

HACKTEX VIRTUAL TRAINING MATERIALS

ADVANCED TEXTILES MANUFACTURING INDUSTRY

Learning unit 5: Issues related to the sustainability of functional and smart textiles

Lesson 3

Ecodesign for smart textiles

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ECODESIGN FOR SMART TEXTILES

LU5.3



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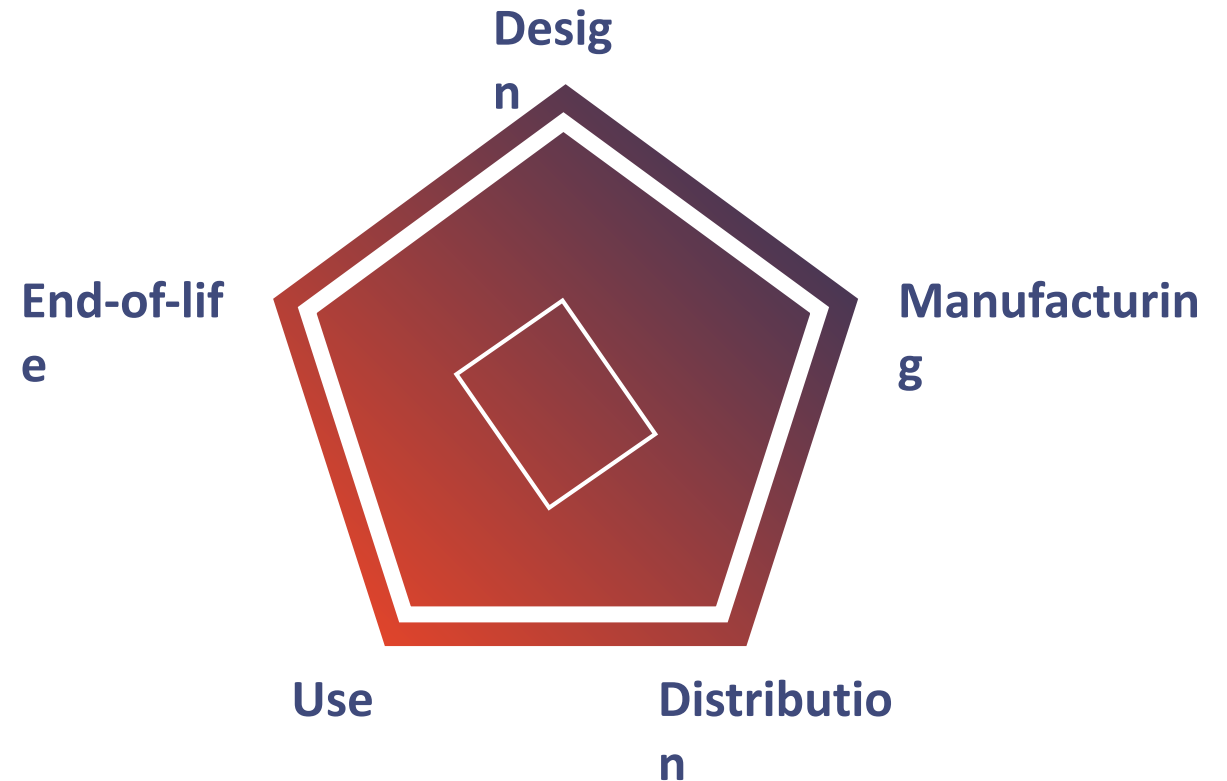
1. ECODESIGN CONCEPT

Ecodesign concept

- The lifecycle of a product can be simplified to 5 phases
- The ***materials, energy and resources*** to be consumed, and the ***hazardous substances and wastes*** to be generated during the lifecycle are **indirectly set during product development.**

