JESPER JERLANG

# Standardization on design for circularity

Dansk Standard webinar 2023-05-26

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# Sustainability manager in Aasted

## Aasted manufactures equipment for the chocolate industry

Member of:
S-611 Miljø og cirkulær økonomi
S-1000/U05 Cirkulær økonomi

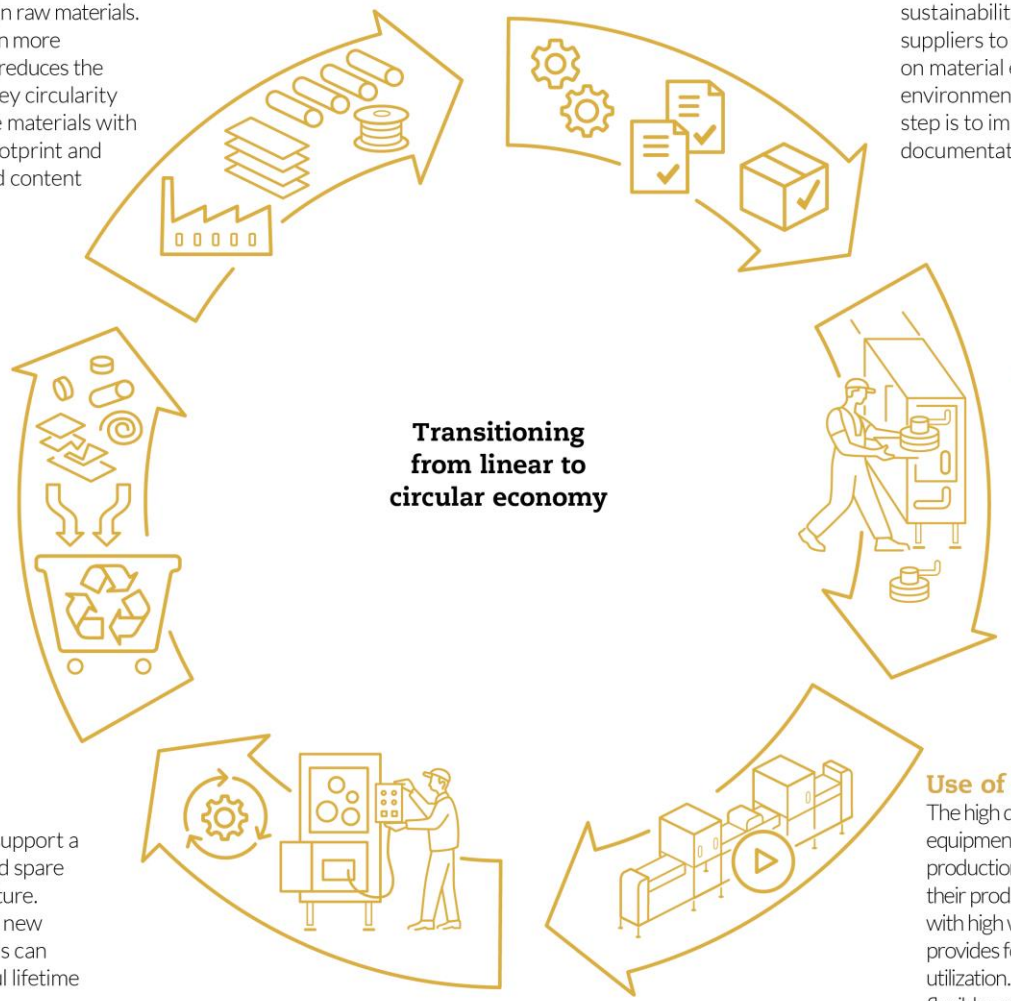
Convenor of:
IEC/TC 111/WG 20 Design for circularity

- MAY 2022-
PLATINUM Top 1%
2022
ecovadis
Sustainability Rating

# Paving the way to a low-carbon circular economy

### Raw materials
A key element in a circular economy is to minimize the usage of virgin raw materials. Product design focusing on more ligthweight constructions reduces the material consumption. A key circularity initiative will be to source materials with smaller environmental footprint and higher degree of recycled content

### Parts manufacturing
We select suppliers based on sustainability ratings and work with suppliers to support their progress on material efficiency and reduced environmental impact. An important next step is to improve the traceability and documentation of used resources




### End of life
Most of our machines can be easily dismantled allowing materials to be recycled. A sizable proportion of our machines are made of pure metals, which are both easy and economically profitable to recycle. By providing recycling instructions, we may increase actual recycling, and product design must focus on removing barriers to recycling such as surface treatment, adhesives and additives

