



# Technical Specification

**ISO/IEC TS 20125-1**

## Information technology — Digital services ecodesign —

### Part 1: Ecopractices for life cycle stages

*Technologies de l'information — Écoconception des services  
numériques —*

*Partie 1: Écopratiques pour les étapes du cycle de vie*

**First edition  
2026-02**

# Sample Document

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## Foreword

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This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 39, *Sustainability, IT and data centres*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

The main purpose of this document is to set requirements and give recommendations on how an organization can ecodesign a digital service.

As the evidence of the consequences of human activity on the climate, the earth's resources and earth sanity become increasingly visible, it is important to reduce as much as possible the adverse environmental impacts of various products and services made by people.

Many publications demonstrate the consequences of digital services on the environment, such as greenhouse gas emissions, abiotic resources depletion and acidification. Studies on the impact of emails, video streaming, network usage, storage explosion, chatbots using large language models (LLM), to name a few, are numerous.

Examples of use cases of digital services include: searching for a trip on a train transportation system, booking a hotel ticket, paying an invoice online, booking an appointment, watching an online video, performing an administrative task. Those are mainly digital services with user interface, but digital services can also be backend or application programming interface (API) type services, invoked by others, like authorising a card payment or querying a reference database.

As far as digital services are concerned, based on today's knowledge on their adverse environmental impacts, it is possible to include, at the design, implementation, operation, maintenance and end-of-life stages, methodological, technical and measurement tools to limit those adverse impacts.

An increasing number of small and large organisations announce stances in favour of the UN Sustainable Development Goals (SDGs) and the will to reduce the adverse environmental impacts of their activities, including those induced by the digital services they provide to their users. Such companies are in need of requirements and recommendations identifying ways to reduce these digital services' adverse environmental impact.

The ecodesign approach (requirements, recommendations and indicators) ensures efficiency in the usage and consumption ratio. This can have a direct impact on the sobriety of consumption of resources (devices, networks, data centres).

By following ecodesign requirements and recommendations, lighter digital services tend to offer a better and faster user response. They also tend to allow broader access to users with old devices or operating systems or low bandwidth, or both. Lighter digital services will not compel users to prematurely change their devices for more powerful ones, therefore extending the lifespan of the devices they already possess.

This document is intended for people and entities involved in digital services and aims to be understood and used by the project teams of private and public organisations.

This document primarily targets digital service providers. However, organisations producing tools, methodologies, training and consulting can use this document to explain, help, train and advise their customers. Even though digital service end users (e.g. client, consumers) will not implement this document, they may, if interested, request information from digital service providers about a digital service, provided these are transparently disclosed.

# Information technology — Digital services ecodesign —

## Part 1: Ecopractices for life cycle stages

### 1 Scope

This document is applicable to environmental matters for a digital service. It establishes requirements and recommendations applicable for requirements gathering, design, implementation, operations, maintenance and the end of life of digital services in order to minimise adverse environmental impacts during all stages of its life cycle. It also establishes a common language and understanding on this subject.

This document focuses on reducing the environmental impacts of a digital service. It therefore does not address all aspects of digital service design. For example, it does not address other aspects such as performance, resilience, reliability, availability or development language choice (see other standards covering these topics, e.g. ISO/IEC 25010 and ISO/IEC 27001).

This document does not include matters linked to other corporate social responsibility (CSR) topics, e.g. social, cultural, diversity, inclusion or exclusion.

This document is applicable to all development methodologies (waterfall, agile, etc.).

### 2 Normative references

There are no normative references in this document.

### 3 Terms, definitions and abbreviations

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1 Terms

##### 3.1.1

##### **architecture**

specific configuration of hardware and software elements in a system

Note 1 to entry: In this context, “system” refers to a digital service.

Note 2 to entry: Hardware and software elements are referred to as “tiers”.

[SOURCE: IEC 61508-4:2010, 3.3.5]

##### 3.1.2

##### **architecture tier**

element of the architecture

Note 1 to entry: A particular tier fulfils the property of being definable by various ecodesign criteria.

Note 2 to entry: A tier can include hardware and/or software.

Note 3 to entry: The totality of all tiers describes the architecture.

