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Sustainability in buildings and civil engineering works — Guidelines on the application of the general principles in ISO 15392

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National foreword

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Développement durable dans les bâtiments et les ouvrages de génie civil — Lignes directrices pour l'application des principes généraux de développement durable

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Foreword

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This document was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 17, *Sustainability in buildings and civil engineering works*.

This second edition cancels and replaces the first edition (ISO/TS 12720:2014), which has been technically revised.

The main changes are as follows:

— reflection of the revised sustainability objectives as published in ISO 15392:2019;

  — the increased number and realignment of sustainability objectives from ten in ISO 15392:2008 to 18 in ISO 15392:2019;

— inclusion of text in Clause 6 describing the categorising of the 18 sustainability objectives into 4 grouped objectives as well as the descriptions, purposes and anticipated outcomes for each of those groupings;

— removal of Annex A.

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.

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Introduction

This document is intended for use by stakeholders involved during the life cycle of a construction works. More and more decision makers involved in construction projects are establishing goals to improve the sustainability performance of a construction works.

Decision-making typically relates to the planning, design, construction, use and operation, and end-of-life processes. The planning and design phases usually include the project inception/initiation, conception of need and feasibility, and initial and detailed design, all of which lead to the actual construction and occupancy of the building.

This document aims to demonstrate to each actor at each phase of the construction project a way to implement the nine general principles of sustainability in buildings and civil engineering works, as described in ISO 15392.

Although the following topics are currently outside the scope of this document, the guidelines in this document can also facilitate the different actors in

— identifying and setting performance targets,

— elaborating relevant practical tools (criteria, indicators, measurement methods) for assessing/measuring the actual performance levels, and

— formalizing a management system based on the general principles of sustainability, which can be monitored, assessed, and improved.

Application of the nine general principles to the life cycle of construction works introduces a multidimensional puzzle leading to a complex framework. Clause 4 presents the different primary elements of the framework and the related facets to be considered regarding each element. Clause 5 introduces the methodological approach for applying sustainability thinking to the development of the construction works and identifies six phases of the decision-making process and 18 sustainability objectives. Clause 6 gives application guidance developed on the basis of these objectives and related issues of concern (see Table 3) and detailed recommendations attached to each issue (see Table 4).

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Sustainability in buildings and civil engineering works — Guidelines on the application of the general principles in ISO 15392

1 Scope

This document provides guidance for the application of the nine general principles of sustainability in buildings and civil engineering works as specified in ISO 15392:2019, 5.3. It shows the different actors involved with the construction works how to take these principles into account in their decision-making processes in order to increase the contribution of the construction works to sustainability and sustainable development.

This document provides a step-by-step approach for:

— encouraging the application of the general principles by all stakeholders at each stage of the project and its use, from the decision to build and the initial development of the project brief until the end-of-life of the construction works;

— helping interested parties to consider and/or incorporate sustainability thinking in all phases of the building's or civil engineering works' life cycle, for all relevant issues of concern, by raising key questions in relation to the general principles;

— understanding the outcome (effect) of the application of the general principles;

— building on acquired experience to develop best practices and engendering a continuous improvement process.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6707-1, *Buildings and civil engineering works — Vocabulary — Part 1: General terms*

ISO 14050, *Environmental management — Vocabulary*

ISO 15392:2019, *Sustainability in buildings and civil engineering works — General principles*

ISO/TR 15686-11, *Buildings and constructed assets — Service life planning — Part 11: Terminology*

ISO/TR 21932, *Sustainability in buildings and civil engineering works — A review of terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1, ISO 14050, ISO 15392, ISO/TR 15686-11 and ISO/TR 21932 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/

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4 Elements of the framework

Sustainability related to buildings and civil engineering works is a complex issue, and the application of a holistic approach is one of its general principles. When incorporating sustainability thinking into the different processes involved in the development of a construction works, it is relevant to keep in mind the elements presented in Table 1, as pieces of a multidimensional puzzle to be assembled. It should be noted that, often, different individual aspects will interrelate with one another.

