



D8.2 - Harmonized Accessibility Standards Guidelines and Implementation Roadmap



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Executive Summary

Accessibility refers to the design and construction of environments, services, and products such that individuals experiencing disability can engage with them without experiencing barriers, enabling full participation in society. The AccesS project aims to develop a unified, standardized evaluation and certification framework to guarantee the inclusiveness and accessibility of built environments throughout the European Union.

The development of various accessibility related regulatory frameworks and standards across EU is vital for ensuring full participation and inclusion of European people with disabilities. However, there is a risk that gaps, in European standardization and regulation, may still exist given the potential variability in advancements across the countries, among areas and among national municipalities. Because of this variability and considering the existing and projected increase in the number of individuals who live with or will have a disability, it is necessary to assess the current accessibility landscape.

This report contains information about the activities developed between M13 and M24 of AccesS project and the results obtained. The interpretation of the data obtained, and the conclusions drawn are of importance for the standardization world in the sector of the AccesS project.

The information collected in this document is important for European standardization networks. This Roadmap provides the European building community with a common reference, facilitating the planning and monitoring of standards development around accessibility and inclusion. More than that, by analysing existing international/European standards and identification of main gaps, by providing recommendation for improvement of existing standards and where the gaps are deep, by providing recommendation for new work items at European level at least, the Roadmap is also committed to contributing to broader standardization efforts related to accessibility, aiming to establish common practices and terminology that transcend regional boundaries.

The document could serve as a guide for actors from the various technological sectors in connection centres around the critical processes of harmonization, implementation, and knowledge sharing in the realm of accessibility standards, especially within the European Union and presents the current standardization activities and discussion results as well as relevant norms and standards in the accessibility area. It outlines the requirements for standardization and sets impulses for successful implementation.

To conduct the environmental scan, accessibility legislation, standards, and guidelines currently employed across EU were identified through a grey literature search using specific methods.

A grey literature search allowed for the data to be systematically extracted from non-academic sources, including the following: relevant EU policy, national legal Information and disability policy; documents cited in published reports on accessibility and disability; organizations overseeing relevant priority areas of accessibility.

This document is the result of 11 months of work, several Working Group (the WG was formed by the main experts from ASRO and researchers from the technical partners involved in T8.2) meetings and the active participation of 4 standardization experts from ASRO and approximately 9 researchers from FRC, IsZEB, CERTH, CETEM and LAMA, focused on the analysis of the selected standards.

The document is divided into eight chapters and three annexes.

Table of Contents

1	Introduction	12
1.1	Scope and objectives of the deliverable	12
1.2	Structure of the deliverable	12
1.3	Relation to Other Tasks and Deliverables	13
2	Sociopolitical framework and trends around sustainable and inclusive buildings	14
2.1	Public policies and strategic initiatives of the European Commission	14
2.1.1	Renovation Wave for Europe Strategy – COM (2020) 662	14
2.1.2	New European Bauhaus Initiative	15
2.1.3	Level (s) – European framework for sustainable buildings	15
2.2	Building and energy efficiency European regulations	16
2.2.1	Directive (EU) 2024/1275 – Energy Performance of Buildings Directive (recast)	16
2.2.2	Directive (EU) 2023/1791 – Energy Efficiency Directive (recast)	17
2.2.3	Directive 2009/28/EC – Renewable Energy Directive	18
2.2.4	Directives (EU) 2023/2413 – Renewable Energy Directive amendment	18
2.2.5	Regulation (EU) 2024/3110 – Construction Products Regulation	19
2.2.6	European Accessibility Act – Directive (EU) 2019/882	20
2.3	Standardization requests addressed to CEN/CLC by the EC	21
2.3.1	Mandate M/480 – Energy Performance of Buildings (2011)	21
2.3.2	Mandate M/350 – Sustainability of construction works (2004)	21
2.3.3	Mandate M/420 – Accessibility of the built environment	22
2.3.4	Mandate M/376 – Accessibility of ICT products and services	22
2.3.5	Mandate M/473 – Design for All	23
2.3.6	Mandate M/587 – Accessibility requirements of products and services	24
2.4	European financial instruments for sustainable buildings	24
2.4.1	EU Taxonomy Regulation (EU) 2020/852	24
2.4.2	European Green Bond Standard	24
2.4.3	Social Climate Fund	25
2.4.4	Recovery and Resilience Facility	25
2.4.5	InvestEU Programme	25
2.5	Governance and mechanisms for implementation	25
2.5.1	Governance of the Energy Union – Regulation (EU) 2018/1999	25
2.5.2	Green Public Procurement	26

2.5.3	Cohesion Policy 2021-2027	26
2.5.4	LIFE Programme	26
3	Current situation in the European and International standardization related to AccessS Project.	27
3.1	European/international Standardization - processes, activities and deliverables	27
3.1.1	Aim of standards	27
3.1.2	Brief explanation of the European standardization process and timelines.....	28
3.1.3	International standardization activities	32
3.1.4	Types of Deliverables at European level	32
3.1.5	ISO/IEC deliverables	35
3.2	Brief comparison between different types of deliverables	38
3.3	Current development of standards for accessibility	42
3.3.1	Accessibility in standardization at European level.....	42
3.3.2	Accessibility in standardization at international level	52
3.3.3	Current standardization activities.....	58
4	Overview of relevant standards, standardization documents, activities and technical committees for the project	61
5	Outcomes of the analysis of selected standards and standardization documents, activities and technical committees related to the project outcomes	65
5.1	Standards and standardization documents analysis in connection with AccessS project.....	65
5.2	Standards analysis - main gaps identified	68
5.3	Proposed Standardization Items	79
5.4	Conclusions drawn from the analysis made.....	84
6	Certification framework principles.....	87
6.1	Generalities.....	87
6.2	European certification framework and accessibility and inclusiveness of buildings ...	89
6.3	Accessibility Assessment Scheme and standardization	90
7	Conclusion and outlook.....	92
7.1	Recommendation for European standardization around the project	92
7.2	Policy recommendations to unlock accessibility and sustainability potentials of buildings.....	95
8	References	96
	Annex 1 - List with selected standards for the analysesReferences.....	100

Annex 2 - Methodologies for analyses of standards	102
Annex 3 - Analyses of selected standards	105

List of Figures

Figure 1. Types of standards & TRLs (CEN-CENELEC Guide 39:2022)	28
Figure 2. The standardization landscape (CEN-CENELEC Guide 39:2022)	29
Figure 3. The standardization system	30
Figure 4. The standardization process	31
Figure 5. ISO deliverables (https://www.iso.org/deliverables-all.html#IS)	37
Figure 6. Comparison based on the timeframe for development	41
Figure 7. General distribution of the identified standards	62

List of Tables

Table 1. Comparison between CEN deliverables	38
Table 2. Comparison based on development	39
Table 3. Comparison based on standstill policy	39
Table 4. Comparison based on official languages	39
Table 5. Comparison based on the availability at national level	40
Table 6. Comparison based on the lifetime and review process	40
Table 7. Examples of contexts of use, environmental and human limitations requiring 'Design for All' Accessibility	47
Table 8. Overview of current accessibility relevant standardization projects (international/European level).....	59
Table 9. Analyses of standards. Identified issues.....	68
Table 10. Recommendation for Standardization	79

List of Terms and Definitions

Term	Definition
Accessibility	(of a building, etc.) the quality of being able to be entered and used by everyone, including people who use a wheelchair, people who are blind, etc.
Carbon footprint:	The sum of all GHG emissions of a given product, asset, or activity.
Circular Economy	A model of production and consumption designed to eliminate waste and pollution by keeping materials, products, and components in use for as long as possible. It shifts away from the traditional "take-make-dispose" linear model towards a closed-loop system of sharing, repairing, refurbishing, and recycling to maximize resource efficiency
Decarbonisation	Decarbonization is the process of reducing and eliminating human-caused carbon dioxide (CO ₂) and other greenhouse gas emissions from the atmosphere, primarily by shifting from fossil fuels to renewable energy. It is a vital climate change mitigation strategy aiming for net-zero emissions to limit global warming
End-of-life carbon	Emissions which occur after a building or infrastructure project's lifetime – whether associated with deconstruction/demolition, transport from the site, waste processing, or disposal.
Energy efficiency	It is the ratio of useful energy output to energy input, ensuring minimal waste.
End-users need	Any need that has been expressed by first responders or similar profession, public or private.
Greenhouse gas (GHG)	Any gas in the atmosphere which absorbs and re-emits heat. The main GHGs are water vapour, carbon dioxide (CO ₂), methane (CH ₄) and nitrous oxide (N ₂ O).
Gap (standardization gap)	Any need that cannot be covered, fully or partially, by an existing standard.
Life-cycle assessment (LCA)	A science-based method of assessing the potential environmental impacts associated with a product throughout its life-cycle. When applied to a building, it is referred to as building LCA.
Nearly zero-emission building (NZEB)	A building that has a very high energy performance, with nearly zero or very low amount of energy required that should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby. According to the revised directive's (Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast)), a zero emission building is defined as a building with a very high energy performance, with very low amount of energy still required fully covered by energy from renewable sources and without on-site carbon emissions from fossil fuels.

Term	Definition
	The ZEB requirement should apply as of 1 January 2030 to all new buildings, and as of 1 January 2027 to all new buildings occupied or owned by public authorities.
Opportunity	Any item such as a document, existing standards, standards under development, a workshop agreement or even a technological solution that can address a particular need and could facilitate the process of pre-standardization.
Renovation Wave for Europe	The Renovation Wave for Europe is a 2020 European Commission strategy aimed at least doubling the annual energy renovation rate of public and private buildings by 2030, targeting 35 million units. It seeks to lower the 36% of greenhouse gas emissions generated by buildings, reduce energy poverty, and create green jobs, making buildings more climate neutral.
Standard	Technical document designed to be used as a guide, a guideline, a definition or even a rule.
Standardization requests (mandate)	A formal, binding request from the European Commission to European Standardization Organizations (CEN, CENELEC, or ETSI) to develop technical standards in support of EU legislation, policies, and the Single Market.
Suitanaible building	Structures designed, built, and operated to minimize environmental impact while improving occupant health.
Taxonomy	A system for naming and organizing things—especially plants and animals—into groups that share similar qualities.

List of Acronyms and Abbreviations

Term	Description
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CWA	CEN and/or CENELEC Workshop Agreement
EAA	European Accessibility Act
EC	European Commission
EN	European standard
ESO	European Standardization Organization
ETSI	European Telecommunications Standards Institute
EU	European Union
DfA	Design for All
HD	Harmonization Documents - CENELEC only
IEC	International Electrotechnical Commission
ICT	Information and communication technology
ISO	International Standardization Organization
ITU	International Telecommunication Union
IWA	International Workshop Agreement
NMC	National Mirror Committee
NSB	National Standardization Body
PAS	Publicly Available Specification
PC	Project committee
SC	Subcommittee
SME	Small and Medium Enterprise
TC	Technical Committee
TR	Technical Report
TS	Technical Specification
WP	Work Package
WG	Working Group

1 Introduction

1.1 Scope and objectives of the deliverable

Accessibility refers to the design and construction of environments, services, and products such that individuals experiencing disability can engage with them without experiencing barriers, enabling full participation in society. The AccesS project aims to develop a unified, standardized evaluation and certification framework to guarantee the inclusiveness and accessibility of built environments throughout the European Union.

WP8 intended on the one hand to create a structured accessibility assessment scheme, including physical accessibility, usability, safety, comfort and social inclusion (T8.1); and on the other hand the second task of WP8 (T8.2) intended to centre around the critical processes of harmonization, implementation, and knowledge sharing in the realm of accessibility standards, especially within the European Union. This deliverable reports on the activities as part of T8.2. A primary objective was to establish comprehensive guidelines and procedures for harmonized implementation and enforcement of accessibility standards across EU member states. The task aims to bridge gaps and disparities that may exist among European/ national standards and regulations, thus promoting a cohesive approach to accessibility throughout the Union. More than that, by analysing existing international/European standards and identification of main gaps, by providing recommendation for improvement of existing standards and where the gaps are deep, by providing recommendation for new work items at European level at least, the deliverable D8.2 is also committed to contributing to broader standardization efforts related to accessibility, aiming to establish common practices and terminology that transcend regional boundaries. Also, recommendation for the certification of accessible buildings will be a key outcome, signifying adherence to high accessibility standards.

The development of various accessibility related regulatory frameworks and standards across EU is vital for ensuring full participation and inclusion of European people with disabilities. However, there is a risk that gaps, in European standardization and regulation, may still exist given the potential variability in advancements across the countries, among areas and among national municipalities. Because of this variability and considering the existing and projected increase in the number of individuals who live with or will have a disability, it is necessary to assess the current accessibility landscape. This will help to identify where gaps in existing international/European standards exist and to determine whether improved and/or new accessibility standards are needed to meet the needs of EU people with disabilities.

1.2 Structure of the deliverable

To conduct the environmental scan, accessibility legislation, standards, and guidelines currently employed across EU were identified through a grey literature search using specific methods. A grey literature search allowed for the data to be systematically extracted from non-academic sources, including the following:

- Relevant EU policy, national legal Information and disability policy and research organization websites;
- Documents cited in published reports on accessibility and disability;
- Organizations overseeing relevant priority areas of accessibility (such as the agencies overseeing various modes of transportation, or telecommunications and broadcasting).

The document is divided in eight chapters and three annexes. A brief overview of the deliverable structure is provided hereafter:

- The Introduction chapter (chapter 1) is an introductory section of the document and a general overview of the deliverable.
- Chapter 2 addresses the socio-political framework and trends in sustainable and inclusive buildings, with accent on public policies and strategic initiatives of the European Commission. Also, general building and energy safety European regulations are analyzed, as well as standardization requests addressed to CEN/CLC by the EC, in the field of accessibility and inclusivity.
- Chapter 3 addresses the current situation in European and international standardization related to the area of AccesS project. After a brief overview of standardization activities at international/European and national level, a brief explanation of the processes, activities and timeline of European and international standardization, the chapter concludes with the current level of development of accessibility standards and recommendations for action and implementation, existing at international and European levels.
- Chapter 4 introduces us to an overview of the relevant standards, standardization documents, activities and technical committees in the project's area of activity. The main technical committees dealing with standards around accessibility and inclusion of buildings, but also the reduction of energy consumption of buildings, especially public ones, are briefly presented.
- The most important part of deliverable D8.2 is dealt with in Chapter 5 which reports on outcomes of the analysis of selected standards and standardization documents, activities and technical committees related to the project outcomes. The chapter refers in the first part to the methods of analysis of existing standards developed within the project, the way in which the analysis of selected standards was carried out, and finally to the main gaps identified and conclusions reached.
- In Chapter 6, the standardization part becomes only a general framework, and the chapter addresses the certification of buildings from the point of view of accessibility. The chapter starts with generalities about the certification of public buildings, briefly describes the European certification framework and the accessibility and inclusion of buildings and ends with recommendations towards European/international standardization related to the Accessibility Assessment Scheme, developed in T8.1.
- Chapter 7 summarizes the basic conclusions of the analysis of selected standards, recommendations for European standardization framework, recommendations for policy makers around accessibility and inclusion of buildings, recommendations based for the other WPs.

Annex 1 presents the list with selected standards for the analyses.

Annex 2 presents the methodologies for analyses of standards.

Annex 3 presents the analyses of selected standards.

1.3 Relation to Other Tasks and Deliverables

The D8.2 is fundamentally based on the gaps identified in existing standards, but also to the future results of the project. It translates the "needs analysis" into a prioritized list of standardization actions.

The D8.2 outlines the preparatory phase, identifying responsible committees and existing standards.

The D8.2 helps transition from the "research", WP3 and T8.1 and D8.1 to the "implementation" phase by transforming technical outputs into actionable standardization strategies.

2 Sociopolitical framework and trends around sustainable and inclusive buildings

The buildings sector is one of the most important areas of intervention of the European Union's policies in the context of the energy transition and the fight against climate change. The built fund influences both the consumption of energy resources and the quality of people's living environment.

European policies have progressively evolved from an approach focused solely on energy efficiency towards an integrated vision of a sustainable and inclusive built environment. This approach includes topics such as circularity and resource efficiency, reducing the life-cycle carbon footprint of buildings, and accessibility of the built environment.

Currently, the European framework for sustainable and inclusive buildings consists of several categories of instruments: public policies and strategies, legislation, financial instruments and governance mechanisms. These instruments are designed to operate in a complementary manner, contributing to the achievement of the objectives of the European Green Deal.

2.1 Public policies and strategic initiatives of the European Commission

2.1.1 Renovation Wave for Europe Strategy – COM (2020) 662

The strategy **A Renovation Wave for Europe** [1] – **greening our buildings, creating jobs, improving lives** presented in the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and Social Committee and the Committee of the Regions – COM (2020) 662 is one of the major initiatives of the European Commission to rethink, redesign and modernise the building stock.

The main objective of the strategy is to at least double the annual energy renovation rate of buildings by 2030 and to promote deep energy renovations capable of significantly reducing the energy consumption of buildings. The implementation of this initiative estimates the renovation of around 35 million buildings by 2030, while helping to create jobs and boost investment in the construction sector.

The key principles of the strategy are:

- Energy efficiency first - in energy and climate policymaking;
- Ensuring affordability of renovations for households and vulnerable people and areas;
- Decarbonization of the buildings sector and integration of renewable energy;
- Applying circular economy principles and life-cycle thinking;
- High health and environmental standards and ensuring accessibility for persons with disabilities and senior citizens;
- Tackling the twin challenges of the green and digital transitions together;
- Respect for aesthetics and architectural quality.

Several of the proposed actions have been implemented through the revision of the Energy Performance of Buildings Directive [2] in 2023 and other legislative revisions under the Fit for 55 package.

An important element of the initiative is the social dimension, with the strategy highlighting the role of energy renovations in reducing energy poverty and improving housing comfort.

2.1.2 New European Bauhaus Initiative

The New European Bauhaus (NEB) [3] initiative is a strategic project launched by the European Commission in 2020 that aims to connect the objectives of the European Green Deal with citizens' living spaces and the design of built environments. The initiative starts from the idea that the ecological transition is not only a technological and economic transformation, but also a cultural and social process that must influence how buildings, cities and public spaces are designed, built and used.

The New European Bauhaus proposes an integrated approach to the sustainability of the built environment, based on three fundamental values: sustainability, aesthetics and social inclusion.

Sustainability refers to reducing environmental impacts, resource efficiency and promoting the circular economy.

The aesthetic dimension focuses on the quality of the experience of built spaces, emphasising that sustainable environments must not only be functional, but also pleasant visually and culturally.

At the same time, the principle of inclusion aims to develop spaces that are accessible and open to all categories of citizens.

The initiative functions as an interdisciplinary platform bringing together architects, designers, engineers, researchers, public authorities, the private sector and civil society. Through this platform, the European Commission encourages the development of innovative solutions for the built environment and sustainable lifestyles. The NEB aims to bridge the gap between science and technology and art and culture to stimulate new models of urban and architectural development.

The implementation of the initiative is carried out through several types of actions. Firstly, the co-creation process involves the participation of citizens and local communities in the definition of concepts and priorities. Second, the initiative supports pilot and demonstration projects that illustrate the New European Bauhaus principles in practice, such as revitalising existing urban areas that are physically, socially or economically degraded or transforming public spaces. Thirdly, the European Union mobilises various funding programmes, such as Horizon Europe, cohesion policy or the LIFE programme, to support projects inspired by NEB values.

With this approach, the New European Bauhaus helps transform the way the ecological transition is perceived, presenting it as an opportunity to improve quality of life. The initiative promotes the idea that sustainable built environments must be functional, beautiful and inclusive at the same time. The NEB thus becomes an important tool of the European Union for developing cities and communities that simultaneously respond to the climate, social and cultural challenges of contemporary society.

The initiative functions as a platform for collaboration between public authorities, construction professionals, local communities and the creative sector.

2.1.3 Level (s) – European framework for sustainable buildings

Level (s) – The European framework for sustainable buildings [4] is a voluntary assessment and reporting framework developed by the European Commission with scientific and technical support from the Joint Research Centre (JRC) and in collaboration with actors in the construction sector. Level (s) is a tool for assessing and improving the sustainability performance of buildings throughout their life cycle and aims to provide a common set of indicators and assessment methods that can be used by architects, real estate developers, public authorities and investors to integrate sustainable development principles into the construction sector.

The Level (s) framework supports the implementation of European policies on the circular economy, energy efficiency and the reduction of carbon emissions associated with the built environment. By using this tool, actors involved in the design, construction and operation of buildings can analyse

environmental impacts from the early stages of projects, thus facilitating decisions that reduce resource consumption and greenhouse gas emissions.

The Level (s) structure is organised around six main sustainability objectives: reducing life-cycle carbon emissions of buildings, circular and resource-efficient material life cycles, water resource efficiency, ensuring a healthy and comfortable indoor environment, adapting to climate change and optimizing costs and market value throughout the life cycle. Indicators and calculation methods enabling the performance of buildings to be assessed in a comparable way at European level are defined for each objective.

A key element of the methodology is Life Cycle Assessment (LCA). This approach looks at the environmental impacts of buildings from the production of construction materials and the construction process to the use, renovation and demolition of buildings. With this perspective, Level (s) helps integrate circular economy principles into the construction sector and reduce the amount of waste generated.

Level (s) is designed as a voluntary and flexible tool that can be applied in different national contexts and for different types of projects. It can be used for both new and renovation of existing buildings. In addition, Level (s) indicators can be integrated into sustainable building certification schemes, green public procurement criteria and European Union funding programmes dedicated to sustainable development.

By developing a common language for assessing the sustainability of buildings, Level (s) facilitates comparability of projects and harmonisation of practices in the construction sector at European level. The instrument is thus an important component of the European Union's socio policy framework on sustainable built environment, contributing to a pathway towards more energy-efficient, resilient and inclusive cities and communities.

2.2 Building and energy efficiency European regulations

2.2.1 Directive (EU) 2024/1275 – Energy Performance of Buildings Directive (recast)

Directive (EU) 2024/1275 [5] on the energy performance of buildings is the current legislative framework of the European Union aimed at accelerating the decarbonisation of the building sector and increasing the energy efficiency of the European building stock. It recasts Directive 2010/31/EU and is part of the 'Fit for 55' package, through which the Union aims to reduce net greenhouse gas emissions by at least 55 % by 2030 and to achieve climate neutrality by 2050. The buildings sector is particularly relevant for those targets, as buildings are responsible for around 40 % of the Union's final energy consumption and around 36 % of energy-related greenhouse gas emissions.

The Directive introduces a long-term vision for transforming the European building stock into a zero-emission building stock by 2050. The concept of 'zero-emission building' implies a very high level of energy performance, very low energy demand and the elimination of the use of fossil fuels for the operation of the building. The energy required must come mainly from renewable sources, produced on-site or nearby.

A central element of the Directive is to accelerate the energy renovation of existing buildings. Around 75 % of buildings in the European Union are considered energy inefficient and the current renovation rate is insufficient to achieve the climate targets. The Directive introduces tools to incentivise deep renovation, including minimum energy performance standards for specific building categories and the obligation for Member States to draw up national building renovation plans. These plans must set out clear trajectories to reduce energy consumption and progressively modernise the building stock by 2050.

The Directive promotes the integration of renewable energy sources into buildings and the phasing out of fossil fuel-based heating systems. In this regard, Member States are encouraged to introduce measures for the installation of solar technologies on buildings and to phase out financial incentives for fossil fuel boilers. In parallel, the law supports the electrification of the building sector, the development of charging infrastructure for electric vehicles and the use of smart technologies to manage energy consumption.

Another important element of the Directive is the integration of sustainability concepts throughout the lifecycle of buildings. In addition to energy performance in the use phase, the Directive encourages the assessment of whole life-cycle emissions of buildings, including those associated with building materials and construction processes. This approach contributes to the development of a circular economy in the construction sector and to a more efficient use of resources.

Overall, Directive (EU) 2024/1275 is one of the main public policy instruments of the European Union for transforming the built environment into a sustainable, energy efficient and resilient sector. By setting clear targets for zero-emission buildings through the incentivising energy renovation and promoting the use of renewable energy and smart technologies, the Directive contributes to achieving the Union's climate goals and improving housing conditions for citizens.

2.2.2 Directive (EU) 2023/1791 – Energy Efficiency Directive (recast)

Directive (EU) 2023/1791 [6] on energy efficiency is one of the main legislative instruments of the European Union to reduce energy consumption and accelerate the transition to a climate-neutral economy. It is part of the “Fit for 55” package and sets out a strengthened framework for improving energy efficiency in all sectors of the economy, including buildings, industry, transport and public services. The Directive contributes to achieving the Union's target of reducing greenhouse gas emissions by at least 55 % by 2030 and achieving climate neutrality by 2050.

A central element of the Directive is the setting of binding targets for the reduction of energy consumption at Union level. Member States should contribute to achieving a common target of reducing final energy consumption by 2030 by adopting national energy efficiency measures and integrating them into their integrated national energy and climate plans. The Directive also introduces more ambitious annual energy savings requirements, requiring Member States to ensure cumulative energy savings through dedicated policies and programmes.

The Directive strengthens the role of the public sector in promoting energy efficiency. Public authorities need to adopt exemplary measures, including by renovating part of the floor area of public buildings annually to improve their energy performance. In addition, public institutions are encouraged to integrate energy efficiency criteria into public procurement procedures, thereby helping to stimulate the market for efficient energy technologies and solutions.