### 3.1.3

#### **data**

representation of information in a formalised manner suitable for human or automatic processing

[SOURCE: IEC 60050-171:2019, 171-01-02]

### 3.1.4

#### **design**

set of actions needed to build a product

### 3.1.5

#### **design phase**

first stage directly following the requirements gathering stage, during which the various software, hardware and network components are selected among other activities

### 3.1.6

#### **development environment**

set of electronic devices, software and telecommunications networks, used to implement the software components of the digital service

### 3.1.7

#### **DevOps**

combined development and operations to increase the efficiency, speed, and security of software development and delivery compared to traditional processes

Note 1 to entry: Adapted from ISO/IEC/IEEE 32675:2022, 3.1.

### 3.1.8

#### **digital service**

<information technology> service that provides one or several functions to users through a combination of electronic devices, software and telecommunication networks, with clearly defined functional boundaries, interacting with each other

Note 1 to entry: A digital service may use other digital services. In this case, requirements and recommendations apply to all services under control of the organisation performing ecodesign.

### 3.1.9

#### **digital sufficiency**

approach which aims to use as little resources as possible to achieve the desired outcome

### 3.1.10

#### **ecodesign**

systematic approach that considers environmental aspects in design and development with the aim to reduce adverse environmental impacts throughout the life cycle of a product

Note 1 to entry: Other terminology used worldwide includes “environmentally conscious design (ECD)”, “design for environment (DfE)”, “green design” and “environmentally sustainable design”.

[SOURCE: ISO 14006:2020, 3.2.2]

### 3.1.11

#### **ecoefficiency assessment**

evaluation of the quantity of resources used to reach the desired result

### 3.1.12

#### **ecopractice**

set of requirements and recommendations referring to a specific topic within a life cycle stage to achieve the ecodesign of a digital service

**3.1.13**

**environmental budget**

predefined level of beneficial or adverse environmental impacts

**3.1.14**

**environmental impact**

any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects

[SOURCE: ISO 14001:2015, 3.2.4]

**3.1.15**

**indicator**

quantitative, qualitative or descriptive measure

EXAMPLE Energy consumption in kWh, weight in kg, distance in m.

[SOURCE: ISO 6707-3:2022, 3.10.8, modified — The EXAMPLE has been added.]

**3.1.16**

**life cycle**

consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

[SOURCE: ISO 14044:2006, 3.1]

**3.1.17**

**life cycle stage**

element of a life cycle

[SOURCE: IEC 62430:2019, 3.2.2]

**3.1.18**

**metric**

verifiable measure that captures performance in terms of how something is being done relative to a standard

[SOURCE: ISO/TS 18864:2017, 3.20, modified — The phrase "allows and encourages comparison, supports business strategy" has been removed.]

**3.1.19**

**procurement**

process of asking a quote to suppliers, studying their propositions, choosing and raising the procurement order

**3.1.20**

**product**

any goods or service

[SOURCE: ISO 14006:2020, 3.2.3]

**3.1.21**

**recommendation**

expression that conveys a suggested possible choice or course of action deemed to be particularly suitable without necessarily mentioning or excluding others

**3.1.22**

**redesign**

design of a product based on an existing product design to improve targeted characteristics of the product

Note 1 to entry: Examples of targeted characteristics include reducing the use of raw materials, enhancing the recycled content, reducing the use of hazardous substances, energy saving, improving material recyclability.

[SOURCE: ISO 14009:2020, 3.2.2]

**3.1.23**

**relevance score**

indicator assessing the level of relevance of the service with regards to requirements

**3.1.24**

**requirement**

<standard> expression that conveys objectively verifiable criteria to be fulfilled and from which no deviation is permitted if conformance with the document is to be claimed

**3.1.25**

**requirement**

<user expression need> need or expectation that is stated, generally implied or obligatory

**3.1.26**

**service**

means of delivering value for the customer by facilitating outcomes the customer wants to achieve

Note 1 to entry: Service is generally intangible.

[SOURCE: ISO/IEC 20000-1:2018, 3.2.15, modified — Note 2 to entry has been removed.]

**3.1.27**

**service type**

characteristic of digital service (i.e. with or without user interface)

Note 1 to entry: See [Annex A](#).

**3.1.28**

**stakeholder**

person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity

[SOURCE: ISO 14006:2020, 3.1.7, modified — The EXAMPLE and Notes 1 and 2 to entry have been removed.]

**3.1.29**

**technical architecture**

information technology activity that aims to design computer solutions

Note 1 to entry: Technical architecture involves the structured arrangement, interaction and interdependence of all elements so that system-relevant requirements are met.