Ecodesign concept

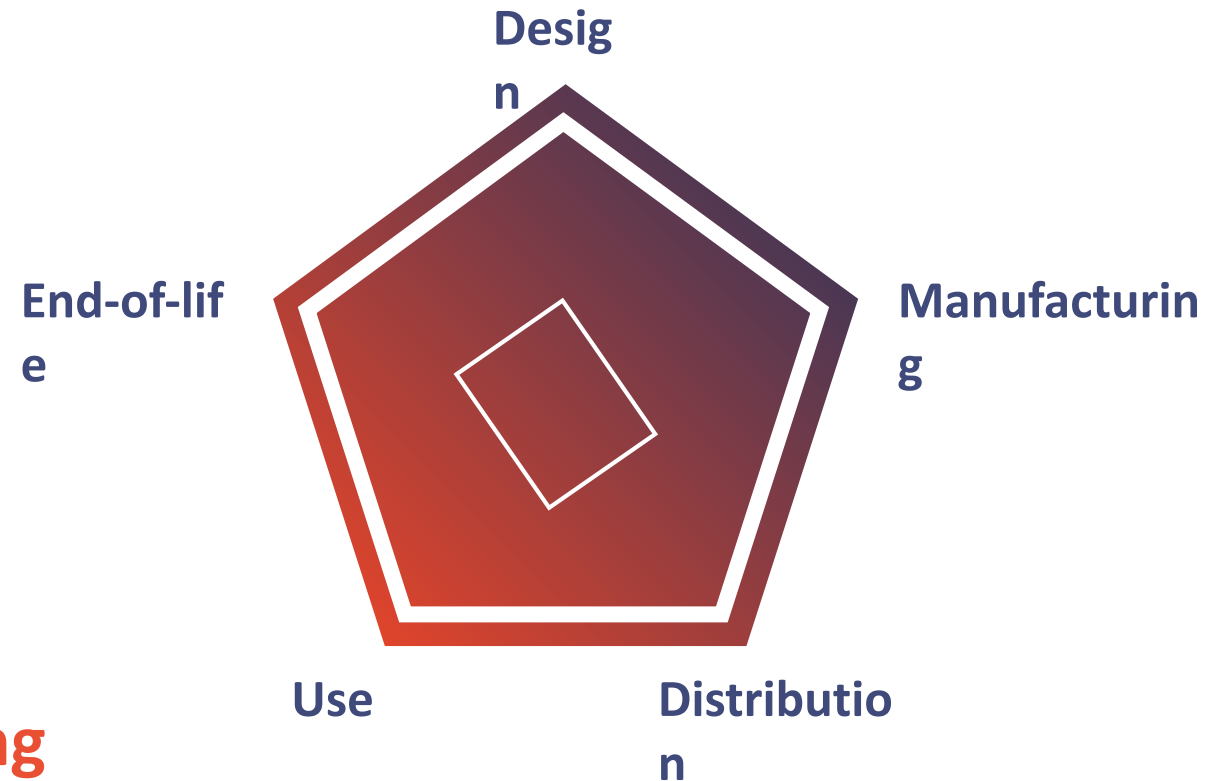
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80% of the impacts of a product are determined during the design phase



Ecodesign concept

Ecodesign

Process of designing products with sustainability in mind, considering the entire lifecycle