The Directive also promotes measures aimed at reducing energy poverty and protecting vulnerable consumers. Member States must consider the social impact of energy efficiency policies and develop support programmes for households affected by high energy costs. In this context, energy efficiency is recognised not only as a climate policy tool, but also as a means of improving living conditions and reducing social inequalities.

A fundamental principle reinforced by the Directive is the “energy efficiency first” principle. It requires that measures to reduce energy consumption to be considered as a priority in energy planning and investment decisions, prior to the expansion of generation capacities or energy infrastructure. Applying this principle helps to optimise energy system costs and reduce environmental impacts.

Overall, Directive (EU) 2023/1791 strengthens the Union's governance framework for energy efficiency and paves the way for the structural reduction of energy consumption in all sectors of the economy. By setting more ambitious targets, mobilising the public sector and integrating the social dimension of the energy transition, the Directive supports making the European energy system more efficient, sustainable and resilient.

2.2.3 Directive 2009/28/EC – Renewable Energy Directive

Directive 2009/28/EC [7] of the European Parliament and of the Council on the promotion of the use of energy from renewable sources is one of the fundamental legislative acts of the European Union in the field of energy and climate policy. Adopted as part of the 2020 climate and energy package, the Directive sets out a common framework to increase the share of renewable energy in the Union's final energy consumption. The main aim of the Directive is to reduce greenhouse gas emissions, strengthen energy security and stimulate technological and economic development in the renewable energy sector.

The Directive sets a binding target at European Union level for the share of energy from renewable sources to reach at least 20 % of gross final energy consumption by 2020. In order to achieve this objective, differentiated national targets have been set for each Member State, considering their starting point, potential for the development of renewable sources and economic conditions. Member States were required to draw up national renewable energy action plans describing the national trajectories, policies and measures needed to achieve the targets set.

The Directive promotes the use of renewable energy in three main sectors: electricity generation, heating and cooling, and transport. In the buildings sector, the Directive encourages the integration of renewable technologies such as solar energy, biomass, geothermal energy and heat pumps, thereby helping to reduce the consumption of fossil fuels for heating and cooling. Member States are also encouraged to introduce minimum requirements for the use of renewable energy in new or renovated buildings, in line with national building regulations.

Another important element of the Directive is the introduction of cooperation mechanisms between Member States aimed at facilitating the achievement of national targets in an economically efficient manner. These mechanisms include statistical transfers of renewable energy between Member States, joint renewable energy generation projects and joint support schemes. These instruments make it possible to tap into the different potential of Member States in terms of renewable resources and contribute to the development of an integrated European energy market.

The Directive also includes sustainability criteria for biofuels and bioliquids to ensure that the development of renewable energy effectively contributes to the reduction of greenhouse gas emissions and does not lead to negative impacts on the environment or land use. These criteria set out the conditions under which biofuels can be considered sustainable and eligible for support schemes or for counting towards renewable energy targets.

Overall, Directive 2009/28/EC was a key step in the development of a European energy policy geared towards renewable sources. By setting binding targets, introducing cooperation mechanisms between Member States and promoting the integration of renewable energies in the buildings sector and other economic sectors, the Directive has significantly contributed to transforming the European energy system and strengthening the transition to a sustainable energy model.

2.2.4 Directives (EU) 2023/2413 – Renewable Energy Directive amendment

Directive (EU) 2023/2413 [8] of the European Parliament and of the Council is the revision of the Renewable Energy Directive and is part of the "Fit for 55" package adopted to support the European Union's target of reducing greenhouse gas emissions by at least 55 % by 2030. The Directive amends and strengthens the framework established by Directive (EU) 2018/2001 and aims to accelerate the development and deployment of renewable energy in all sectors of the economy, including buildings, transport and industry. With this revision, renewable energy is recognised as an essential element of the energy transition and of strengthening the Union's energy security.

One of the main objectives of the Directive is to increase the share of energy from renewable sources in the European Union's gross final consumption of energy. The Directive sets a Union-wide target of at least 42,5 % renewable energy by 2030, with additional efforts to reach around 45 %. To achieve this objective, Member States must adopt national policies and measures that accelerate the development of renewable energy generation capacities and their integration into national energy systems.

The Directive introduces measures to simplify and speed up administrative procedures for renewable energy projects. Member States are obliged to designate acceleration areas for the development of renewable energy, where permitting procedures are simplified and limited in time. Those measures aim to reduce administrative obstacles and facilitate the rapid deployment of solar, wind and other renewable energy projects, thereby contributing to the rapid increase of installed capacity in the Union.

In the buildings sector, the Directive encourages the integration of renewable energy into heating and cooling systems and promotes the electrification of energy consumption through the use of technologies such as heat pumps and solar systems. Member States are encouraged to introduce measures to increase the share of renewable energy used in buildings, including by integrating these technologies into the design of new buildings and the renovation of existing buildings. These measures are complementary to European policies on energy efficiency and energy performance of buildings.

The Directive also strengthens the role of renewable energy communities and prosumers in the European energy system. Citizens, local authorities and businesses can produce, consume, store and trade renewable energy, thus helping to decentralise energy production and increase social participation in the energy transition. These mechanisms support the development of a more flexible, participatory and resilient energy system.

Overall, Directive (EU) 2023/2413 strengthens the European legislative framework for the promotion of renewable energy and accelerates its integration into the European economy. By setting more ambitious targets, simplifying permitting procedures and boosting the use of renewable energy in buildings and other economic sectors, the Directive contributes to achieving the Union's climate objectives and to developing a sustainable and secure energy system.

2.2.5 Regulation (EU) 2024/3110 – Construction Products Regulation

Regulation (EU) 2024/3110 [9] on construction products establishes the current European Union legal framework for the placing on the market and use of products intended for the construction sector. It replaces Regulation (EU) No 305/2011 and has as its main objective to modernise the legislative framework to meet the Union's new priorities of sustainability, circular economy and digitalisation. The Regulation aims to ensure the efficient functioning of the internal market for construction products, while guaranteeing high levels of performance, safety and transparency as regards the characteristics of products used in the built environment.

A central element of the Regulation is the establishment of harmonised requirements for assessing and declaring the performance of construction products. Manufacturers must provide standardized information on the performance of products in relation to the essential characteristics relevant for their use in construction works. This information is contained in the declaration of performance and is associated with the CE marking, which indicates that the product complies with the applicable European requirements and can circulate freely in the internal market of the European Union.

The Regulation introduces a stronger integration of sustainability criteria and environmental impact assessment in the construction products sector. In this context, harmonised methods shall be developed for assessing the environmental performance of products throughout their life cycle, including in terms of greenhouse gas emissions, resource use and reusability or recyclability. These measures help promote the circular economy and reduce the environmental impact of the construction sector.

The Regulation also promotes the digitalisation of construction product information through the introduction of the Digital Product Passport. This tool facilitates access to relevant information on the technical characteristics, performance and environmental impact of products, thereby supporting market transparency and facilitating the integration of data into digital building design and management processes, including the use of Building Information Modelling (BIM) digital models.

Another important objective of the Regulation is to strengthen market surveillance and ensure compliance of construction products. The competent authorities of the Member States shall be responsible for monitoring products placed on the market and for preventing the marketing of non-compliant products. In addition, the Regulation clarifies the responsibilities of the different economic actors involved in the supply chain, including manufacturers, importers and distributors.

Overall, Regulation (EU) 2024/3110 is a key instrument for modernising the construction products sector in the European Union. By integrating sustainability, digitalisation and transparency requirements, the Regulation supports the development of a construction sector that is more efficient, innovative and aligned with the European objectives of climate neutrality and sustainable development.

2.2.6 European Accessibility Act – Directive (EU) 2019/882

Directive (EU) 2019/882 [10] on the accessibility requirements for products and services, known as the European Accessibility Act, establishes a common framework at European Union level to improve the accessibility of certain products and services for persons with disabilities. The legislation aims to remove barriers in the internal market generated by diverging national regulations and contributes to a more inclusive society. The Directive is part of the Union's objectives on equal opportunities, social and economic participation of persons with disabilities and the implementation of the United Nations Convention on the Rights of Persons with Disabilities.

The Directive lays down harmonised accessibility requirements for a number of products and services considered essential for full participation in economic and social life. These include IT equipment, payment terminals, smartphones, electronic communication services, consumer banking, e-commerce and certain transport services. By introducing common requirements, the Directive aims to ensure access for persons with disabilities to these products and services and to facilitate their free movement in the internal market.

The Directive's accessibility requirements cover how products and services are designed and delivered so that they can be used by as many people as possible, including persons with different types of disabilities. These requirements include, for example, the provision of information in a perceptible and understandable way, the use of accessible interfaces and compatibility with assistive technologies. The Directive thus promotes the principles of universal design, which aim to create products and services that can be used by all without the need for special adaptations.

The Directive also lays down obligations for economic operators involved in the supply chain, including manufacturers, importers and distributors. They shall ensure that products and services placed on the market comply with accessibility requirements and that relevant information on their use is provided in an accessible manner. At the same time, Member States are responsible for putting in place effective market surveillance mechanisms and for applying the necessary measures in case of non-compliance.

While the Directive focuses mainly on digital and technological products and services, the principles of accessibility promoted by it also have important implications for the built environment. The requirements for access to services, infrastructures and equipment are complementary to other Union legislation, such as the Energy Performance of Buildings Directive or public procurement legislation, contributing to the development of more inclusive and accessible spaces and services for all citizens.

Overall, Directive (EU) 2019/882 is a key instrument for promoting accessibility and social inclusion in the European Union. By harmonising accessibility requirements and stimulating the development of products and services designed according to universal design principles, the Directive contributes to

strengthening the internal market and improving the quality of life of persons with disabilities and other vulnerable groups.

2.3 Standardization requests addressed to CEN/CLC by the EC

2.3.1 Mandate M/480 – Energy Performance of Buildings (2011)

M/480 [11], mandate to CEN, CENELEC and ETSI deals with the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and promoting the energy efficiency of buildings, in accordance with the terms set out in the recast of the Directive on the energy performance of buildings 2010/31/EU. The mandate was issued in the context of the revision of the Energy Performance of Buildings Directive and is intended to support its implementation by developing harmonised methodologies for calculating and assessing energy performance.

The main purpose of the mandate is to develop a common European methodology framework for calculating the energy performance of buildings. In this regard, the mandate calls for the development and revision of a set of European standards allowing the assessment of the energy consumption of buildings based on transparent and comparable methods. These standards must cover both new and existing buildings as well as different technical building systems, including heating, cooling, ventilation, lighting and domestic hot water production systems.

The standards developed under the mandate are organised in a modular system of EPB (Energy Performance of Buildings) standards. This system includes standards covering different components of the energy performance of buildings, such as the energy needs of the building, the performance of technical systems, the conditions of use and the methods to aggregate the total energy consumption. The modular structure allows for the use of standards in a flexible way so that Member States can adapt the methodology to national climatic conditions, constructive traditions and legislative frameworks.

An important element of the mandate is the national annexes to the European standards developed, through which Member States can specify the parameters and assumptions used in the calculation of energy performance. This approach makes it possible to maintain a harmonised methodological framework at European level, while retaining the flexibility needed to adapt to local conditions. Differences in climate, constructive practices and energy policies across Member States justify the need for these adjustments at national level.

The main result of mandate M/480 was the development of the second generation of European standards on the energy performance of buildings, largely published in 2015-2017. The standards developed under the mandate facilitate the application of legislative requirements on energy performance and contribute to the development of a more sustainable and energy-efficient built environment.

The list of standards currently in force developed in the context of that mandate by the committees CEN/TC 156, CEN/TC 169, CEN/TC 228, CEN TC/247, CEN/TC 371 and CEN/TC 89 [12], includes 86 standardization deliverables.

2.3.2 Mandate M/350 – Sustainability of construction works (2004)

M/350 [13], standardization Mandate to CEN – Development of horizontal Standardized methods for the assessment of the integrated environmental performance of buildings, was issued by the European Commission to support the development of European standards on sustainability assessment of construction works. The mandate was launched in the context of strengthening European policies on sustainable development, resource efficiency and reducing the environmental impact of the construction sector.

The main objective of the mandate was to develop a harmonised methodological framework for assessing the environmental performance of buildings and other construction works throughout their life cycle. To this end, the mandate led to the development of standards in the CEN/TC 350 technical committee dedicated to the sustainability of the built environment.

The standards developed under this mandate introduce methods for environmental impact assessment of buildings, including Life Cycle Assessment (LCA) and Life Cycle Costing (LCC). These methods make it possible to assess greenhouse gas emissions, material and energy resource consumption and other performance indicators over the whole life cycle of buildings. Standards also enable the provision of environmental information on construction products and materials used, resulting in voluntary Environmental Product Declarations (EPDs).

Mandate M/350 has played an important role in promoting an integrated approach to sustainability in the construction sector. The resulting standards provide tools for assessing the sustainable performance of buildings and are used in sustainable building certification schemes, public policies and research projects on the built environment.

By introducing harmonised sustainability assessment methods, the mandate contributes to the development of a common technical framework in the European Union. This framework facilitates the comparability of construction projects and supports the implementation of European policies on the circular economy, resource efficiency and the reduction of carbon emissions in the building sector.

The list of standards currently in force developed under this mandate by the committee CEN/TC 350 includes 7 standardization deliverables.

2.3.3 Mandate M/420 – Accessibility of the built environment

Standardization Mandate M/420 [14] – Standardization mandate to CEN, CENELC SND ETSI in support of European accessibility requirements for public procurement in the built environment was issued by the European Commission to the European standardization organisations to support the development of standards on accessibility of the built environment. The mandate was developed in the context of European policies on social inclusion and the rights of persons with disabilities.

The aim of the mandate was to develop functional and technical requirements to facilitate equal access to buildings and infrastructure for all categories of users, including persons with disabilities, elderly persons or persons with reduced mobility. This mandate aims to develop a common reference framework for accessible design of the built environment.

The mandate promotes the concept of universal design, according to which built environments must be designed to be usable by as many categories of people as possible without further adaptation. This approach contributes to the development of more inclusive cities and communities.

From the perspective of the European socio-political framework, mandate M/420 contributes to the implementation of the UN Convention on the Rights of Persons with Disabilities and to the development of urban policies oriented towards accessibility and social inclusion.

The list of standards currently in force developed under this mandate by the committee CEN/CLC/JTC 11 includes 3 standardization deliverables.

2.3.4 Mandate M/376 – Accessibility of ICT products and services

M/376 [15] – standardization mandate to CEN, CENELEC and ETSI in support of European Accessibility requirements for public procurement of products and services in the ICT domain was issued by the European Commission to the European standardization organisations CEN, CENELEC and ETSI for the development of technical specifications to support the accessibility of information and communication technologies (ICT) products and services in the context of public procurement. The mandate was adopted in the framework of the European Union's policies on social inclusion and equal participation

of persons with disabilities in economic and social life, as well as in the context of the implementation of the European Accessibility Strategy. The mandate document sets out the objectives, scope and tasks assigned to standardization organisations for the development of technical requirements to facilitate the procurement of accessible ICT products and services.

In the text of the mandate, the European Commission highlights the strategic role of public procurement in promoting accessibility. Public institutions are an important segment of the market for ICT products and services, and the introduction of accessibility requirements in procurement documentation can influence the development and supply of products on the market. The mandate therefore calls for clear and verifiable technical specifications that enable contracting authorities to include accessibility criteria in procurement procedures without creating unjustified barriers to trade or to the functioning of the internal market.

The mandate defines the scope of standardization activities and identifies the main categories of ICT products and services to be considered. These include IT equipment, software, web applications, electronic communication services and other technologies used in the public sector to provide services to citizens. The document stresses the need for accessibility requirements to be formulated in a technically neutral way so that they can be applied to different types of technologies and do not limit technological innovation.

Another important element of the mandate is the request to the European standardization organisations to cooperate with each other in order to develop consistent and harmonised specifications. The mandate provides for the coordination of activities between CEN, CENELEC and ETSI and the involvement of relevant experts from industry, the public sector and organisations representing persons with disabilities. This participatory approach aims to ensure that technical requirements reflect the real needs of users and can be applied effectively in practice.

The mandate document shall also set out the principles to be followed in drawing up the technical specifications. These include transparency of the standardization process, compatibility with existing international standards and the use of functional criteria to assess the accessibility of ICT products and services. The mandate underlines the importance of developing methods that allow for the verification of compliance and the use of technical specifications in public procurement procedures.

The list of standards currently in force developed under this mandate by the committee CEN/CLC/ETSI/JWG eAcc includes 2 standardization deliverables.

2.3.5 Mandate M/473 – Design for All

Mandate M/473 [16] – Design for All was issued by the European Commission to integrate inclusive design principles into the work of the European standardization organisations. The mandate promotes the Design for All concept, according to which products, services and environments must be designed to be usable by as many categories of users as possible.

The purpose of the mandate is to support the inclusion of accessibility and usability requirements in the process of developing European standards. In this way, technical standards can help remove barriers that hinder the full participation of persons with disabilities or other vulnerable groups.

Mandate M/473 does not cover a specific technical area but aims at the cross-cutting integration of the Design for All principles into European standardization. With this approach, accessibility becomes an essential component of the development of products and services.

Applying the Design for All principles contributes to the development of more user-friendly products and services for all users, including older people or people with temporary mobility or perception limitations.

The mandate is an important tool for promoting social inclusion and mainstreaming accessibility in European standardization and innovation policies.

The list of standards currently in force developed under this mandate by the committees CEN/CLC/Guides and CEN/CLC/JTC 12 includes 2 standardization deliverables.

2.3.6 Mandate M/587 – Accessibility requirements of products and services

Standardization Mandate M/587 [17] was issued by the European Commission to support the implementation of Directive (EU) 2019/882 on the accessibility of products and services.

The mandate requests the European standardization organisations CEN, CENELEC and ETSI to develop or revise harmonised standards supporting the application of the accessibility requirements of the Directive.

The standards developed under this mandate provide technical specifications for the design of products and services to be accessible to persons with different types of disabilities. The areas covered include digital products, online services, payment systems, electronic equipment and other technologies widely used in modern society.

By developing these standards, the mandate contributes to the harmonisation of accessibility requirements within the European Union's internal market and the elimination of technical barriers to trade.

Mandate M/587 reflects the role of European standardization as a tool to implement public policies, in particular in the field of social inclusion and accessibility of products and services.

The list of standards currently in force developed under this mandate by the committees CEN/CLC/JTC 11, CEN/CLC/JTC 12 and CEN/CLC/ETSI/JWG eAcc/WG 1 includes 6 standardization deliverables.

2.4 European financial instruments for sustainable buildings

2.4.1 EU Taxonomy Regulation (EU) 2020/852

Regulation (EU) 2020/852 [18] of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088, sets the framework for the creation of a European Union classification system for environmentally sustainable economic activities.

The main purpose of the Regulation is to steer investments towards activities that contribute to the environmental objectives of the EU and to support the transition to a sustainable and climate-neutral economy.

The taxonomy is used as a reference tool for investors, financial institutions and public authorities in assessing the sustainability of investments.

2.4.2 European Green Bond Standard

Regulation (EU) 2023/2631 [19] of the European Parliament and of the Council of 22 November 2023 on European Green Bonds and optional disclosures for bonds marketed as environmentally sustainable and for sustainability-linked bonds establishes a legal framework at European Union level for the issuance and use of European Green Bonds (EuGB).

The main aim of the regulation is to create a common European green bond standard that ensures transparency, comparability and credibility in the financial market.

The funds raised through these bonds must be exclusively allocated to the financing or refinancing of projects that contribute to the environmental objectives set out in the EU Taxonomy.

2.4.3 Social Climate Fund

Regulation (EU) 2023/955 [20] of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/106 establishes the Social Climate Fund (SCF), a European Union financial instrument to support the transition to a low-carbon economy.

The fund was created in the context of the Fit for 55 legislative package to mitigate the social impact of the extension of the Emissions Trading System (ETS) on the buildings and road transport sectors.

The main aim of the Regulation is to support vulnerable households, micro-enterprises and vulnerable transport users who may be affected by rising energy costs. It finances measures such as housing renovation and energy efficiency improvements.

2.4.4 Recovery and Resilience Facility

Regulation (EU) 2021/241 [21] of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility is the main financial instrument of the European Union created to support the economic recovery after the COVID-19 pandemic.

The Facility is part of the NextGenerationEU initiative and provides financial support to Member States to implement structural reforms and investments.

The aim of the regulation is to strengthen the resilience of European economies, accelerate the green and digital transitions and boost sustainable economic growth.

2.4.5 InvestEU Programme

Regulation (EU) 2021/523 [22] of the European Parliament and of the Council of 24 March 2021 establishing the InvestEU Programme and amending Regulation (EU) 2015/1017 is a financial instrument of the European Union aimed at stimulating strategic investments in the European economy.

The programme aims to mobilise public and private investment by using a guarantee from the European Union budget, de-risking investors and facilitating the financing of projects with significant economic and social impact.

The Regulation sets out four main areas of intervention: sustainable infrastructure, research and innovation, digitalisation and competitiveness, and social investment and skills.

2.5 Governance and mechanisms for implementation

2.5.1 Governance of the Energy Union – Regulation (EU) 2018/1999

Regulation (EU) 2018/1999 [23] of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action sets out the governance framework for the energy and climate policies of the European Union.

The Regulation creates an integrated system for planning, reporting and monitoring Member States' energy and climate policies.

A central element of the Regulation is the obligation for Member States to draw up Integrated National Energy and Climate Plans (NECPs), which describe the objectives, policies and measures for the period 2021-2030.

2.5.2 Green Public Procurement

Green public procurement (GPP) [24] is an important tool for integrating sustainability criteria into public contracts. It is a process where public authorities use their purchasing power to select goods, services, and works with reduced environmental impacts throughout their life cycle, aiming for sustainability, resource efficiency, and lower carbon footprints. It is a voluntary instrument in the EU—covering nearly 19% of GDP—designed to stimulate eco-innovation and provide cost-effective solutions.

The European Commission (EC) has been developing voluntary GPP criteria [25] for several product groups. Furthermore, following the adoption of the 2020 Circular Economy Action Plan, the Commission is proposing minimum mandatory GPP criteria and targets in sectoral legislation and phase in compulsory reporting to monitor its uptake.

Public authorities can use these criteria to promote products and services with a reduced environmental impact.

Standards play a crucial role in shaping product and process design, encompassing environmental aspects like material usage, durability, or energy and water consumption. Directly including references to technical standards that cover these environmental aspects in your specifications aids in clarifying the subject matter. The procurement directives refer to European, international, or national standards along with various technical systems of reference as methods for defining specifications. When reference to a standard is used, it must be accompanied by the term 'or equivalent.' This implies that proof of compliance to an equivalent standard should be accepted. Such proof might come in the form of a test report, or a certificate issued by a conformity assessment body. If, for reasons beyond their control, a tenderer can't obtain third-party evidence within the stipulated time, they might rely on a manufacturer's technical dossier. In such cases, the contracting authority must assess whether this demonstrates compliance.

2.5.3 Cohesion Policy 2021-2027

Cohesion Policy 2021-2027 is the European Union's main investment tool for reducing economic, social and territorial disparities between European regions.

Cohesion policy is implemented through funds such as the European Regional Development Fund (ERDF), the European Social Fund Plus (ESF+) and the Cohesion Fund (CF).

For 2021-2027, investments are focused on five headline targets, including a smarter, greener, more connected and more social Europe.

2.5.4 LIFE Programme

The LIFE programme is the European Union's financial instrument dedicated to environmental protection and climate action.

The programme funds projects that contribute to biodiversity conservation, pollution reduction, resource efficiency and adaptation to climate change.

In 2021-2027, the LIFE programme supports the implementation of the European Green Deal and the EU's climate objectives.

The programme includes sub-programmes dedicated to nature and biodiversity, circular economy and quality of life, climate change mitigation and adaptation, and clean energy transition.

3 Current situation in the European and International standardization related to AccessS Project

3.1 European/international Standardization - processes, activities and deliverables

3.1.1 Aim of standards

Standardization is an activity that sets out provisions for common and repeated use, regarding actual or potential problems, aimed at achieving the optimum degree of order in a given context.

A standard is a technical document that prescribes technical requirements to be met by products, processes, services or systems, which are voluntary in use. Standards are always voluntary. Of course, it could happen that legislation, both at national and European level, may change the nature of the standards, but it is not under the control of CEN and CENELEC.

The standard is produced by all the parties interested in a transparent, open and consensus-based process. It is intended for common repetitive use. This is a key element, it is recognized also in the definition from Regulation 1025 of 2012, because the Standardization Organizations like CEN, CENELEC and ETSI are recognized at European level, ISO, IEC and ITU, at international level or the NSBs and national committees at national level, where procedures that allow to ensure a transparent, open and consensus-based process are in place. Of course, standards can help the national and European legislators to implement the policy and legislation.

There are many types of standards: basic standards, terminology standards, product standards, interface standards, etc.

Standards are voluntary, whereas the documents concerning the administrative provisions, technical regulations and legislative documents are mandatory. When standards are used as reference documents in technical regulations, the requirements of standards, in whole or in part, will become mandatory.

We have standards in all domains, standards that support the implementation of technical regulations, standards for industrial sectors. In the construction sector there are design, research and execution standards, standards for product certification, management systems, public services – healthcare, education, public safety, public procurement and as a starting point of contract negotiation, etc.

