

LAST CANVAS PRINCIPLES AND GUIDELINES

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1. Introduction

This report is intended to guide the use of the Certified to LAST canvases.

The concept of LAST establishes the fundamental content, trust and structure of an information system needed to verify the promises and claims about individual product's circularity, durability, and sustainability. This refers to claims about the product's durability lifetime, accessibility to affordable service and spare parts, resource efficiency, and other sustainability claims about the materials and resources. These claims are classified into four groups, Long lifetime, Accessible service and spare parts, Sustainable materials and life cycle, and Transparent information, abbreviated into L, A, S, and T, and integrated into a certified market competition platform called Certified to LAST (see Figure 1).

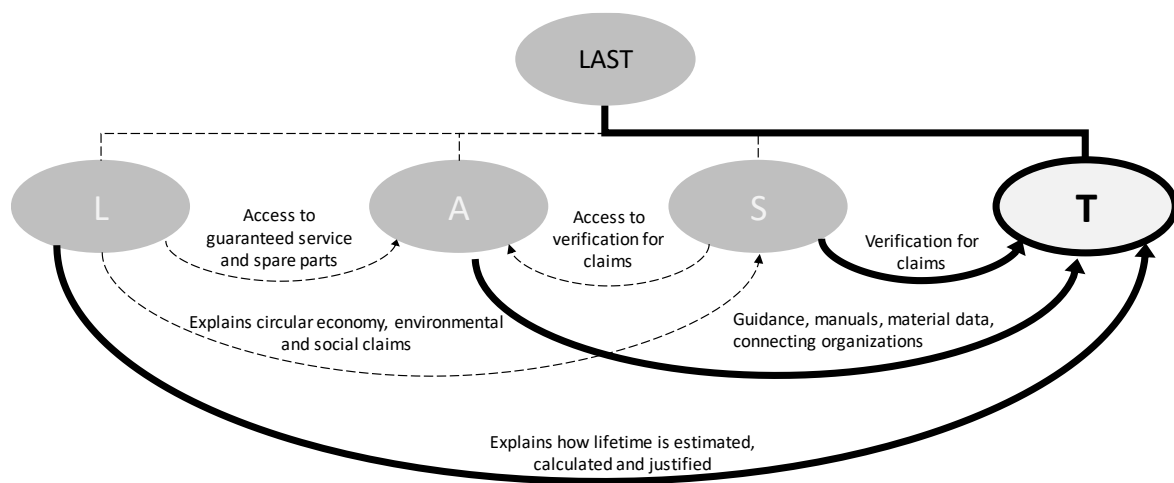


Figure 1. The role of (T)ransparency in a verified circularity product declaration based on (L)ong lifetime, (A)ccessible service and spare parts, and (S)ustainable materials and life cycle.

The bold black arrows in Figure 1 show how the different claims, statements, and data references made concerning Lifetime, Accessibility, and Sustainability are all represented and realized through an IT system named T (traceability):

- **L:** Long lifetime is verified by T—how the lifetime is estimated, calculated, and justified; by A—how access to guaranteed service and spare parts is ensured; and by S—what explanations of economic, social, and other sustainability claims exist about the product.
- **A:** Accessible service and spare parts are verified by T—access to guidance, manuals, material data, connecting organizations, and other data that verify and enable maintenance to achieve the claimed and promised lifetime and durability.
- **S:** Sustainable materials and life cycle are verified by T—access to relevant information trails, digital product passport, LCA studies, ecolabel certificates, and other information that can verify statements about the economic, social, and sustainability factors of products and how they are sustainably used, maintained, scrapped, made circular, etc.

- T: Transparent information holds the verifications in the form of contents (or verifiably secured access to the contents), verifiability requirements of the structure of the content, and the actual verification process(es) needed to ensure the credibility of the claims and promises.

LAST is developed in parallel with that the European Commission's implementation of the Circular Economy Action Plan and the Proposal for Ecodesign for Sustainable Products Regulation. It is therefore expected that much of what may be considered too demanding and difficult to establish with regard to Certified to LAST will soon be part of European legislation. This concerns data sharing, the verifiability of claims, and commonplace customer awareness of circular economy, repairability, and durability of products.

