cycle.



FUNCTIONAL UNIT: The reference for comparison: what service is delivered?
SYSTEM BOUNDARY: The processes included: where does the analysis begin and end?

The four phases of LCA



The process is iterative: interpretation can reveal data gaps, change the scope and trigger a new calculation.

Where conventional LCA can struggle

The method is robust; the practical challenge is maintaining consistent data and assumptions across a changing system.



Data gaps · static assumptions · manual rebuilding

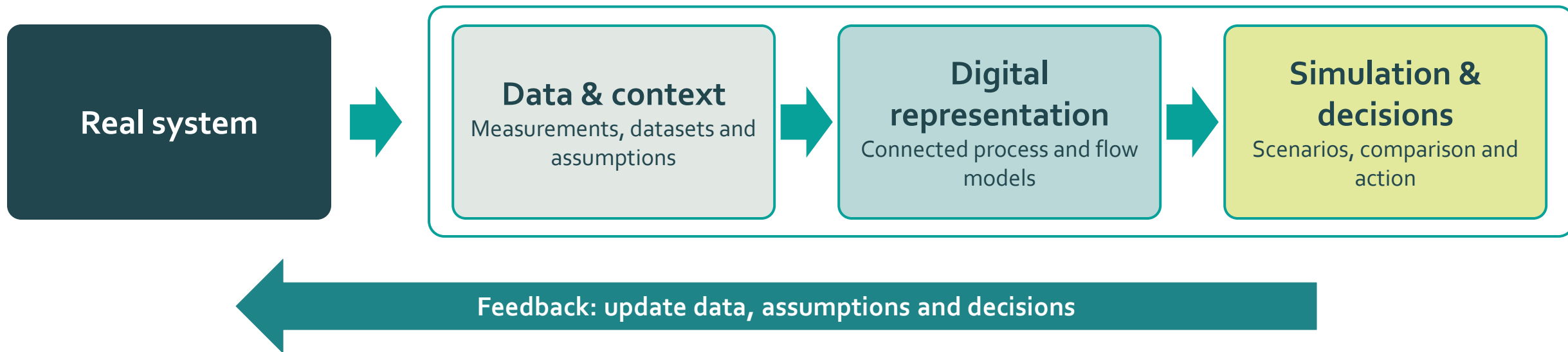


A connected model of change



What is a Digital Twin?

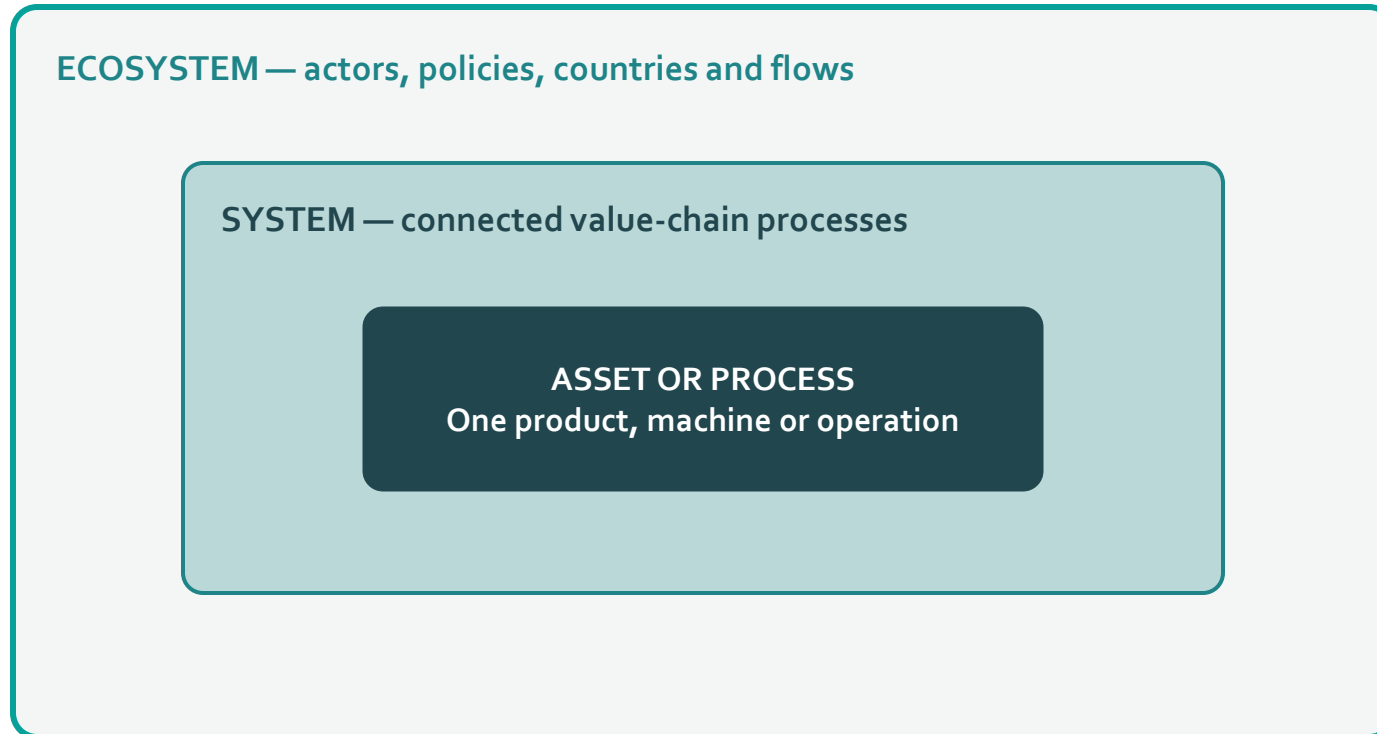
A Digital Twin is a digital representation of a real system that combines data and models to explore its behaviour under different conditions.



A model describes a configuration. A Digital Twin keeps the representation connected to changing data and context.

From a Digital Twin to an Ecosystem Digital Twin

The scope expands from one asset to connected organisations, processes and material flows.



MAGNO eDT

A virtual representation of European food-packaging value chains.

It combines data and process models to simulate material flows, pollution scenarios and circular strategies.

Its role is scenario analysis and decision support — not real-time operational control.

The object being modelled is the packaging ecosystem, not only the packaging itself.