Whilst standards become more relevant where a technology matures (higher Technology Readiness Levels (TRLs)), standards do support all stages of innovation, since the subjects that can be addressed by standards cover the full innovation cycle, as illustrated by the examples suggested in Figure 1:

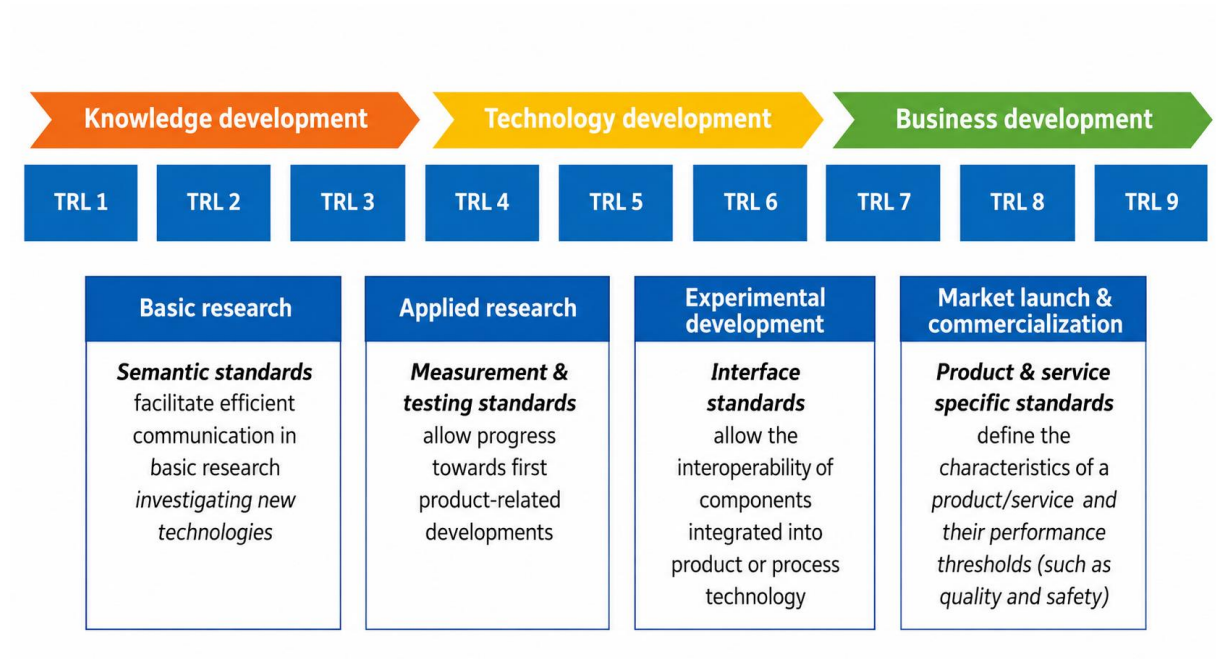


Figure 1. Types of standards & TRLs (CEN-CENELEC Guide 39:2022)

Standards create trust and enable consistency, as well as ensuring interoperability. They can ease scalability and market access. This makes it much more likely that the European and international markets will respond well to the innovation process.

3.1.2 Brief explanation of the European standardization process and timelines

The standardization landscape is a diverse one as illustrated below but ensures the support of the innovator in a structured, pluralistic, transparent and consensus way.

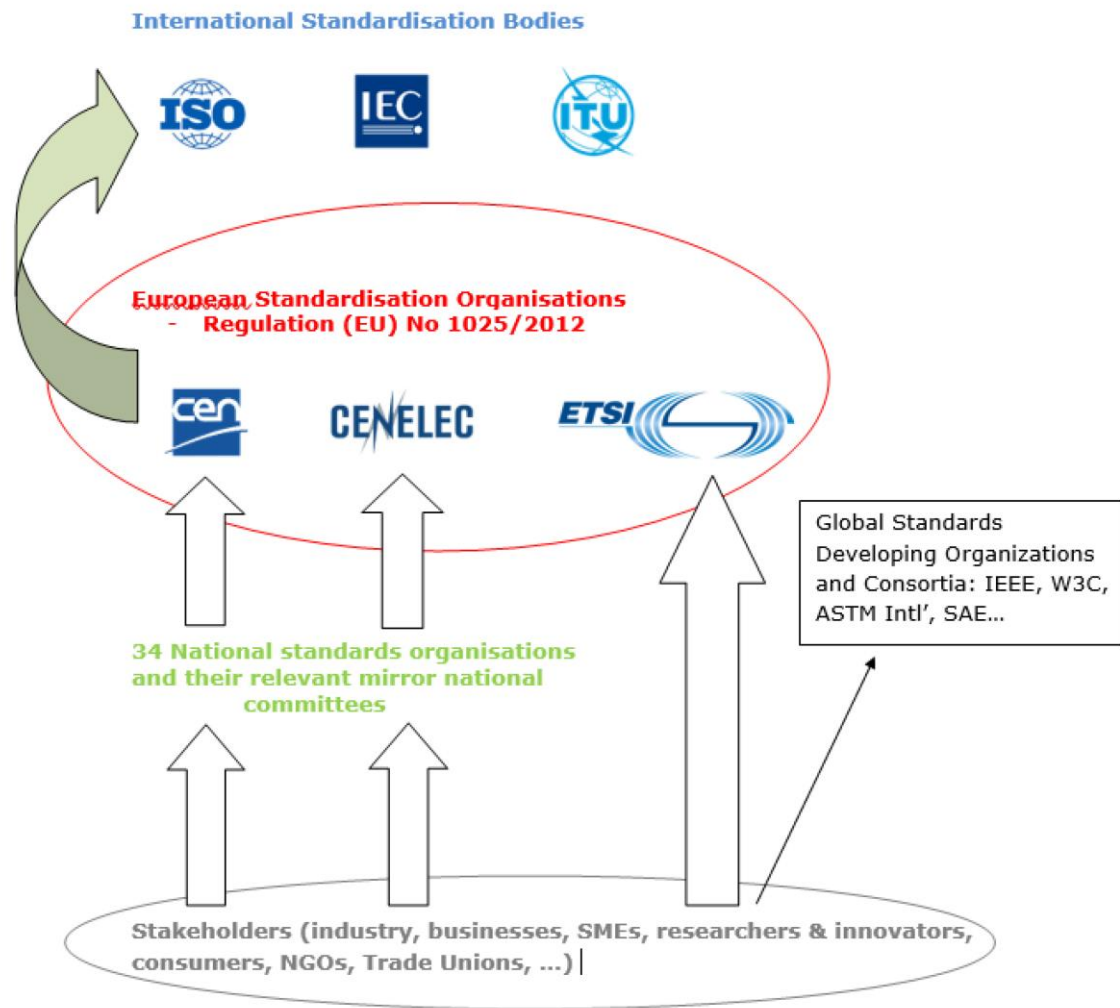


Figure 2. The standardization landscape (CEN-CENELEC Guide 39:2022)

The standardization process within the European Union (EU) is a systematic approach aimed at developing, implementing, and maintaining standards across various sectors and industries.

European standards (ENs) and standardization deliverables are developed by the three recognized Standardization Organizations:

- CEN (European Committee for Standardization),
- CENELEC (European Committee for Electrotechnical Standardization) and
- ETSI (European Telecommunications Standards Institute).

In many cases, when possible and relevant, European standards are aligned with the international standards of

- ISO (International Organization for Standardization) and
- IEC (International Electrotechnical Commission)

Many actors are involved in standardization on different levels. There are 34 national members (for example: ASRO for Romania, AFNOR for France, UNI for Italy, SN - Standards Norway for Norway, UNE for Spain, DIN for Germany, NBN for Belgium, ASI for Austria etc.), the national standardization bodies in CEN and the national electrotechnical committees in CENELEC.

At European level there are 3 different standardization organizations: CEN (The European Committee for Standardization), CENELEC (The European Electrotechnical Committee for Standardization), and ETSI (The European Telecommunications Standards Institute), which have been officially recognized by the European Union and by the European Free Trade Association (EFTA) as responsible for developing and defining voluntary standards at European level.



Figure 3. The standardization system

CEN provides a platform for the development of European standards and other technical documents in relation to various kinds of products, materials, services, and processes. CENELEC prepares voluntary standards in the electrotechnical field, which help facilitate trade between countries, create new markets, cut compliance costs, and support the development of the Single European Market.

ETSI is the recognized regional standards body dealing with telecommunications, broadcasting and other electronic communication networks and services.

At international level, there are the International Organization for Standardization ISO, the International Electrotechnical Commission IEC, with whom there are cooperation agreements in place and which, in collaboration with the European organizations, monitor and develop standards and ITU (International Telecommunication Organization). ITU is the corresponding international organization of ETSI.

It is important to emphasize that the CEN and CENELEC members are the same ones as the ISO and IEC members. There is one major difference when it comes to their work in these organizations at European and international levels. When a standard is published at European level by CEN and CENELEC, the national members are under the obligation to implement it as a national standard and withdraw any conflicting national standards. That is not the case for the international standards developed by ISO and IEC.

There are many actors involved in the standardization system. At national level, there is a variety of experts participating in the national mirror committees that represent sectors such as industry, academia, certification bodies, public authorities, consumer organizations. All those interested in the development of standards can participate in the work, at national, European and international levels.

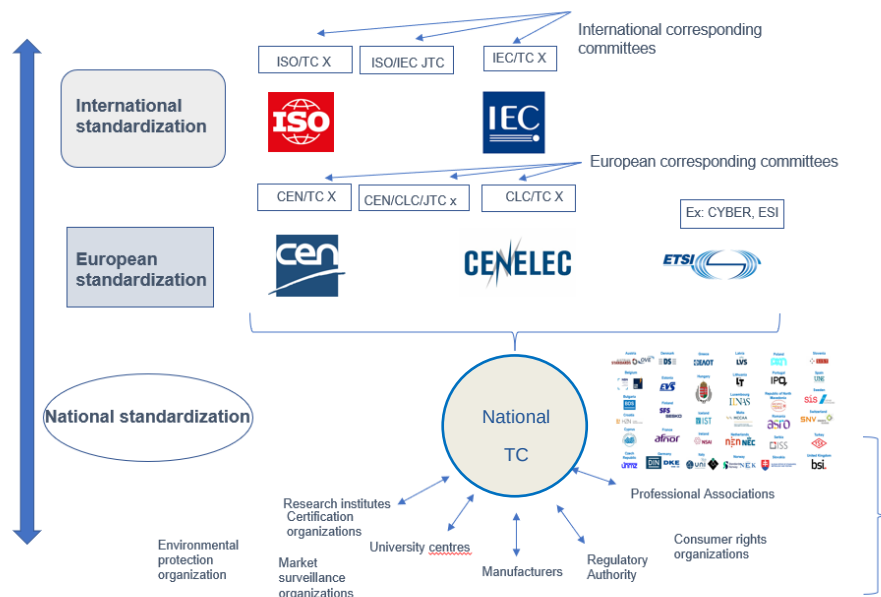


Figure 4. The standardization process

When there is an interest in creating, developing a standard or another specification at European level, this is either done through an already existing technical body or by establishing a new technical body. When it is done, the actual drafting of the document takes place in working groups, where the experts participate and contribute with their knowledge and expertise to the development of the document.

These experts are the ones who are identified at national level as having the adequate expertise and the proper competence to contribute. They participate in the working group in their capacity as experts, but they also must be aware of the positions of all the other experts and representatives at national level.

When it comes to the technical committees and the technical bodies, which are actually the ones that remain ultimately responsible for the development of the documents, the participation takes place following the national delegation principle. The members identify those who can represent them and every time they take a position in the technical committees, and this is based upon discussions that take place at national level.

The European organizations, such as the European federation representing specific interests may appoint a representative for the work, both in the working group, and at technical committee level.

This is to complement the participation at national level, while CEN and CENELEC support and strongly invite all the stakeholders to proceed to participate through national members. There are also representatives of European institutions that may participate in the work of the technical committees, especially when the standards that are being developed are in support of the European legislation, of European policies.

CEN-CENELEC Guide 25 [26] provides guidance on the participation of the European organizations and on how they can contribute and participate.

The participation of all the representatives of the industry, regulators, equipment manufacturers, professional associations, consumers, universities, etc. in writing the standards developed by the European and international technical committees is very important and it is paramount to gather all the main actors around the discussion table, to develop standards that meet the market needs.

The principles of the standardization activity are transparency, openness, impartiality, consensus, efficiency, relevance, and consistency.

Consensus is the most important principle aimed to be met within the TC work. It is the general agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to consider the points of view of all the parties concerned, and to reconcile any conflicting arguments.

One of the most important moments when standardization takes place is before developing and bringing a specific technology to market. This is anticipatory standardization.

Another case is developing standards while developing the specific market. And lastly, developing standards for a specific technology available on the market.

3.1.3 International standardization activities

3.1.3.1 ISO and IEC – International Standardization Organizations

To avoid duplication between standardization at international and European levels, for the benefit of the contributors and users of standards, as well as to increase the efficiency of standardization at European and international level, CEN and CENELEC have signed agreements with their respective international counterparts that are the International Standardization Organization ISO and the International Electrotechnical Commission IEC. These agreements set out rules governing cooperations. When it comes to ISO and CEN, the Vienna agreement is in place and when it comes to IEC and CENELEC, the Frankfurt agreement is in place.

3.1.3.2 The Vienna Agreement

The Vienna agreement was signed between CEN and ISO in 1991 and recognizes the primacy of international standards and aims at standards to be recognized simultaneously at international and European level by means of improved exchange of information and mutual representation at meetings. In line with the agreement, either CEN or ISO shall take the lead in drafting new standards and/or other related other documents and shall be presented for simultaneous approval by both organizations. In this way, ISO members can influence the content of the CEN standards and vice versa, noting that, for Europe, European members of ISO are the same members of CEN.

The Frankfurt Agreement

In October 2016, during the annual IEC general meeting in Frankfurt, the IEC which publishes most international standards for electrotechnical and electronic devices and systems, and CENELEC signed the Frankfurt agreement that will increase the harmonization between international and European standards. As a matter of fact, around 80 percent of all European electrotechnical standards are identical to or based on IEC international standards.

This level was already achieved through the Dresden agreement which was signed in 1996 by both organizations.

Under the Frankfurt agreement, the priority of electrotechnical standardization at international level in the IEC is reinforced, and one of the main objectives is to avoid the duplication of efforts and make the best use of European and IEC experts. Whenever they try to go international as much as possible, CENELEC takes into consideration also the European specificities and specific measures, and procedures are in place to consider European elements whenever needed and be specific when it comes to those standards supporting specific pieces of legislation.

3.1.4 Types of Deliverables at European level

The following types of deliverables exist at European level:

- European Standard (EN)
- Technical Specification (TS)
- Technical Report (TR)
- CEN and/or CENELEC Guides
- Harmonization Document (HD) - CENELEC only
- CEN and/or CENELEC Workshop Agreement (CWA)

3.1.4.1 European Standard (EN)

A standard (French: norm, German: die Norm) is a document that provides rules, guidelines or characteristics for activities or their results, for common and repeated use. Standards are created by bringing together all interested parties including manufacturers, users, consumers and regulators of a particular material, product, process or service. Everyone benefits from standardization through increased product safety and quality as well as lower transaction costs and prices.

Each European Standard is identified by a unique reference code which contains the letters 'EN'. A European Standard is a standard that has been adopted by one of the three recognized European Standardization Organizations (ESOs): CEN, CENELEC or ETSI. It is produced by all interested parties through a transparent, open and consensus-based process.

European Standards are a key component of the Single European Market. Although rather technical and mostly unknown to the public and media, they represent one of the most important issues for businesses. Often perceived as boring and not particularly relevant to some organizations, they are crucial in facilitating trade and hence have high visibility among manufacturers inside and outside Europe. Standards provide individuals, businesses and all kinds of organizations with a common basis for mutual understanding. A standard represents a model specification, a technical solution against which a market can trade. It codifies best practice and is usually state of the art.

In essence, European Standards relate to products, services or systems. Today, however, standards are no longer created only for technical reasons but have also become enablers for greater social inclusiveness and engagement with technology, as well as convergence and interoperability within growing markets across industries.

3.1.4.2 Technical Specification (TS)

A Technical Specification (TS) is a normative document, the development of which can be envisaged when various alternatives that would not gather enough as to allow agreement on a European Standard (EN), need to coexist in anticipation of future harmonization, or for providing specifications in experimental circumstances and/or evolving technologies.

A Technical Specification is established by a CEN and/or CENELEC Technical Body and approved through a weighted vote by the CEN and/or CENELEC national members. The TS shall be announced at national level. It may be adopted as a national standard, but conflicting national standards may continue to exist. A Technical Specification may however not conflict with a European Standard. If a conflicting EN is subsequently published, the TS is withdrawn.

No time limit is specified for the lifetime of TSs, but the responsible Technical Body shall ensure that they are reviewed at intervals of not more than 3 years, starting from their date of publication by CCMC.

3.1.4.3 Technical Report (TR)

A Technical Report (TR) is an informative document that provides information on the technical content of standardization work. It may be prepared when it is considered urgent or advisable to provide additional information to the CEN and CENELEC national members, the European Commission, the EFTA Secretariat, other governmental agencies or outside bodies.

A Technical Report is established by a CEN and/or CENELEC Technical Body and approved through a simple majority vote by the CEN and/or CENELEC national members. It involves no obligation at national level.

No time limit is specified for the lifetime of TRs, but it is recommended that they are regularly reviewed by the responsible Technical Body to ensure that they remain valid.

3.1.4.4 CEN and/or CENELEC Guides

A Guide is a document that gives rules, orientation, advice or recommendations relating to European standardization.

Guides are approved by a corporate body through a simple majority vote. Guides providing information or guidance on technical work shall be approved by the Technical Board, all others being approved by the General Assembly or Administrative Board.

3.1.4.5 Harmonization Document (HD) - CENELEC only

A Harmonization Document (HD) is a normative document made available by CENELEC in the three official languages.

The elaboration of a HD includes a public enquiry, followed by an approval by weighted vote of CENELEC national members and final ratification. The Harmonization Document is announced at national level, and every conflicting national standard is withdrawn. Having fulfilled these obligations, a member is free to maintain or issue a national standard dealing with a subject within the scope of the HD, if it is equivalent in technical content. The number, title and date of each such national standard shall be notified to the CEN-CENELEC Management Centre. A Harmonization Document does not conflict with any other EN and HD and is periodically reviewed.

During the elaboration and whole lifetime of the Harmonization Document, standstill applies.

The preparation, the approval and the review of an HD follow the same procedure as that given for an EN.

3.1.4.6 CEN and/or CENELEC Workshop Agreement (CWA)

A CEN and/or CENELEC Workshop Agreement (CWA) is a document published by CEN and/or CENELEC in at least one of the three official languages.

A CWA is an agreement developed and approved in a CEN or CENELEC Workshop; the latter is open to the direct participation of anyone with an interest in the development of the agreement. There is no geographical limit on participation; hence, participants may be from outside Europe. The development of a CWA is fast and flexible, on average between 10-12 months.

A CWA does not have the status of a European Standard. It involves no obligation at national level. A CWA may not conflict with a European Standard; if a conflicting EN is subsequently published, the CWA shall be withdrawn.

While TSs, TRs and CWAs are considered standardization documents, ENs are standards.

3.1.4.7 ETSI Deliverables

Work in ETSI is done based on ETSI work items, approved by the Technical Body and adopted by the ETSI membership. A work item results in one deliverable (sometimes more than one), which can be a European Standard or a Technical Specification, an ETSI Guide or a Technical Report. ETSI has a suite of specifications, standards and reports that fulfil the various needs of the market:

- **ETSI EN (European Standard)** - adopted by ETSI National Standards Organizations (NSOs) (except those elaborated in response to a Standardization Request (SReq)).

- **ETSI European standardization deliverables** – adopted by ETSI National Standardization Bodies (NSBs).
- **ETSI TS** (*ETSI Technical Specification*) and **ETSI TR** (*ETSI Technical Report*) - adopted by the responsible Technical Group (except those elaborated in response to a Standardization Request (SReq)).
- **ETSI ES** (*ETSI Standard*) and **ETSI EG** (*ETSI Guide*) - adopted by ETSI Members (except those elaborated in response to a Standardization Request (SReq)).
- **ETSI SR** (*ETSI Special Report*) - adopted by the ETSI responsible Technical Group (except those elaborated in response to a Standardization Request (SReq)).
- **ETSI GS** (*ETSI Group Specification*) and **GR** (*ETSI Group Report*) - adopted the Industry Specification Group responsible.

This suite of deliverables fulfils the needs for:

- Deliverable intended to meet needs specific to Europe and requiring transposition into national standards - ETSI EN.
- Deliverable intended to meet needs specific to the Europe Economic Area (EEA), required under a Standardization Request (SReq) from the European Commission (EC)/European Free Trade Association (EFTA) – ETSI EN and European standardization deliverable.
- Deliverable providing technical requirements or explanatory material or both – ETSI GS.
- Deliverable containing only informative elements – ETSI GR.
- High quality specifications delivered early to the market - ETSI TS.
- High quality standards supported by the whole ETSI global membership - ETSI ES.
- Deliverable containing explanatory material – ETSI TR.
- Information document used for various purposes, including giving public availability to information not produced within a Technical Group – ETSI SR.
- Document elaborated by ETSI partners and adopted by ETSI, to become an ETSI Technical Specification (TS) or an ETSI Technical Report (TR) - Publicly Available Specification (PAS).

The numbering convention used by ETSI to link related documents at these various "levels" simplifies their market application.

3.1.5 ISO/IEC deliverables

ISO/IEC deliverables are the various types of documents published by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) to facilitate international trade, technology development, and consensus-based standardization.

- ISO Standards
- ISO/TS Technical Specifications
- ISO/TR Technical Reports
- ISO/PAS Publicly Available Specifications
- IWA International Workshop Agreements
- ISO Guides

3.1.5.1 International Standards

An International Standard provides rules, guidelines or characteristics for activities or for their results, aimed at achieving the optimum degree of order in each context. It can take many forms. Apart from product standards, other examples include test methods, codes of practice, guideline standards and management systems standards.

3.1.5.2 Technical Specification

A Technical Specification addresses work still under technical development, or where it is believed that there will be a future, but not immediate, possibility of agreement on an International Standard. A Technical Specification is published for immediate use, but it also provides a means to obtain feedback. The aim is that it will eventually be transformed and republished as an International Standard.

3.1.5.3 Technical Report

A Technical Report contains information of a different kind from that of the previous two publications. It may include data obtained from a survey, for example, or from an informative report, or information of the perceived “state of the art”.

3.1.5.4 Publicly Available Specification

A Publicly Available Specification is published to respond to an urgent market need, representing either the consensus of the experts within a working group, or a consensus in an organization external to ISO. As with Technical Specifications, Publicly Available Specifications are published for immediate use and serve to obtain feedback for an eventual transformation into an International Standard. Publicly Available Specifications have a maximum life of six years, after which they can be transformed into an International Standard or withdrawn.

3.1.5.5 International Workshop Agreements

To respond to urgent market requirements, International Workshop Agreements are prepared through a workshop mechanism outside of ISO committee structures, following a procedure that ensures the broadest range of relevant interested parties worldwide have the opportunity to participate, and are approved by consensus amongst the individual participants in the workshops.

If there is an existing ISO committee whose scope covers the topic, the published International Workshop Agreement is automatically allocated to this committee for maintenance. An International Workshop Agreement is reviewed three years after its publication and can be further processed to become a Publicly Available Specification, a Technical Specification or an International Standard, according to the market requirement. An International Workshop Agreement can exist for a maximum of six years, following which it is either withdrawn or converted into another ISO document.

3.1.5.6 Guides

Guides help readers understand more about the main areas where standards add value. Some Guides talk about how, and why, ISO standards can make it work better, safer, and more efficiently.

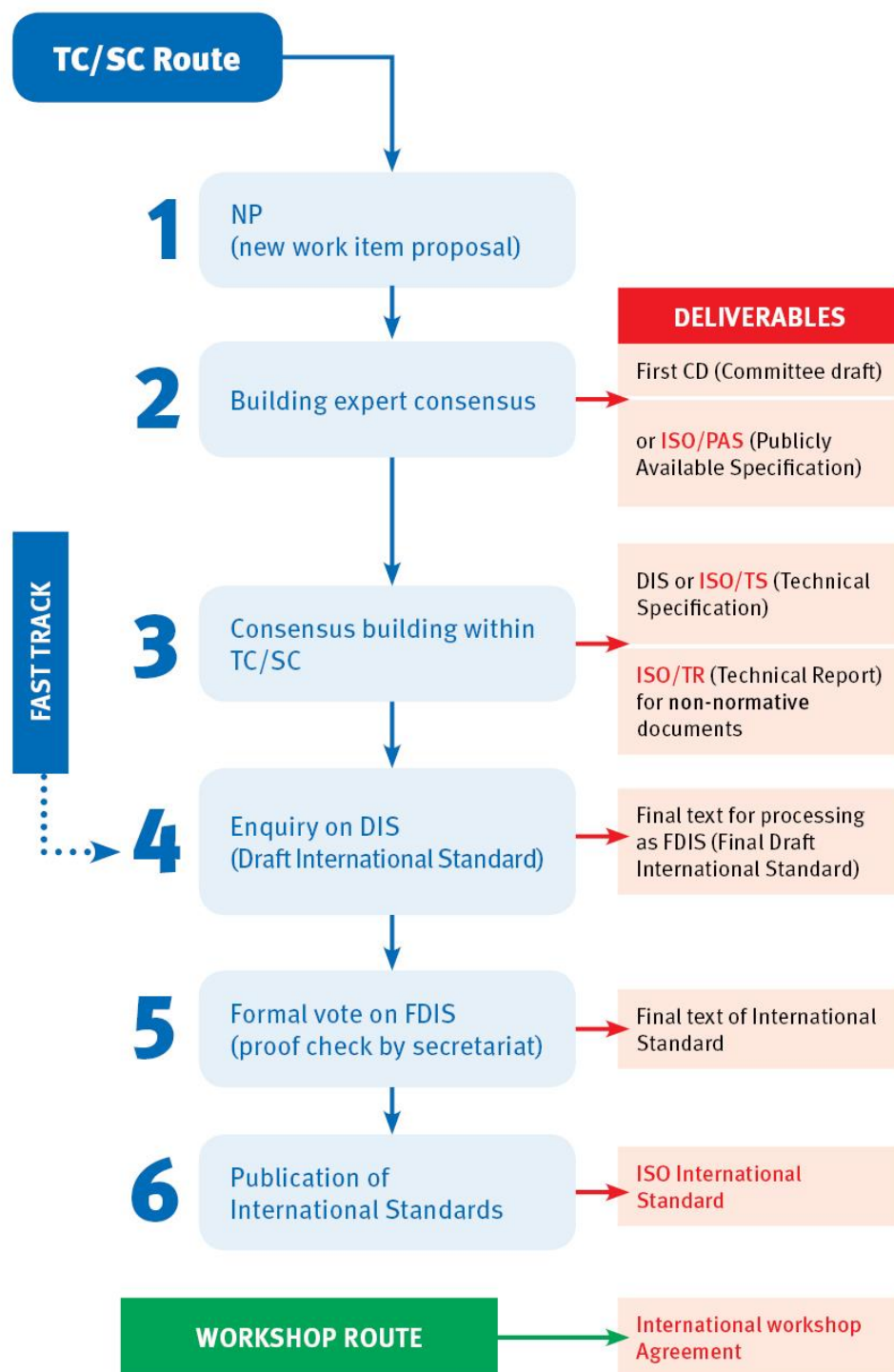


Figure 5. ISO deliverables (<https://www.iso.org/deliverables-all.html#IS>)

3.2 Brief comparison between different types of deliverables

The table provides a comparative overview of four types of deliverables: EN, TS, TR, and CWA, highlighting differences in procedural rigor, approval mechanisms, and development context.

