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Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms, definitions and abbreviations **1**
3.1 Terms 1
3.2 Abbreviated terms 5

4 Principles, usage guidelines and clarifications for digital services ecodesign **5**
4.1 Underlying principles 5
4.2 Intended audience 5
4.3 How to read and use the document and implementation matters 6
4.3.1 How to read and use the document 6
4.3.2 Implementation matters 6
4.3.3 Trade-offs 7
4.4 Environmental impacts 7
4.5 Selection process 8
4.6 Development environment 8
4.7 Indicators 9

5 Life cycle stages **9**
5.1 General 9
5.2 Stage 1: Requirements gathering, prioritization and contextualization 10
5.3 Stage 2: Design phase 10
5.4 Stage 3: Implementation 11
5.5 Stage 4: Use and run or operations 11
5.6 Stage 5: Maintenance 11
5.7 Stage 6: End of life 12

6 Requirements and recommendations per stage **12**
6.1 Stage 1: Requirements gathering, prioritization and contextualization 12
6.1.1 Collect and challenge functional requirements and usages ecopractice 12
6.1.2 Analyse and size requirements and usages to the minimum ecopractice 13
6.1.3 Challenge the added value of the service for all or part of service ecopractice 14
6.1.4 Assess the impact of digital service ecopractice 14
6.1.5 Set an environmental budget ecopractice 16
6.1.6 Take a systemic view on service ecopractice 16
6.2 Stage 2: Design phase 17
6.2.1 Document the ecodesign methodology ecopractice 17
6.2.2 Design user path using a frugal approach ecopractice 18
6.2.3 Identify minimal technical solutions to meet the requirements ecopractice 19
6.2.4 Setup a data retention and purge policy ecopractice 21
6.2.5 Assess design consistency with regards to initial requirements and environmental challenges ecopractice 22
6.2.6 Prepare and plan total or partial service end of life ecopractice 23
6.3 Stage 3: Implementation 23
6.3.1 Collect strictly needed items ecopractice 23
6.3.2 Limit and optimise processing ecopractice 25
6.3.3 Select scalable and appropriate technologies and infrastructures ecopractice 26
6.3.4 Integrate a service usage and efficiency monitoring ecopractice 28
6.3.5 Favour consolidation, sharing and capitalisation of service elements ecopractice 29
6.4 Stage 4: Use and run or operations 30
6.4.1 Manage service frontend to maintain its efficiency ecopractice 30
6.4.2 Manage service backend to maintain its efficiency ecopractice 31
6.4.3 Monitor service ecosystem to maintain its efficiency ecopractice 32
6.4.4 Raise users' awareness of service usage environmental impacts ecopractice 33

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6.4.5 Ensure usefulness of each service function ecopractice 34
6.4.6 Check usability of each service function ecopractice 35
6.4.7 Check usage of every function of the service ecopractice 36
6.5 Stage 5: Maintenance 37
6.5.1 Ensure continuous training of teams and monitor ecodesign practices ecopractice 37
6.5.2 Fix service frontend to maintain and enhance its efficiency ecopractice 37
6.5.3 Fix service backend to maintain and enhance its efficiency ecopractice 38
6.5.4 Assess emerging technology opportunities to enhance service efficiency and fight its obsolescence ecopractice 39
6.6 Stage 6: End of life 39
6.6.1 Question appropriateness of stopping the service totally or partially ecopractice 39
6.6.2 Decide on future of specific data of service ecopractice 40
6.6.3 Decide on future of specific software of service ecopractice 41
6.6.4 Decide on future of freed up hardware and resources ecopractice 41

7 Conformance and communication 42
7.1 Conformance 42
7.1.1 General 42
7.1.2 Partial conformance 42
7.1.3 Full conformance 43
7.2 Communication 43
7.2.1 General 43
7.2.2 Partial conformance 43
7.2.3 Full conformance 43

Annex A (informative) **Cross reference table of ecopractices and service types 44**

Annex B (normative) **Architecture of digital services 46**

Annex C (informative) **Environmental impacts table 49**

Annex D (informative) **Impacts assessment methodologies 51**

Annex E (informative) **Ecodesign and "SQuaRE" Mapping 55**

Bibliography 60

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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*.

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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.

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Information technology – Digital services ecodesign – 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.

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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

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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]

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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.

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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

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