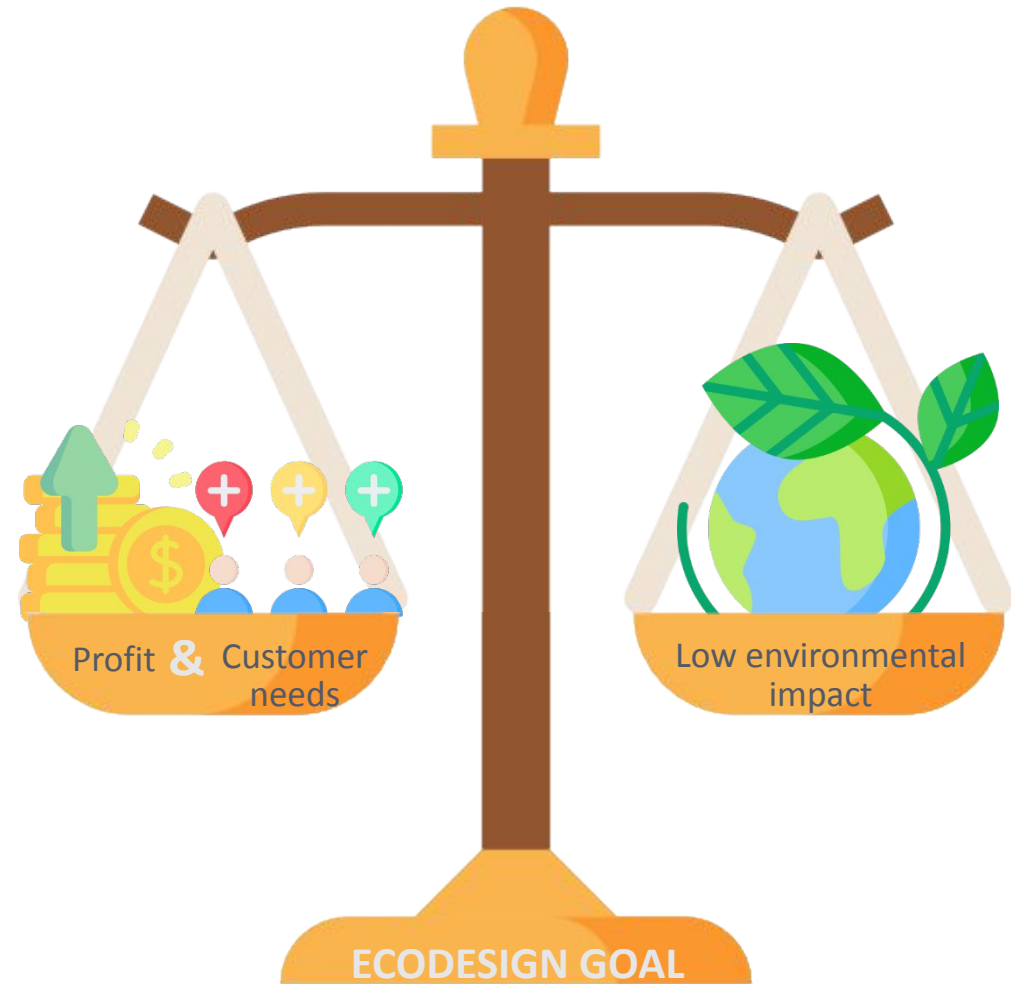
- *From:* raw material extraction and production
- *To:* use, disposal, and potential reuse or recycling.

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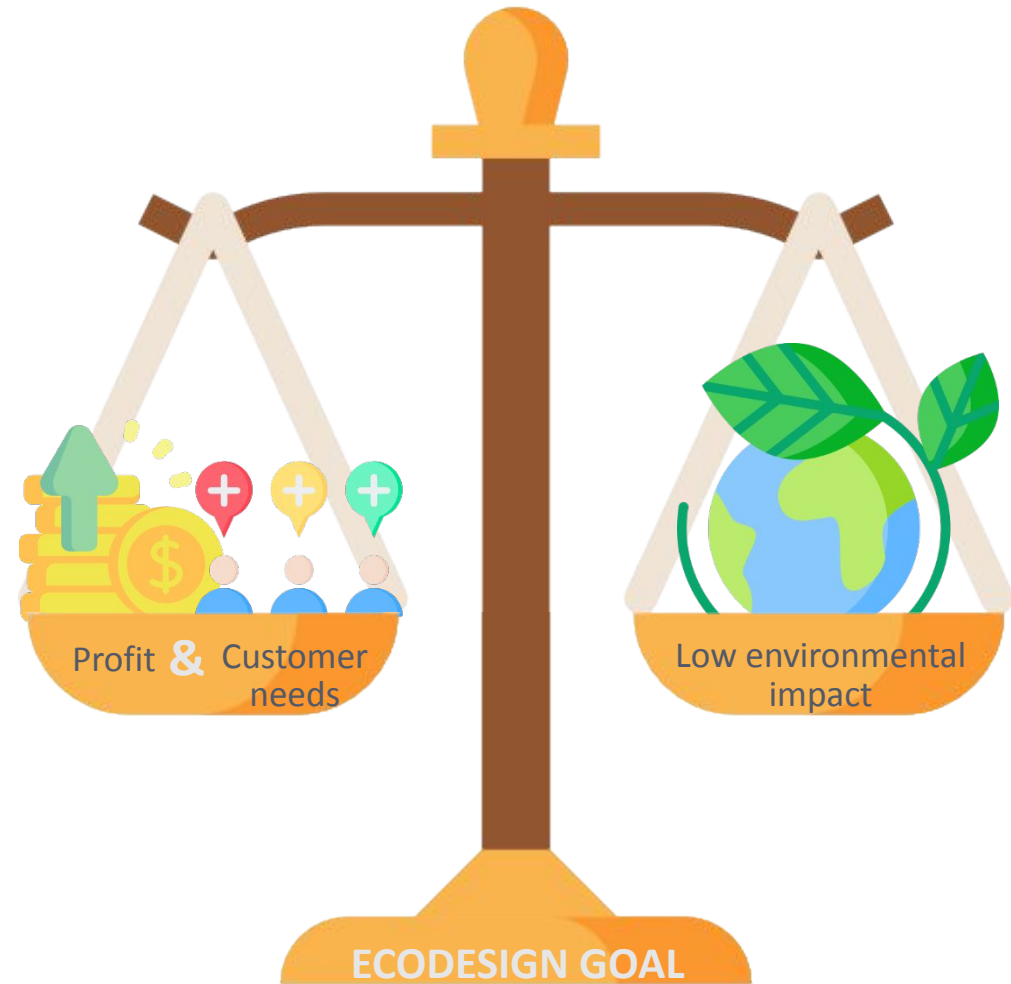
Ecodesign concept