Table 1. Comparison between CEN deliverables

Type of standardization document	Standstill	Enquiry	Approval by an NSB	Type of approval	Publication	Developed in
EN	Yes	Mandatory	Yes	Weighted vote	Mandatory publication	Technical Body
TS	No	No	Yes	Weighted vote	Announcement	Technical Body
TR	No	No	Yes	Simple majority	Announcement	Technical Body
CWA	No	Optional, but recommended	Approved by the registered Workshop participants	Consensus	Announcement	CEN/CENELEC Workshop

The overview is concentrated on EN, TR, TS and CWA and the following the criteria based:

- on development,
- on standstill policy,
- on official languages,
- on availability at national level,
- on lifetime and review,
- on timeframe for development,

The main conclusions are listed in tables 2 to 6 and figure 6.

Table 2. Comparison based on development

EN	TS	TR	CWA
The proposal is included as a work item in the work programme of a TC	The proposal is included as a work item in the work programme of a TC	The proposal is included as a work item in the work programme of a TC	The document is developed outside the normal CEN and/or CENELEC Technical Body structure
Approved by a TC, following a weighted vote of CEN/CENELEC national members	Approved by a TC, following a weighted vote of CEN/CENELEC national members	Approved by a TC, following a weighted vote of CEN/CENELEC national members	Approved by registered participants to a CEN/CENELEC Workshop, following a nonvoting procedure
Developed if the consensus/approval was obtained	Developed if future possibility of agreement as a EN exists but: - the required support cannot be obtained, - there is doubt on whether consensus has been achieved, - the subject matter is still under technical development, or - there is another reason precluding immediate publication as EN	Developed if: - failure to gain consensus/approval of a draft EN - contain informative material not suitable to be published as EN or TS - it is considered urgent or advisable to provide information to the CEN/CENELEC national members, the European Commission, the EFTA Secretariat or other governmental agencies	If the scope falls within the scope of existing TC, the Workshop description form shall be submitted to it. There will also be the possibility for the Technical Bodies to participate in the CEN and/or CENELEC Workshop or to be kept informed about the progress.

Table 3. Comparison based on standstill policy

EN	TS	TR	CWA
Standstill applies	- No standstill obligation exists except if the Technical Board has specifically decided so - conflicting national standards may continue to exist - an existing TS shall be withdrawn if the publication of a subsequent EN brings the TS into conflict with that EN	No standstill obligation exists	- No standstill obligation exists - no obligation to adopt it, nor to withdraw national standards in conflict with CWA

Table 4. Comparison based on official languages

EN	TS	TR	CWA
All the official languages: English, French, German	At least one of the official languages	At least one of the official languages	At least one of the official languages

Table 5. Comparison based on the availability at national level

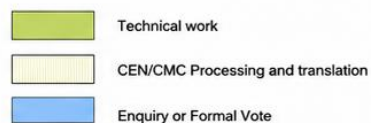
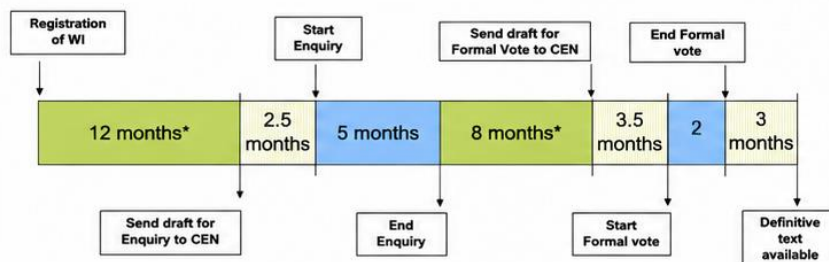
EN	TS	TR	CWA
Mandatory implementation as an identical national standard and withdrawal of conflicting national standards	Mandatory announcement and availability	Optional	Optional

Table 6. Comparison based on the lifetime and review process

EN	TS	TR	CWA
- reviewed at intervals of not more than 5 years - as a result of the review, the EN shall be a) confirmed, or b) amended, or c) revised as a new edition with a new date, or d) withdrawn. - for EN adopting ISO or IEC, no review process is initiated at European level	- reviewed at intervals of not more than 3 years - are not amended but replaced by a new edition with a new date of edition. Corrigenda are, however, possible. - any decision to confirm the TS for another 3 years shall be accompanied with a valid justification of the responsible Technical Body	- are not amended but replaced by a new edition with the same number and new date of edition. Corrigenda are, however, possible - no time limit is specified for the lifetime of TRs, but it is recommended that TRs are regularly reviewed by the responsible technical body to ensure that they remain valid	6 years lifetime - valid for 3 years or until transformation into another deliverable - after 3 years, the CEN-CENELEC Management Centre consults the former Workshop participants to see whether a renewal for a further 3 years is appropriate; if not, the CWA should be withdrawn.

Based on timeframe for development

Timeframe for the development of European standards (EN)



* An extension of 9 months may be requested

Total
36 months

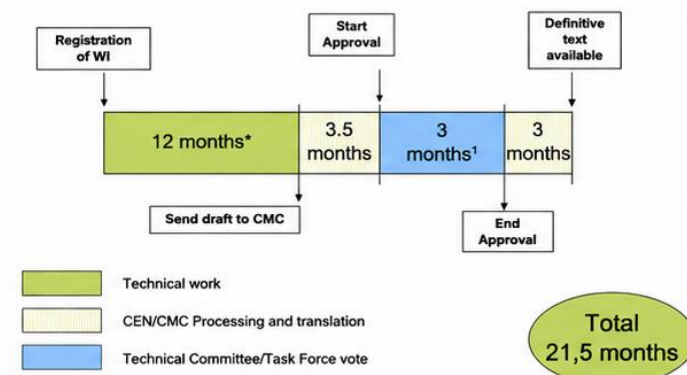
Workshop schedule (preliminary)

CEN/CENELEC Workshop	M01	M02	M03	M04	M05	M07	M08	M09	M10	M11	M12	...
Initiation												
1. Module description form submission at TC/WG												
2. Open connecting portal on eIF (portal pre-investment)												
Operation												
3. Kick-off meeting												
4. CWA development												
5. Open connecting portal on eIF (CWA development)												
6. CWA to Technical committee/working participants												
Publication												
7. CWA publication												
Dissemination (opt.)												
Milestones				K	V	V	M	V		M/A	P	D

Legend

- K Kick-off
- M Workshop meeting
- V Virtual Workshop meeting
- A Adoption of CWA
- P Publication of CWA
- D Online distribution of CWA

Timeframe for the development of Technical Specifications/Reports (TS/TR)



* An extension of 9 months may be requested

¹Technical specifications by weighted vote and Technical reports by simple majority vote

Figure 6. Comparison based on the timeframe for development

3.3 Current development of standards for accessibility

Accessibility ensures that barriers to mainstream products and services are removed or prevented, allowing people with functional limitations, including disabilities, to perceive, operate, and understand them on an equal basis with others.

Standards play a crucial role in integrating and strengthening accessibility aspects by providing a framework, requirements, and specifications for accessible products and services.

3.3.1 Accessibility in standardization at European level

3.3.1.1 “Design for All” approach

The ‘Design for All’ approach promotes human diversity, inclusion, and equality, enabling the widest possible use of products, goods, and services.

Accessibility is particularly important as EU member states prepare for the implementation of the European Accessibility Act (EAA). Starting June 2025, the EAA's mandatory accessibility requirements for products and services must be met. These requirements will also be applicable in public procurement and EU funded projects.

The EAA emphasizes that accessibility should be achieved by systematically removing and preventing barriers through a universal design or 'Design for All' approach. This principle ensures equal access for people with disabilities.

CEN/CLC JTC 12 ‘Design for All’ develops standards for human diversity, inclusion, and equality.

This committee was responsible for EN 17161:2019, the European Standard on Design for All, which resulted from Mandate M/473. In 2022, a new Mandate M/587, was issued to revise EN 17161 and develop two additional harmonized standards:

- Accessibility of non-digital product-related information
- Accessibility of support services (help desks, call centers, technical support, relay services, and training services)

EN 17161 provides a consistent approach for organizations to integrate accessibility within their management systems, enhancing innovation, expanding market reach, and supporting sustainable development and human rights. It also helps organizations:

- Prepare for compliance with the European Accessibility Act (EAA);
- Integrate Design for All principles with ISO 9001 or 14001 management systems;
- Demonstrate accessibility capability in public procurement and EU funding;
- Engage diverse users in development activities;
- Improve accessibility in products and services;
- Implement human-centered design processes;
- Develop new accessibility features where requirements are still evolving.

3.3.1.2 eAccessibility

Electronic accessibility (eAccessibility) refers to the use of information and communication technologies (ICT) by people with disabilities.

CEN, CENELEC, and ETSI developed EN 301549, the first European Standard for accessible ICT products and services, in response to European Commission Mandate M/376. This standard ensures that publicly procured ICT systems do not introduce accessibility barriers.

The CEN-CENELEC and ETSI Joint Working Group (JWG) 'eAccessibility' managed this initiative. The project was funded by the European Commission (EC) and the European Free Trade Association (EFTA).

The latest revision, EN 301549:2021, is available through ETSI and National Standardization Bodies and officially supports the Web Accessibility Directive since August 2021 (Commission Implementing Decision (EU) 2021/1339). It was developed inclusively, involving relevant stakeholders, and is aligned with global accessibility requirements through collaboration with the World Wide Web Consortium (W3C).

Under Mandate M/587, the JWG 'eAccessibility' is revising EN 301549 and developing new standards to support the EAA.

EN 301 549 can be applied to any type of ICT-based products and services. This includes software (web pages, mobile applications, desktop applications...), hardware (smartphones, personal computers, information kiosks...) and any combination of hardware and software.

To that end, the requirements of the standard are self-scoping. This means that they consist of two parts; the first part is a precondition for the second part, which holds the actual requirement. If the precondition is met by a product or service, then the product or service must conform to the second part of the requirement.

The standard contains, among other contents:

- A description of the needs of people with disabilities, written as functional performance statements, explaining the functionality that is needed to enable users with different abilities to locate, identify and operate functions in technology (chapter 4).
- The accessibility requirements, organized by functions or product features, rather than by commercial product or service categories (chapters 5 to 13).
- The description of which requirements of the Standard presume conformance with European Directive 2016/2012 (the Web Accessibility Directive) (annex A).
- A description of the relationship between requirements and functional performance statements (annex B).

Supporting Technical Reports

EN 301549:2021 is supplemented by three Technical Reports:

- CEN/CLC/ETSI TR 101550:2022 - *Documents relevant to EN 301 549 (V1.1.1) "Accessibility requirements suitable for public procurement of ICT products and services in Europe"*.

The document lists the documents used in the creation of EN 301 549 (V1.1.1) [i.3] on accessibility requirements for public procurement of ICT products and services in Europe and provides a source reference for any other documents needed to implement the test procedures specified in that document. As well as identifying the sources for the EN content, the document also provides additional explanation to assist users of the EN with clarifications and supporting information about measurement methods, particularly where no globally agreed test presently exists.

- CEN/CLC/ETSI/TR 101551:2026 - *Guidelines for public procurement of ICT products and services in the European Union: accessibility award criteria and conformity assessment*

This Technical Report (TR) provides guidance to contracting authorities on how to determine contract award criteria to meet the accessibility requirements of Directive (EU) 2019/882 (European Accessibility Act, EAA) and Directive (EU) 2016/2102 (Web Accessibility Directive, WAD); and on how to verify the conformance of publicly procured ICT products and services with these requirements. The present document describes how the accessibility requirements for the

procured ICT should be specified, documented and assessed in the frame of the procurement process, under the EU Public Procurement Directives¹. The different mechanisms for conformity assessment with the applicable accessibility requirements are explained. It is discussed how these mechanisms may be applied both in the pre-procurement research phase and when awarding a contract, as well as part of contract management in the post-award stage. This Technical Report also provides a useful guidance for bidders who prepare an offer for public procurement of ICT products and services, and others aiming to procure accessible ICT.

- CEN/CLC/ETSI TR 101552:2014 - *Guidance for the application of conformity assessment to accessibility requirements for public procurement of ICT products and services in Europe*

This Technical Report (TR) incorporates all information and documentation needed in the frame of the procurement process in order to allow conveying the assessment of accessibility via conformity with the functional accessibility requirements contained in EN 301 549 (see clause 2, i), regardless of whether self-declaration, second party attestation or third party certification is requested, and with award criteria: the criteria, by which the award of a contract is judged.

In addition, this Technical Report provides procuring bodies with guidance on conformity assessment mechanisms for accessibility as part of contract management in the post-award stage. It is also useful in the pre-procurement research phase as well as during the contract negotiations. Finally, it may be consulted by bidders preparing an offer.

Alignment with Global Standards

Through a formal agreement between the World Wide Web Consortium (W3C), CEN, CENELEC, and ETSI, the accessibility requirements outlined in these standards align with global accessibility regulations, ensuring consistency in international best practices.

3.3.1.3 Strategic Advisory Group on Accessibility (SAGA)

Created in 2011, the Strategic Advisory Group on Accessibility (SAGA) advises CEN and CENELEC on accessibility-related political and strategic matters.

SAGA includes representatives from standardization bodies, disability organizations, and policy experts. It does not develop standards but promotes best practices and awareness in accessibility.

SAGA's key priorities (2020–2022) include:

- Promoting the Design for All approach (M/473)
- Raising awareness of accessibility in European standardization
- Supporting standardization for the EAA

SAGA also monitors accessibility policies and initiatives, ensuring their alignment with European standardization efforts.

To steer and streamline its work on accessibility across all relevant sectors, CEN's Strategic Advisory Group on Accessibility (SAGA) developed the brochure "How to address accessibility in standardization", providing guidelines to CEN and CENELEC's technical bodies on how to include accessibility aspects in their standards development work.

The brochure is an important tool to foster the adoption and understanding of accessibility in standardization and provides a series of examples of good practice showing the wide range of sectors impacted by accessibility.

3.3.1.4 Built Environment

CEN/CLC JTC 11 'Accessibility in the Built Environment' is revising EN 17210, which sets accessibility requirements and recommendations for buildings, streets, parks, and other spaces, in alignment with

the EAA. This work follows previous standardization efforts under Mandate M/420 and is supported by an EC/EFTA grant. Ensuring accessibility in the built environment allows all citizens, including those with disabilities and older people, to fully participate in daily life.

3.3.1.5 Spectator Facilities

CEN/TC 315 'Spectator facilities' develops standards for designing spectator facilities, ensuring accessibility for people with special needs. The committee published CEN/TR 15913:2009, which provides layout criteria for accessible viewing areas in sports and multipurpose venues.

3.3.1.6 Lifts, Escalators and Moving Walks

CEN/TC 10 'Lifts, escalators and moving walks' establishes safety standards for lifts and escalators, including accessibility requirements.

EN 81-70:2021+A1:2022 specifies minimum accessibility requirements for lifts, while EN 81-82:2013 focuses on improving accessibility in existing lifts. The committee recently revised these standards to enhance usability, such as improving button contrast.

3.3.1.7 Assistive Products and Independent Living

CEN/TC 293 'Assistive products and accessibility' develops standards for assistive products and services, including interoperability with mainstream products. The committee recently revised:

- EN 12183:2022 (Manual wheelchairs – Requirements and test methods)
- EN 12184:2022 (Electrically powered wheelchairs, scooters and their chargers – Requirements and test methods)

The committee recently published a new standard on accessible systems for independent living:

- EN 17999:2025 (Accessible systems for living independently - Requirements and recommendations)

3.3.1.8 Transport and Passenger Services

CEN/TC 320 'Transport - Logistics and services' developed EN 17478:2021, which sets requirements for passenger transport communication services using a Universal Design approach to ensure accessibility for all users, including people with disabilities and older people.

3.3.1.9 Ergonomics

CEN/TC 122 'Ergonomics' develops ergonomic standards for work systems and environments, ensuring safety, well-being, and accessibility in workplaces, machinery, and personal protective equipment.

3.3.1.10 CEN-CENELEC Protocol on accessibility following a Design for All approach in standardization

This Protocol helps Technical Bodies to decide if accessibility following a DfA approach should be addressed when reviewing an existing, or developing a new, standardization deliverable. Technical Bodies (TB) is a generic term designating the CEN/CENELEC Technical Committees, Working Groups, Subcommittees, and Task Forces of the CEN and CENELEC Technical Board. [75]

The Protocol may be used at any stage in the standardization process.

As a guide, four suggested stages for using this Protocol have been identified:

- During the 'scoping phase' of a New Work Item (NWI);
- Prior to Enquiry;

-
- Post Enquiry following submission of comments;
 - During the revision of an existing standard.

The Table 7 below provides examples of context of use, environmental and human limitations where accessibility following a Design for All approach is necessary. The list is not exhaustive.

Explanations to the columns:

- Column 1 can be used to identify the human or environmental limitations that are relevant to consider when developing the standard
- Columns 2, 3 and 4 provide examples of scenarios where a person using the product, good or service might experience a limitation (categorized under context of use, environment and impairment).
- Column 5 provides examples of design solutions or design considerations that might be considered during the design of the product, good or service.
- Column 6 provides examples of tools and techniques that can be used during the design and development of a product, good or service, to promote accessibility following a Design for All approach. This column can be referred to when writing requirements that describe any part of the design process of a product, good or service.

Table 7. Examples of contexts of use, environmental and human limitations requiring 'Design for All' Accessibility

1	2	3	4	5	6
Human or environmental limitations to use of product, good or service	Constraining context of use	Constraining environment	Temporary or permanent impairment	Examples of design considerations that might help to address the limitation	How to apply accessibility following a Design for All approach to the Product/Service Design Process
Using a product, good or service without vision	- Controls that are designed to be used by touch alone (e.g. video game controls, buttons on a steering wheel)	- At nighttime or in complete darkness	- People who are blind - People who have forgotten their glasses - People who must focus their vision elsewhere	Use of haptic information or feedback, sound or speech, and/or provide compatibility with assistive technologies such as screen readers.	DIRECT USER (OR USER EXPERT) INVOLVEMENT: - Consult Design for All Expert - Consult Accessibility Expert - Consult users at all stages of the design process, ensuring that diverse user needs are represented
Using a product, good or service with restricted vision	- While wearing a helmet or goggles - Using a small display - When controls are in an awkward position (e.g. at the back of a television)	- In low lighting - On a very sunny day (glare) - In a smoky environment	- People who are visually impaired - People who have forgotten their glasses - People who mostly need to focus their vision elsewhere	Use of haptic feedback, sound or speech, and/or provide compatibility with assistive technologies such as screen readers.	
Using a product, good or service without hearing or without audio	- In forced silence (library or meeting) - When wearing earplugs or protective headgear	- In a very noisy environment (e.g. loud music, loud traffic, noisy machinery)	- People who are deaf - People who are unable to use their hearing aid	Use of visual or haptic feedback and/or provide compatibility with assistive technologies for deaf people such as speech to text or speech to sign language.	- Consult relevant end user organizations (such as disability organizations, organizations that represent older people or consumer organizations)

1	2	3	4	5	6
Using a product, good or service with restricted hearing	- When ears are busy (e.g. listening to people talking while using a product, good or service) - While wearing a helmet	- A room with poor acoustics - In a noisy environment	- People who are hearing impaired - People with tinnitus - People who are unable to use their hearing aid	Use of visual or haptic feedback and/or provide for adjustable volume levels.	- Test product, good or service in diverse environmental
Using a product, good or service with restricted manual dexterity	- Wearing gloves - Using controls while holding onto the product (e.g. buttons on a hand console, controls on a musical instrument, controls on a handlebar)	- In very cold weather or in an artificial cold environment - If hands or fingers are slippery due to moisture or chemicals.	- People with limited or no manual dexterity (e.g. missing fingers, hands or arms, arthritis) - People with loss of sensation in fingers - People with injured fingers, hands or arms	Enable easy manipulation, allow for speech input and/or provide for compatibility with assistive products or technologies such as special keyboards, joysticks, eye tracking devices.	conditions and in real life contexts - Involve users through, for example, interviews, focus groups, surveys, user testing, participatory design. - Observe users, for example using sampling techniques or user testing.
Using a product, good or service with restricted mobility	- In a tight space (e.g. accessing controls in the boot of a car) - A very small or very tall person using a product, good or service at an awkward height - While pregnant - While holding a child	- In very cold weather or in an artificial cold environment	- People with physical impairment which limits their ability to move or control their body (e.g. musculoskeletal disorders, paralysis, severe arthritis, broken limbs or any other illnesses or injury that limit strength, stamina or movement)	All elements of the products, goods or services should be easy to operate. Consider force, positioning and space. Provide opportunity to operate with either left or right arm. Consider the range of body sizes, heights, and postures.	INDIRECT USERCENTRED DESIGN TECHNIQUES: Impairment simulators - Personas - Scenarios Stakeholder mapping techniques

1	2	3	4	5	6
	- Awkwardly positioned controls (e.g. buttons at the back of a monitor; a power socket behind furniture) - While driving a car or cycling a bicycle - While pulling luggage		- Wheelchair users who use products and access services in a seated position - People who use a walking aid	Consider adjustable features or series of parallel designs that cover the whole spectrum of anthropometric variance. Consider compatibility with assistive products/ technology.	
Using a product, good or service with restricted balance	- While driving or cycling - While travelling in a moving vehicle - While operating heavy machinery - While pregnant - While carrying a child - While holding something heavy or awkwardly shaped	- In windy weather - In wet or cold weather where surfaces are slippery	- People with impaired balance (e.g. conditions that affect the middle ear, musculoskeletal disorders) - People experiencing vertigo	Elements and parts of buildings such as windows, doors, bathroom equipment, lifts/elevators, lobbies, intercom systems, etc., should be accessible and easy to handle. This concerns the application of force, positioning, logical structure and having enough space to move around when using assistive products. Surfaces should be slip resistant.	Secondary Sources of User Research: - Consult Design for All, Universal Design, Inclusive Design or Accessibility guidelines and standards - Consult anthropometric databases

1	2	3	4	5	6
Using a product, good or service under high cognitive stress	- When busy, under time pressure, distracted or stressed - When panicked (e.g. using a fire extinguisher in a fire) - When under pressure in an unfamiliar place (e.g. an airport) - When feeling unwell	- In extreme weather conditions (e.g. stormy weather)	- People with cognitive difficulties (perception, memory, attention, learning, orientation, visual and verbal thinking)	Use of clear and concise formulations. No excess information. Limit number of choices. Supplement textual information with images and icons. Consider grouping of features that are similar. Allow for variation in completion time. Require attention to only one place at a time. Robust error handling. Ensure that actions are easily reversible.	- Consult user research reports
Using a product, good or service when unable to read or understand	- Text in a foreign language - Moving text that is difficult to read - Labels or instructions for use are damaged	- In poor lighting - In darkness	- People with a reading disability - People with a learning disability - People who are visually impaired - People who have forgotten their glasses	Possibility of selecting language, using audio output such as speech (synthetic or recorded), and illustrative icons drawings, pictures or videos.	
Using a product, good or service when unable to write or provide text input	- Limited input methods (e.g. a mobile device) - Wearing gloves - In restrictive clothing (e.g. chemical suit)	- In cold weather	- People with a writing disability - People with dyslexia - People who have limited manual dexterity	Let user select between predefined alternatives, use speech recognition, provide for compatibility with access technologies such as special keyboards, joysticks or eye tracking devices.	