**3.1.30**

**technical debt**

implied cost of future reworking required when choosing an easy but limited solution instead of a better approach that can take more time

Note 1 to entry: In software development, or any other IT field (e.g. infrastructure, networking.), technical debt – the chosen term for this document – is also known as design debt or code debt.

**3.1.31**

**telecommunications**

branch of technology concerned with the transmission, emission, and reception of signs, signals, writing, images, and sounds, that is, information of any nature by cable, radio, optical, or other electromagnetic systems

Note 1 to entry: The term “telecommunication networks” can be used synonymously.

[SOURCE: ISO/IEC 22237-1:2021, 3.1.31, modified — Note 1 to entry has been added.]

**3.1.32**

**user**

any person or thing that communicates or interacts with the digital service at any time

Note 1 to entry: The term “thing” covers digital services.

### 3.1.33

#### **virtual architecture**

in information technology, architecture that defines servers without stating which ones are virtual or physical (real)

## 3.2 Abbreviated terms

For the purpose of this document, the following abbreviated terms apply:

LCA	life cycle assessment
LLM	large language models
PUE	power usage effectiveness
SDGs	sustainable development goals

## 4 Principles, usage guidelines and clarifications for digital services ecodesign

### 4.1 Underlying principles

The following principles form the basis of all the ecopractices, requirements and recommendations:

- The digital service should only deliver functions essential to the business case.
- Only those devices, both physical and virtual, required to perform the necessary functions should be active at any point in time. A reasonable balance is necessary between the digital service performance, active devices and resource utilization.
- Digital service software and other used software components should not induce unjustified hardware obsolescence.
- When an additional hardware device is needed, a digital service provider should select a device with the lower environmental impact over the whole life cycle and should consider reusing hardware devices.
- When decommissioning hardware devices, a digital service provider should ensure it is reused if feasible:
  - first internally in the organisation;
  - second, if previous scenario is not possible, in other organisations.

If disposal is the only choice, a digital service provider should ensure the hardware device goes through proper recycling channels, so that it can be disassembled and that parts or raw material can be reused to build new products.

- The digital service should be designed with a modular approach that allows for the easy integration and reuse of service elements.
- The digital service should maintain transparency regarding its environmental impact. Regular reporting on progress towards sustainability goals and seeking feedback can drive continuous improvements in eco-friendly practices.

### 4.2 Intended audience

This document is intended to be used by people and organisations involved in any stage of the life cycle of digital services, e.g. requirements gathering, design, implementation, operations, maintenance and end of life. It aims to be understood and used by the project teams of private and public organisations.

This document primarily targets digital service providers. However, organisations that produce tools, methodologies, training materials and consultation can use this document to explain, help, train and advise

their customers. Even though digital service end users (e.g. clients, consumers) will not implement this document, they may, if interested, request information from digital service providers about a digital service, provided these are transparently disclosed.

### 4.3 How to read and use the document and implementation matters

#### 4.3.1 How to read and use the document

[Clause 5](#) of this document describes six life cycle stages of a digital service:

- Stage 1: Requirements gathering, prioritization and contextualization
- Stage 2: Design phase
- Stage 3: Implementation
- Stage 4: Use and run or operations
- Stage 5: Maintenance
- Stage 6: End of life

[Clause 6](#) introduces several ecopractices that should be addressed at each of the six life cycle stages. Each ecopractice is introduced from various perspectives (e.g. various stakeholders, environmental aspects, environmental impacts, technologies). These ecopractices are composed of a brief description (subclause 6.X.Y.1), requirements and recommendations (subclause 6.X.Y.2) followed by quantitative indicators (subclause 6.X.Y.3). They help measure to what extent the requirements and recommendations of the ecopractice as a whole have been considered during the service ecodesign (e.g. whether an environmental budget has been set and checked). As the name indicates, only measurable or countable indicators will be given. Indicators are not requirements or recommendations.

This document does not cover tools or methodologies to produce a global ecoscore of the digital service or an evaluation of its ecodesign maturity. Third parties can use this document as a basis to audit or assess the ecodesign of a digital service.

Some of the recommendations for the various stages of the digital service life do not apply to all the digital services. Typically, a backend or an API type service will not consider the requirements and recommendations of the user interface because it does not have this interface. However, this exclusion shall be explicitly stated when communicating about the digital service ecodesign externally. [Annex A](#) should be used for a reference of ecopractices per service types. Service types refer to some characteristics of a digital service (i.e. with or without user interface, new or existing service).