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European Union has been at the forefront of promoting ecodesign principles and policies

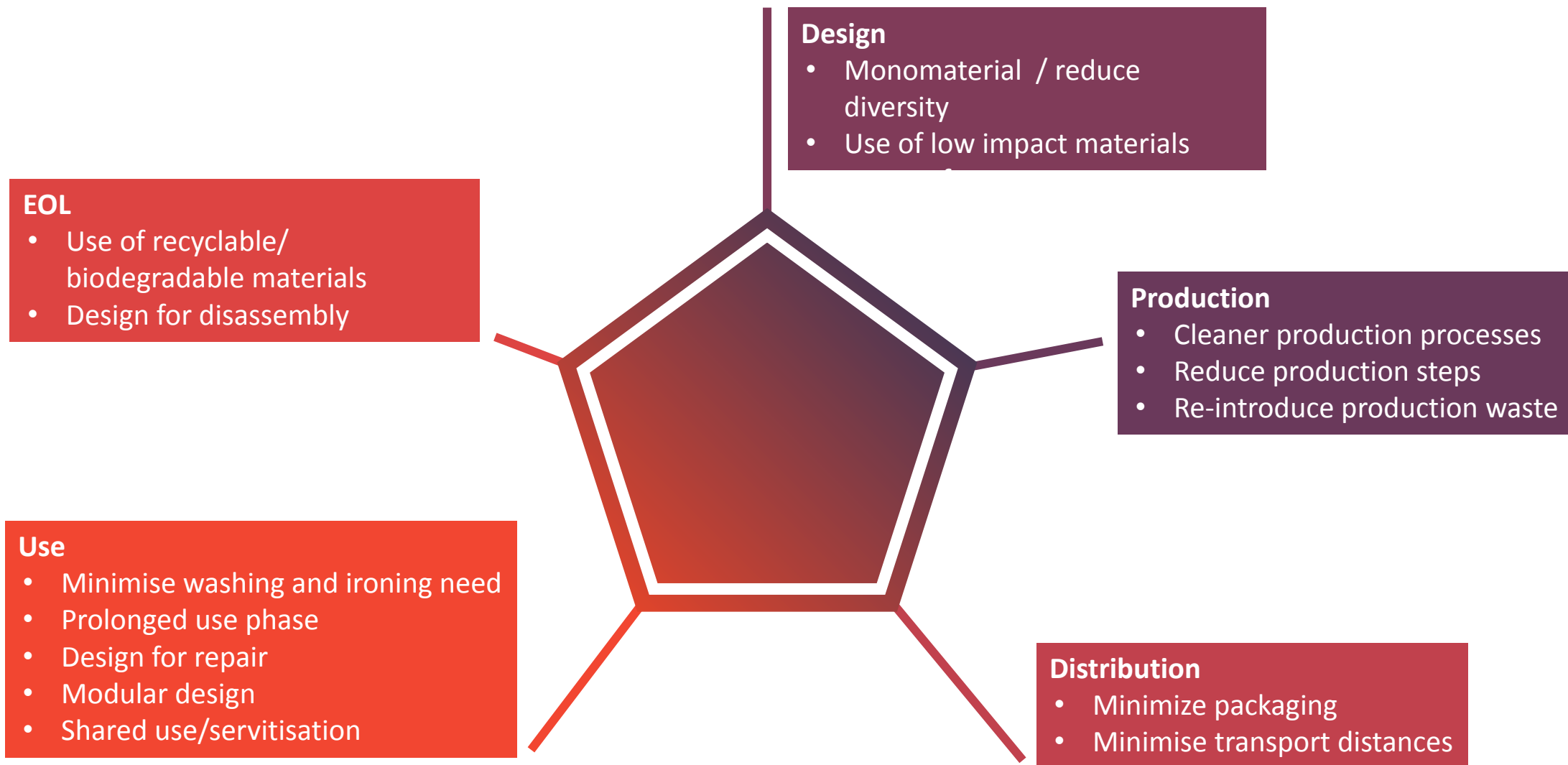


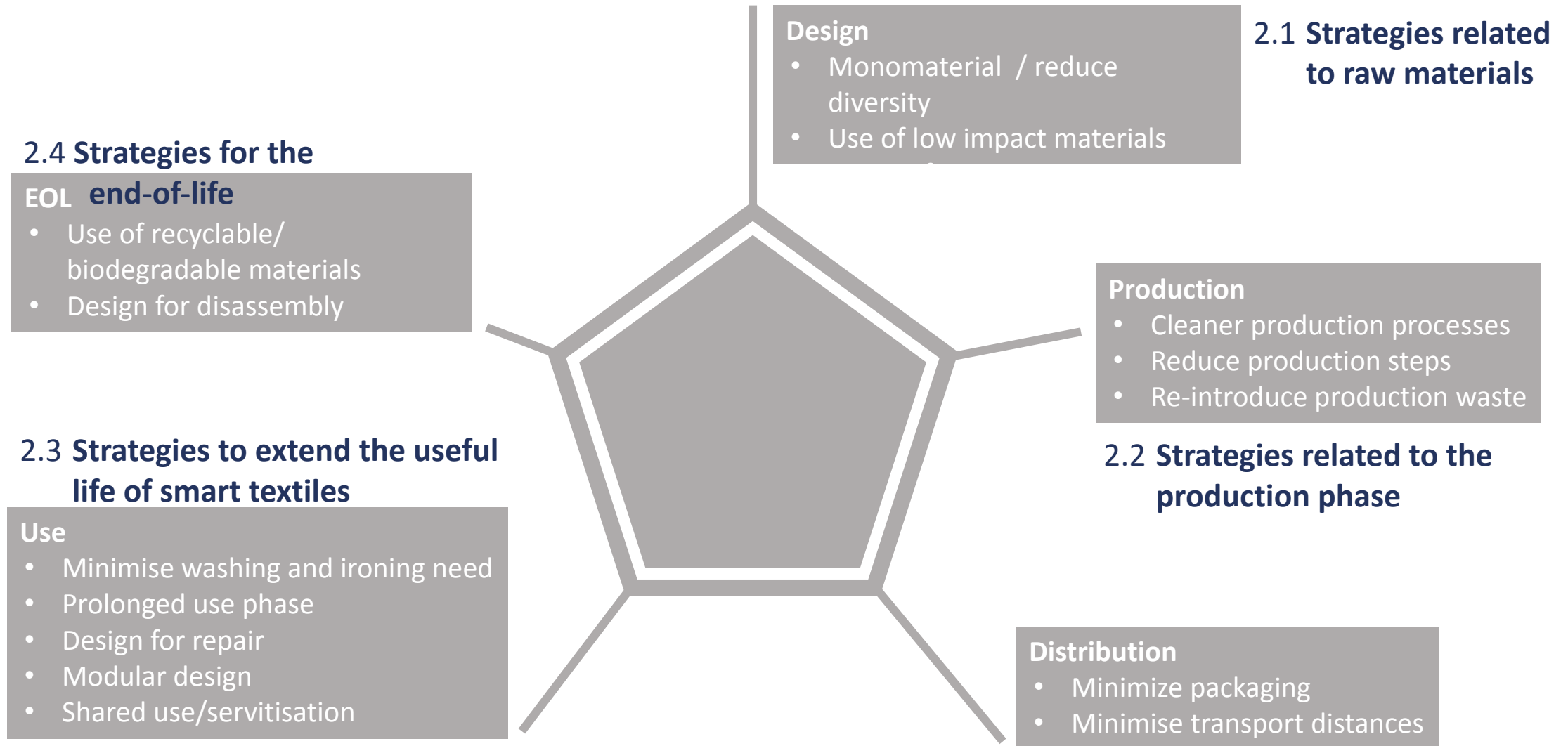
2. ECODESIGN STRATEGIES



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2.1. USE OF LOW-IMPACT RAW MATERIALS: MATERIALS SELECTION

Ecodesign strategies related to raw materials



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Materials selection

I. Optimal **material efficiency**:

- economizing the scarce raw materials application
- using lightweight materials
- avoiding excessive decorative layers

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- III. Minimize **material diversity**.