1	2	3	4	5	6
	- In a moving vehicle				
Using a product, good or service without the use of voice	- In forced silence (library or meeting)	- In a noisy environment where voice will not be heard or understood	- People with speech or communication impairment - People who are deaf or hard of hearing	An alternative to speech input should be provided.	
Using a product, good or service without the use of taste or smell	- In environments with strong odors or smoke		- People with reduced ability to distinguish odors or flavors - People with a cold or flu	List ingredients, use by and expiration dates and use visual and auditory signals to alert people to the presence of smoke or dangerous chemicals	
Using a product, good or service while having specific preferences and requirements regarding wellbeing, the environment or health			People with impairments related to their immunological system (such as contact, food or respiratory allergies or hypersensitivities)	Provide customization or personalization. List ingredients; avoid the inclusion of allergens or sensitizing substances.	

The Protocol presents a series of steps that will help a Technical Body to decide if, and how, accessibility following a DfA approach should be addressed:

Step 1: Establish if people will access and use a product, good or service;

Step 2: Understand the people who will access and use the product, good or service;

Step 3: Establishing if the standard will include content on the design or development process of a product, good or service;

Step 4: How to address accessibility following a DfA approach in standardization;

Step 5: Outcome of the Protocol.

The Protocol explains how accessibility following a Design for All approach can be directly or indirectly relevant to standardization, providing the definition of (and distinction between) **direct and indirect users of a product, good or service**. This distinction will help Technical Committees to consider the widest range of possible users of their product/service – not just the immediate and most obvious users.

Also, provides examples of how accessibility following a Design for All approach appears not to apply to a product, good or service (for example a product, good or service that doesn't have a user interface itself), but it interacts with, or is accessed by, another product, good or service that is accessed and used by people. Therefore, it indirectly influences the ability of a user to access, understand or use a product, good or service.

3.3.2 Accessibility in standardization at international level

3.3.2.1 ISO/IEC Guide 71, Guide for addressing accessibility in standards

ISO/IEC Guide 71:2014 [27] provides guidance to standards developers on addressing accessibility requirements and recommendations in standards that focus, whether directly or indirectly, on systems (i.e. products, services and built environments) used by people. To assist standards developers to define accessibility requirements and recommendations, it presents a summary of current terminology relating to accessibility, issues to consider in support of accessibility in the standards development process, a set of accessibility goals (used to identify user accessibility needs), descriptions of (and design considerations for) human abilities and characteristics, and strategies for addressing user accessibility needs and design considerations in standards.

3.3.2.2 ISO/TR 22411, Ergonomics data for use in the application of ISO/IEC Guide 71:2014

This standard helps standards developers to understand human characteristics and capabilities of people with disabilities and older persons.

This technical report provides quantitative data and knowledge as well as context-specific and task-specific data, all being based on ergonomics research. The data focuses on the effects of ageing and/or consequences of various types of human sensory, physical and cognitive disabilities.

While primarily aimed at standards developers, ISO/TR 22411 can also be used by ergonomists and designers to support the development of more accessible products, systems, services, environments and facilities.

The technical report has just been updated with new or more elaborate data that is now available. What's more, this new edition includes the provision, in an annex, of alternative text for figures and tables that makes them more accessible to visually impaired readers.

3.3.2.3 ISO/TC 59/SC 16, Accessibility and usability of the built environment

Operating under the parent technical committee ISO/TC 59 (Buildings and civil engineering works), its primary goal is to standardize the design and construction of buildings and surroundings to ensure they are usable by the widest possible range of people, including those with disabilities.

Key Responsibilities and Scope

- Standardization: Developing requirements and recommendations for construction elements, assemblies, and fittings to ensure accessibility.
- Coverage: Standards cover access to buildings, internal circulation, and safe emergency evacuation.
- Cultural Heritage: Recent work includes principles for accessibility in immovable cultural heritage sites.

ISO 23234:2021, *Buildings and civil engineering works – Security – Planning of security measures in the built environment*, details requirements and recommendations to help organizations put plans in place to protect against undesirable intentional actions. It provides a well-structured template to identify their requirements and develop appropriate security measures.

The document describes which methods and routines need to be implemented in various stages of a building or civil engineering works project, as well as the competencies needed to achieve a good result.

ISO 21542:2021, *Building construction – Accessibility and usability of the built environment*, specifies a range of requirements and recommendations related to the design and construction of the usability and accessibility of buildings. These include access to buildings, circulation within buildings, exiting from buildings during normal conditions and evacuation in the event of a fire.

This document is primarily written for adults with disabilities, but it includes some recommendations on specific accessibility needs of children.

3.3.2.4 ISO/IEC JTC 1/SC 35, User interfaces

ISO/IEC JTC 1/SC 35 is the international standardization subcommittee responsible for User Interfaces (UI) within the field of Information and Communication Technology (ICT).

It operates under the ISO/IEC JTC 1 (Joint Technical Committee 1) and focuses on making technology more accessible, adaptable, and usable for all people, regardless of their language, culture, or physical abilities.

The scope of this Technical Committee is standardization in the field of user-system interfaces in information and communication technology (ICT) environments and support for these interfaces to serve all users, including people having accessibility or other specific needs, with a priority of meeting the JTC 1 requirements for cultural and linguistic adaptability.

This includes:

- user interface accessibility (requirements, needs, methods, techniques and enablers);
- cultural and linguistic adaptability and accessibility (such as evaluation of cultural and linguistic adaptability of ICT products, harmonized human language equivalents, localization parameters, voice messaging menus);
- user interface objects, actions and attributes;
- methods and technologies for controlling and navigating within systems, devices and applications in visual, auditory, tactile and other sensorial modalities (such as by voice, vision, movement, gestures);
- symbols, functionality and interactions of user interfaces (such as graphical, tactile and auditory icons, graphical symbols and other user interface elements);

- visual, auditory, tactile and other sensorial input and output devices and methods in ICT environments (for devices such as keyboards, displays, mice);
- user interfaces for mobile devices, hand-held devices and remote interactions.

This committee has published over 60 standards, including:

- **ISO/IEC 30113-1:2015**, *Information technology — User interface — Gesture-based interfaces across devices and methods* defines a framework and guidelines for gesture-based interfaces across devices and methods in supporting interoperability. Some of these devices include mice, touch screens, touch pads, 3D mice, joysticks, game controllers, wired gloves, depth-aware cameras, stereo cameras, Web cameras.
- **ISO/IEC 30071-1:2019**, *Information technology — Development of user interface accessibility - Part 1: Code of practice for creating accessible ICT products and services* takes a holistic approach to the accessibility of information and communications technology (ICT) by combining guidance on implementing the accessibility of ICT systems (ICT accessibility) both at organizational and system development levels.

This document gives guidelines for building and maintaining ICT systems (including products and services) that are accessible to diverse users (including users with disabilities and older people).

This document is applicable to all types of organizations. This document applies to the breadth of ICT systems and the results of convergent and emerging technologies within an organization including but not limited to: information systems; intranet systems; websites; mobile and wearable applications; social media; and Internet of Things (IoT) systems.

It gives requirements and recommendations for organizations:

- a) ensuring accessibility is considered in their policies or strategy by creating an organizational ICT accessibility policy;
 - b) embedding the consideration of accessibility decisions through the entire process of developing procuring, installing, operating and maintaining ICT systems, and documenting these choices;
 - c) justifying decisions on accessibility;
 - d) communicating the ICT system's accessibility decisions to its users at launch, through creating and publishing its accessibility statement.
- **The ISO/IEC 9995 series** define a framework for the layout of all alphanumeric and numeric keyboards across the widest spectrum of today's and upcoming applications using keyboards. The functions to be performed by keyboards are grouped into three categories that correspond to the main physical sections of the keyboard.

Application of the ISO/IEC 9995 series in the design of keyboards provides the user with a unified, predictable user-machine interface by dividing the keyboard into functional areas and sections and allocating functions to keys. One of the major tasks of a universal-usage keyboard is to accommodate the larger sets of characters required by the various applications for which keyboards are used today.

This is achieved by permitting the allocation of more than one graphic character or control function to each of the keys of a keyboard, predominantly in the alphanumeric section.

The ISO/IEC 9995 series specify the requirements for keyboard layouts and allocation of keycap imprints (including letters, numerals, symbols, and other markings) on alphanumeric and numeric input devices for all types of information and communication technology apparatus and systems including:

- personal computers, workstations, computer terminals, visual display terminals (VDTs);
- electronic typewriters and other machines with alphanumeric and numeric keyboards;
- mobile computer systems including ultra-mobile personal computers (UMPCs), personal digital assistants (PDAs) and multimedia devices with hardware keyboards (e.g. linear keyboards, foldable keyboards) or virtual keyboards (e.g. touchscreens, projection keyboards);
- electronic document scanners and multifunction devices incorporating alphanumeric or numeric keyboards;
- calculators, telephones and automated teller machines having alphanumeric or numeric keypads/keyboards.

3.3.2.5 ISO/TC 173/SC 7, Assistive products for persons with impaired sensory functions

ISO/TC 173/SC 7 is an international subcommittee focused on assistive products for persons with impaired sensory functions. It operates under the Technical Committee ISO/TC 173 (Assistive Products).

The primary goal of this subcommittee is the standardization of assistive products that help individuals with sensory impairments (such as vision or hearing) participate more fully in social and daily activities and develops standards for tactile guide maps, braille on appliances, auditory signals in public spaces, and communication support boards.

ISO/TC 173/SC 7 contributes directly to several **UN Sustainable Development Goals**, including:

- **Goal 3:** Good Health and Well-being.
- **Goal 10:** Reduced Inequalities.
- **Goal 11:** Sustainable Cities and Communities.

ISO/TC 173/SC 7 integrates accessibility through several key standards:

- **ISO 6273:2024**, Assistive products —Accessibility guidelines and requirements to survey the needs of persons with sensory disabilities for assistive products and services
- **ISO 17049:2013**, Accessible design —Application of braille on signage, equipment and appliances
- **ISO 17069:2020**, Accessible design —Consideration and assistive products for accessible meeting
- **ISO 19028:2016**, Accessible design —Information contents, figuration and display methods of tactile guide maps
- **ISO 19029:2016**, Accessible design —Auditory guiding signals in public facilities

3.3.2.6 ISO/TC 178, Lifts, escalators and moving walks

ISO/TC 178 is the international technical committee responsible for the standardization of all safety and functional aspects of lifts (elevators), service lifts, escalators, and moving walks (passenger conveyors). The committee's work ensures global consistency in safety, design, and performance, helping to remove trade barriers by providing a unified set of requirements for manufacturers and building owners worldwide.

ISO/TC 178's work on accessibility directly supports **UN Sustainable Development Goal 10 (Reduced Inequalities)**, aiming to create inclusive urban environments where vertical transport does not become a barrier to social participation.

Accessibility within the **ISO/TC 178** committee is primarily governed by specific standards designed to ensure that lifts and escalators are usable by everyone, including people with physical, sensory, or cognitive disabilities:

- **ISO 8100-7:2024**, Lifts for the transport of persons and goods. Part 7: Accessibility to lifts for persons including persons with disability
- **ISO 9386-1:2000**, Power-operated lifting platforms for persons with impaired mobility —Rules for safety, dimensions and functional operation. Part 1: Vertical lifting platforms
- **ISO 9386-2:2000**, Power-operated lifting platforms for persons with impaired mobility —Rules for safety, dimensions and functional operation. Part 2: Powered stairlifts for seated, standing and wheelchair users moving in an inclined plane

3.3.2.7 ISO/TC 204, Intelligent transport systems

ISO/TC 204 is the technical committee responsible for the standardization of Intelligent Transport Systems (ITS).

In the context of ISO/TC 204, accessibility focuses on ensuring that transport technologies are inclusive for all users, particularly persons with disabilities and the elderly.

ISO/TC 204 integrates accessibility through several key standards and Technical Reports (TR):

- **ISO/TR 12859:2009**, *Intelligent transport systems — System architecture — Privacy aspects in ITS standards and systems*. This technical report specifically addresses ITS data privacy but also touches upon the user interface requirements to ensure diverse groups can access system information securely and easily.
- **ISO 17423:2025**, *Intelligent transport systems — Application requirements and objectives*. While focusing on ITS application requirements, it provides the communication profile framework that allows "Personal ITS Stations" (like smartphones or specialized handhelds) to interface with infrastructure, aiding those with visual or hearing impairments.
- **ISO 24014-1:2021**, *Public transport — Interoperable fare management system - Part 1: Architecture*. Relates to Public Transport - Interoperable Fare Management. It includes provisions to ensure payment systems (kiosks, apps, gates) are accessible to users with different physical and cognitive abilities.

Key Working Groups (WGs) Handling Accessibility

WG 8 (Public Transport): This group focuses on making public transit data (schedules, vehicle locations) accessible. Their goal is to ensure that "Universal Design" principles are applied so that a wheelchair user or a person with visual impairment receives the same quality of real-time data as any other commuter.

WG 10 (Traveler Information Systems): They develop standards for how information is delivered. Accessibility here means providing multimodal information (text-to-speech, haptic feedback, or simplified visual icons) to ensure no traveler is left behind due to a sensory disability.

WG 17 (Nomadic Devices): This group works on how personal devices (phones, tablets, wearables) interact with the vehicle and infrastructure. This is crucial for accessibility, as many users rely on their own assistive apps to navigate the transport network.

The committee's work on accessibility aims to:

- **Reduce Barriers:** Move away from physical barriers toward digital assistance that guides users through complex transit hubs.
- **Interoperability:** Ensure that an accessibility app developed in one country works seamlessly with the transport infrastructure in another.
- **Safety:** Ensure emergency notification systems within ITS are accessible to everyone, regardless of their physical condition.

3.3.2.8 Standards for accessible travel

- **ISO 14785:2024**, *Tourism and related services — Tourist information services — Requirements and recommendations*, provides minimum quality requirements and recommendations for onsite tourist information services located at the destination, online tourist information services or both. This document is applicable for management organizations responsible for tourism information services at the destination. This standard will help make such places more accessible for everyone, by considering things like getting through the door (the entrance and parking) as well as being able to access the information they distribute, taking into account hearing and sight abilities. It also recommends that tourist offices should assist those with disabilities get the most out of their visit, by providing a list of the best-accessible hotels, activities and adapted transport.
- **ISO 21902:2021**, *Tourism and related services — Accessible tourism for all — Requirements and recommendations* establish requirements and provides guidelines for “accessible tourism for all” with the aim of ensuring equal access and enjoyment of tourism by the widest range of people of all ages and abilities.

This document provides information on the key aspects of policy making, strategy, infrastructure, products and services and is addressed to all stakeholders involved in the tourism supply chain, whether from the public or private sector. It applies at local, regional, national and international levels.

Stakeholders include, but are not limited to, public administrations, accommodation services, catering and restaurant services, transport, tour operators and travel agencies, MICE and leisure activities, as well as service providers from other economic sectors related to tourism, travel and destination management, including their contractors and suppliers.

These internationally agreed guidelines and recommendations are aimed at helping them improve their current accessibility provisions, covering information on everything from policy making, strategy, infrastructure, products and services, it is relevant to the whole tourism supply-chain.

- **ISO 13009:2015**, *Tourism and related services — Requirements and recommendations for beach operation*, establishes general requirements and recommendations for beach operators that offer tourist and visitor services. It provides guidance for both beach operators and users regarding the delivery of sustainable management and planning, beach ownership, sustainable infrastructure and service provision needs, including beach safety, information and communication, cleaning and waste removal. This International Standard is applicable to beaches during the bathing season.

This International Standard highlights the importance of making beaches accessible to all. It outlines recommendations for the accessibility of beaches such as design of access ramps and boardwalks, as well as facilities on site including toilets, showers and drinking fountains.

- **ISO 17049:2013**, *Accessible design — Application of braille on signage, equipment and appliances* specifies the fundamental requirements for braille used on signage, equipment and appliances, including the dimensional parameters of braille and the characteristics of materials used, and the guidelines for practical implementation. It provides requirements for braille used all over the world, enabling visually impaired travelers to access information wherever they are.
- **ISO 23599:2019**, *Assistive products for blind and vision-impaired persons — Tactile walking surface indicators*, provides product specifications for tactile walking surface indicators (TWSIs) and recommendations for their installation to assist in the safe and independent mobility of blind or vision-impaired persons.

This document specifies two types of TWSIs: attention patterns and guiding patterns. Both types can be used indoors and outdoors throughout the built environment where there are insufficient cues for wayfinding, or at specific hazards. helps them visit new places more easily and safely.

3.3.3 Current standardization activities

To have a complete picture of the European/international standardization framework, the few standardization projects currently underway (current standardization activities), both at European and international level, in the field of accessibility were also considered.

Each draft standard was analysed considering the domains relevant to the project. The results are in the table below.

Table 8. Overview of current accessibility relevant standardization projects (international/European level)

Document	Title	Brief description	Relevance to AccesS				
			Accessibility	Mobility	Energy performance	Sustainability	Smart cities
prEN17210	Accessibility and usability of the built environment - Requirements and recommendations	This document describes functional requirements and recommendations for an accessible and usable built environment, following a "Universal Design"/"Design for All" approach which will facilitate equitable and safe use for a wide range of users, including persons with disabilities. This document also describes performance requirements as applicable for an accessible and usable built environment.	x				x
prEN17161	Design for All approach - Managing accessibility of products and services	This document specifies requirements and recommendations that can enable an organization to design, develop and provide products and services so that they can be accessed, understood and used by the widest range of users, including persons with disabilities.	x	x			
prEN ISO 8100-7 rev	Lifts for the transport of persons and goods — Part 7: Accessibility to lifts for persons including persons with disability	This document specifies the minimum requirements for the safe and independent access and use of lifts by persons, including persons with disabilities. It covers the needs of persons with disabilities according to Annex A. For guidance on solutions for increased accessibility and usability, see Annex D. This document is not applicable to lifts installed before the date of its publication.	x				
ISO/WD TR 25554-2	Ageing societies- Guidelines for						x

Document	Title	Brief description	Relevance to AccesS				
			Accessibility	Mobility	Energy performance	Sustainability	Smart cities
	promoting wellbeing in communities Part 2: Examples of practices for promoting wellbeing in communities						
ISO/WD 37120	Sustainable cities and communities — Indicators for city services and quality of life	This document defines and establishes methodologies for a set of indicators to steer and measure the performance of city services and quality of life. It follows the principles set out in ISO 37101 and can be used in conjunction with ISO 37101 and other strategic frameworks.					x

4 Overview of relevant standards, standardization documents, activities and technical committees for the project

There are an increasing number of accessibility standards and guidelines being employed at international/European/national level as EU-level and national-specific legislation is enacted. To provide a current and up-to-date resource given the many available documents, an environmental scan of the existing European/international standards and guidelines was carried out.

In order to identify the relevant European and International standards related to AccesS scope, from the very beginning of the project, The Romanian Standards Body (ASRO) performed a thoroughly research activity using the following means:

The European and International Standardization Organizations platforms were used:

- CEN – CENELEC: <https://www.cencenelec.eu/>
- ISO: <https://www.iso.org/home.html>
- IEC <https://www.iec.ch>

Following a comprehensive research activity, 452 European (CEN, ETSI) and International (ISO) standards were identified.

The list includes a description of:

- the standardization topics
- the relevance for AccesS
- the status of the standardization project:
 - in place: standard published;
 - under revision;
 - in preparation: standardization topic is addressed; preliminary project; new project
- the standardization committee responsible

In addition, a matching with the existing international/European draft work programme, elaborated in the context of the potential accessibility/mobility standardization request and further identified topics by CEN -CENELEC, was done to visualise which standardization topic is already addressed by international/European standardization and which are additionally identified. This gives a comprehensive picture of all topics and facilitates the overall implementation.

The general distribution of the selected standards is:

- 120 CEN, CENELEC standards
- 275 ETSI standards
- 57 ISO standards

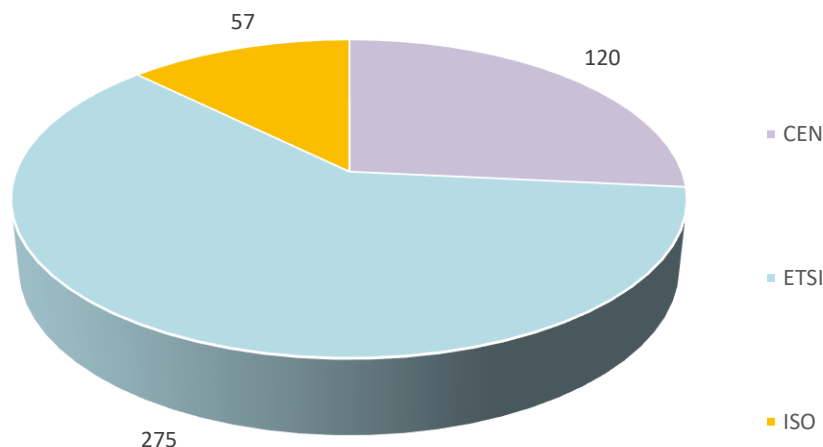


Figure 7. General distribution of the identified standards

For the European standards (CEN, CENELEC) the most relevant Technical Committees are:

Accessibility:

- CEN/TC 122 *Ergonomics*
- CEN/CENELEC/ETSI *ETSI's Technical Committee Human Factors (HF) and eAccessibility Joint Working Group (JWG) of CEN/CENELEC/ETSI*
- CEN/CLC/JTC 11 *Accessibility in the built environment*
- CEN/CLC/JTC 12 *Design for All*
- CEN/TC 10 *Lifts, escalators and moving walks*
- CEN/TC 136 *Sports, playground and other recreational facilities and equipment*
- CEN/TC 178 *Paving units and kerbs*
- CEN/TC 211 *Acoustics*
- CEN/TC 224 *Personal identification and related personal devices with secure element, systems, operations and privacy in a multi sectorial environment*
- CEN/TC 256 *Railway applications*
- CEN/TC 261 *Packaging*
- CEN/TC 293 *Assistive products and accessibility*
- CEN/TC 315 *Spectator facilities*
- CEN/TC 33 *Doors, windows, shutters, building hardware and curtain walling*
- CEN/TC 452 *Assistance Dogs*
- CEN/WS EXOSK *Integration process of new technologies of physical assistance such as exoskeletons*
- CLC/SR 100 *Audio, video and multimedia systems and equipment*
- CLC/SR 29 *Electroacoustics*
- CLC/TC 100X *Audio, video and multimedia systems and equipment and related sub-systems*

Mobility:

- CLC/SR 125 *Personal e-Transporters (PeTs)*
- CEN/TC 278 *Intelligent transport systems*

- CEN/TC 293 *Assistive products and accessibility*

Energy performance:

- CEN/TC 371 *Energy performance of buildings*
- CEN/TC 89 *Thermal performance of buildings and building components*

Sustainability, smart city:

- CEN/TC 247 *Building Automation, Controls and Building Management*
- CEN/TC 350 *Sustainability of construction works*
- CEN/TC 465 *Sustainable Cities and Communities*
- CEN/WS 088 (Disbanded) *Functional Specification for a Resilience Information Portal*
- CEN/WS SCS *Description and Assessment of Good Practices for Smart City Solutions*

At international level (ISO), the following Technical Committees were identified:

Accessibility:

- ISO/IEC JTC 1/SC 28 *Office equipment*
- ISO/IEC JTC 1/SC 35 *User interfaces*
- ISO/TC 159/SC 4 *Ergonomics of human-system interaction*
- ISO/TC 159/SC 5 *Ergonomics of the physical environment*
- ISO/TC 173 *Assistive products*
- ISO/TC 173/SC 2 *Classification and terminology*
- ISO/TC 173/SC 7 *Assistive products for persons with impaired sensory functions*
- ISO/TC 178 *Lifts, escalators and moving walks*
- ISO/TC 314 *Ageing societies*
- ISO/TC 59/SC 16 *Accessibility and usability of the built environment*
- ISO/TMBG *Technical Management Board - groups*

Mobility:

- ISO/TC 204 *Intelligent transport systems*

Sustainability

- ISO/TC 268 *Sustainable cities and communities*

From the first list with existing European/International standards and standardization documents, the technical partners selected the most relevant standards for the purpose of AccessS project to obtain the short list of standards that will be analyzed during the implementation of the project.

8 European (CEN) and International (ISO) standards were selected by 5 participants (Annex 1):

- 2 CEN standards
- 1 CEN project
- 5 ISO standards

For the Partners to be able to make the analysis of the selected standards, ASRO made the standards available on a SharePoint hosted by the project coordinator, to be used only for the Project's purpose.

Standards are copyright protected works, consequently, making them available meant for ASRO to take some precautions to ensure abiding by the legislation. Thus, each interested Partner was asked to sign a Nondisclosure Agreement taking the responsibility of abiding by the copyright legislation on standards inside their company.

ASRO made sure that the SharePoint includes a folder with the list of selected standards, a folder with the full text of the standards selected for analyses, a folder with the list of interested Partners and a folder with the signed NDA's.

Also, each standard for the analyses was watermarked with "Not for distribution outside the AccesS consortium" and was made available in a read only pdf. version.

For the analysis to be as easy and friendly as possible, ASRO designed and developed two methodologies to be chosen by the partners (Annex 2).

The first one, simpler methodology consists of an Excel table, which includes the main key performance indicators (KPIs) of the project:

- Degree of accessibility coverage,
- Degree of energy performance,
- Quality of inclusion,
- Whether it is suitable for certification
- Degree of user protection

The second, more complex methodology included several categories of possible gaps:

- Governance and system gaps,
- Technical and engineering gaps,

At the end of the analysis, a modular structure was proposed to extend the analysed standard into legally applicable and operationally robust standards, adapted to EU needs and accessibility/mobility risk profiles.