MAGNO



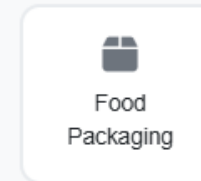
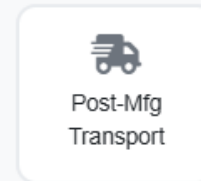
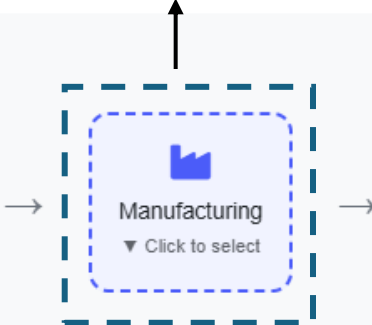
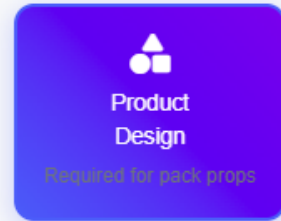
alejandra.pita@idener.ai

A model of the full packaging life cycle

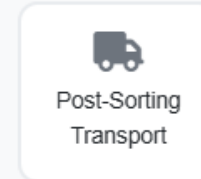
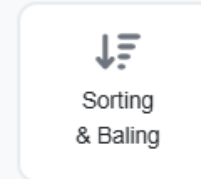
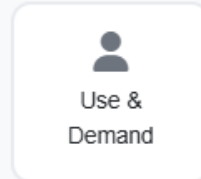
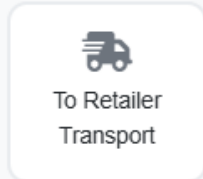
1 Configure Value Chain Flow

Click on **Manufacturing** to choose a process. Toggle optional steps and select

Manufacturing route
Injection moulding,
thermoforming, blow moulding
or extrusion



End-of-life route
Mechanical recycling,
chemical recycling or
recovery



Instructions: Click on **Manufacturing** to choose a process. Toggle optional steps and select one end-of-life path. Gray boxes are reference-only.

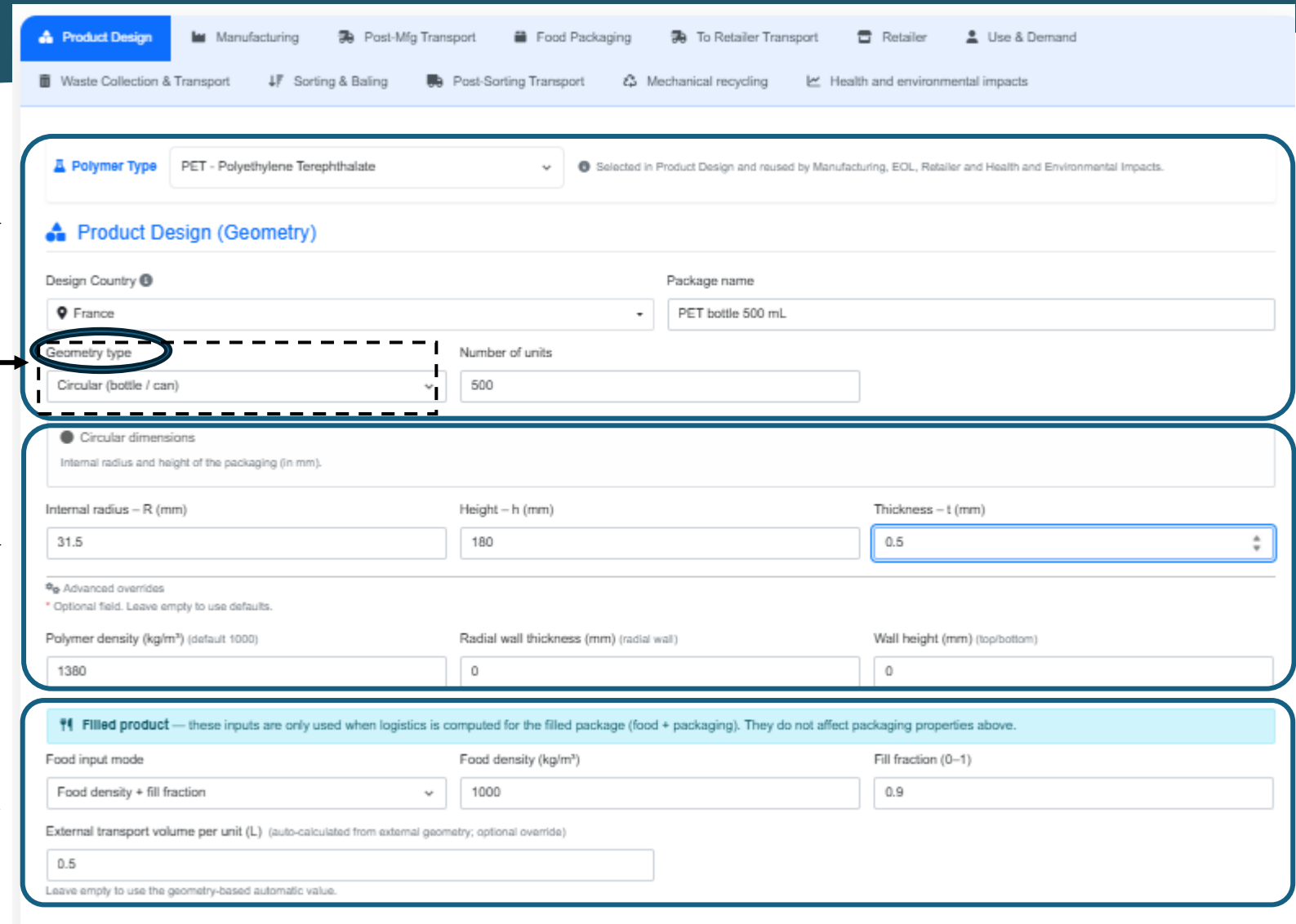
User Inputs

Define the functional unit, geography and packaging format

- Material and recycled content
- Geometry and package mass
- Food fill and number of units

Set transparent design parameters that drive material demand

Reuse defaults or override them to test alternatives



The screenshot displays the MAGNO software interface, which is organized into several sections for user input. At the top, a navigation bar includes tabs for 'Product Design', 'Manufacturing', 'Post-Mfg Transport', 'Food Packaging', 'To Retailer Transport', 'Retailer', and 'Use & Demand'. Below this, a secondary bar lists various lifecycle stages: 'Waste Collection & Transport', 'Sorting & Baling', 'Post-Sorting Transport', 'Mechanical recycling', and 'Health and environmental impacts'.