To verify how a producer achieves the physical enablers of a claimed lifetime, the Certified to LAST system includes a number of canvases that are used to map the lifetime and sustainability weaknesses of the product as well as how these weaknesses are handled with regard to accessibility to all the relevant and claimed information, such as, for example, the product lifetime risks canvas. In this canvas, weaknesses with regard to the product's ability are mapped through a combination of assessing the failure statistics, how old products turn up at service stations, the reasons for guarantee claims, and interviews with users, as well as the different sorts of failure mode risk assessments, etc.

The LAST canvases are intended for setting the combined lifetime and sustainability criteria for products. In order to customers be able to compare product lifetime and sustainability between products, it is necessary to have comparable criteria for products that provides the same functionality and that are similarly designed. Such equal and similar products are grouped into well-defined product categories, within which product lifetime and sustainability can be compared.

2. Principles

LAST Canvases are based on principles needed to support verifiability of claims underlying a Certified to LAST certificate.

Note: When beginning to work with the canvases on a certain product many of the needed facts are not yet known or well-established. The canvases are intended to support guidance towards selecting which facts to acquire.

2.1. Objectivity

The LAST canvases are intended to get the facts right for a producer who is serious about achieving a verifiable product lifetime. Therefore, statements entered into the canvases need to be impartial and based on best available facts.

2.2. Relevance

The LAST canvases request facts and knowledge from several different information sources and expertise. What to include and not include should be based on an assessment of the significance of the information.

Note: Relevance should be guided by a combination of respect for the customers and for the sustainability impact from the product over its total circular life cycle(s).

2.3. Simplicity

Statements in canvases should be clear, straightforward, and easy to understand. Complex explanations of logic relationships, risk causalities and potential solutions should be handled separate from the canvases.

2.4. Verifiability

Statements made in canvases are supported by empirically supported facts or by transparent risk analysis. Claims about future promises are supported by verifications such as future responsibility agreements and other verifications ensuring how accessibility of spare parts, service and information are secured.

Note: Risk analysis can include, but are not limited to, those associated with:

- a) the objective of the canvas, such as shortened lifetime or sustainability impact risks;
- b) legal, regulatory and liability issues;
- c) risks related to the operating environment, geographic location, etc. of the product;
- d) risk control and improvement opportunities throughout the design, production, supply chain, use, after market etc. of the product.

2.5. Comparability

When canvases are used with the intent to compare lifetime, accessibility, sustainability and transparency claims between different products in the same product category, competence, facts and information should be generated, selected and provided similarly, consistently and with equal measurement units.

3. The layout of canvases

The Certified to LAST canvas system creates a common platform to work practically and concretely with extended life of products. The Certified to LAST system includes four canvases used to map the lifetime and sustainability risks of the product as well as how these risks are handled with regard to accessibility to all the relevant and claimed information.

4. L The lifetime risk canvas

The first risk canvas relates to the assessment of the product lifetime. In the presented canvas, risks with regard to the product's ability are mapped through a combination of assessing the failure statistics, how old products turn up at service stations, the reasons for guarantee claims, and interviews with users, as well as the different sorts of failure mode risk assessments, etc.

The assessment of the product lifetime risks canvas starts with identification of a product (analyzed object itself) and its functionality (set of functions or capabilities of the product) (1). Further, a company needs to formulate a lifetime definition for the analyzed product (2) that should include the lifetime itself, the ways this lifetime is to be reached through, for example, service, maintenance, upgrade etc., and specifies what needs to be accessible in order to uphold this lifetime in a sustainable way.

The next part of the canvas refers to the product specification and constituents. The company looks at the production part and specifies all the components (items considered part of the product), joints (the connection between components in the whole product) and components' functionality (set of co-functions or capabilities of the product) (3) that the product contains and parts that are at risk to be broken. In terms of product materials (4), potential risks should be found in relation to components' materials, which could reduce the durability of the product. Afterwards, the "Wear and aging" part (5) shows how the material is worn until its functionality is lost and evaluates the risks related to surfaces exposed to wear and functionality deterioration over time.