Thus, those who analysed the selected standards had to provide recommendations for improvement for the following areas:

- Accessibility and Sustainable Awareness
- Common evaluation and certification framework
- Degree of energy utilization
- Technical Operations and Monitoring
- Uncertainty and Risk Quantification

Following several rounds of discussions and practical explanations related to the use of each methodology, as well as the advantages and disadvantages presented by each methodology, from the point of view of the project, but also of standardization activities, the project partners chose the second methodology for the analysis of the selected standards.

The following partners were involved in the analysis of the standards: IsZeb, CETEM, FRC, LAMA, CERTH and of course, ASRO.

5 Outcomes of the analysis of selected standards and standardization documents, activities and technical committees related to the project outcomes

5.1 Standards and standardization documents analysis in connection with AccessS project

The standards selected for analysis are described below.

- **ISO/IEC 10779:2020** Information technology — Office equipment — Accessibility guidelines for older persons and persons with disabilities

ISO/IEC 10779:2020 provides essential accessibility guidelines for the planning, design, and development of office equipment, specifically focusing on copying machines, page printers, and multi-function devices (MFDs). The standard aims to ensure that these devices are usable by a diverse range of individuals, including older persons and those with physical, sensory, or cognitive disabilities.

The 2020 revision emphasizes Universal Design (UD), moving away from "specialized features" for the disabled toward a design philosophy that benefits all users (e.g., adjustable touchscreens and high-contrast interfaces).

The standard identifies that accessibility is not just about the final output but the entire chain: reaching the device, identifying controls, inputting commands, and retrieving the printed/scanned media.

A major finding is its alignment with EN 301 549 (European accessibility) and US Section 508. It specifically incorporates WCAG 2.0 (via ISO/IEC 40500) for the digital interfaces of modern printers.

- **ISO 5727:2024** Accessibility and usability of the built environment — Accessibility of immovable cultural heritage — Principles and methodology for interventions

Released in October 2024, ISO 5727 establishes a systematic methodology for interventions in heritage sites (monuments, archaeological sites, historic buildings). It shifts the paradigm from "compliance-only" accessibility to a Universal Design (UD) approach that respects the "Heritage Value" of a site. It is largely based on the precursor Spanish standard UNE 41531.

The standard introduces a requirement to rank the "exceptionality, integrity, and authenticity" of different parts of a site. This allows designers to identify where physical interventions (like ramps or lifts) are permissible and where they would cause irreparable "heritage loss."

Unlike ISO 21542 (which gives strict measurements), ISO 5727 provides a procedural framework. It mandates a "Heritage Values Study" and an "Accessibility Chain Analysis" before any design begins.

- **ISO 21542:2021** Building construction — Accessibility and usability of the built environment

ISO 21542:2021 defines the requirements for the "Accessibility Chain"—the uninterrupted path a person takes to reach, enter, use, and exit a building. Unlike local codes that often focus only on wheelchairs, this standard addresses physical, sensory, and cognitive abilities across the entire lifecycle of a building, including emergency evacuation.

The most significant change in the 2021 version is the full integration of emergency egress. It moves away from "assisted rescue" toward "independent evacuation," mandating that fire safety be baked into the architectural design rather than added as a management procedure.

The 2021 update aligns with ISO 23599 for Tactile Walking Surface Indicators (TWSI) and provides stricter formulas for Luminance Contrast (LRV) to assist users with low vision.

The standard introduces a strict "Existing Buildings" clause. It allows for "restricted accessibility" in historic or difficult structures only if full compliance is technically impossible, preventing its use as an economic loophole for new builds.

- **EN 17210:2021** Accessibility and usability of the built environment - Functional requirements

EN 17210:2021 was developed under Mandate M/420 from the European Commission to provide a common European language for accessibility in public procurement. Unlike its predecessors, which focused on specific technical values (e.g., "a door must be 900mm wide"), this standard defines functional requirements (e.g., "a door must allow for the passage of a person using a large, powered wheelchair").

The standard's core strength is its focus on the outcome for the user. It describes what a space must do to be inclusive, leaving the how to be addressed by its accompanying technical reports, CEN/TR 17621 (Technical Specifications) and CEN/TR 17622 (Conformity Assessment).

It is the first major European standard to fully embed the UN Convention on the Rights of Persons with Disabilities (UNCPRD). It moves beyond "specialized design" for the disabled and toward "Universal Design" that benefits everyone, including parents with strollers and the aging population.

The standard extends beyond buildings to include the entire urban chain, such as outdoor pedestrian areas, parks, and transportation hubs, ensuring that the journey to a building is as accessible as the building itself.

- **prEN 17210** Accessibility and usability of the built environment - Requirements and recommendations

The prEN 17210 (Draft European Standard) represents the evolution of the 2021 version from a purely voluntary guideline into a Harmonized Standard. Its primary purpose is to provide a "Presumption of Conformity" with the mandatory accessibility requirements of the EAA (Directive 2019/882). While it retains the Design for All philosophy, it introduces concrete technical benchmarks for the first time.

The most significant finding in the 2025/2026 draft is the addition of Annex A. While the main body remains "functional" (describing outcomes), Annex A contains specific technical values (dimensions, clear widths, contrast ratios). This is designed to give service providers legal certainty when being audited for EAA compliance. The draft revision is specifically focused on the areas covered by Annex III of the EAA. This includes public access areas where "covered services" (like banking, transport, and e-commerce-linked physical locations) are provided.

The draft reinforces the "Chain" concept—ensuring that the journey from the street, through the entrance, into the service area, and out via the emergency exit is managed as a single, uninterrupted accessible path. Current tracking indicates the final standard is scheduled for publication in Autumn 2027, following the resolution of public inquiry comments that closed in late 2025.

- **EN 63080:2017** Accessibility terms and definitions

EN 63080:2017, Accessibility terms and definitions, is a specialized terminology standard. Its primary purpose is to harmonize the language used by standards developers, manufacturers, and policymakers when discussing ICT, telecommunications, and general accessibility. It was created to bridge the

linguistic gap between technical engineering and the human rights framework established by the UN Convention on the Rights of Persons with Disabilities (UNCRPD).

The standard provides a definitive list of terms to prevent confusion among international implementers. By establishing common definitions for terms like "Accessibility," "Assistive Technology," and "Universal Design," it ensures that a "compliant" product in one region meets the same conceptual criteria in another.

The standard is a direct technical response to Article 9 of the UNCRPD, ensuring that "accessibility" is defined as a proactive process of removing barriers rather than a reactive medical accommodation.

- **ISO/IEC 29138-3:2022** Information technology — User interface accessibility. Part 3: Requirements and recommendations on user needs mapping

ISO/IEC 29138-3:2022 provides a structured methodology for "User Needs Mapping." It bridges the gap between the high-level needs of diverse users (defined in ISO/IEC 29138-1) and the specific technical provisions in standards like WCAG or EN 301 549. It is essentially the "Rosetta Stone" for developers, ensuring that every line of technical code can be traced back to a human necessity.

The standard's primary find is its mapping matrix. It moves accessibility from an "abstract goal" to a "traceable requirement." Developers can now prove exactly which technical clause (e.g., contrast ratios) satisfies which specific user need (e.g., the need to perceive visual information with low vision).

- **ISO/IEC TR 29138-2:2009** Information technology — Accessibility considerations for people with disabilities. Part 2: Standards inventory

The ISO/IEC TR 29138-2 was developed to create a comprehensive "map" of the global standards landscape. Its primary goal was to help developers, standardizers, and policymakers identify which existing documents provided guidance for specific user accessibility needs.

The report successfully consolidated a disparate list of "standards" (including ISO/IEC documents, regional standards, and industry consortia guidelines like WCAG) into a single, searchable reference.

5.2 Standards analysis - main gaps identified

The following table summarizes the analysis of selected standards in terms of: environmental oversight, stakeholder's role, ethics and societal impact, certification, regulation etc.

Table 9. Analyses of standards. Identified issues

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
Environmental Oversight	ISO/IEC TR 29138-2:2009 does not provide guidance for organizational governance of accessibility across ICT systems, including lifecycle monitoring and continuous compliance checks.	ISO 5727:2024 contains no provisions regarding environmental sustainability, carbon footprint or climate resilience of accessibility interventions. No environmental impact assessment is required at any stage of the methodology.	The standard does not consider environmental conditions.	The standard refers to indoor air quality (IAQ) and the pollutants that may be present in the environment, but does not define environmental performance indicators, monitoring mechanisms or sustainability objectives related to accessibility solutions in the built environment.	The standard does not define environmental performance indicators, monitoring mechanisms, or sustainability targets related to accessibility solutions in the built environment.	Like many built-environment standards, EN 17210 focuses on the design phase. Real-world feedback shows a high failure rate in the maintenance phase (e.g., accessible routes being blocked by temporary displays or elevators being out of service), which the standard only addresses in a	No gap. The standard is increasingly connecting accessibility with the sustainability of the built environment, ensuring that accessible designs are also resource-efficient and sustainable.	N/A

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
						non-mandatory Annex B.		
Stakeholder Roles	The TR does not define responsibilities for key roles such as accessibility leads, auditors, procurement officers, or product owners.	The scope identifies nine categories of intended users but assigns no responsibilities, accountability structures or decision-making authority to any of them.	No explicit definition of roles (e.g., manufacturer, software provider, accessibility auditor, service provider).	ISO 21542 does not define roles or responsibilities for stakeholder	The standard does not define roles or responsibilities for stakeholders	Based on the provided search results, the development and implementation of EN 17210:2021 (Accessibility and usability of the built environment) involved collaboration with key stakeholders, including disability organizations (EDF), consumer representatives (ANEC), and industry bodies	No gap. ` The stakeholder's role is increase	A single technical requirement might serve five different user needs, while one user need might require ten different technical fixes. Critics argue this complexity can lead to "mapping fatigue" where developers oversimplify the matrix to save time.

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
Ethics and Societal Impact	The report does not address equitable access, inclusion for diverse user groups (e.g., cognitive disabilities, aging populations), or societal implications of inaccessible ICT.	The Introduction references the UN Convention on the Rights of Persons with Disabilities and clause 4.1 states that a balance shall be ensured between heritage conservation and social goals. The standard sets no measurable equity criteria and no process for monitoring social inclusion outcomes over time.	The standard focuses on functional accessibility but lacks guidance on inclusion, fairness, and broader societal implications (e.g., digital exclusion, stigmatization).	Standard grounded in the UN Convention on the Rights of Persons with Disabilities but without measurable criteria or impact assessment processes.	Definitions of inclusive design, universal design, and design for all but not the impact in the society	N/A	No gap. The most significant finding in the 2025/2026 draft is the addition of Annex A. While the main body remains "functional" (describing outcomes), Annex A contains specific technical values (dimensions, clear widths, contrast ratios). This is designed to give service providers legal certainty when being audited	The standard encourages the investigation and assessment of ethical and social concerns regarding user interfaces, ensuring that technology serves a broad population and promotes equality.

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
							for EAA compliance.	
Regulatory Integration	No mapping to modern legal mandates such as the European Accessibility Act, UN CRPD guidance, or Section 508 Refresh.	Clause 4.4(a) requires consideration of all relevant legal obligations and clause 5.3.3(a) requires that statutory requirements on accessibility be included in the analysis bases. Despite this, ISO 5727:2024 has zero normative references and does not reference or align with the European Accessibility Act (Directive 2019/882), EN 17210, the EU Construction	Limited explicit linkage to EU frameworks, despite alignment with WCAG and EN 301 549.	The standard does not provide guidance on harmonisation with EU or national legislation on accessibility.	The standard does not establish integration with regulatory frameworks or legislation.	The standard does not establish integration with regulatory frameworks or legislation.	Technical forums highlight that prEN 17210 values sometimes conflict with national building codes (e.g., German DIN or French NF standards). This creates a "Regulatory Collision" where a building might be accessible by EU standards but technically non-compliant with local safety or heritage laws.	Industry forums warn that a completed ISO/IEC 29138-3 map is not a certification of accessibility. It is a planning and documentation tool. Some vendors misrepresent a "completed map" as a "passed audit," which is a significant legal risk under the European Accessibility Act

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
		Products Regulation or any EU Member State accessibility legislation.						
Certification Framework	The inventory provides no standardized certification or conformance framework for assessing adherence to accessibility requirements.	ISO 5727:2024 provides no conformity assessment mechanism, no certification scheme, no audit process and no compliance verification procedure.	No defined conformity assessment, certification scheme, or measurable compliance criteria.	ISO 21542 does not provide any attestation of conformity.	IEC itself does not provide any attestation of conformity.	Forum discussions among building auditors highlight that CEN/TR 17622 (Conformity Assessment) is often ignored. This creates a risk where developers claim "alignment" with the standard without undergoing the rigorous verification needed to ensure the	The standard, supported by CEN/TR 17621 (technical performance criteria) and CEN/TR 17622 (conformity assessment), is set to be used more extensively as a requirement for awarding public contracts. Future, more rigorous assessment methods (perhaps moving toward	ISO/IEC 29138-3:2022 is not intended to be used to evaluate or certify a given standard or set of guidelines.

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
						accessibility chain is unbroken.	third-party certification) are being developed to measure compliance with these standards.	
Sustainable Design	No guidance exists for integrating accessibility into modern ICT systems while ensuring sustainability, e.g., energy-efficient assistive technologies or eco-friendly hardware.	ISO 5727:2024 contains no provisions addressing material sustainability, lifecycle assessment, embodied carbon or circular economy principles in relation to accessibility interventions.	Accessibility is treated independently of sustainability (e.g., energy consumption of accessibility features, material choices).	The document sets out the essential requirements for creating a safe, inclusive, age-friendly and sustainable built environment that is accessible and usable by all. These principles are reinforced by the United Nations 2030 Agenda for Sustainable Development, in particular the Sustainable Development	No sustainable or environmental design criteria are established.	The standard focuses heavily on design and construction, with limited guidance on the operational management and maintenance of these spaces, which are critical for long-term accessibility.	N/A	N/A

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
				Goals, but do not include technical requirements or metrics linking accessibility to environmental sustainability.				
Degree of Coverage of the Building	The TR is limited in scope and does not address accessibility across diverse ICT environments (mobile, cloud, IoT, AI interfaces).	Clause 5.3.3 establishes the accessibility chain as the analytical framework and requires that every element of the chain satisfies the required level of accessibility. The level of coverage achieved is entirely at the discretion of the implementing team.	The standard focuses on individual devices, not their integration within building-level accessibility (e.g., placement, connectivity, spatial accessibility).	The standard indicate Audible emergency signals with an output between 60 dB and 80 dB shall be provided to ensure full coverage within the building. Low-output audible signals shall be used for effectiveness.	The standard does not refer to buildings or construction infrastructure.	The standard does not refer to buildings or construction infrastructure.	The standard does not refer to buildings or construction infrastructure.	The standard does not refer to buildings or construction infrastructure.

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
Assistive Technologies for Accessibility	Limited information on integration with modern assistive technologies (e.g., updated screen readers, voice assistants, ARIA standards).	Clause 3.7 defines assistive products as products that optimize a person's functioning and reduce disability. Clause 5.5.1 identifies assistive technologies and products as supplementary means alongside information and communication technologies for achieving accessibility objectives. The standard sets no technical specifications for any assistive technology, no interoperability	While standard connections are required, there is no detailed guidance on interoperability, compatibility testing, or integration with assistive technologies.	The standard refers to the use of information and communication technologies such as beacons, online support and two-way communication, provided they are in accessible formats to provide sensory information. It also refers to recommendations for emerging technologies related to fire safety.	The standard includes definitions of assistive technology (AT) and definitions of such technologies as audio and spoken captions, audio captioning, audio description, subtitles, and clean audio	While it is better than older standards, scientific critiques suggest it still lacks depth regarding neurodiversity (e.g., sensory overload in transit hubs) compared to its robust physical requirements.	The standard does not yet sufficiently address the integration of IoT and smart-building features (like automated doors triggered by disability-ID beacons) which are essential for true modern accessibility.	The standard does not provide enough guidance on "Dynamic Mapping"—how to update your needs-map when the underlying software or user expectations shift.

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
		requirements and no performance criteria.						
Primary Energy Savings for the Building	Accessibility standards do not consider energy optimization in assistive or adaptive ICT systems.	ISO 5727:2024 contains no reference to energy performance, primary energy consumption or energy savings in relation to accessibility interventions or to the cultural objects in which they are implemented.	No consideration of how accessibility features interact with energy efficiency (e.g., always-on displays).	Energy efficiency is outside the scope of the standard.	Energy efficiency is outside the definitions in the standard.	The standard does not directly target its energy-saving capabilities, but rather its functional, accessibility, and implementation aspects, which indirectly interact with building energy efficiency goals.	No gap. Future revisions will better align with the Energy Performance of Buildings Directive (EPBD), ensuring that building renovations for energy efficiency also improve accessibility.	
Intelligent Systems	No guidance on accessibility of AI/ML-driven systems, intelligent interfaces, or	Clause 5.5.1 recognises information and communication technologies as a means of achieving accessibility	Limited coverage of smart/adaptive systems (e.g., AI-based interfaces, context-aware adjustments).	The standard refers only to the use of ICT and emerging technologies related to fire safety, such as intelligent fire	The intelligent systems covered by the standard are those related to assistive technology (AT).	The intelligent systems covered by the standard are those related to assistive technology (AT).	No gap. Future developments aim to blend physical accessibility with digital, "intelligent" systems (e.g.,	While primarily ICT-focused, the mapping methodology is designed to be "domain-agnostic," making it useful for office

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
	adaptive user experiences.	objectives. Annex D requires that digital access guides comply with WCAG Level AA as specified in ISO/IEC 40500 and ISO/IEC 30071-1 and references HTML pages, PDF files, audio and video formats, maps and applications.		evacuation management systems, together with technologies such as the Internet of Things (IoT), augmented reality and artificial intelligence (AI).			smart buildings, navigation, and automated vehicle services) to enhance the independence of people with disabilities.	equipment, built environments, and public kiosks.
Mobility Management	The TR does not provide standards for accessibility in mobile devices, wearables, or other portable ICT platforms.	Clause 5.2.2 includes facilities and service provision among the considerations for general accessibility objectives. The standard	Does not address user movement, navigation, or interaction across multiple devices within a workspace.	Mobility management is addressed in detail in the standard (routes, ramps, lifts).	Mobility is referenced only indirectly through terminology persons with age-related disabilities with reduced mobility	Like many built-environment standards, EN 17210 focuses on the design phase. Real-world feedback shows a high failure rate in the maintenance	No gap. Future updates emphasize that accessibility is not just for initial construction, but for ongoing management, maintenance, and regular	N/A

Area	Main Gaps Identified							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
		provides no framework for external mobility management, no requirements for transport connectivity, no specifications for accessible parking provision, no guidance on pedestrian route continuity between public transport stops and the heritage site entrance and no provisions for real-time mobility information or dynamic route management.				phase (e.g., accessible routes being blocked by temporary displays or elevators being out of service), which the standard only addresses in a non-mandatory Annex B.	audits of built environments.	

5.3 Proposed Standardization Items

The following table provides recommendations for standardization around following area: accessibility and sustainability awareness, certification framework, energy utilization, risks etc.

Table 10. Recommendation for Standardization

Area	Short Description							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
Accessibility and Sustainable Awareness	Establish guidelines that integrate accessibility with sustainable ICT design principles, including energy-efficient assistive technologies, eco-friendly software design, and inclusive system operation.	On the sustainability side, it establishes requirements for lifecycle assessment of materials used in accessibility interventions, selection criteria for reversible and low-carbon construction solutions and minimum environmental performance thresholds for	Introduce integrated guidelines combining accessibility and sustainability, including energy-efficient accessibility features and environmentally adaptive interfaces.	Develop measurable indicators that link accessibility solutions to environmental sustainability, life cycle assessment, and climate resilience.	Introduce standardised links between accessibility terminology and sustainability, climate resilience and environmental performance.	Transition from "passive design" to "active management." Use EN 17161 (Design for All) as a management layer to ensure that the functional accessibility designed under EN 17210 is maintained through staff training and	N/A	N/A

Area	Short Description							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
		mechanical systems such as lifts and platform lifts.				regular facility audits.		
Common evaluation and certification framework	Develop a harmonized framework for evaluating, certifying, and auditing accessibility across ICT systems, including both software and hardware, aligned with EU and international legal mandates.	The certification framework is designed to support public procurement conditions, heritage management planning and national standardization roadmaps.	Develop measurable criteria, testing protocols, and certification schemes aligned with EU standards, enabling consistent compliance verification.	Establish certification systems for accessible built environments.		Organizations should begin auditing their physical assets against the Annex A (Conformity) of the new draft revision now. The European Accessibility Act (EAA) transition periods are ending, and functional non-compliance will soon carry significant legal and financial penalties.	The most significant finding in the 2025/2026 draft is the addition of Annex A. While the main body remains "functional" (describing outcomes), Annex A contains specific technical values (dimensions, clear widths, contrast ratios). This is designed to give service providers legal	

Area	Short Description							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
							certainty when being audited for EAA compliance.	
Degree of energy utilization	Include standardized metrics for energy efficiency in accessibility implementations, ensuring solutions meet both functional and sustainability criteria.	N/A	Define requirements for optimizing energy consumption of accessibility features (e.g., adaptive brightness, intelligent audio activation).	Integrate accessibility design with energy efficiency and renewable energy considerations in the building.	Align accessibility-related terminology with energy efficiency and smart energy management standards.	N/A	N/A	N/A
Technical Operations and Monitoring	Establish practices to ensure accessibility is actively managed throughout the system lifecycle. This includes regular compliance checks, recording accessibility	This module addresses the combined absence of intelligent systems provisions, assistive technology specifications and mobility management	Introduce lifecycle management requirements, including monitoring, logging, maintenance, and validation of accessibility	Define the requirements for operational monitoring, maintenance, and continuous improvement of accessibility features.	Establish accessibility terms in operational requirements for monitoring and technical operations.	Real-world feedback shows a high rate of failures during the maintenance phase (e.g. accessible routes blocked by temporary displays or elevators out of	It lacks enforceable requirements for the real-time operational state of accessibility (e.g., ensuring an elevator remains working or that	By mapping user needs to a target standard, developers should see which needs are "unsupported" by current technical rules, allowing for

Area	Short Description							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
	activities, tracking and resolving issues, and continuously improving processes based on feedback, user testing, and evolving standards.	requirements in ISO 5727:2024.	features post-deployment.			service), an aspect addressed by the standard only in a non-mandatory Annex B. Revision of Annex B should be considered	braille signs aren't painted over during renovations).	proactive, custom accessibility solutions.
Uncertainty and Risk Quantification	Introduce mechanisms to quantify and mitigate accessibility risks, including gaps in assistive technology compatibility, emerging technology adoption, and legal compliance.	This module establishes a structured risk and accountability framework for accessibility interventions in immovable cultural heritage, addressing the absence of defined stakeholder roles, governance models and risk	Establish metrics and methodologies to evaluate accessibility performance, usability risks, and uncertainty (e.g., variability in user needs, environmental conditions).	Introduce methods for assessing risk and uncertainty in emergency scenarios.	Establishes terminology for risk, uncertainty, and degraded operational scenarios related to accessibility.	As the main body of EN 17210 contains functional requirements rather than specific figures, this can lead to subjective interpretations. Without using the accompanying Technical Reports (CEN/TR), architects may inadvertently	A concern could be in relation with the "Functional Main Body" and a "Technical Annex A," developers might cherry-pick requirements. There is a risk that "Functional" requirements will be treated as optional	A single technical requirement might serve five different user needs, while one user need might require ten different technical fixes. This complexity can lead to "mapping fatigue" where developers over-simplify the matrix to

Area	Short Description							
	ISO/IEC TR 29138-2:2009	ISO 5727:2024	ISO/IEC 10779:2020	ISO 21542:2021	EN 63080:2017	EN 17210:2021	prEN 17210	ISO/IEC 29138-3:2022
		assessment requirements in ISO 5727:2024.				design spaces that are "compliant" but physically unusable. Greater rigour in the functional requirements is desirable for the next edition.	"fluff" while the "Technical" Annex becomes a minimum-effort checkbox.	save time with low results.

5.4 Conclusions drawn from the analysis made

The role of a standard is to provide uniform rules for a procedure, to minimize or eliminate unnecessary variation in its performance, typically with the aim of reducing costs.

The AccessS project exemplifies the pivotal role of standardization in fostering innovation and knowledge dissemination within the context of EU-funded initiatives. By meticulously mapping existing and emerging standards, the project has leveraged standardization to avoid redundancy, promote the adoption of established best practices, and facilitate the integration of new technologies into the market.