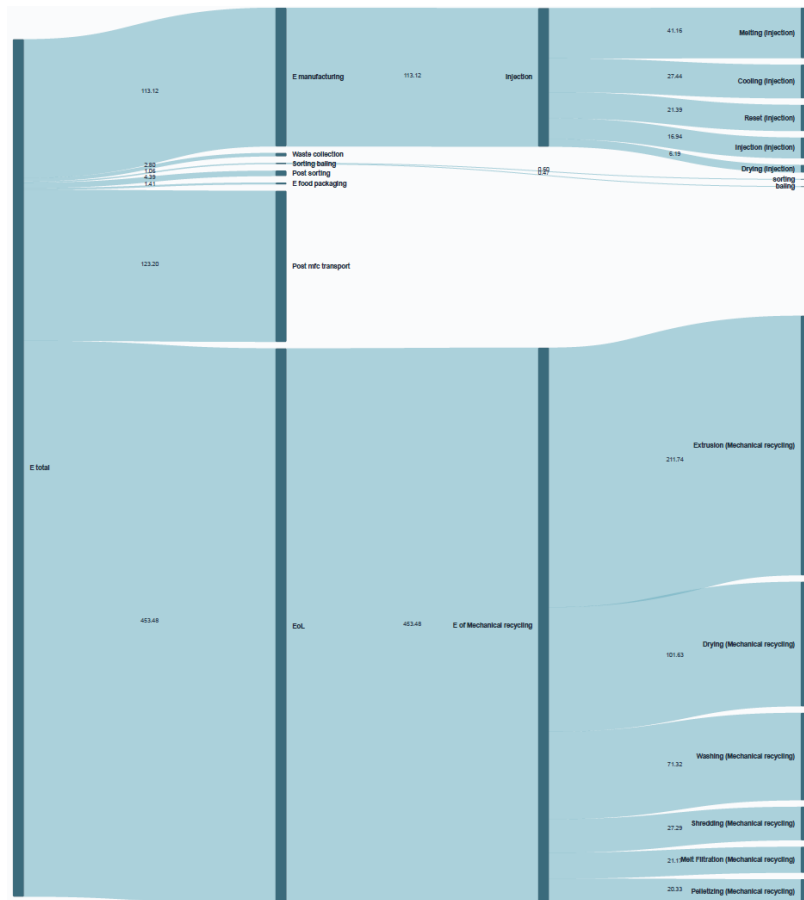
The main content area is divided into several sections:

- Polymer Type:** A dropdown menu is set to 'PET - Polyethylene Terephthalate'. A note indicates it is 'Selected in Product Design and reused by Manufacturing, EOL, Retailer and Health and Environmental Impacts.'
- Product Design (Geometry):**
 - Design Country:** A dropdown menu is set to 'France'.
 - Package name:** A text field contains 'PET bottle 500 mL'.
 - Geometry type:** A dropdown menu is set to 'Circular (bottle / can)', which is circled in red.
 - Number of units:** A text field contains '500'.
- Circular dimensions:**
 - Internal radius – R (mm):** A text field contains '31.5'.
 - Height – h (mm):** A text field contains '180'.
 - Thickness – t (mm):** A text field contains '0.5'.
- Advanced overrides:**
 - Polymer density (kg/m³) (default 1000):** A text field contains '1380'.
 - Radial wall thickness (mm) (radial wall):** A text field contains '0'.
 - Wall height (mm) (top/bottom):** A text field contains '0'.
- Filled product:** A section with a light blue header stating: 'these inputs are only used when logistics is computed for the filled package (food + packaging). They do not affect packaging properties above.'
 - Food input mode:** A dropdown menu is set to 'Food density + fill fraction'.
 - Food density (kg/m³):** A text field contains '1000'.
 - Fill fraction (0–1):** A text field contains '0.9'.
 - External transport volume per unit (L) (auto-calculated from external geometry; optional override):** A text field contains '0.5'.

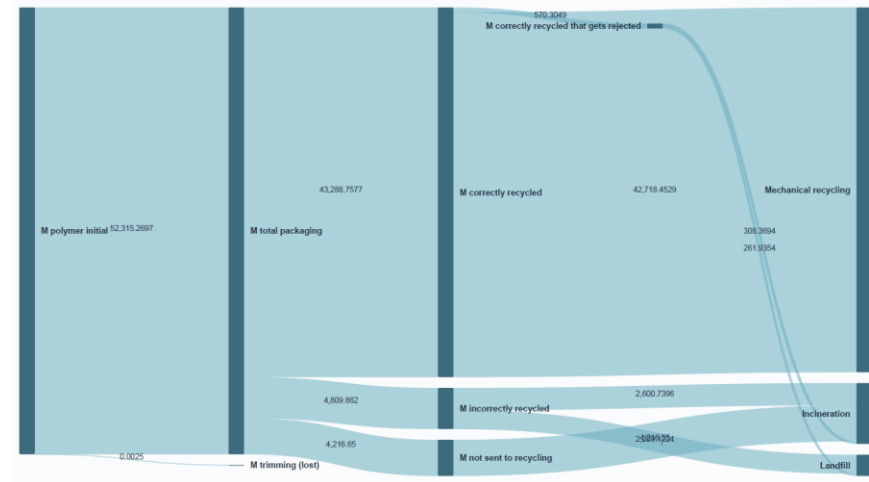
One scenario, several connected results

The same configuration generates flow balances and impact indicators across the packaging life cycle.

Energy balance

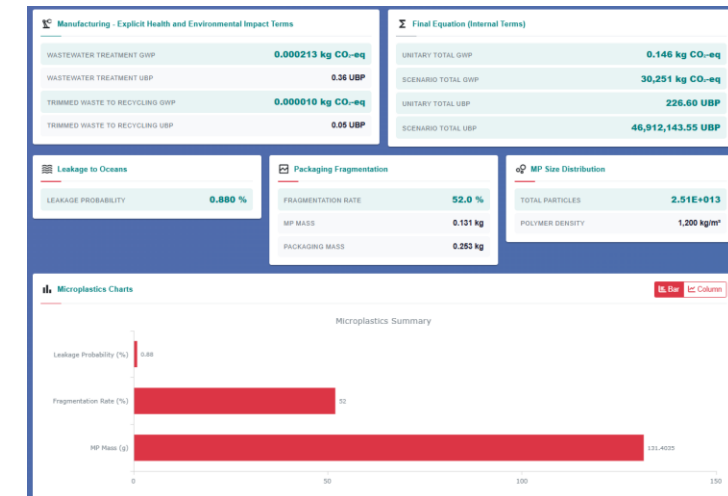


Material balance



Packaging mass follows the routes to recycling, incineration and landfill.

Environmental indicators



GWP, leakage and microplastic indicators remain linked to the same scenario.

The eDT and LCA are different

LCA is an assessment method.