A digital service can be new, when no such service is already in operation, or existing otherwise. This document addresses both scenarios. However, some requirements or recommendations do not apply when the service is new ([Annex A](#) includes a reference table per service type).

#### 4.3.2 Implementation matters

The goal of ecodesign is to reduce the environmental impact of a digital service. So, once the business, technical and user needs are collected and prioritised (see [5.2](#) and [6.1](#)), the project team shall carefully select the relevant stages and ecopractices it intends to implement (see [7.1](#)). Similarly, environmental impacts that the digital service provider can act upon are considered.

Using [Annex A](#), the project team can see which ecopractices are relevant, depending on the digital service category.

Using [Annex B](#), a digital service provider shall consider the relationship between the architecture tiers and ecopractices and, by extension, the environmental impacts.

Whether the digital service is being planned or is already in use, an estimate of the chosen environmental impacts should be performed [e.g. using the life cycle assessment (LCA)]. See [Annex D](#) for a list of impact assessment methodologies.

The project team then shall use [5.3](#) to [5.7](#) and [6.2](#) to [6.6](#), according to the selection using [5.2](#) and [6.1](#), to fulfil the requirements and optional recommendations of the chosen stages and ecopractices.

Finally, the user of this document shall disclose the results by following [7.2](#).

### 4.3.3 Trade-offs

Ecodesign opportunities to reduce environmental impacts throughout the life cycle stages of a digital service can be interlinked and are not mutually exclusive. As a consequence, the improvement of particular impacts can lead to the deterioration of one or more other impacts associated with the digital service. For example, targeting aspects of resilience (e.g. availability, reliability, fault tolerance according to ISO/IEC TS 22237-31, IEC 60300), cybersecurity, software quality (e.g. SQuaRE, see [Annex E](#) and [Table E.1](#)) or performance considerations to the digital service, can potentially lead to conflicts with ecodesign opportunities on environmental impacts level (see [4.4](#)).

Such interlinked effects result in a trade-off in the design and environmental improvement opportunities. These trade-offs should be assessed and evaluated before committing to specific ecodesign and implementation options. Balancing targets to improve different impact categories can be appropriate.

Organizations can find it helpful to maintain a trade-off log or decision matrix that records:

- conflicting objectives (e.g. energy efficiency vs. latency requirements);
- rationale for chosen solutions;
- stakeholder input;
- expected vs. actual outcomes;
- legal or regulatory requirements.

This ensures transparency and supports continuous improvement.

## 4.4 Environmental impacts

Environmental impacts are changes to the environment, whether adverse or beneficial, that wholly or partially result from a digital service over its life cycle.

An example of a positive environmental impact of a digital service is the reduction of CO<sub>2</sub>e emissions, e.g. by implementing a carpooling service that allows travellers to group in a single means of transportation, instead of each traveller using their own.

An example of a negative environmental impact of a digital service is the increase of CO<sub>2</sub>e emissions involved by the energy consumption of intensive computing required for a cryptographic operation.

This document aims at minimising the adverse environmental impacts of digital services. Increasing positive impacts is important and should be considered. However, this document focuses on limiting negative impacts and does not provide a methodology to balance both types of impacts.

When estimating the impacts of a digital service, care should be taken to avoid unexpected consequences of the digital service that produce adverse impacts. Such unexpected consequences can be categorised as induced or opportunity effects or rebound effects (which are indirect impacts):

- Induced or opportunity effects: A digital service provides a train ticket purchasing service. The user can directly purchase tickets from home or elsewhere, rather than at the train station desks. However, users often have to print the tickets themselves. This therefore leads to the purchase of a printer. The printer purchase is an induced or opportunity effect. Another example is home working: employees

have to equip their home office with associated devices to work from home. All this generates additional greenhouse gas (GHG) emissions and exhausts earth resources.

- Rebound effects: These are indirect effects. The digital service provides an efficiency gain on a process, a component or a good. They, most of the time, come from innovation and can lead to energy, time, physical space or financial gains. The result is to achieve the same result with less resources. The rebound effect occurs when the saved resources are used to do more of the same thing. In other words, the efficiency savings are partially or totally nullified, if not exceeded. For example, a digital service provides carpooling to travellers to avoid taking one fossil-fuel consuming vehicle per traveller (gains). However, given its ease of use, many users use it, or the same users begin to travel more, thus making the environmental impacts worse than before.

There are various types of adverse environmental impacts that can be categorized. This document does not offer a judgement of the importance of a specific impact category.