During the analysis of the selected standards, several options for each standard were analyzed and discussed, the most important ones are presented below for each standard analyzed separately:

- **ISO/IEC TR 29138-2:2009** served as a foundational accessibility standards inventory, but significant technological and regulatory evolution has rendered its content outdated for today's digital ecosystems. A revised, modular approach is required, one that provides dynamic updates, integrates modern accessibility mandates, addresses emerging technologies, and embeds accessibility across the entire ICT lifecycle. By re-structuring the inventory into actionable, maintainable modules aligned with global and EU regulatory frameworks, the updated standard can play a central role in ensuring accessible, interoperable, and inclusive digital products and services.
- **ISO 5727:2024** establishes a methodologically coherent and conceptually sound framework for planning accessibility interventions in immovable cultural heritage. Its five-step methodology, its heritage value analysis requirements and its recognition of the diversity of physical, sensory and cognitive accessibility needs represent a solid foundation for standardization in this domain. However, the standard operates exclusively at a strategic and procedural level, produces no binding compliance obligations and contains no normative references. It does not align with EU legislative instruments including the European Accessibility Act (Directive 2019/882) and the recast Energy Performance of Buildings Directive. It defines no roles or accountability structures, no coverage metrics, no energy performance requirements, no technical specifications for assistive technologies and no framework for intelligent systems or mobility management. The five standardization modules proposed in this analysis address these gaps in a targeted and modular way, building directly on the methodology and the good practice evidence already present in ISO 5727:2024 while extending it into a legally grounded, technically specific and verifiable framework suited to the needs of EU Member States, publicly funded heritage institutions and the diverse communities of users who depend on accessible cultural heritage for their full participation in social and cultural life.
- **ISO/IEC 10779:2020** provides a strong foundation for accessibility in office equipment, particularly at the device level, focusing on design and functional requirements. However, when assessed against the predefined areas of interest, gaps emerge in system-level integration, sustainability, certification, and alignment with modern intelligent environments. Addressing these gaps would enable the evolution of the standard toward a holistic, measurable, and future-proof framework, capable of supporting accessibility across devices, buildings, and user contexts within the European regulatory landscape.
- **ISO 21542:2021**: A major criticism in urban planning forums is the "Compliance vs. Reality" gap. A building may be certified at completion, but the standard does not effectively govern the maintenance of accessibility features (e.g., tactile strips wearing down or accessible toilets being used for storage).

- Accessibility is experienced as a continuous journey, not building-by-building. This creates discontinuities between urban design and building access fragmentation between ISO 21542 and other standards (transport, public realm). The standard focus on “average” wheelchair users, underrepresents the bariatric users, the powered mobility devices (larger turning radii), complex assistive devices etc. Practically the document leads to minimum compliance rather than inclusive design. Weak coverage for neurodiverse users, children with disabilities, aging populations with combined impairments.
- **ISO 21542** mixes mandatory-sounding requirements with advisory recommendations, that designers and regulators interpret differently: some treat everything as optional, others enforce selectively. Finally leads to inconsistent compliance levels. The document applies to existing buildings but does not provide step-by-step retrofit strategies, lacks prioritization frameworks.
- **EN 63080:2017** - The risk of the “Static Vocabulary”: Language in the disability community evolves faster than the 5-to-10-year ISO/EN revision cycles. There is a risk that by the time a term is “standardized,” the community may have already shifted to newer, more preferred self-identifiers (e.g., the rise of “Neurodivergent” which is not fully integrated into the 2017 version).

Another problem of the document referred to lack of performance metrics: a major risk for organizations is treating EN 63080 as a “checkbox.” Because it only defines terms and not technical specification, an organization can use the correct vocabulary in their marketing while failing to meet the actual functional requirements found in standards like EN 301 549.

Because it is a terminology document, it is often overlooked by engineers. The risk is that technical teams use “layman’s terms” in documentation that do not align with legal definitions in the European Accessibility Act (EAA), leading to potential litigation.

- **The ISO/IEC 29138-3:2022** explicitly states that mapping should be performed by someone with considerable expertise in both the target standard and accessibility. The critical risk for organizations is using non-experts who might misinterpret technical clauses, leading to a “compliant” map that still leaves users blocked.

Industry forums warn that a completed ISO/IEC 29138-3 map is not a certification of accessibility. It is a planning and documentation tool. Some vendors misrepresent a “completed map” as a “passed audit,” which is a significant legal risk under the European Accessibility Act (EAA).

Users’ needs change as technology evolves (e.g., the rise of AI-driven voice interfaces). Noted that the standard does not provide enough guidance on “Dynamic Mapping” how to update your needs-map when the underlying software or user expectations shift.

- Despite its progressive nature, **EN 17210:2021** experts and disability advocacy groups (like the European Disability Forum) have identified significant risks: because the main body of EN 17210 contains functional requirements rather than specific numbers, it can lead to subjective interpretations. Without using the accompanying Technical Reports (CEN/TRs), architects may inadvertently design “compliant” but physically unusable spaces.

Like many built-environment standards, EN 17210 focuses on the design phase. Real-world feedback shows a high failure rate in the maintenance phase (e.g., accessible routes being blocked by temporary displays or elevators being out of service), which the standard only addresses in a non-mandatory Annex B.

While it is better than older standards, it still lacks depth regarding neurodiversity (e.g., sensory overload in transit hubs) compared to its robust physical requirements.

Practically EN 17210 provides functional requirements (what to achieve) but not detailed technical specifications (how to achieve it). That leads to different designers interpret requirements differently, to a lack of uniformity across countries and projects and finally to difficulty verifying compliance objectively.

The standard has poor integration with the national rules, because countries already have building codes and maybe national accessibility standards (often more prescriptive). This will lead to conflicts or overlaps between EN 17210 (functional) and national rules (technical), the results will go to designers rely on national rules, ignoring EN 17210 or use it only for high-level justification.

- **prEN 17210**, the document tries to cover a very broad range of environments: buildings, outdoor spaces, transport infrastructure etc. As a result, some requirements are too generic, others lack practical design detail. All this will lead to difficulties for practitioners translating into concrete solutions. Even is a project of standard, now the document has insufficient Integration with other standards. Weak alignment with fire safety regulations, structural codes, transport and mobility standards. This causes design conflicts, e.g.: evacuation vs accessibility requirements, space constraints vs usability guidelines. prEN 17210 focuses heavily on the physical built environment, limited guidance on: smart buildings, digital interfaces in public spaces, wayfinding technologies.

Based on the analysis of selected standards, the conclusions drawn on accessibility consistently highlight the need for a shift from passive compliance to proactive, integrated and continuous improvement.

Key conclusions drawn from these roadmaps include:

- Beyond basic compliance: Accessibility should no longer be seen as a one-off regulatory task, but as a continuous, mandatory commitment, integrated into the entire life cycle of building development, especially public ones, for digital assets.
- Prioritizing user-centered design: Standards should focus on the real experience of the end user, people with disabilities, rather than completing a technical checklist. Moreover, standards should consider the specificity of possible disabilities.
- Standardizing emerging technologies: As industries adopt new technologies such as artificial intelligence, it is crucial to integrate accessibility standards early to prevent the creation of new barriers.
- Urgency in digital transition: Roadmaps often emphasize that increasing legal, social, and economic pressure is forcing organizations to embrace accessibility to ensure equal access to information and technology.
- Interoperability: A separate takeaway is the need to standardize accessibility preferences and metadata to ensure that user needs are met across applications and platforms.
- Proactive risk management: Investing in accessibility reduces legal risks and financial penalties, especially as global accessibility regulation tightens.

6 Certification framework principles

6.1 Generalities

Official certifications go back almost 500 years. In 1518 Thomas Linacre petitioned Henry VIII [46] for permission to establish a college of physicians for the purpose of granting licenses to practice, and to punish “unqualified” practitioners. Over time this became the Royal College of Physicians in London. Prospective doctors had to pass exams to prove they were classically educated and possessed the sufficient medical knowledge. Certifications are also found in every country. Even the defunct Soviet Union had their own cert – the State Quality Mark of the USSR, which was used to certify that certain goods were of higher quality.

Product/services certification or product qualification is the process of certifying that a certain product has passed performance tests and quality assurance tests, and meets qualification criteria stipulated in contracts, regulations, or specifications (sometimes called "certification schemes" in the product certification industry).

Most product/services certification bodies (or product certifiers) are accredited to or aligned with ISO/IEC 17065 *Conformity assessment – Requirements for bodies certifying products, processes, and services*, the international standard for ensuring competence in those organizations performing product, process and service certifications. The organizations that perform this accreditation are called Accreditation Bodies, and they themselves are assessed by international peers against the ISO 17011 standard.

The first was quality!

Quality control and quality management have a long tradition: during the years, statistical quality control and quality management systems have been used to guarantee a high-quality level in every industrial production process. In the recent years, another tool for quality assurance has come to the fore namely, certification systems. Main feature of these systems is that all inspections are conducted by independent bodies (so-called third-party audit) grounded on standards laid down by well-known and accepted external organisations (standard owner). At the beginning there was the intention to create one standard for all economic sectors by establishing a general open-for-all certification scheme (ISO 9000). Unfortunately, this proved to be impossible. Today a large number of certification schemes can be identified. Instead of a one-for-all-standard more complex and industry-specific certification schemes are evolving throughout all sectors. Many economic approaches imply that both suppliers and buyers are fully informed about the commodities concerned. In fact, market activities are often characterised by far-reaching information deficits that impede the smooth functioning of markets.

Product/services or systems certification gives the manufacturer the opportunity to have their product(s)/service/system certified by an independent, competent, and authorized third-party organization (Third-Party Declaration of Conformity for products) with regard to the fulfilment of product standards focusing on development/design, type testing and routine testing as well as quality management of manufacture. Certificates save the end customer (operating company) the time-consuming and challenging checking of the documents themselves which are submitted by the manufacturer to prove the conformity of the products to be purchased, giving them an independent status.

With the product certificate, the product manufacturer is attested the conformity of the product with the international standards and additional user specifications after a thorough assessment by the technically experienced personnel of the certification body. This concerns in particular the conformity of the fulfilment of the subsequent requirements (depending on the certification program selected):

- Requirements for type tests in European test laboratories accredited according to ISO/IEC 17025;
- Requirements regarding design and construction;

- Requirements regarding the routine tests;
- Requirements regarding a quality assurance system certified to ISO 9001.

The International Accreditation Forum (IAF) (IAF ceased operations on 01 January 2026, now Global Accreditation Cooperation Incorporated (Global ACI) is the international authority on the accreditation of laboratories, certification bodies, inspection bodies, proficiency testing providers, validation/verification bodies, reference material producers and biobanks.) has a listing of all recognized Accreditation Bodies whose accreditations to the ISO 17065 standard are deemed equivalent. From the IAF MLA informational page: *"IAF is encouraging more of its members to join the MLA as soon as they have passed a rigorous evaluation process to ensure that their accreditation programs are of world standard. The consequence of joining the IAF MLA is that conformity assessment certificates issued, within the scope of the IAF MLA, by conformity assessment bodies accredited by any one of the members of the IAF MLA will be recognised in the worldwide IAF program. [67]"*

Most countries only have a single Accreditation Body representing their economy in the IAF MLA. The two exceptions are the United States with American National Standards Institute (ANSI), American National Standards Institute - American Society for Quality National Accreditation Board (ANAB, a subdivision of ANSI), American Association for Laboratory Accreditation (A2LA), and International Accreditation Service (IAS) as signatory members, and United Accreditation Foundation as Full Member of IAF (International Accreditation Forum); and Korea which is represented by Korea Accreditation Board (KAB) and Korean Accreditation System (KAS).

Each Accreditation Body is required to keep a listing of those organizations it accredits, as well as a Scope of Accreditation which details the activities that the organizations can perform, whether that be testing, inspection, or product certification. Accreditation Bodies routinely audit the Product Certifiers whom they have accredited in order to determine if the performance or actions of the organization have changed and do not meet the requirements of the Accreditation Body and the International Standards they are to conform to.

Building accessibility certifications, such as the Rick Hansen Foundation Accessibility Certification (RHFAC) and AIS Certification, evaluate and verify that buildings and public spaces are designed for, and accessible to, people with diverse disabilities. These certifications involve audits to meet standards for mobility, sensory, and cognitive accessibility, enhancing legal compliance and inclusion.

Main Accessibility Certifications and Programs:

- **Rick Hansen Foundation Accessibility Certification (RHFAC)** [68]: A comprehensive rating system measuring meaningful access in commercial, institutional, and multi-unit residential buildings.
- **AIS (Accessibility Indicator System)** [69]: An international certification system that rates the degree of accessibility in environments and services on a scale (1 to 5 stars).
- **Certified Professional in Accessible Built Environments (CPABE)** [70]: Offered through the IAAP, this certifies professionals rather than buildings, including Associate, Advanced, and Expert levels.
- **Access Consultant Certification (NRAC/RICS)** [71]: Validates professionals who audit and advise on inclusive design to comply with legal requirements like the Equality Act 2010.
- **APAC-BE (Accessibility Professionals Association)** [72]: National certification for professionals to demonstrate knowledge of federal, state, and local accessibility codes.

The Certification Process, in brief:

1. **Assessment/Audit:** A trained professional audits the site to identify barriers.
2. **Rating:** The site is scored based on established criteria.

3. Certification & Reporting: A rating is awarded (e.g., Gold, Silver, Star rating), and a report suggests improvements.
4. Recognition: The building may receive a certificate or plaque to display

6.2 European certification framework and accessibility and inclusiveness of buildings

Accessibility certification for buildings in the European Union (EU) is driven by a mix of harmonized European standards, national building codes, and emerging directives that emphasize "Design for All" principles. While the European Accessibility Act (EAA) primarily focuses on products and services, it has significant implications for physical spaces where these services are provided.

There is no single "EU Certification," but rather recognized standards and third-party certifications that align with EU law. In particular:

- AIS 2/2023 (Accessibility Indicator System) [69]: A holistic system that grades the level of accessibility in buildings, services, and digital products based on five grades.

The AIS accessibility certification system is the first Voluntary Harmonized Accessibility Standards System, which conceives accessibility in an integral manner and as another dimension of the social responsibility of companies, public and private entities and individuals.

The AIS system is made up of a set of standards (AIS norms) that certify the degree of accessibility of services, facilities and products in their design phase or once they have been developed.

AIS standards respond to criteria of usability, comfort and safety for all people, whatever their characteristics or needs may be.

- Building without Barriers: A certificate used to verify accessibility in commercial properties.

The Rick Hansen Foundation Accessibility Certification (RHFAC) [68], often referred to within the "Buildings Without Barriers" initiative, is a rating system that measures and certifies the meaningful accessibility of commercial, institutional, and multi-unit residential buildings. It evaluates a site based on user experience for people with varying disabilities (mobility, vision, hearing).

- LEED and BREEAM: These popular sustainability certifications are increasingly aligning with EU Taxonomy and including robust accessibility criteria in their assessments.

LEED (Leadership in Energy and Environmental Design) is the world's most widely used green building rating system, certifying structures for sustainability, efficiency, and health. It provides a framework for healthy, cost-effective, and energy-efficient buildings, offering certification levels—Certified, Silver, Gold, and Platinum—based on points achieved across various metrics like water efficiency, energy, and indoor environmental quality.

BREEAM (Building Research Establishment Environmental Assessment Method) is a globally recognized, voluntary certification system for sustainable built environments. It evaluates buildings across ten categories, including energy, health, materials, and water, to ensure low-impact design, reduced carbon emissions, and high occupant well-being. Certification is issued by licensed assessors at design and post-construction stages [73].

- Certification schemes: Member States are responsible for ensuring compliance with accessibility, which leads to various national/European/international certification schemes that should consider the European standard EN 17210.

6.3 Accessibility Assessment Scheme and standardization

Usually, an Accessibility Assessment Scheme provides the “how” (evaluation process), while standardization provides the “what” (rules and benchmarks). Together, they ensure accessibility is measurable, enforceable, and scalable.

In Europe, accessibility of public buildings for people with disabilities is addressed through a combination of legislation, standards, and assessment frameworks rather than a single unified “assessment scheme.”

The European Accessibility Act (EAA) sets minimum accessibility requirements for key products and services across the EU.

Accessibility of the built environment (including public buildings) is also required under:

- UN Convention on the Rights of Persons with Disabilities (CRPD) (Article 9)
- EU disability strategies and public procurement rules

For public buildings, implementation is mainly done at national level but guided by European standards.

The standard EN 17210:2021 defines minimum functional requirements for accessible environments, covers: entrances, circulation, signage lighting, acoustics usability for people with diverse disabilities. It applies to design, construction, refurbishment, and maintenance

The document CEN/TR 17621:2021 provides detailed technical criteria (e.g., dimensions, slopes, contrasts) and supports EN 17210 implementation.

On the other hand, CEN/TR 17622:2021 defines how to assess compliance by self-assessment, third-party certification and links requirements directly to EN 17210.

Till now this is effectively the European “assessment scheme” for accessibility of buildings.

A typical European-based assessment of a public building check involves:

- Physical access
 - step-free entrances, ramps, lifts
 - door widths, circulation space
- Usability
 - wayfinding (signage, tactile info)
 - lighting, acoustics
- Inclusiveness, usability for:
 - wheelchair users
 - visually impaired users
 - hearing impairments
 - cognitive disabilities
- Safety & independence
 - evacuation accessibility
 - accessible sanitary facilities

These criteria follow the “Design for All / Universal Design” principle promoted in EU standards.

CEN/TR 17621:2021 - *Accessibility and usability of the built environment - Technical performance criteria and specifications* is a European Technical Report that was developed to support EN 17210 -

Accessibility and usability of the built environment – Functional requirements. The Technical Report provides and exemplifies technical performance criteria and specifications for an accessible and usable built environment, following the Design for All/Universal design principles.

The document specifies what is necessary to align with these principles which will facilitate equitable and safe use for a wide range of users. The technical performance criteria and specifications are applicable across the full spectrum of the built environment and can be used as criteria for awarding public contracts (in support of the Public Procurement Directives).

These technical performance criteria and specifications are specifically applicable to the design, construction, refurbishment or adaptation, and maintenance of public or public-use environments including external areas. Alternatively, national standards and regulations may determine the technical performance criteria and specifications to fulfil the functional requirements of EN 17210.

CEN/TR 17622:2021 - *Accessibility and usability of the built environment - Conformity assessment*, provides criteria to assess conformity of the built environment with the functional requirements and recommendations described in EN 17210 *Accessibility and usability of the built environment – Functional requirements*, regardless of whether self-declaration, second-party attestation or third-party certification is requested.

This document provides guidance on how and when accessibility and usability of the built environment must be considered throughout all stages of the building process, including feasibility, design, construction, completion and post occupancy. It is also applicable for refurbishment or adaptation of existing buildings.

7 Conclusion and outlook

Important literature review notes that while accessibility standards are an important tool, systemic or policy-level changes are required for many of the key challenges identified by people with disabilities [74]. For example, the building code not aligning with accessibility standards was an identified concern considering many aspects of the built environment. To address this barrier, changes at a policy level would be required. Other identified barriers would also likely demand systemic- or policy-level changes. Examples include inadequate maintenance of pedestrian facilities, a lack of proper training of employers or customer service representatives regarding accessible supports, or delays/absence of accommodations (whether in education or employment). In a similar vein, the need for increased funding for system-wide accessible services or resources (which was a commonly identified barrier across many areas of accessibility) or improved access to transportation services would also require policy or system-level changes.

7.1 Recommendation for European standardization around the project

There is great potential in addressing many of the identified barriers through existing standards or through policy-level changes beyond standard development.

However, a few standard development opportunities have emerged from the existing standards analyses approach taken within this report. These opportunities were identified for broad areas that are largely unaddressed by existing standards or where there is a distinct opportunity to provide a dedicated and consolidated resource to address ongoing barriers within a particular area of accessibility. This approach includes standards related to the following:

- Emergency services and emergency response;
- Recreational and green spaces; and
- Wayfinding and navigation systems.

The analysis of the selected standards identified a main gap: the lack of auditable standards for the accessibility of public buildings, public spaces, public transport and, at the same time, the existence of inconsistent certification schemes for the accessibility of public buildings.

Even prEN 17210 did not consider a formal accessibility certification for public buildings.

Here lies the first opportunity: Developing a standard for accessibility audit requirements, based on the Accessibility Assessment Scheme developed within the project, aligned with the European Accessibility Act.

EN 17210 is largely providing qualitative requirements, complementary standards would be needed defining: minimum door widths, ramp slopes, signage contrast, acoustic and luminous thresholds, signage systems for cognitive accessibility. This could be like how the Eurocodes complement the principles of structural design.

On the other hand, public buildings are assessed physically, but not digitally, so standards linking physical accessibility with digital navigation (apps, indoor positioning) and intelligent interfaces for buildings would be needed. This is also relevant for the Web Accessibility Directive.

It would be advantageous to have a universal approach to specific standards, more precisely standards adapted for several types of public buildings: hospitals, schools, cultural buildings. Each of these, especially if we consider that some buildings are old (so they should be renovated considering accessibility and inclusion), and others are new (so they should comply with the requirements of the EAA, from the design phase) and practically each has unique accessibility challenges.

New or improved existing standards should be aligned with the CRPD (United Nations Convention on the Rights of Persons with Disabilities) and promote:

- Universal design principles
- Inclusive user experience
- Dignity and autonomy

New or improved accessibility standards should be integrated into

- ESG reporting
- Green building certifications (e.g. BREEAM, LEED extensions)

Many countries already use standards (e.g. ISO, EN rules), but there are gaps:

- Different definitions of “accessible building”
- Lack of harmonized certification criteria between countries

The development of internationally harmonized certification frameworks, aligned with ISO/EN standards, could be a great opportunity, on the one hand for standardization, and on the other hand for end users, people with different disabilities.

Most standards focus on ramps, elevators, toilets, but often ignore cognitive accessibility (clear signage), sensory accessibility (lighting, acoustics), digital interfaces (self-service kiosks). The most desirable opportunity for existing standards is to extend these standards to universal design principles.

Many standards are descriptive rather than measurable, so new standards, or new editions of existing standards, should include and define quantifiable indicators, such as:

- Door width (cm)
- Maximum slope (%)
- Clarity of orientation scores
- Accessibility audit scores

A future new standard(s) on the accessibility of public buildings should include:

- Technical requirements (dimensions, layouts)
- User experience criteria
- Performance indicators
- Audit methodology
- Certification levels
- Monitoring and renewal rules

Key actions for the project

Because of the analysis, the WG (formed by the technical partners involved in standards analysis and ASRO) on Standardization propose the following key actions beyond the D8.2:

Key action 1: Prioritization

To enable accessibility take-up, standards are necessary for the entire building. Prioritization, as a first step, needs to ensure that main topics are actively dealt with in standardization. Therefore, prioritization here is targeted to streamline the standardization activities, by introducing the classification of standardization activities according to the priorities of the field. In this case, one can start with accessibility in buildings based on disabilities (not just motor ones), and spaces, products,

programs and services should be designed from the beginning to be accessible to all people, including people with disabilities. Here again, the role of European/international standardization is important.

Key action 2: Stakeholder engagement in the standardization process

A broader stakeholder engagement is essential for the development of standards. Therefore, the WG on Standardization requests the AccesS partners and further stakeholders to better commit and verify/ensure their representation and input of expertise into the standardization process. This should not necessarily be done within or during the implementation of the project, but, if they are not already involved in national/European/international standardization activities (as members of national/European/international TCs), they should start doing so. For SMEs and startups, this task can be accomplished through industry associations, sometimes the costs of participating in standardization activities, we must admit, are too high compared to the benefits.

The D8.2 document can be used to inform stakeholders about the ongoing standardization projects and facilitate their exchange with the National Standardization Bodies for involvement.

Key action 3: Call on the European Commission to better support the accessibility standardization process

The standardization WG, at events organized within the project or events in which different partners participate (conferences/workshops at European/international level), should request the European Commission representatives present at those events to support the European standardization process around accessibility by:

- issuing one or more standardization requests covering all accessibility needs (mandates for EOSs);
- ensuring funding for European standardization (especially for development of harmonized standards), its coordination and pre-normative research on accessibility needs at the beginning of the building design process, but also in those sectors for which standardization projects are ongoing;

The European Commission should ensure that the necessary policy framework and legal requirements are put in place for the standardization of deliverables to underpin their implementation. Funding harmonized standards and standardization activities at European level is essential if European standardization is to maintain its role as a world leader in technology. Research projects involving standardization activities are important, valuable including for standardization, but not sufficient.

Key action 4: Continuous support of the standardization process

The WG on Standardization should continuously monitor and support the ongoing standardization process, by the end of the project implementation, to:

- create awareness and transparency of the ongoing standardization for the AccesS project partners;
- identify further needs of pre-normative research and standardization topics and communicating to the standardization bodies, if any;
- motivate AccesS members to actively participate (encouraging nominations via National Standardization Bodies) in technical standardization committees;
- inform AccesS partners about the progress of standardization by the end of the project implementation.

7.2 Policy recommendations to unlock accessibility and sustainability potentials of buildings

Unlocking both accessibility and sustainability in buildings isn't just a design challenge—it's largely a policy problem. When regulations, incentives, and standards align, developers and owners want to build better.

Policy makers should update building codes to unify sustainability and accessibility under a single "inclusive green" framework. The following actions are emphasized:

- **Harmonized Codes:** Integrate universal design principles into green building codes to ensure that new constructions and major renovations meet both energy efficiency and accessibility benchmarks simultaneously.
- **Pre-emptive Compliance:** Mandate accessibility site inspections at various construction stages to prevent costly, carbon-intensive retrofits later in the building's lifecycle.
- **Extended Mandates:** Expand building performance policies to cover the existing building stock, prioritizing the repurpose of underused assets (e.g., converting offices into accessible community amenities).

EU policies should empower the professionals designing and operating these spaces through:

- **Professional Training:** Supporting industry bodies in developing "Inclusive Design Overlays" that guide professionals through every stage of the project lifecycle.
- **Tech-Driven Management:** Encouraging the adoption of AI and IoT for real-time monitoring of both building performance (energy/water use) and accessibility needs (dynamic signaling or haptic maps).
- **Sustainable Materials Support:** Fund research and offer subsidies for low-carbon materials that also meet accessibility durability standards, such as non-slip, low-VOC surfaces.

Governments are important customers in the real estate sector. So, when it comes to public procurement, authorities should consider the following:

- Require all publicly funded buildings to meet high accessibility + net zero emissions standards
- Use life cycle costs instead of initial cost assessment

Also, authorities should consider the fact that you can't improve what you don't measure, so they should require regular building audits covering:

- Energy performance
- Carbon footprint
- Accessibility (mobility, sensory, cognitive)

And finally, publicly present the results obtained in public buildings to create market pressure on real estate developers.