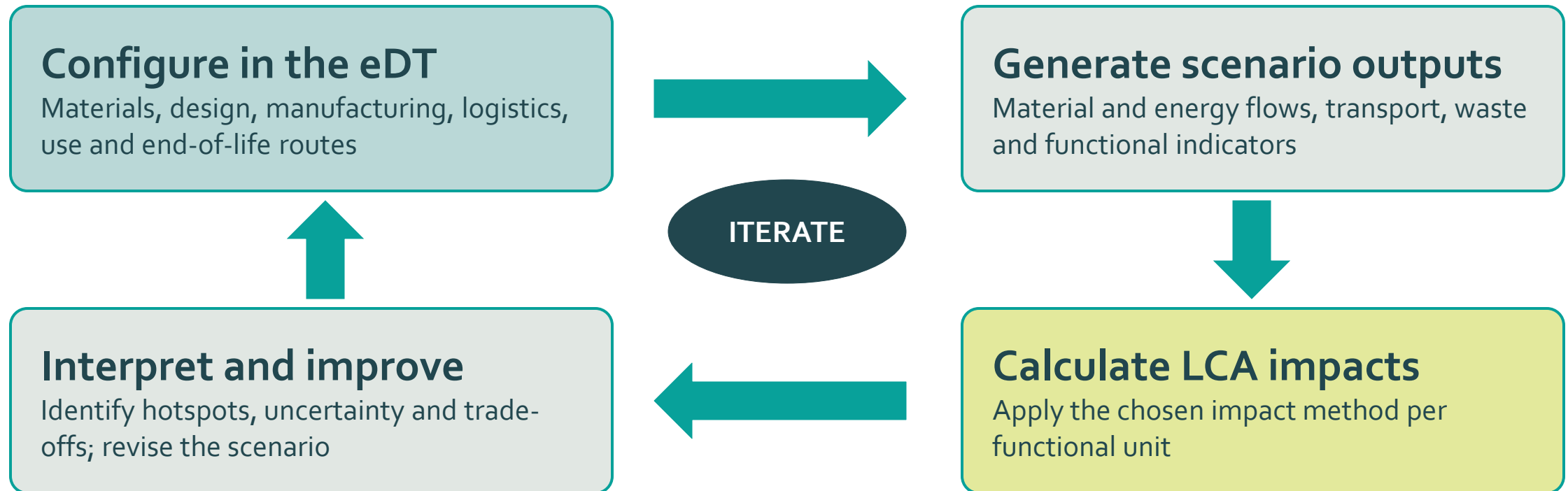
The eDT is a digital system for representing, configuring and simulating the value chain.

Dimension	MAGNO eDT	LCA
Main question	What changes across the system when assumptions or routes change?	What are the potential environmental impacts per functional unit?
Representation	Configurable processes, actors, material flows and context	A defined product system, boundary and life cycle inventory
Scenario role	Builds consistent multi-parameter scenarios	Evaluates each defined alternative
Outputs	Flows, technical and functional KPIs, and scenario data	Impact indicators, hotspots and contribution analysis

The eDT organises and runs the scenarios. LCA evaluates their environmental consequences.

How the eDT complements LCA

Together they create an iterative decision loop: configure, calculate, interpret and improve.



The eDT expands scenario exploration. LCA preserves environmental accounting discipline.

What digital tools add to LCA



01

Repeatable analysis

Update assumptions and rerun consistent life cycle models.

02

System-wide comparison

Test realistic combinations across design, production, logistics, use and end of life.

03

More transparent decisions

Expose trade-offs while keeping data provenance, scope and uncertainty visible.



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Session 2-

Social assessment in SSbD

Key updates from the 2025 Framework and 2026 EC
Recommendation

Giulio Bracalente and Lucia Mancini, Joint Research Centre

Outline

- Policy context and evolution of the Socio-Economic Assessment (SEA) in the Safe and Sustainable by Design framework
- Objectives and scope
- Methodologies underpinning the SEA
 - Social Life Cycle Assessment
 - Identification of Critical Raw Material along the life cycle
 - Monetisation of externalities
- Conclusions

EU Policy context on Environmental & Social Governance (ESG) and Competitiveness

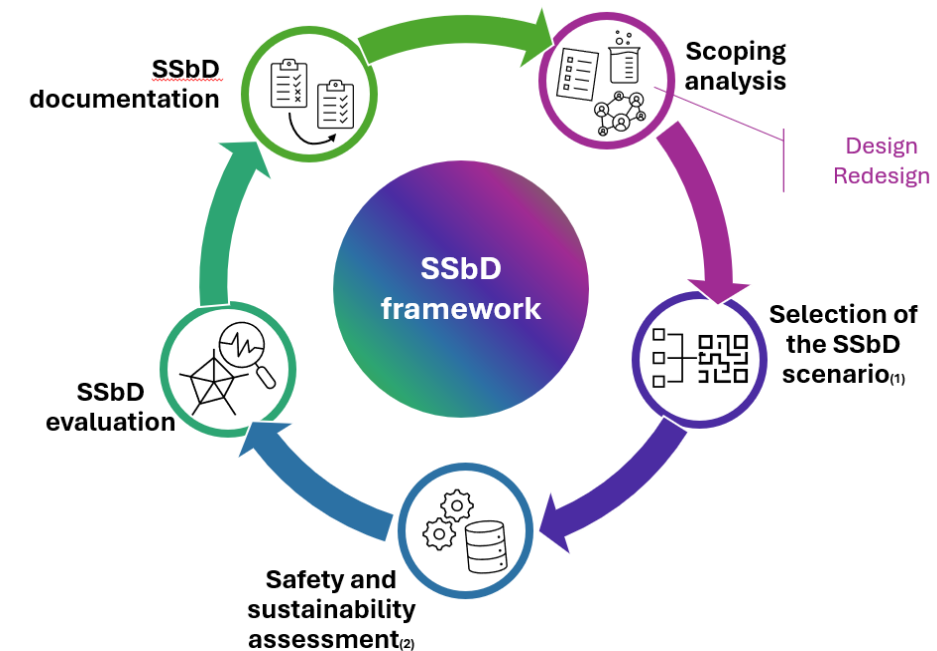
- **Corporate Sustainability Reporting Directive (CSRD)** (Directive 2022/2464)
 - European Sustainability Reporting Standards (ESRS)
- **Directive on Corporate Sustainability Due Diligence (CSDDD)** (Directive 2024/1760)
- **Forced Labour Regulation** (Reg. 2024/3015)
- **Sectoral legislation** requiring due diligence on batteries, conflict minerals, deforestation-free supply chain.
- **Competitiveness Compass** (incl. innovation, strategic dependences, etc.)