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The selection of raw materials for smart textiles must contain a wide diversity of criteria of *performance, aesthetics, and environmental, technical and manufacturing parameters.*

2.2. LOW-IMPACT PRODUCTION: PROCESSES SELECTION

Ecodesign strategies related to production phase



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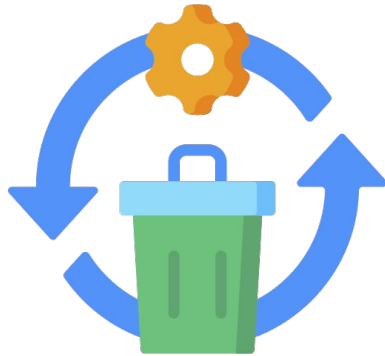


Processes selection

- **Minimisation of production waste**
- **Reduction of production steps**
- **Use of green/cleaner production processes**

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2.3. STRATEGIES TO EXTEND THE USEFUL LIFE OF SMART TEXTILES

Ecodesign strategies related to use phase

Extending the useful life

- Because of their complexity, smart textiles present high economic and environmental costs.
- Extending their service life allows reaching a more sustainable production and avoids waste accumulation.

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Design for reparation



Servitisation



2.4. END-OF-LIFE

Ecodesign strategies related to the end-of-life phase



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Design for disassembly

- Designing products that, at the end of their useful life, their **parts can be easy to dismantle**.
- To minimize waste and environmental impact by making it **easier to recover and reuse valuable resources from products**.
- Separating parts or components promotes their possible **reuse, recycling or** appropriate **waste management** routes.



3. TOOLS FOR ASSESSING THE SUSTAINABILITY OF SMART TEXTILES



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Aim of **ecodesign strategies**



reduce or minimize the environmental impact

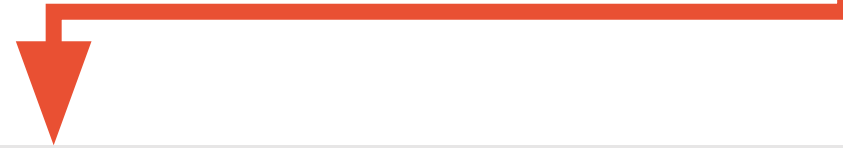
Aim of **ecodesign strategies**

=

reduce or minimize the environmental impact

BUT...

...how to evaluate?



Need to have tools for an objective evaluation,
quantifying the impact in multiple categories and
comparing various alternatives to decide

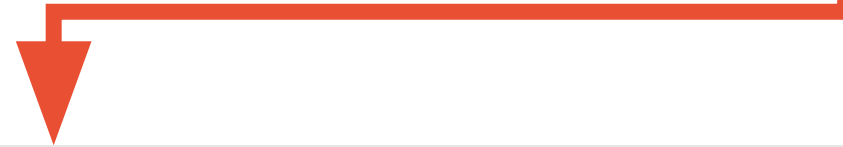
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Most common tool: **Life Cycle Assessment (LCA)**

Life Cycle Assessment (LCA)

- Methodology used to evaluate the **environmental impacts** of a product throughout its lifecycle