Table 1 — Primary elements for consideration

Primary elements	Facets to be considered
Primary aspects of sustainability	— environmental protection — economic efficiency — social needs
General principles of sustainability related to construction works (ISO 15392:2019, 5.3)	— continual improvement — equity — global thinking and local action — holistic approach — involvement of interested parties — long-term consideration and resilience — risk management — responsibility — transparency
Sustainability objectives (ISO 15392:2019, 5.2)	— provision of functionality, health, comfort, safety and accessibility; — performance management during operation; — application of life cycle thinking; — provision of economic value over time; — provision of social and cultural value over time and for all; — minimization of adverse end-of-life impacts; — limitation of adverse environmental impacts and where possible, maintenance or provision of environmental value over time; — adaptability; — efficient and responsible management throughout the process; — integration into the relevant planning schemes and policies (including sustainability planning) related to local building / town-planning and infrastructure; — involvement of interested parties and consideration of their needs; — reconciliation of contradictory interests or requirements arising from short-term and long-term planning or decision-making; — stimulation of innovation; — stimulation of a pro-active approach; — improvement of the construction sector and the built environment;

[a] For each type of works (buildings or civil engineering works) the issues of concern should be studied from a relevance and significance point of view. It is not in the scope of this document to elaborate more on the types of works.

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Table 1 *(continued)*

Primary elements	Facets to be considered
	— decoupling of economic growth from increasing adverse impacts on the environment and/or society; — maximization of beneficial impacts and value through application of restorative and regenerative approaches; — reduction of adverse impacts while improving value, where impacts as well as value may be judged against any combination of the three primary aspects of sustainability.
The functions of a building and its site	— supporting main activities corresponding to users' needs — providing useable and functional indoor and outdoor spaces — providing a healthy indoor environment — providing safety and security — providing for privacy — providing a sense of place
The functions of a civil engineering works	— conveying and managing flows (material, water, energy, waste, goods, persons, information, etc.) — storing, treating, or converting flows — producing, storing, distributing, or managing energy — connecting places, functions, or people — producing services for the community — accommodating medium- or large-scale activities — providing safety and security — protecting the environment, goods, or people
Main stakeholder groups	— clients — designers: architects, engineers, and related consultants — contractors: builders, constructors, services engineers — suppliers and manufacturers — users — facility managers — community interest groups — regulatory authorities

	— buildings
	  — residential buildings
	  — commercial buildings
	  — public buildings
	  — industrial buildings
	  — etc.

[a] For each type of works (buildings or civil engineering works) the issues of concern should be studied from a relevance and significance point of view. It is not in the scope of this document to elaborate more on the types of works.

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Table 1 *(continued)*

Primary elements	Facets to be considered
Main types of construction works[a]	— civil engineering works — parks and public spaces — transportation systems — water and sewerage systems — energy generation and distribution systems — waste systems — airports — etc.
Decision-making processes	— strategic planning — project definition — design — construction and handover — operation and maintenance — end-of-life strategy
Geographical scales linked to a project	— construction works and its site — local and extended neighbourhood — city or region
Physical life cycle stages of a construction works (“cradle to grave”)	— production stage (including extraction of raw materials and manufacturing of products) — construction stage — in-use stage (including use, operation, maintenance, repair, replacement, and refurbishment) — end-of-life stage
Combined product and process approach (see Figure 1)	— product-oriented, in terms of performance (technical, functional, environmental, social, economic) of the resulting works — process-oriented, in terms of decision-making over the entire life of the works

[a] For each type of works (buildings or civil engineering works) the issues of concern should be studied from a relevance and significance point of view. It is not in the scope of this document to elaborate more on the types of works.