The following part of the canvas analyzes the product's risk aspects that can limit the function and lifespan in the use phase context. The company evaluates any risks related to availability of support system (6) (fundamental resources, such as spare parts, wear parts, available repair service and energy sources) and risks associated with external co-functionality (7) that showed the inability of the product to function together with any external devices.

The user preferences and needs (8), i.e., requirements that add value to a product for a user, also should be assessed as risks. This part not only includes changes in the fashion needs but also new updated ironing technologies that could leave customers reluctant to continue using the same model and instead buy the new, more modern one. The last category (9), newly established legal, regulatory, or technical requirements that prevent the use of this model also need to be taken into account when analyzing the lifetime of the product.

It should be stressed that one may use the same canvas as template to repeatedly describe the lifetime risks to analyze lifetime risks of components and subcomponents etc.

5. A The accessibility risk canvas

The lifetime risk accessibility canvas contains information that should be available for consumers. Based on the lifetime definition that was formulated at lifetime risk canvas (1), a company needs to list all available maintenance documentation (2) necessary to preserve the defined product lifetime as well as detailed manuals on how to perform maintenance. The next category of the accessibility canvas concerns spare parts and their specifications (3), including, for example, addresses to spare parts providers, price in relation to buying a fully new product, manuals for changing spare parts, manuals for handling of recirculation of worn spare parts. Service and dismantling (4) manuals on how to dismantle the product should be available including for non-professional users. Material lists (5) part should include total material scroll as well as materials that are related to dismantling structure to facilitate value preserving material recycling. Regulatory or voluntary environmental (6) and ethical (7) compliance, which the manufacturer company complies with, are also required. An important part is a conscious trade-offs (8) that company consciously makes in order to establish lifetime goals and instead needs, for example, choose less sustainable choice. Since not all materials are durable that can be at the same time sustainable. Any other requirements' specifications for accessibility risks that a company will find relevant can also be listed in the canvas.

6. S The sustainability risk canvas

However, products should not be durable but at the same time unsustainable. Therefore, our next risk canvas relates to product sustainability, in which we look at second life (2) of the product and analyze whether the whole product is intended to be used continuously or its construction parts may be used as spare parts for new products. This also includes to explore other lifecycles of the product (reuse, remanufacture, refurbish, recycle etc.). Since second life is much dependent on internal structure (3) and materials (4), we assess internal structure and materials of the product in terms of their sustainability aspects and identify the model to describe the product life(s) (6): either Circular, Cradle to Circular or Grave by having making life cycle perspective. We also look at the sustainability performance (5) of specific stages of a product lifecycle such as manufacturing, dismantling, refurbishment, and also include recycling potentials and expectations.

Further, the company needs to provide sustainability aspects of the product (6) in use phase (e.g. energy consumption) and sustainability aspects of the support systems (7), such as spare parts of the product. There is a need to assess whether it is possible to create a value of the product beyond functionality, i.e. to use the product in another way than it was aimed to be created. In addition, social aspects of the product in use such as health and safety risks of the product should also be evaluated.

It should be stressed that one may use the same canvas as template to repeatedly describe the sustainability risks. For example, if there is a need to assess a product from the three pillars perspective, one may choose to assess the sustainability aspects of a product by using a copy of the canvas specifically for the environmental risks (for example depletion of resources or biodiversity or contamination of water or air), the social risks (for example child labor, contribution to inequalities or bad working conditions) and the economic risks (for example tampering innovation, cannibalization on alternative more sustainable businesses). One may also use the canvas for each of the 17 Sustainability Development Goals, or one canvas for climate impact risks, one for toxicity risks and one for resource depletion related risks. The user is encouraged to apply any such method that facilitates their work with assessing and acquiring facts and other verifying documents about sustainability risks related to their long lifetime product.

7. T The transparency canvas

7.1. Structured transparency

The last but not least principle is transparency and traceability of provided information about the product. The Figure 2 describes the general architecture of the information system, which provides the transparency and traceability functionality of the Certified to LAST service.