### Assembly at Aasted
We already work with waste management to retain the value of all recyclable waste materials. Further efforts will be made to reduce the waste and improve the sorting for recycling

### Extended service life
We offer extended services to support a longer lifetime such as repair and spare parts, upgrades and remanufacture. We are currently exploring how new product-service business models can improve sustainability and useful lifetime

### Use of sold products
The high quality of our machines and equipment generally helps customers limit their production waste, as our machines allow that their products are produced uniformly and with high weight accuracy. The high quality also provides for a long lifetime and high degree of utilization. Product development with focus on flexible use may further increase utilization

Each of the life cycle phases are affected by the design

More than 80% of a products' environmental impact is determined in the design phase

# Standardization on design for circularity

IEC/TC 111 Environmental standardization for electrical and electronic products and systems
WG 20 Design for circularity considerations

CEN/CENELEC JTC10 Material efficiency aspects for Ecodesign
WG 8 Design for circularity

# IEC TS 63428 - Guidance on material circularity considerations in environmentally conscious design

This TS will build on IEC 62430 Environmentally conscious design

Out for CD enquiry until 14 July. Expects formal vote end of 2023 and publication early 2024

The document describes principles and provides guidance on how to embed material circularity aspects into the design and development of products

Content:

- Terms and definitions
- Principles of material circularity
- Guidance for integrating material circularity aspects during design and development
- Trade-offs between different ecodesign measures

# TS 63428 – Material circularity principles

3 guiding principles:

**Narrowing resource flows:** aimed at using fewer materials or other resources per product

**Slowing resource flows**: through the design of long-life goods and product-life extension

**Closing resource loops:** through the use of recycled, reused, and renewable content,


**Figure 2 – The material efficiency hierarchy**

# TS 63428 – Guidance for the products' life phases

**Value proposition creation** – how to include circularity in value propositions

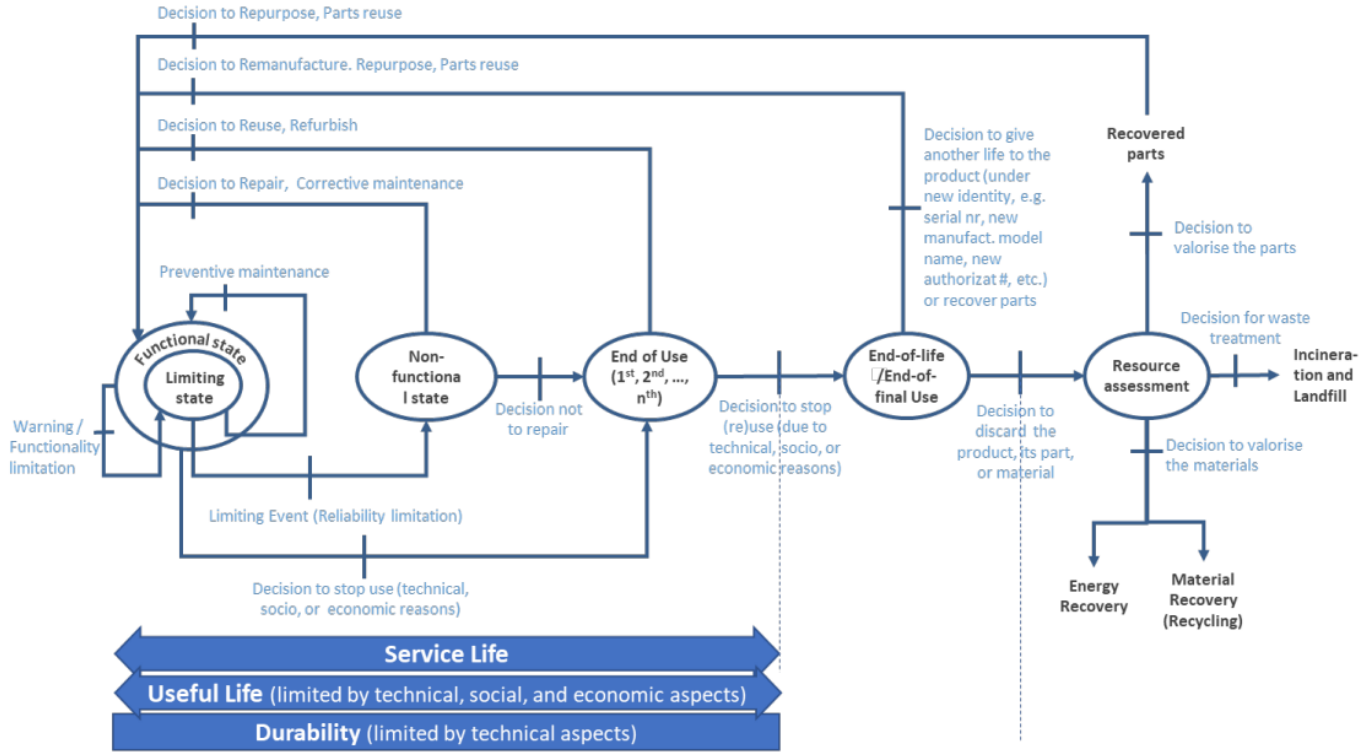
**Material selection** – how to support narrowing, slowing or closing the loops