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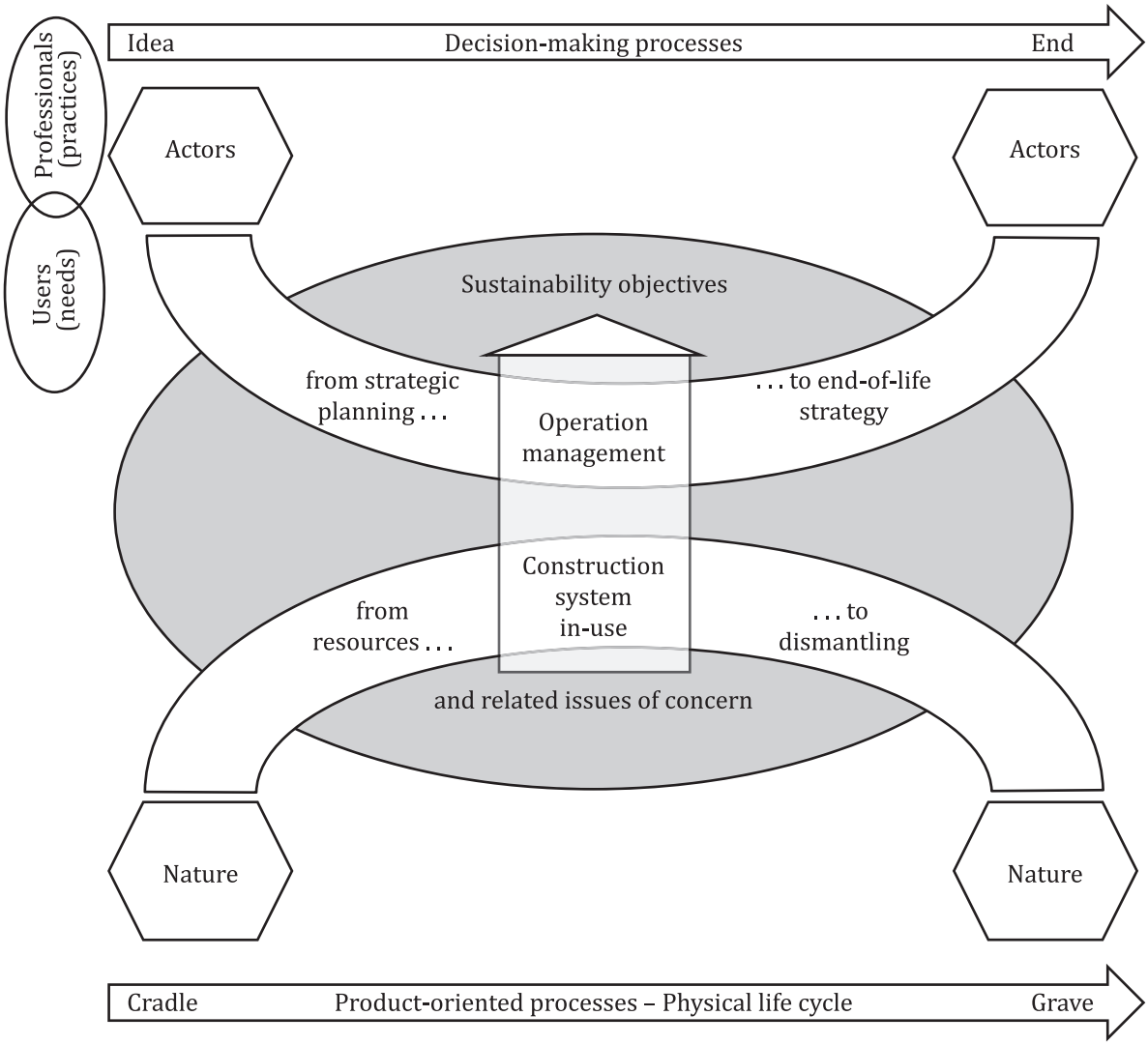

Figure 1 — Diagram of process-oriented and product-oriented life cycles

5 Methodological approach

5.1 General

The starting point of the methodology of applying sustainability thinking to development of construction works is from ISO 15392:2019, 5.1, Paragraph 1.

Six main phases are identified within the decision-making processes that relate to the life cycle of a construction works, from the first expression of a need (idea) until the end-of-life of the works. These are:

— strategic planning (leading to the project definition);

— project definition (leading to the creation of the project/client brief);

— design (conceptual, detailed);

— construction and handover (including commissioning);

— operation and maintenance (including repair, replacement, and refurbishment);

— end-of-life strategy (deconstruction, waste treatment, and disposal).

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NOTE 1 National practice can give alternative descriptions and groupings of phases in the life cycle of a construction works. The above presents the terms used in this document to identify the key elements that take place in all projects.

NOTE 2 Refurbishment is considered as a sub-project of the use phase including, in itself, strategic planning, project definition, design and construction, and also the end-of-life of some elements such as exterior claddings, windows, partitions, and interior finishes.