Evolution: socio-economic assessment in SSbD

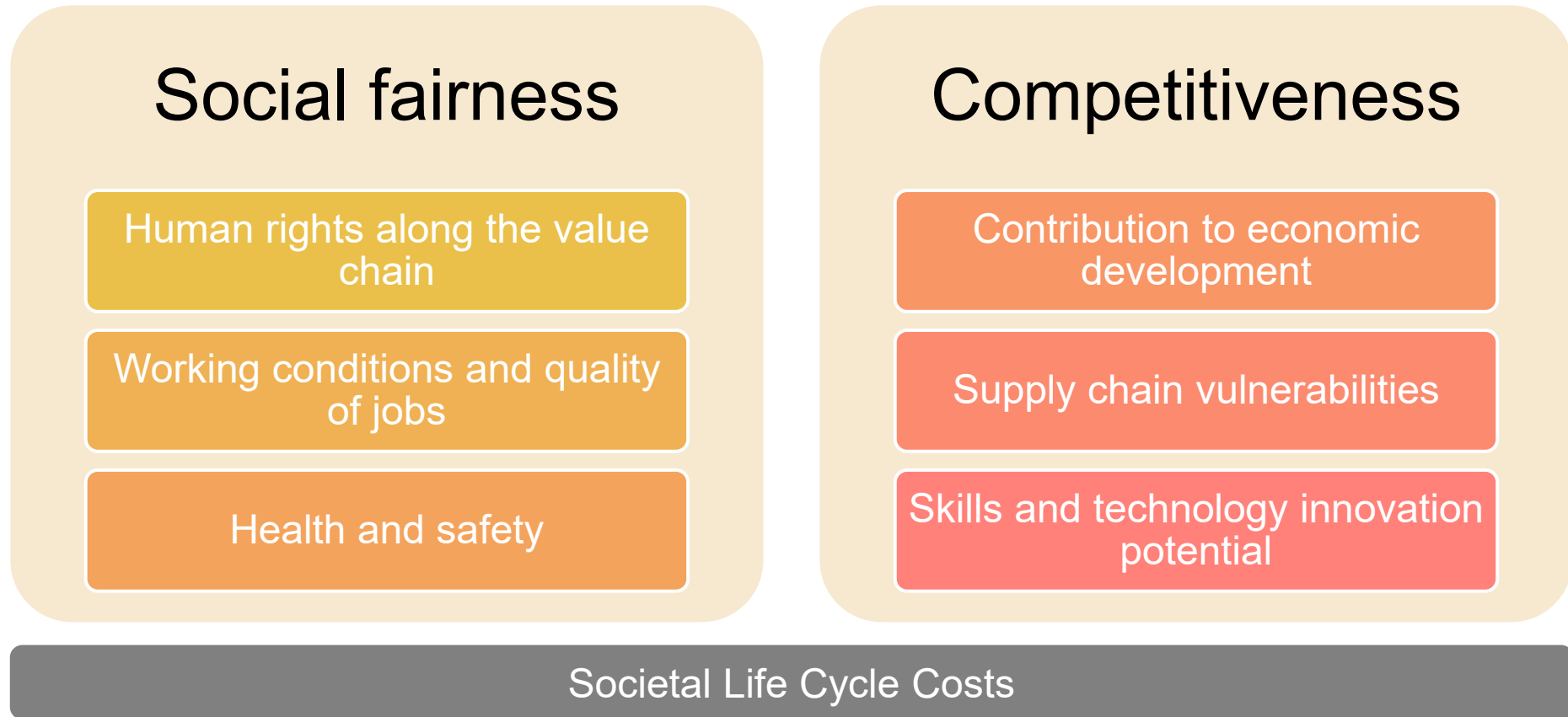


Objectives of socio-economic assessment (SEA) in SSbD

- Complements the safety and environmental assessments with **social fairness** and **competitiveness** considerations
- Promotes innovation through more **resilient** and **sustainable value chains**
- Provides **complementary information** for comparing alternatives and identifying potential **trade-offs** between safety, environmental and socio-economic performance.
- Supports **early-stage decision-making**, helping innovators & managers to identify aspects that require further investigation, as the technology develops.
- Raising **awareness** of potential risks embedded in the value chain for business-to-business (B2B) and business-to-consumer (B2C) relations and communication
- Facilitates information sharing and **transparency** along the value chain



Pillars and socio-economic aspects in SSbD



Methodologies used for the socio-economic assessment

1. Simplified Social Life Cycle Assessment (S-LCA)

Socio-economic risks and opportunities along the value chains



- UNEP 2020 Guidelines
- ORIENTING project outputs
- ISO standard ISO 14075:2024

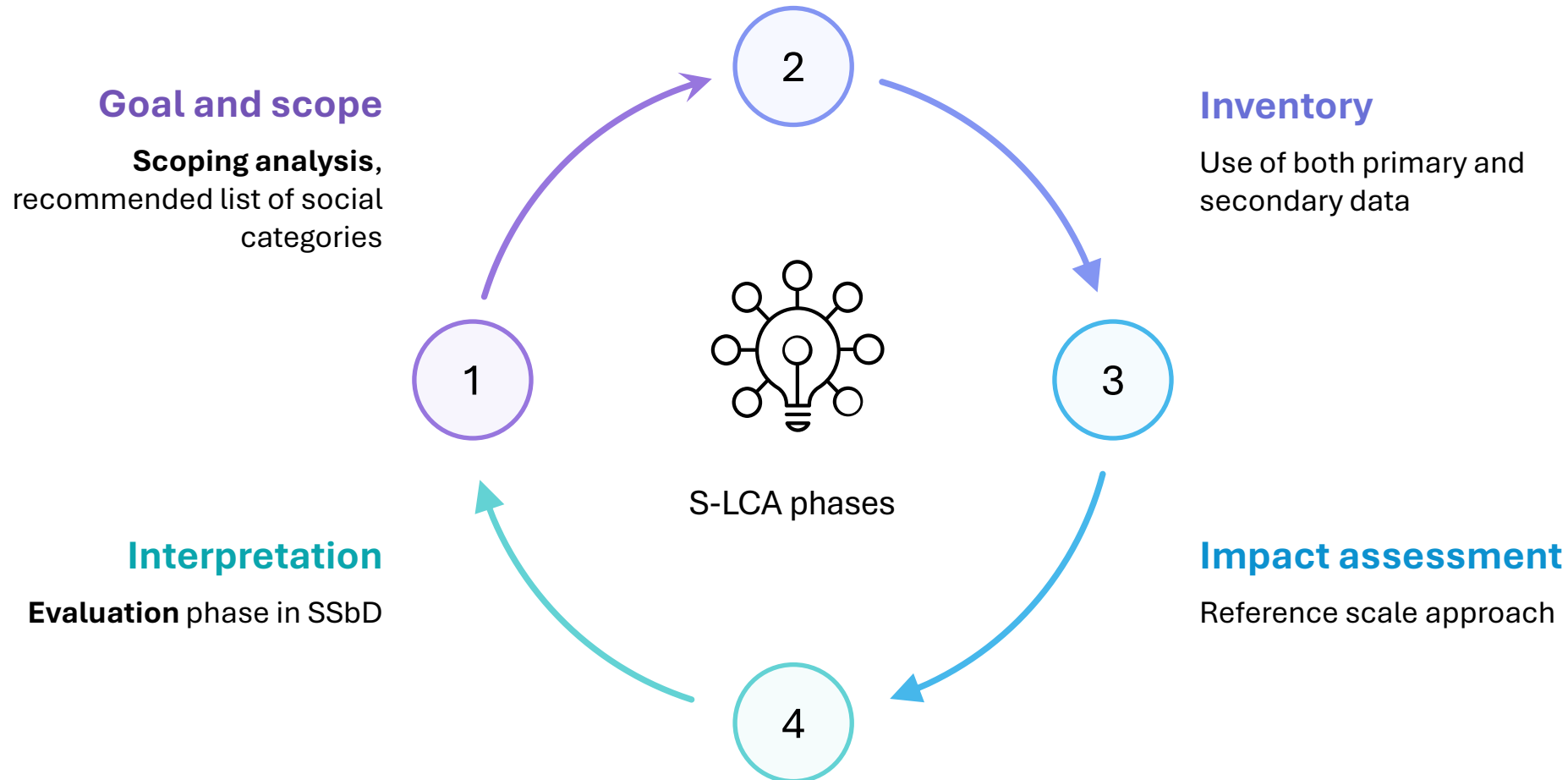
2. Flagging of Critical Raw Materials along the life cycle