**Manufacture** – how to avoid waste

**Distribution and installation** – how to avoid early ageing

**Use** (maintenance, repair, upgrade, reuse and refurbishing) – how to support durability

**End-of-Life** (remanufacture, repurpose, recovery and disposal) – how to support closing the loops



# EN 45560: Method to achieve circular designs of products

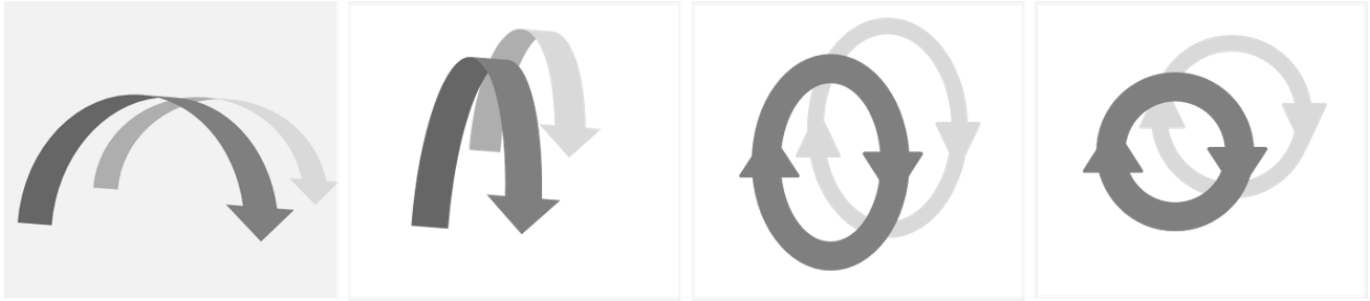
The document will be out for enquiry from July. Expected to come to voting Q2 2024 and publication end 2024

Scope:

This document proposes **a method to define circular products design rules**. It details principles, requirements and guidance associated with the proposed method. This document:

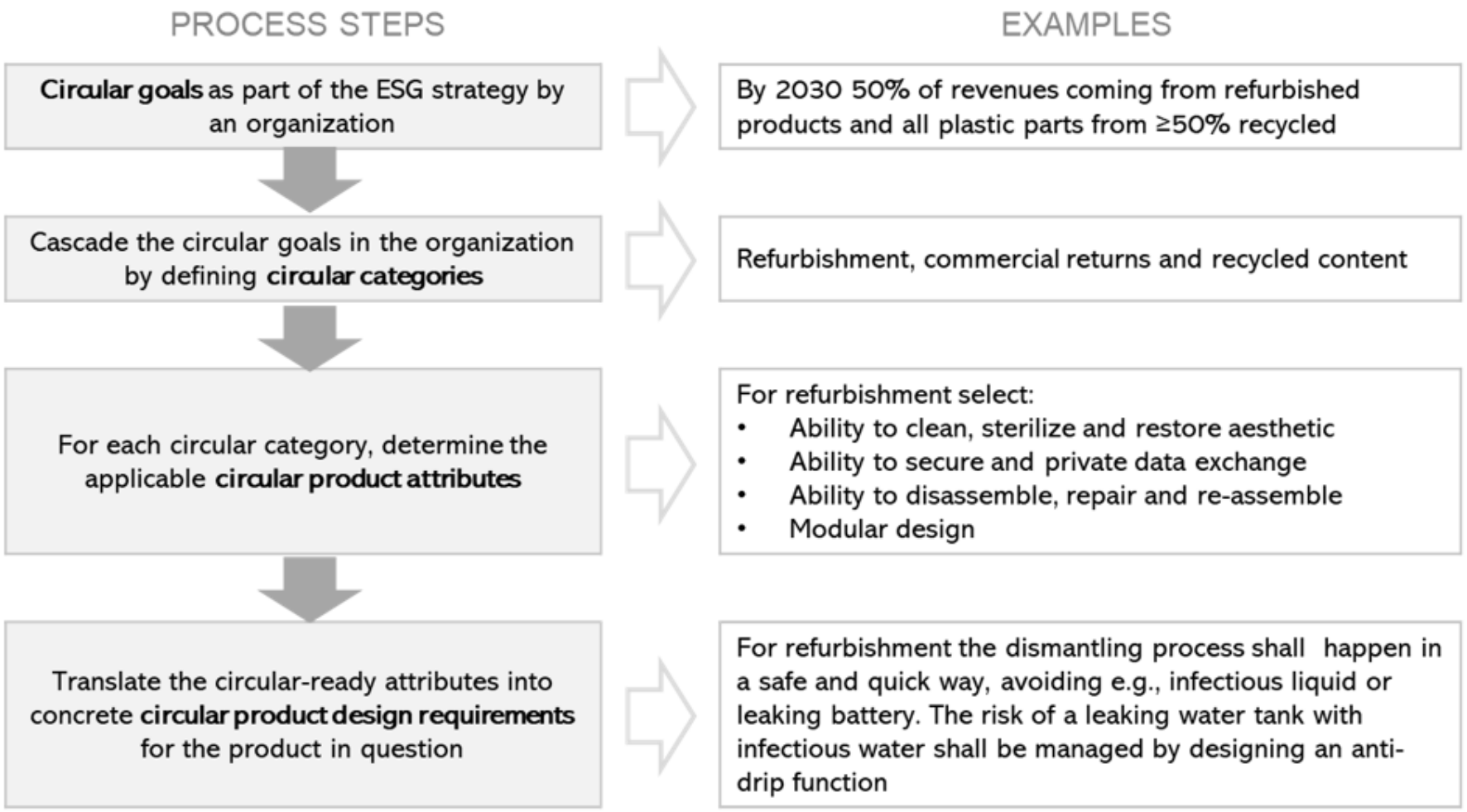
- specifies requirements and guidance for integrating circularity into the design and development process of products by an organization.
- supports organizations to develop product design rules to fulfil their chosen circular categories (e.g., the circular business models chosen by the organization or the legislation requirements).