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Goal and Scope
Definition

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Inventory
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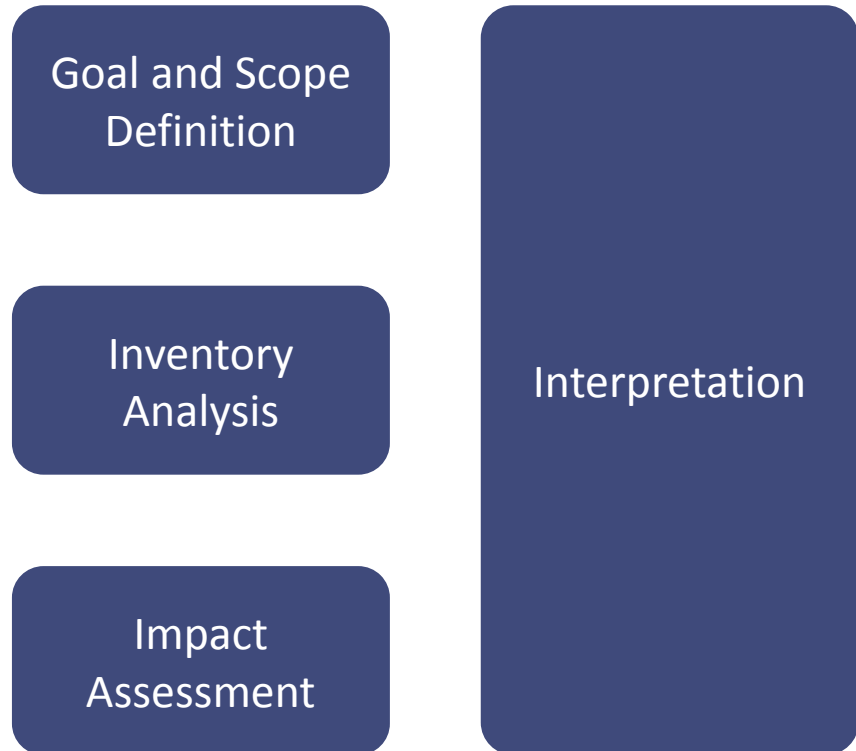
Goal and Scope
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Impact
Assessment