Identification of **vulnerabilities** along the value chains

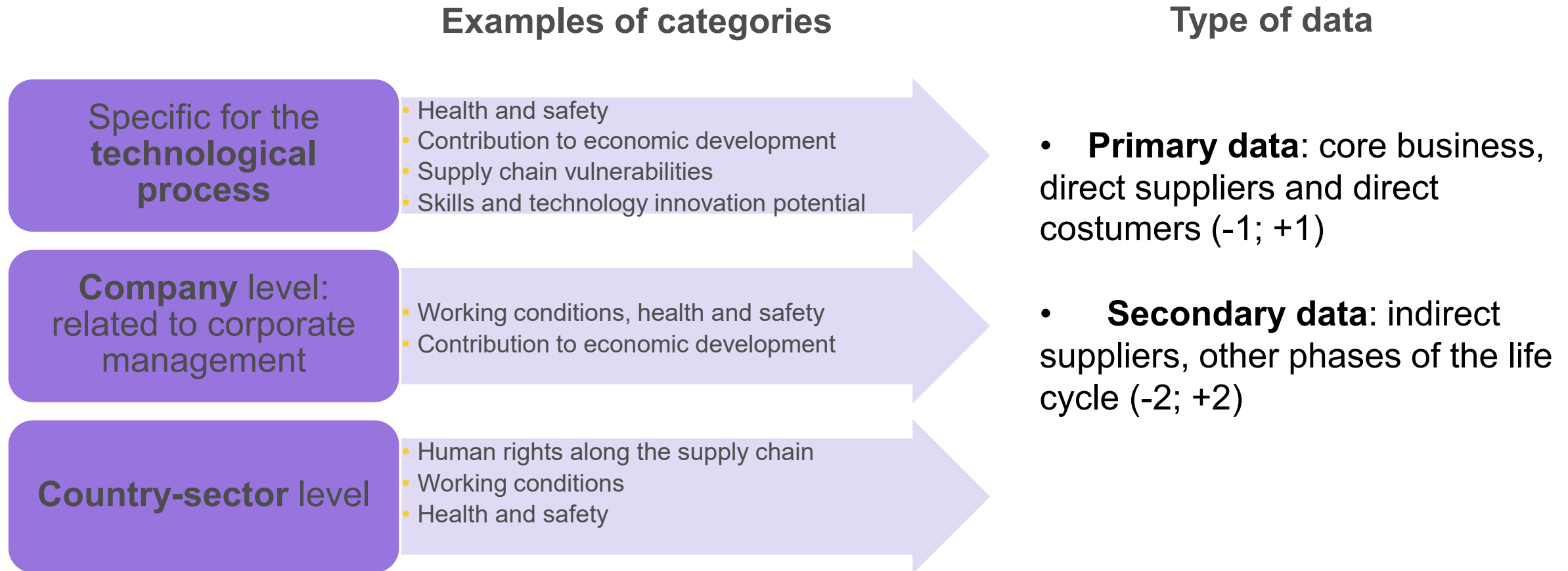
3. Monetisation of externalities

Consider **societal costs** in the comparison of options

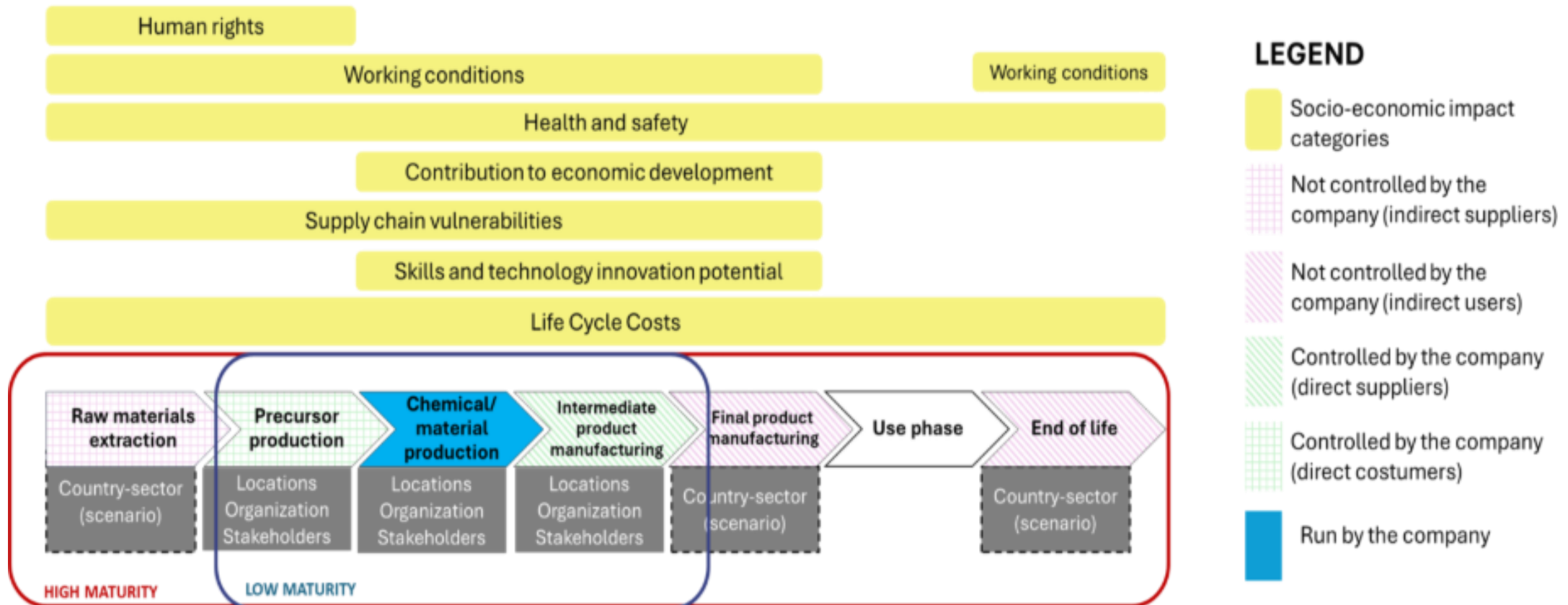
Phases of Social LCA and adaptation in SSbD