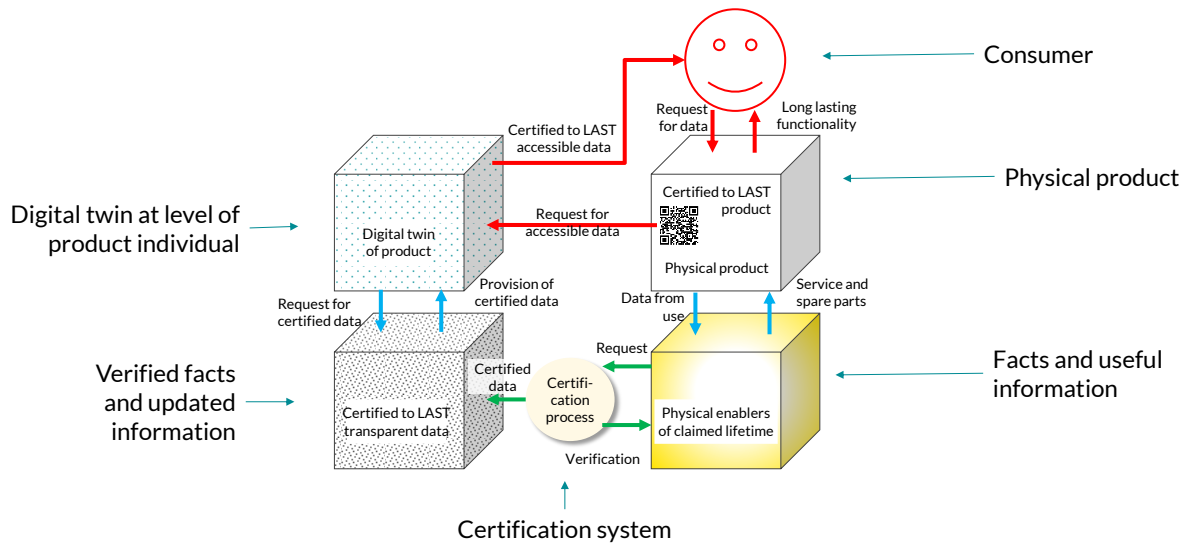


Figure 2. The architecture of the Certified to LAST information system service, which verifies and enables long-lasting functionality.

The red arrow labeled “Request for accessible data” shows how the user acquires access to all the transparent and traceable data provided by the system. The QR code is placed directly on the product itself. The user accesses the information by using a smartphone or another QR code reader on the information represented by the box labeled “Digital twin of product”. If the information is provided by the article number, the information can give much technical support about the product in general, but if the information is provided at the level of an individual product, it can also give information about, for example, the history of ownership, service, quality, and upgrades, as well as individual traceability.

The blue arrow labeled “Request for certified data” points from the box labeled “Digital twin of product” to the box “Certified to LAST transparent data”, and the oppositely directed blue arrow labeled “Provision of certified data” represents how the information is requested and provided via the digital twin of the product from the data storage of the “Certified to LAST transparent data” of the information system to the digital twin.

At the core of the functionality of the information system is the certification process, represented by the green circular “Certification process”, which is initiated by a request for verification from a product producer. When the result of the verification and validation conforms with the requirements of the Certified to LAST criteria for its product category, the product can be supplied with “Certified data”.

The two red arrows pointing to the schematic face at the top of the figure represent the two ways in which the information system supplies services to the user. The red arrow labeled “Certified to LAST accessible data” demonstrates the provision of manuals for handling, care, upgrading, service, recycling, and other information, which, for example, a seller, user, service technician, or recycler needs to realize the full long life of the product and its functionality, as well as the circular lifetime of its components and materials. The red arrow labeled “Long lasting functionality” pointing from the box “Certified to LAST product–Physical product” represents the functional ability of a Certified to LAST certified product to maintain a long product lifetime, mainly through access to upgrades, spare parts, second-hand markets, and addresses to service stations. Since a Certified to LAST product is also designed for sustainability and a circular life cycle, the information regarding the “Physical enablers of claimed lifetime” is also verified with regard to the claimed choice of materials, the potential for recycling, environmental and social life cycle impact.