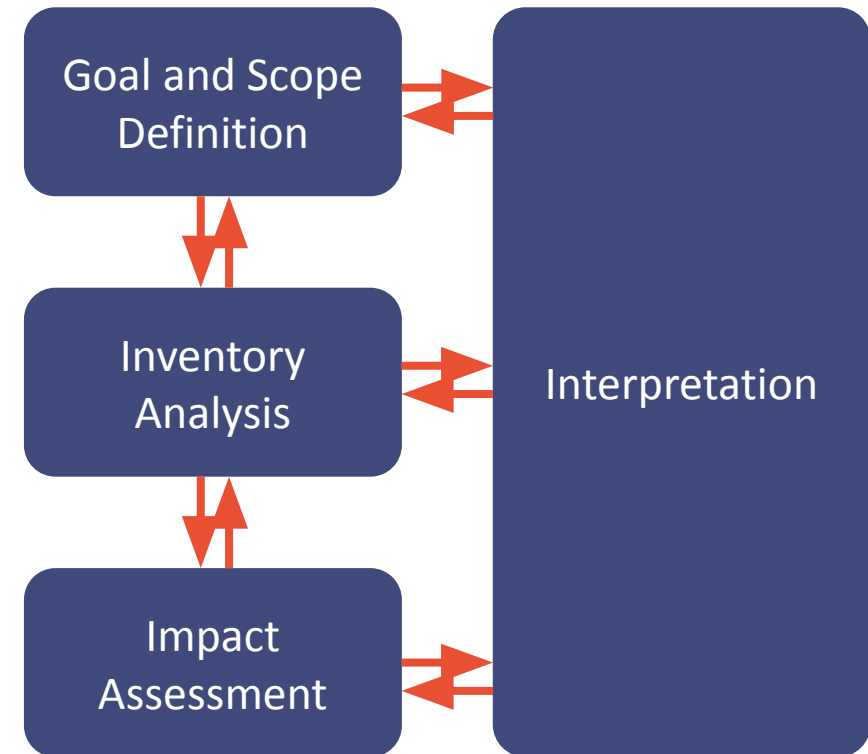
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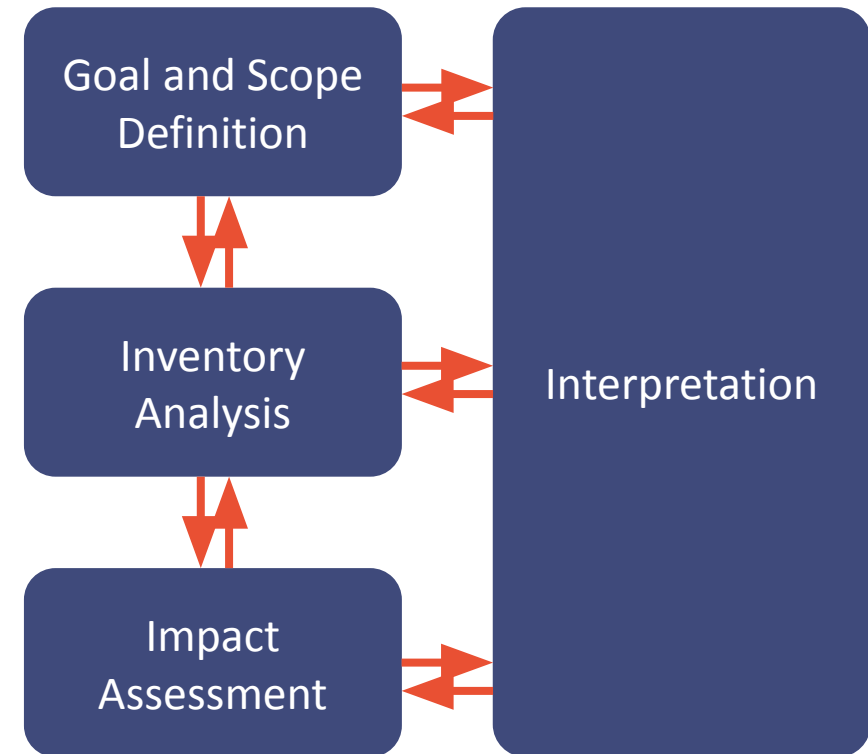
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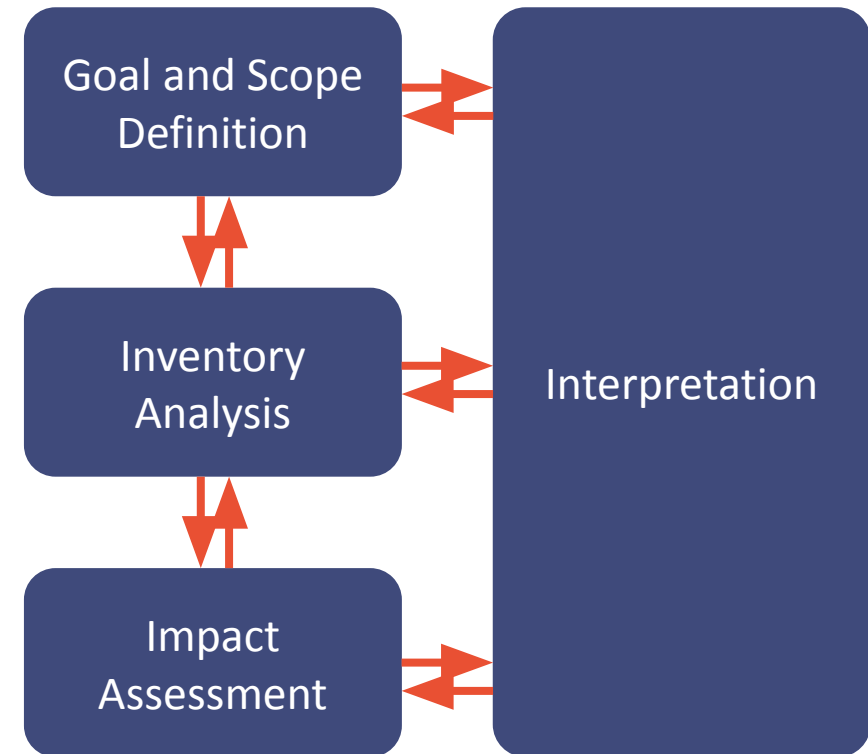
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Life Cycle Assessment (LCA)

- Methodology used to evaluate the **environmental impacts** of a product throughout its lifecycle
- LCA can reach:
 - Comprehensive **evaluation of environmental impacts** (multiple impact categories)
 - Identification of **potential improvement** opportunities
 - Quantitative basis for **comparative** of environmental performances



Life Cycle Assessment (LCA)



Cons

Pros

--	--

Life Cycle Assessment (LCA)



Cons

- Requires specialized expertise and knowledge
- Time- and resource-consuming data collection
- Difficulty to compare results from different studies
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LCA studies provide valuable insights and information for the development of more sustainable products

Summary

In this lesson you have reviewed:

- The concept of ecodesign and its relevance towards the development of sustainable smart textiles.
- The overall ecodesign strategies that can be applied in the five main phases of the products life cycle.
- The Life Cycle Assessment (LCA) methodology as a tool to quantify and characterise the environmental impact of smart textiles.

Partners:



UNIVERSITAT POLITÈCNICA
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