Socio-economic aspects and level of application



Application of the Socio-Economic Assessment at low TRL



Level of application of each impact category considering the life cycle of a chemical/materials and the maturity of the innovation

Source: authors' elaboration

Conclusions: key updates on the Socio-Economic Assessment in SSbD

- SEA is an integral part of the **EC Recommendation 2026** and the related revised framework
- Better **integration** with the other parts of the framework, e.g. in the scoping and evaluation phase
- List of recommended **impact categories** updated and aligned with the new policy priorities
- Inclusion of **positive aspects** and possibility of assessing potential handprints: e.g. in terms of skills development and innovation potential

Thank you



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Session 3- SO-LCA and product S- LCA as complementary approaches across the innovation cycle

Gabriela Munares
Kveloce



SSbD in Horizon Europe R&D projects

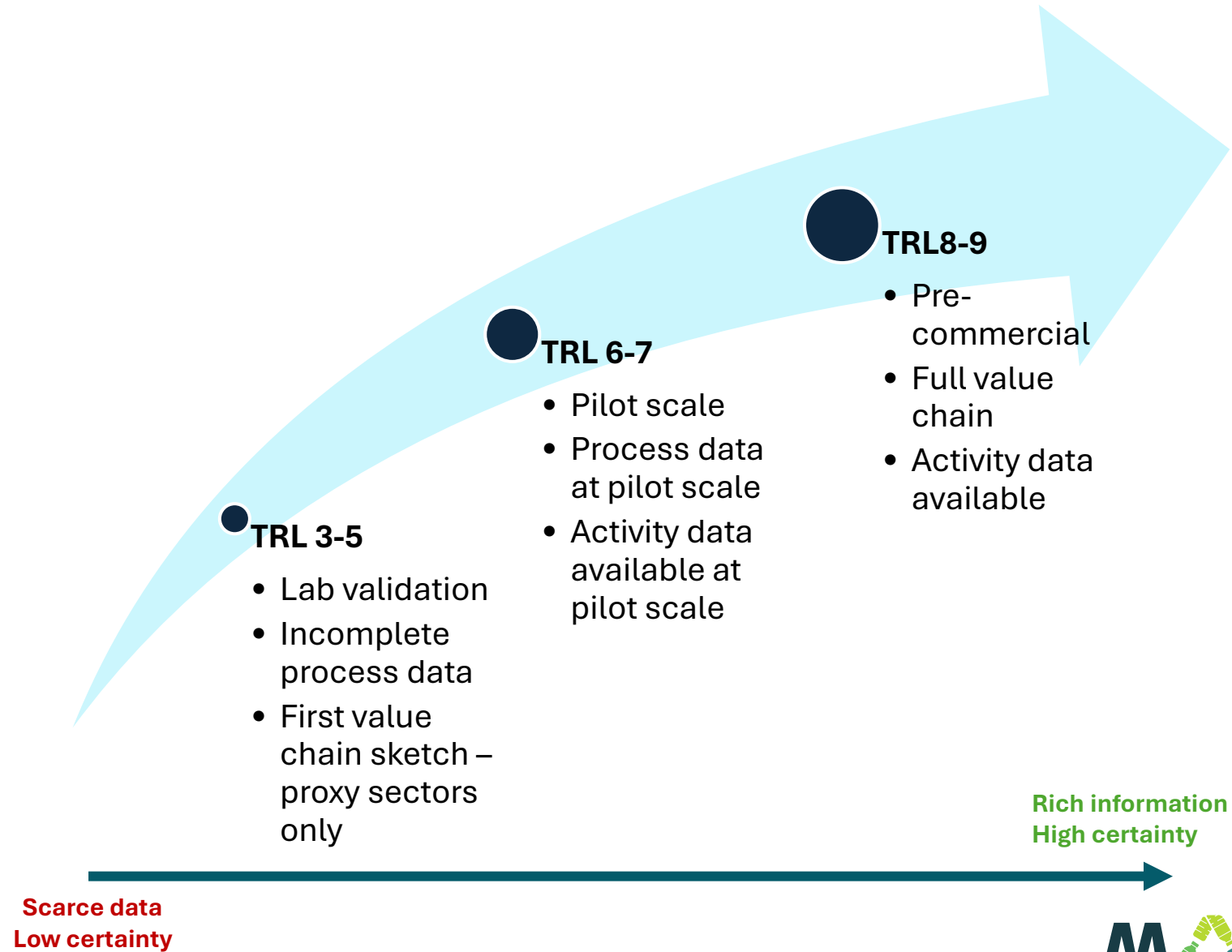
What SSbD requires

- Life cycle-based evaluation across 4 dimensions: including social sustainability
- Iterative assessment across the innovation cycle
- Comparison against a reference system or benchmark
- Actionable recommendations to inform (re)design decision

The challenges

- Projects usually start at low TRLs
 - Nascent value chains
 - Process parameters still undefined
 - Activity data (hours of work, volumes) unavailable
 - The product itself may change before commercialisation

Information Grows, uncertainty shrinks across innovation cycle



Social dimension: additional challenges

Less methodologically mature	S-LCA methodology is younger and less standardised Fewer validated tools, databases and sector specific benchmark are available
Heavy reliance on secondary data with significant limitations	Available databases aggregate risk data at broad sector level, which cannot capture the specific practices of individual organisations or the realities emerging in new sectors
Social aspects are context-specific and hard to quantify	Social risks depend on country, sector and organisational practices simultaneously. A high-risk flag for a country-sector pair does not mean all organisations in that sector behave the same way
What methodology to use?	JRC Guidance orients towards product-level S-LCA, but this is not always feasible, opening the door to discuss other alternatives
What to measure?	Social aspects are highly diverse, and so are the indicators used to measure them. Unlike environmental LCA, there is no standardised indicator set for S-LCA — practitioners must define what to measure and how, which adds methodological complexity and limits comparability across projects.