7.2. Verifications

These data relate to the documents of different kinds that verify different claims of lifetime definition and sustainability impacts, especially with regards to how measures are taken to mitigate risks identified during the analyses of lifetime and sustainability canvases. Examples can be:

For lifetime (relate to section 4):

- Risk exposure test results
- Aftermarket and spare parts partner agreements
- Specifications for future spare parts
- Contingency plans for securing existence of specifications over the whole lifetime

For sustainability (relate to section 6):

- Ecolabels
- EPDs
- Toxicity tests for materials and
- Chemical analysis
- Energy efficiency

7.3. Data accessibility (relate to section 5)

These data are intended to be accessible for different users and other stakeholders throughout the entire lifecycle, in order to secure the lifetime and sustainability claims of the product. The examples of such data can be:

- Service, maintenance and repair manuals
- Affordable parts and service partner contact list
- End of life cycle manual and specifications
- Restart a new life cycle manual and specifications
- Second hand and leasing market gateway

8. Canvas for product category criteria

The canvas for product category criteria is intended to list the verifications needed for qualifying that a product belongs in a specified product category and for verifying lifetime, sustainability, accessibility and transparency claims (see Table 1).

Table 1. LAST criteria template.

Claimed threshold categories	Verified by
Acceptance	
Legal requirements	Legal (nation and domain), verified by compliancy statements
Voluntary fundamental requirements	Such as tested for quality of user interface, ease of disassembly, etc.
Certificate or labels that you have today	Any other voluntary label that are considered hard to achieve, such as Science based target, EPD based life cycle story.
Lifetime challenge	
Challenging lifetime	Expression of prolonged lifetime, such as ‘two times longer than average’
Strategies to improve lifetime challenge	
Improved construction	e.g. more sturdy button or mechanics
Improved choices of materials	e.g. more durable material
Improved lifetime protection of materials	e.g. corrosion protecting surface coating
Improved accessibility to maintenance, service and spare parts	e.g. continuously updated address list of affordable maintenance and service stations and accessibility to spare parts
Improved upgradeability to compatibility	e.g. design prepared for exchanging charging plugs, antennas and for upgrading software.
Improved independence from temporary user preference	e.g. designed for exchangeable appearance, such as shell, cover or applicable decorations
Free from known risk to regulatory obsolescence	e.g. anticipated future regulations are considered during product design
Sustainability challenge	

(Long lifetime must not be reached on expense of the sustainability performance)	
Verifications of consequences of material choices	e.g. REACH data, Circular material choices (bio based, recyclable)
Verifications of consequences of product design	e.g. Life cycle assessment, Material flow cost accounting
Verifications of consequences of system design	e.g. Life cycle assessment, Cradle to circular design
Reduction of health and safety risks	e.g. lower level of chemical content, GOTS certified chemicals, VOC emission certificate
Possibility to use product beyond functionality	e.g. tests for intended 'beyond functionality'
Second life	e.g. proof how the durable product structure can survive several lifetimes, to facilitate refurbishment or remanufacturing
Verifications of consequences of support system	e.g. life cycle assessment of the use of the product.
Accessibility challenge	
Verification of environmental compliance	List of selected compliances and why they are selected
Verification of ethical compliance	List of selected compliances and why they are selected
Verification of conscious trade-off	List of selected compliances and why they are selected
All other verifications described in this canvas shall be listed here	List
Transparency challenge	
Availability of operational information	All verifications described in this canvas is structured here
Availability of administrative information	All administrative information, such as certification routines, roles, rules and process descriptions are stored here
Availability of technical information	IT system design and management
Availability of resource information	The organizational structure, resources, ownership, etc.

9. Context and application

Certified to LAST system aims to cover different types of products and become a universal platform, in which our main product will be a trusted intuitive label with having a QR code that will ensure the accessibility to the information about the product as well as ensure that all claims are verified. This is also valid to the products that came out to the secondhand market.

Based on the risk canvases provided, the reviewer can evaluate whether the company fulfills the requirements to be certified according to the Certified to LAST system and also provide recommendations to the company to improve the product lifetime in terms of its design and functionality.