However, when developing a digital service, it is important that an organization uses a multi-impacts approach as opposed to a single-impact approach. The approach taken to ecodesign a digital service in a way that minimises one environmental impact should not increase others. [Annex C](#) shows a non-exhaustive list of environmental impacts.

This document does not provide a methodology of environmental impact assessment for digital services. The LCA methodology can be found in ISO 14040. Additional guidance can be found in Reference [3]. See [Annex D](#) for methodologies. There is no widespread methodology to assess the environmental impact of digital services at the time of publication. For this reason, it is difficult in some cases to calculate environmental impacts until efforts to evaluate LCA and other similar methodologies of digital services become widespread.

However, this document can complement the LCA approach:

- LCA can be used when impact evaluation is needed in the ecodesign approach.
- Ecodesign can be used when trying to reduce the impact of the service assessed through the LCA.

This document is not intended to be used to compare the environmental impact performance of digital services and digital service providers.

#### 4.5 Selection process

While the procurement process (e.g. supplier selection, purchasing) is beyond the scope of this document, this document provides criteria for selecting hardware/software types and specifications to minimise the environmental impact (see ISO 20400). [Figure 1](#) shows procurement activities included and excluded in the scope of this document.

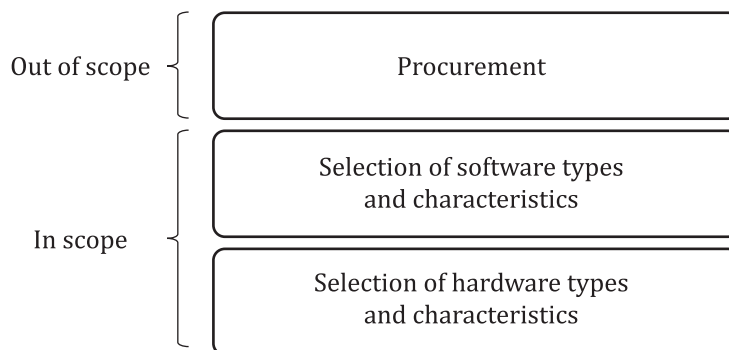


Figure 1 — Procurement process activities in scope and out of scope

## 4.6 Development environment

This document covers the selection, choice and usage of the most appropriate eco-friendly development environments (see [6.2.3.2](#)). Whatever the tool chosen, care should be taken to ensure it is used properly to limit the adverse environmental impacts. Requirements and recommendations on the usage of the development tools are covered by this document.

This document is applicable to all development methodologies (waterfall, agile, etc.).

## 4.7 Indicators

For each ecopractice, indicators are suggested in this document. These are non-exhaustive and for informational purposes only at this stage.

These indicators should be used as tools to help digital service providers in their decision-making process by supplying quantitative information that can be considered before (only for existing digital service), during and after ecodesign.

Some indicators use measured means, some use measured results.

**EXAMPLE** The power usage effectiveness (PUE) indicator is defined in ISO/IEC 30134-2. It can be used in ecodesign. However, it does not provide a full view on ecodesign efficiency alone. An organisation can host a digital service infrastructure in an efficient datacentre, but that does not mean the digital service is efficient. Also, while a datacentre can have a low PUE, the CO<sub>2</sub>e intensity is not necessarily optimal.

## 5 Life cycle stages

### 5.1 General

This clause outlines each stage of a digital service life cycle. [Clause 6](#) describes ecopractices for each stage. Reduction of adverse environmental impacts is handled in each stage.

The life cycle of digital services differs based on the nature, purpose, usage and prevailing circumstances of the digital service (e.g. regulatory context, user needs and tech limitations). Each stage serves a specific purpose and contributes to the overall life cycle. Thus, a life cycle model consists of one or more stages and can be tailored to the digital service's scope, scale, complexity, evolving needs and opportunities. These stages can be iterative, concurrent or overlapping, as deemed suitable.

For the purpose of this document, the life cycle stages of a digital service are as follows:

- Stage 1: Requirements gathering, prioritization and contextualization
- Stage 2: Design phase
- Stage 3: Implementation
- Stage 4: Use and run or operations
- Stage 5: Maintenance
- Stage 6: End of life

This document does not cover the starting point, the end point, who is involved and the activities for each stage. Refer to existing software design standards (e.g. ISO/IEC/IEEE 12207). [Figure 2](#) shows a time wise sequence of digital service ecodesign stages.