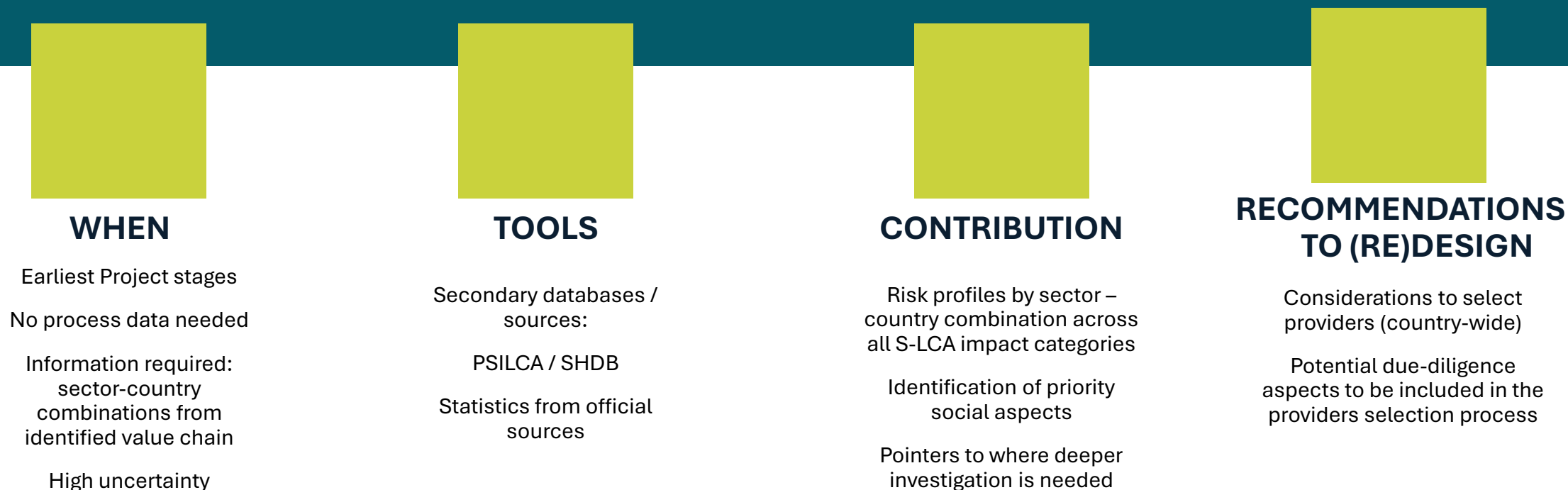
STARTING POINT

Social Hotspot screening with secondary databases

The first step any project can take



Step 0 - Hotspot screening: knowing where to look



Limitation: data are aggregated at sector level — they indicate where risk may exist, not whether it does in your specific value chain.

Going beyond screening:

TWO
COMPLEMENTARY
APPROACHES

SO-LCA
Organisational
approach

S-LCA
Product-level
approach

Approach 1:

Organisational S-LCA (SO-LCA)



WHEN

- At least some of the organisations currently participating in the project belong to the industrial sectors that will form part of the future commercial value chain
- Limited product-specific data available (activity data: workforce-hours per phase)
- High uncertainty
- Typically TRL 4 – 6



TOOLS

- Primary sources
- Questionnaires
- Organisation public documents (CSR Report, Annual Report)
- Customised indicators based on hotspots identified in the screening phase



CONTRIBUTION

- Moving from broad sector level to organisation-specific reality
- Focus on the actual relevant risks
- In-depth data on actual organisational practices



RECOMMENDATIONS TO (RE)DESIGN

- Improvement recommendations for current partners (identify gaps, suggest specific improvements)
- Baseline for continuous improvement: documented baseline that can be monitored and updated in successive assessment cycles
- Social requirements for future supplier/partner selection (minimum social criteria, due diligence process)

Approach 2:

Product-level S-LCA



WHEN

- Production processes are better defined
- Material inputs are clearer
- Activity data across life cycle stages begin to be available (workforce-hours per production phase, or volume of material processed per unit)
- Typically TRL 5 – 6 onwards



TOOLS

- Primary sources / Questionnaires + Activity data weighting system → product level scoring, higher detail, no benchmarking
- Secondary sources – PSILCA/SHDB + Activity data weighting system → product system scoring, enables benchmarking



CONTRIBUTION

- Reveals not only where social risks exist, but where they have the greatest impact across the life cycle
- Enables scoring
- Partial comparison with market alternatives where sector-level public data are available — full benchmarking remains constrained by data accessibility



RECOMMENDATIONS TO (RE)DESIGN

- Prioritisation of redesign across the life cycle: by weighting social risks by their phase contribution, it becomes possible to rank which parts of the value chain deserve the greatest attention
- Partial benchmarking against market alternatives: where public data exists that allow building the value chain sketch and weighting to extract information from PSILCA.

SO-LCA and Product S-LCA as a cumulative strategy

	SO-LCA (TRL 4 – 6)	S-LCA (TRL 6 – 9)
Unit of analysis	■ Organisation	■ Product system
Results reflect	■ Mean organisational risk within system	■ Social risk profile of the production system
Focus on	■ What is really happening? Due diligence processes to be introduced	■ Where does it matter most? Prioritisation of redesign efforts across the life cycle
(Re) design Recommendations	■ Improvement recommendations at organisational level Social requirements for future supplier selection	■ Conclusions on benchmark comparison (where data allow) Identification of phases where mitigation is most critical

Thank you for your attention.

Gabriela Munares

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Panel Discussion - **Sustainability** Assessment as a Driver for Acceptance and Behaviour Change



Gabriela Munares

Sustainability life-cycle assessment as a driver for acceptance and behaviour change



Lucia Mancini



Jutta Hildenbrand



Giulio Bracalente



Alejandra Pita



Maite Ferrando

Sustainability Assessment as a Driver for Acceptance and Behaviour Change

What makes sustainability assessment results credible and meaningful to consumers and end users? And what currently gets in the way?

Sustainability Assessment as a Driver for Acceptance and Behaviour Change

**How do we reduce the complexity of technical results without losing methodological integrity?
Where is the line between simplification and oversimplification?**

Sustainability Assessment as a Driver for Acceptance and Behaviour Change

What can existing digital platforms and dashboards teach us about making sustainability assessment results accessible, what works, and what does not?



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QUESTIONS & ANSWERS





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