From a process or management point of view, the main phases of the decision-making process related to a construction project, together with the stakeholders and their actions/decisions at each phase, are the core elements for this document (see Table 2).

From a point of view of sustainability objectives, the thematic issues of concern provide the basis for operational guidance and the technical and management recommendations (see Table 3 and Table 4).

In simple terms, each phase will:

— raise questions that should be addressed;

— implicate the various stakeholders or actors needing to answer these questions;

— end with an optimal result or deliverable.

This is made more explicit in Table 2.

Table 2 — The six phases of the decision-making process

Decision-making process	Questions raised	Main stakeholders (or actors)	Result/deliverables
Strategic planning	— What is the demand? — What are the needs? — What are the sustainability objectives? — What are the opportunities and constraints of the site?	Clients, users, community interest groups	— Preliminary objectives — Decision to proceed or not
Project definition	— What are the technical and functional requirements? — What are the environmental, economic, and social performance requirements?	Clients, users, community interest groups	— Project detailed objectives — Creation of the project/client brief[a]
Design	How is the demand expressed into a project, first schematically and then in detail?	Designers, engineers, clients, users, regulatory authorities, community interest groups	A sustainable construction project, with detailed drawings and specifications
Construction and handover	How is the design realized and the works handed over to users?	Contractors, suppliers, manufacturers, clients, users	A sustainable construction process, a sustainable works/asset, a user guide, specifications for use
Operation and maintenance	How to operate and maintain the built environment in an effective, sustainable way?	Clients, users, facility managers, suppliers, community interest groups	A sustainable service life, including continuous improvement
End-of-life strategy	Once full obsolescence is reached, how to deal with the end-of-life, without creating damage to the environment or the community?	Clients, suppliers, contractors, community interest groups	A sustainable exit strategy and its realization, a clean site

[a] The resulting brief is expected to balance the consideration of the technical, functional, environmental, economic, and social aspects and to prioritize the related performance requirements.

The guidance in Clause 6 demonstrates to each actor, at each phase of the construction project, a way to implement the nine general principles. The guidelines can be used as a framework against which decisions

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can be checked. The most practical way to implement them is to translate them into sustainability objectives and related issues of concern, with both a product-oriented and a process-oriented approach.

Sustainability objectives and issues of concern are the items or requirements that should be raised and taken into consideration at different critical points throughout the project life cycle, starting with the choice of the site and the elaboration of the brief, which is a critical document. These items/requirements need practical solutions to help ensure the maximum contribution to sustainability and sustainable development from the construction works. All the actors involved in the process should have these items/requirements in mind, while knowing that ISO 15392 requires solutions to be given and that each of the actors has a role and a responsibility in enabling those solutions to be progressively elaborated throughout the project's life cycle.

The sustainability and sustainable development objectives identified in ISO 15392:2019, 5.2 are presented in Table 1 as follows:

a) provision of functionality, health, comfort, safety and accessibility;

b) performance management during operation;

c) application of life cycle thinking;

d) provision of economic value over time;

e) provision of social and cultural value over time and for all;

f) minimization of adverse end-of-life impacts;

g) limitation of adverse environmental impacts and where possible, maintenance or provision of environmental value over time;

h) adaptability;

i) efficient and responsible management throughout the process;

j) integration into the relevant planning schemes and policies (including sustainability planning) related to local building / town-planning and infrastructure;

k) involvement of interested parties and consideration of their needs;

l) reconciliation of contradictory interests or requirements arising from short-term and long-term planning or decision-making;

m) stimulation of innovation;

n) stimulation of a pro-active approach;

o) improvement of the construction sector and the built environment;

p) decoupling of economic growth from increasing adverse impacts on the environment and/or society;

q) maximization of beneficial impacts and value through application of restorative and regenerative approaches;

r) reduction of adverse impacts while improving value, where impacts as well as value may be judged against any combination of the three primary aspects of sustainability.

5.2 Grouped sustainability objectives

5.2.1 General

In order to facilitate practical consideration of these 18 objectives, they have been grouped into four overarching categories, referred to as the grouped sustainability objectives in the remainder of this document. The grouped sustainability objectives, without indication of importance or priority, are: provision of base requirements, application of life cycle thinking, efficient and responsible management, and

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