# EN 45560 - Principles

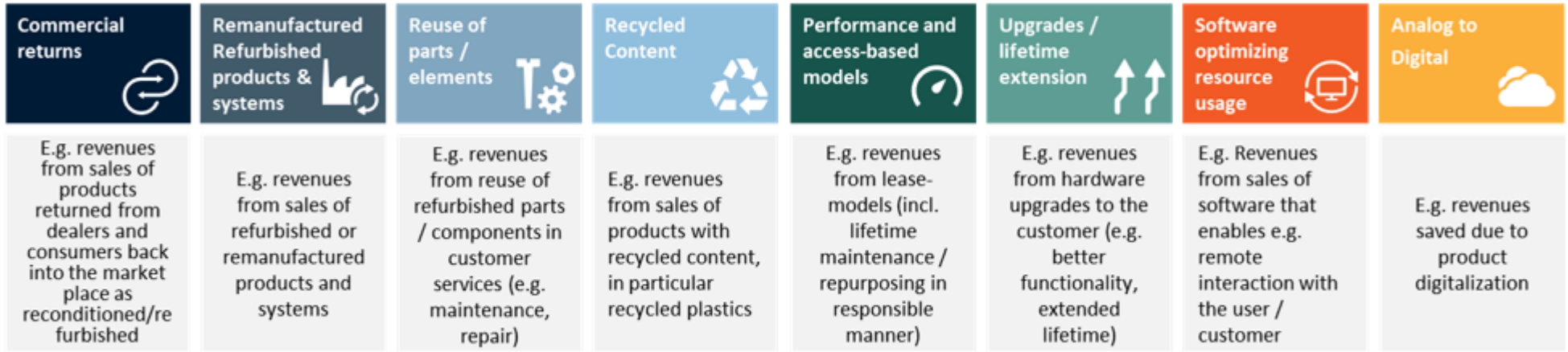


| LINEAR FLOW | NARROWING FLOWS | SLOWING FLOWS | CLOSING FLOWS |
|---|---|---|---|
| We take materials, make products and dispose them when they become obsolete | This principle is aimed at using less resources to make and use a product | This principle is aimed at long product lifes, slowing down the flow of materials from initial production up to post-use | This principle is aimed at closing the loop between post-use and production, resulting in a circular flow of materials |

# The circular product design process for implementation



# Circular categories as the entry




Circular categories can be either:

- A circular design strategy
- A circular business model
- An area of action

# Assessing product circularity through circular product attributes

| User safety or security | Functional Performance | Obsolescence / Lifetime | Material Stewardship |
|---|---|---|---|
| *identifying, analyzing and preventing errors that lead to adverse events* | *refers to the capacity of the material to fulfil its requirements in the specific device application* | *refers to the time and state in which a piece of technology or product ceases to be useful, productive, or compatible* | *embodies the range of activities required for optimal and appropriate use of minerals, metals and other (natural) resources in society* |
| 1. *Ability to clean, sterilize and restore aesthetic state*<br>2. *Ability to guarantee digital security*<br>3. *Ability to operate safely when given longer lifetimes* | 4. *Ability to assess and track performance*<br>5. *Ability to disassemble and reassemble*<br>6. *Ability of users to accept used products* | 7. *Forward and backward compatibility and use of standardized parts*<br>8. *Modular design*<br>9. *Product durability and reliability (including parts, components, and materials)*<br>10. *Potential for adaptability and flexibility*<br>11. *Potential for product attachment and emotional durability by users* | 12. *Use of non-toxic and sustainable materials*<br>13. *Potential for materials to be separated and recycled*<br>14. *Potential for material minimization*<br>15. *Potential for digitalization* |

# Supporting questions to determine circular product requirements

| Circular product attributes | Design questions | Description, guidance, examples | Circular product design requirements |
|---|---|---|---|
| **1. Ability to clean, sterilize and restore aesthetic state** | 1.1. Will the end user be confident that the product has a high quality of hygiene? | A product expressing a high quality of hygiene is essential to a sharing model<br>It is also important to ensure the end-user of the product's cleanliness. E.g., the packaging states 'This product has been controlled to have the same hygiene standard of a new product" | Product-specific or product-group requirements shall be applied |
| | 1.2. Will the product withstand many cycles of cleaning and sterilization? | Product looks and functions expressing a high quality is essential to achieve end user acceptance. 'Age with grace' is necessary | Product-specific or product-group requirements shall be applied |
| | 1.3. Will the dismantler be protected from contagious or hazardous content? | It is important that the dismantling process happens in a safe and quick way, avoiding e.g., infectious liquid or leaking battery. E.g., A leaking water tank with infectious water could be designed with an anti-drip function | Product-specific or product-group requirements shall be applied |
| | 1.4. Will the dismantler be able to disinfect the product with standard tools and methods | Using standard tools reduces throughput time for service. E.g., disinfection liquid + cloth, autoclave | Product-specific or product-group requirements shall be applied |
| | 1.5. Is the product designed so it maximizes cleaning efficiency? | Smooth surfaces with no/few gaps or ridges accumulate less dirt. E.g., design all buttons as foil buttons | Product-specific or product-group requirements shall be applied |
| | 1.6. Is a long life ensured by 'age with grace' materials? Also, after some physical damage? | It is necessary to include in the design aesthetics that product looks good after use, also considering potential damages. E.g., scratches on a leather backpack | Product-specific or product-group requirements shall be applied |

# A circular product design matrix

aasted

| | CIRCULAR CATEGORIES | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Use less<br>Narrow the material flows | | | | | Facilitate reuse<br>Slow down the material flows | | | | | | Use again<br>Close the material flows | | |
| CIRCULAR PRODUCT ATTRIBUTES | Physical to Virtual | Multiple functions | Lease & Share | Use less materials | Longer Life | SW update | HW maintenance | HW or SW Upgrade | Repair | Refurbish | Reuse | Remanufacture | Parts recovery | Recycling & recycled content |
| 1. Ability to clean, sterilize and restore aesthetic state | | | | | | | | | | | | | | |
| 2. Ability to guarantee digital security | | | | | | | | | | | | | | |
| 3. Ability to operate safely when given longer lifetimes | | | | | | | | | | | | | | |
| 4. Ability to assess and track performance | | | | | | | | | | | | | | |
| 5. Ability to disassemble and reassemble | | | | | | | | | | | | | | |
| 6. Ability of users to accept used products | | | | | | | | | | | | | | |
| 7. Forward and backward compatibility and use standardized parts | | | | | | | | | | | | | | |
| 8. Modular design | | | | | | | | | | | | | | |
| 9. Parts durability and reliability | | | | | | | | | | | | | | |
| 10. Potential for adaptability and flexibility | | | | | | | | | | | | | | |
| 11. Potential for product attachment and emotional durability by users | | | | | | | | | | | | | | |
| 12. Use of sustainable materials | | | | | | | | | | | | | | |
| 13. Ability for materials to be separated and recycled | | | | | | | | | | | | | | |
| 14. Potential for material minimization | | | | | | | | | | | | | | |
| 15. Potential for digitalization | | | | | | | | | | | | | | |

High relevance  Some relevance  Minor to no relevance