Accessibility is often treated as a social issue, sustainability as an environmental one - this division weakens both, so policy makers should think about integrating building policies into national climate change strategies, and at the same time link public funding to both carbon reduction and social inclusion indicators, while also tracking co-benefits (health, productivity, equity)

The biggest missed opportunity today is integration. Accessibility measures (such as better circulation, natural light, ventilation) often enhance sustainability and vice versa. Policies should stop treating them as trade-offs - these are often co-benefits.

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Annex 1 - List with selected standards for the analyses

No	Standard indicative	Standard title	Who will analyse the standard
1	ISO/IEC 10779:2020	Information technology — Office equipment — Accessibility guidelines for older persons and persons with disabilities	ISZEB
2	ISO 5727:2024	Accessibility and usability of the built environment — Accessibility of immovable cultural heritage — Principles and methodology for interventions	ISZEB
3	ISO 21542:2021	Building construction — Accessibility and usability of the built environment	CETEM
4	EN 17210:2021	Accessibility and usability of the built environment - Functional requirements	FRC/ASRO
5	prEN 17210	Accessibility and usability of the built environment - Requirements and recommendations	FRC/ASRO
6	EN 63080:2017	Accessibility terms and definitions	CETEM
7	ISO/IEC 29138-3:2022	Information technology — User interface accessibility Part 3: Requirements and recommendations on user needs mapping	LAMA/ASRO
8	ISO/IEC TR 29138-2:2009	Information technology — Accessibility considerations for people with disabilities. Part 2: Standards inventory	CERTH

Annex 2 - Methodologies for analyses of standards

Gap Analysis Methodology

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight		
Stakeholder Roles		
Ethics and Societal Impact		
Regulatory Integration		
Certification framework		

Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design		
Degree of coverage of the building		
Assistive Technologies for Accessibility		
Primary energy savings for the building		
Intelligent Systems		
Mobility management		

Proposed Standardization Items

A modular structure is proposed to extend the analysed standard into legally enforceable and operationally robust standards, tailored to EU needs and accessibility/mobility risk profiles.

Area	Scope & Description
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Accessibility and Sustainable Awareness	
Common evaluation and certification framework	
Degree of energy utilization	
Technical Operations and Monitoring	
Uncertainty and Risk Quantification	



Table Analysis Methodology

No	Standard indicative	Standard title	Development organization	Coverage of the accessibility			Energy performance				Inclusivity quality				Certification		User protection			Identified gaps
				higher	medium	low	LCA	Product level	Service level	Regulation level	Critical	Average	Good	Additional comments	Harmonization	Discussion	General specification	Particular disability	Local/regional use	

Annex 3 - Analyses of selected standards

Analysis 1

Introduction

ISO/IEC TR 29138-2:2009 provides an inventory of standards, guidelines, and supporting documents related to accessibility in Information Technology (IT). Its purpose is to help standards developers and other stakeholders identify existing accessibility-relevant material. While valuable at the time of publication, the report reflects the state of technology and regulation as of 2009. Since then, accessibility expectations have evolved significantly due to major technological shifts (mobile computing, IoT, AI/ML, immersive interfaces) and the emergence of binding legal frameworks such as the European Accessibility Act (EAA), updated Section 508 rules, and advances in the W3C Web Content Accessibility Guidelines (WCAG 2.1 and 2.2).

As a result, the 2009 inventory no longer provides sufficient direction for organizations seeking compliance in modern ICT ecosystems. A modernized, structured, and dynamic version of the report is needed to address today's accessibility, interoperability, and regulatory requirements.

Gap Analysis

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight	ISO/IEC TR 29138-2:2009 does not provide guidance for organizational governance of accessibility across ICT systems, including lifecycle monitoring and continuous compliance checks.	Accessibility practices remain ad hoc, with inconsistent implementation and poor long-term oversight across projects.
Stakeholder Roles	The TR does not define responsibilities for key roles such as accessibility leads, auditors, procurement officers, or product owners.	Lack of clear accountability reduces coordination, inhibits risk ownership, and increases likelihood of non-compliance.
Ethics and Societal Impact	The report does not address equitable access, inclusion for diverse user groups (e.g., cognitive disabilities, aging populations), or societal implications of inaccessible ICT.	Risk of exclusion, reduced public trust, and failure to meet ethical obligations for inclusive design.
Regulatory Integration	No mapping to modern legal mandates such as the European Accessibility Act, UN CRPD guidance, or Section 508 Refresh.	Organizations cannot rely on the TR for compliance, leading to manual cross-referencing, errors, and potential legal exposure.
Certification Framework	The inventory provides no standardized certification or conformance framework for	Organizations cannot systematically certify ICT products, limiting auditability

Area	Gap	Technical/Operational Impact
	assessing adherence to accessibility requirements.	and comparability of accessibility performance.

Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design	No guidance exists for integrating accessibility into modern ICT systems while ensuring sustainability, e.g., energy-efficient assistive technologies or eco-friendly hardware.	Developers may implement accessibility solutions that are technically effective but energy-inefficient, undermining broader sustainability goals.
Degree of Coverage of the Building	The TR is limited in scope and does not address accessibility across diverse ICT environments (mobile, cloud, IoT, AI interfaces).	Modern ICT systems may remain inaccessible due to incomplete guidance, particularly in emerging contexts like smart buildings or interactive kiosks.
Assistive Technologies for Accessibility	Limited information on integration with modern assistive technologies (e.g., updated screen readers, voice assistants, ARIA standards).	Poor interoperability with AT leads to fragmented or unusable user experiences, failing to meet real-world accessibility requirements.
Primary Energy Savings for the Building	Accessibility standards do not consider energy optimization in assistive or adaptive ICT systems.	Implementations may consume unnecessary resources, increasing operational costs and environmental footprint.
Intelligent Systems	No guidance on accessibility of AI/ML-driven systems, intelligent interfaces, or adaptive user experiences.	AI outputs and intelligent controls may be inaccessible, non-transparent, or biased, violating user expectations and legal mandates.
Mobility Management	The TR does not provide standards for accessibility in mobile devices, wearables, or other portable ICT platforms.	Users with disabilities may face barriers accessing critical services via mobile, limiting independence and inclusion.

Proposed Standardization Items

A modular structure is proposed to extend the analysed standard into legally enforceable and operationally robust standards, tailored to EU needs and accessibility/mobility risk profiles.

Area	Scope & Description
Accessibility and Sustainable Awareness	Establish guidelines that integrate accessibility with sustainable ICT design principles, including energy-efficient assistive technologies, eco-friendly software design, and inclusive system operation.

Common Evaluation and Certification Framework	Develop a harmonized framework for evaluating, certifying, and auditing accessibility across ICT systems, including both software and hardware, aligned with EU and international legal mandates.
Degree of Energy Utilization	Include standardized metrics for energy efficiency in accessibility implementations, ensuring solutions meet both functional and sustainability criteria.
Technical Operations and Monitoring	Establish practices to ensure accessibility is actively managed throughout the system lifecycle. This includes regular compliance checks, recording accessibility activities, tracking and resolving issues, and continuously improving processes based on feedback, user testing, and evolving standards.
Uncertainty and Risk	Introduce mechanisms to quantify and mitigate accessibility risks, including gaps in assistive technology compatibility, emerging technology adoption, and legal compliance.

Conclusion

ISO/IEC TR 29138-2:2009 served as a foundational accessibility standards inventory, but significant technological and regulatory evolution has rendered its content outdated for today's digital ecosystems. A revised, modular approach is required, one that provides dynamic updates, integrates modern accessibility mandates, addresses emerging technologies, and embeds accessibility across the entire ICT lifecycle. By re-structuring the inventory into actionable, maintainable modules aligned with global and EU regulatory frameworks, the updated standard can play a central role in ensuring accessible, interoperable, and inclusive digital products and services.

Analysis 2

Introduction

ISO 5727:2024 is the first international standard dedicated to the accessibility of immovable cultural heritage. Published in October 2024 by ISO/TC 59/SC 16, it establishes principles and a methodology for planning and implementing accessibility interventions in cultural objects and their settings. The standard is addressed to heritage owners and managers, curators, accessibility professionals, conservation and restoration professionals, architects, engineers, designers, builders and user representatives. Its methodology follows a sequential process from the determination of general accessibility objectives through heritage value analysis, accessibility condition analysis, specific objective setting, proposal development and the production of an intervention plan.

The standard addresses a domain of growing regulatory and social relevance across the European Union. The UN Convention on the Rights of Persons with Disabilities, referenced in the Introduction of ISO 5727:2024, establishes accessibility as a precondition for full and effective participation in cultural life. The European Accessibility Act (Directive 2019/882) reinforces this obligation at the legislative level for EU Member States. The Faro Convention (2005) further underlines that access to cultural heritage is a right of all people. In this context, the existence of an international standard governing accessibility interventions in cultural heritage sites represents a significant step toward harmonised practice.

However, ISO 5727:2024 operates exclusively at a strategic and procedural level. It contains no normative references and all five of its annexes are informative. The standard produces planning documents but provides no conformity assessment mechanism, no certification pathway and no measurable compliance criteria. It does not align with specific EU legislative instruments such as Directive 2019/882 or with construction product regulations. It contains no provisions addressing environmental sustainability, energy performance, intelligent building systems or digital mobility management. The standard does not define roles or accountability structures for the professionals and stakeholders it addresses, leaving governance entirely undefined.

For the AccessS project, ISO 5727:2024 provides a methodological foundation that is conceptually sound but operationally incomplete. The standard must be extended and complemented to serve as a basis for accessible, sustainable and technologically responsive interventions in European cultural heritage sites. This GAP analysis, conducted on behalf of IsZEB, identifies the specific deficiencies of ISO 5727:2024 across governance, technical and engineering dimensions and proposes targeted standardization items to address them. The proposed items are designed to feed directly into ASRO's Standardization Roadmap and to support the development of a harmonized European framework for accessible cultural heritage.

Gap Analysis

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight	ISO 5727:2024 contains no provisions regarding environmental sustainability, carbon footprint or climate resilience of accessibility interventions. Reversibility (clause 3.19 and clause 4.3(d)) is addressed exclusively as a heritage conservation mechanism with no reference to	Accessibility interventions in cultural heritage sites proceed without any evaluation of their environmental consequences. New construction elements such as ramps, lifts, platforms and surfaces can generate

	environmental performance. No environmental impact assessment is required at any stage of the methodology. The informative annexes contain no guidance on this matter either, confirming that the omission is systematic rather than incidental.	significant embodied carbon and material waste with no requirement to assess or mitigate this. This gap prevents alignment with the EU Green Deal, the Renovation Wave Strategy and national sustainability obligations applicable to publicly funded cultural heritage works.
Stakeholder Roles	The scope identifies nine categories of intended users but assigns no responsibilities, accountability structures or decision-making authority to any of them. Clause 4.2(d) requires a multidisciplinary approach without specifying who leads it. Clause 5.2.1 requires the establishment of reference groups of users with impairments but provides no governance model defining how their input is collected, weighted or formally incorporated into decisions. Annex B acknowledges that accessibility maintenance protocols are essential for mechanical lifting devices and hearing enhancement systems but assigns this responsibility to no named party. Annex E documents the Akershus Castle project, where disability organizations, cultural heritage organizations and The Directorate for Cultural Heritage all participated, and the Valle Salado project, where a multidisciplinary team including architects, archaeologists and salt workers operated under a foundation. These governance arrangements are presented as good practice but carry no normative weight and are not required by the standard.	The absence of defined roles produces accountability gaps at every stage of the methodology. No party is formally responsible for ensuring that the access concept, action proposals or intervention plan meet the standard's requirements. Disputes between heritage conservation professionals and accessibility professionals cannot be resolved through the standard. Reference group participation risks being treated as a formality rather than a substantive input, undermining the inclusive design objective the standard seeks to achieve.
Ethics and Societal Impact	The Introduction references the UN Convention on the Rights of Persons with Disabilities and clause 4.1 states that a balance shall be ensured between heritage conservation and social goals. The standard sets no measurable equity criteria and no process for monitoring social inclusion outcomes over time. Annex A acknowledges that accessibility needs can be influenced by factors such as age, gender, health, training & culture and that when two or more impairments combine their cumulative effect can significantly amplify the impact. This breadth of need is recognised in informative	Accessibility interventions designed without measurable social impact criteria risk producing solutions that are technically adequate in narrow terms but socially exclusionary in practice. Groups facing intersecting barriers such as elderly visitors with combined cognitive and physical impairments, visitors from low-income backgrounds or visitors from linguistic minorities are not specifically addressed. The lack

	guidance but is not translated into measurable criteria or mandatory assessment requirements within the normative methodology.	of any monitoring obligation means that achieved accessibility levels cannot be verified or reported after implementation, removing any mechanism for accountability to the communities the standard is intended to serve.
Regulatory Integration	Clause 4.4(a) requires consideration of all relevant legal obligations and clause 5.3.3(a) requires that statutory requirements on accessibility be included in the analysis bases. Despite this, ISO 5727:2024 has zero normative references and does not reference or align with the European Accessibility Act (Directive 2019/882), EN 17210, the EU Construction Products Regulation or any EU Member State accessibility legislation. The case studies in Annex E reference national legal frameworks selectively. The Jesús de Tavarangué example cites the Spanish Building Code and the Paraguayan Accessibility Law as the basis for its accessibility analysis. The Akershus Castle example references the Norwegian Equality and Anti-Discrimination Act and the Act concerning cultural heritage. These references confirm that national legal alignment is applied in practice but is left entirely to each implementing team and is not structured or required by the standard itself.	Heritage owners and operators in EU Member States cannot use ISO 5727:2024 alone to demonstrate legal compliance with national transpositions of EU accessibility directives. The absence of alignment with Directive 2019/882 is particularly significant for cultural heritage sites that provide services to the public, as these fall within the scope of the Act from 2025 onward. The standard's silence on regulatory integration creates legal uncertainty for public authorities responsible for accessible cultural heritage and prevents its use as a reference document in public procurement or permitting procedures.
Certification framework	ISO 5727:2024 provides no conformity assessment mechanism, no certification scheme, no audit process and no compliance verification procedure. The methodology produces five planning documents: general objectives and strategies, heritage values study, access study, access concept and intervention plan (clause 5). None of these documents is linked to any external validation or accreditation body. Annex D describes the access guide as a publicly available document and is the closest the standard comes to a transparency mechanism. It references WCAG Level AA compliance via ISO/IEC 40500 and ISO/IEC 30071-1 for digital formats. However, the access guide is informative & voluntary and WCAG compliance applies only to the format of the document itself rather than to the accessibility performance of the cultural	Without a certification framework, there is no instrument available to heritage site operators, public authorities or funding bodies to verify that an accessibility intervention meets the standard's requirements. This prevents ISO 5727:2024 from being used as a basis for public funding eligibility criteria, regulatory compliance demonstrations or quality assurance in procurement processes. It also prevents users and visitor organizations from independently verifying the accessibility level of a cultural heritage site, removing a key

	object. This does not constitute a certification framework.	tool for informed participation in cultural life.
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Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design	ISO 5727:2024 contains no provisions addressing material sustainability, lifecycle assessment, embodied carbon or circular economy principles in relation to accessibility interventions. Clause 4.3(d) introduces reversibility as a selection criterion for interventions but frames it exclusively around heritage integrity rather than environmental performance. Clause 4.3(b) requires that actions to enhance accessibility be proportionate to the scope of the intervention but sets no sustainability threshold for material selection or construction methods. Annex E illustrates a range of construction approaches across the case studies: limestone, bricks and iron at Akershus Castle, Corten steel at the Pazo de Castrelos garden and a timber annex at Kenban. In each case the material choice is justified by heritage compatibility or spatial constraints. No environmental performance criterion is applied or required in any of these examples, confirming that sustainable design is absent from both the normative methodology and its practical application.	Accessibility interventions are designed and executed without any assessment of their environmental impact. The selection of construction materials, surface finishes and mechanical systems for ramps, lifts, platforms and tactile installations proceeds on heritage compatibility grounds alone. No lifecycle consideration is applied to the durability, repairability or end-of-life treatment of new elements. This prevents integration with EU sustainable construction requirements and with public funding schemes that condition disbursement on environmental performance criteria. It also creates a structural inconsistency between accessibility investment in cultural heritage and the broader sustainability commitments of the institutions responsible for these sites.
Degree of coverage of the building	Clause 5.3.3 establishes the accessibility chain as the analytical framework and requires that every element of the chain satisfies the required level of accessibility. Clause 4.3(e) states that individual interventions should be considered as part of a site-wide plan. However, the standard defines no quantitative coverage metrics, no minimum percentage of accessible spaces or routes, no scoring system and no threshold for what constitutes adequate coverage. The level of coverage achieved is entirely at the discretion of the implementing team.	The absence of coverage metrics means that a cultural heritage site can claim conformity with the methodology of ISO 5727:2024 while providing accessible access to only a fraction of its spaces, routes or content. Partial accessibility solutions that create separate or secondary access routes for persons with disabilities are not measured against any standard of equivalence. This makes it impossible for public authorities, funding bodies or user organizations to compare the accessibility levels of different sites or to set minimum conditions for public

	Annex E confirms this discretionary approach. The Kenban example explicitly states that the most desirable solution of a single shared access route for all visitors could not be achieved and that a separate route for wheeled entry was introduced instead, with no normative requirement to justify or compensate for this limitation. The Akershus Castle project chose an approach of improved accessibility rather than full universal design, a decision presented as reasonable but not measured against any defined coverage standard. The State Library Victoria example maintained accessible lifts alongside the upgraded staircases, providing parallel rather than integrated access without any coverage adequacy criterion being applied.	investment. It also prevents the identification of coverage gaps at a national or European level, limiting the usefulness of ISO 5727:2024 as a policy instrument.
Assistive Technologies for Accessibility	Clause 3.7 defines assistive products as products that optimize a person's functioning and reduce disability. Clause 5.5.1 identifies assistive technologies and products as supplementary means alongside information and communication technologies for achieving accessibility objectives. Annex A addresses sensory accessibility needs and recommends scale reproductions, tactile plans and descriptive audio tours for people with vision impairments, as well as surface finishes, hearing enhancement systems and induction loops for people with hearing impairments. Annex B lists audio guides, sign language interpreters and induction loops among the resources relevant to service provision objectives. Annex D requires that access guides include information on available assistive technology, equipment and assistance on site. Annex E demonstrates practical deployments: tactile Braille-equipped models and sign language tours at the Santa Giulia museum in Brescia, a VR experience and tactile haptic trail at Valle Salado and a Corten steel tactile orientation strip with Braille information panels at the Pazo	The absence of technical specifications for assistive technologies means that their deployment in cultural heritage sites is driven by individual project decisions rather than by standardized requirements. Solutions vary widely in quality, interoperability and effectiveness across sites and Member States. There is no basis for procurement specifications or quality assessment. The exclusion of emerging digital assistive technologies from the standard's scope leaves a growing and increasingly important category of accessibility provision entirely unregulated, creating risks of fragmentation across the EU and preventing the development of interoperable solutions for cross-border cultural tourism.

	de Castrelos garden. Despite this range of examples, the standard sets no technical specifications for any assistive technology, no interoperability requirements and no performance criteria. Smart assistive devices, sensor-based indoor navigation, augmented reality tools and AI-assisted accessibility solutions are entirely absent from both the normative text and the annexes.	
Primary energy savings for the building	ISO 5727:2024 contains no reference to energy performance, primary energy consumption or energy savings in relation to accessibility interventions or to the cultural objects in which they are implemented. No connection is made to the Energy Performance of Buildings Directive (EPBD, Directive 2010/31/EU as recast in 2024) or any national energy performance framework. The operational principles in clause 4.4 list technical and economic feasibility among the factors to consider when deciding to intervene but make no reference to energy efficiency. None of the case studies in Annex E records any energy performance consideration in relation to the mechanical systems installed, including the multiple lifts, platform lifts and stair lifts described at St Paul's Cathedral, Santa Giulia, Akershus Castle and Kenban.	Accessibility interventions that introduce mechanical systems such as lifts, platform lifts, hearing loop amplifiers and automated doors generate ongoing energy consumption within cultural heritage buildings. This consumption is not assessed, reported or optimized under ISO 5727:2024. For publicly owned cultural heritage sites that are subject to national transpositions of the EPBD, the installation of new energy-consuming systems without energy performance assessment creates a compliance risk. It also represents a missed opportunity to align accessibility improvement with building renovation and energy efficiency upgrades, which are increasingly required to be coordinated under EU policy.
Intelligent Systems	Clause 5.5.1 recognises information and communication technologies as a means of achieving accessibility objectives. Annex D requires that digital access guides comply with WCAG Level AA as specified in ISO/IEC 40500 and ISO/IEC 30071-1 and references HTML pages, PDF files, audio and video formats, maps and applications. The Valle Salado case study in Annex E mentions a virtual reality experience dedicated to explaining the characteristics of the valley, its landscapes and its history. These are the only references to digital or intelligent solutions in the entire standard. Smart building systems, IoT-based accessibility monitoring, real-	Cultural heritage sites are increasingly integrating smart building systems for visitor management, environmental monitoring and security. The absence of any framework for intelligent accessibility systems in ISO 5727:2024 means that these deployments occur without any standardized requirements for accessibility performance, data privacy or interoperability. Visitors with disabilities cannot rely on consistent or verifiable digital accessibility tools across different sites. The gap also prevents cultural heritage institutions from leveraging real-time data to maintain and improve accessibility conditions dynamically, limiting the

	time occupancy and route management, indoor positioning and wayfinding technologies, AI-assisted visitor support and sensor-based environmental controls are entirely absent from both the normative methodology and the informative annexes. The WCAG compliance requirement in Annex D applies only to the accessibility of documents and websites rather than to intelligent systems deployed within the physical cultural object.	effectiveness of even well-designed physical interventions over time.
Mobility management	Clause 5.2.2 includes facilities and service provision among the considerations for general accessibility objectives. Annex A addresses location needs, noting that information on transport and routes to reach the cultural object should be provided in accessible formats. Annex B lists objectives related to facilities and service provision and refers to the functions of reception and information. Annex D requires that access guides include links and information related to transportation. The Jesús de Tavarangué example in Annex E mentions the allocation of parking spaces for people with reduced mobility as one of the action proposals. Despite these scattered references, the standard provides no framework for external mobility management, no requirements for transport connectivity, no specifications for accessible parking provision, no guidance on pedestrian route continuity between public transport stops and the heritage site entrance and no provisions for real-time mobility information or dynamic route management.	Persons with disabilities and older visitors frequently encounter the greatest barriers to cultural heritage participation before they reach the entrance of a site. The lack of a mobility management framework in ISO 5727:2024 means that the accessibility chain concept defined in clause 3.5 cannot be fully implemented. A chain in which one link fails compromises the system as a whole, as the standard itself acknowledges. Yet by excluding external mobility and transport connectivity from its scope the standard structurally tolerates a broken chain at the point of arrival. This limits the practical value of physical interventions within the cultural object for a significant proportion of the target user groups.

Proposed Standardization Items

A modular structure is proposed to extend the analysed standard into legally enforceable and operationally robust standards, tailored to EU needs and accessibility/mobility risk profiles.

Area	Scope & Description
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Accessibility and Sustainable Awareness	This module addresses the dual absence of environmental sustainability provisions and measurable social equity criteria in ISO 5727:2024. On the sustainability side, it establishes requirements for lifecycle assessment of materials used in accessibility interventions, selection criteria for reversible and low-carbon construction solutions and minimum environmental performance thresholds for mechanical systems such as lifts and platform lifts. This responds directly to the gap identified in clause 4.3(d), where reversibility is addressed exclusively as a heritage mechanism with no environmental dimension. On the social side, it establishes measurable equity criteria for the assessment of accessibility interventions across diverse user groups, extending the recognition in Annex A that accessibility needs are influenced by age, gender, health, training and culture into normative requirements. It requires the assessment of cumulative impairments as acknowledged in Annex A and mandates post-implementation monitoring of social inclusion outcomes. It also defines minimum content requirements for access guides as described in Annex D, elevating them from informative tools to verifiable public accountability instruments. The module draws on the good practice demonstrated at Valle Salado (Annex E), where a multidisciplinary team integrated sensory, physical and cognitive accessibility across a landscape heritage site, and at the Pazo de Castrelos (Annex E), where a material-specific tactile solution was designed with long-term usability in mind.
Common evaluation and certification framework	This module establishes a structured conformity assessment and certification framework for accessibility in immovable cultural heritage, addressing the complete absence of any such mechanism in ISO 5727:2024. It defines graduated accessibility performance levels applicable to cultural objects of different typologies, scales and heritage protection grades, building on the five-step methodology of clause 5 and introducing verifiable output criteria for each step. It specifies minimum requirements for the heritage values study, access study, access concept and intervention plan that allow external auditors to assess conformity. It establishes alignment with the European Accessibility Act (Directive 2019/882) and with EN 17210, providing a compliance pathway for EU Member State operators of publicly accessible cultural heritage sites. It draws on the regulatory references applied in practice across Annex E case studies, including the Norwegian Equality and Anti-Discrimination Act at Akershus Castle and the Spanish Building Code and Paraguayan Accessibility Law at Jesús de Tavarangué, and systematizes these into a harmonized EU reference framework. It also defines coverage adequacy thresholds for the accessibility chain established in clause 3.5 and clause 5.3.3, addressing the gap by which sites such as Kenban (Annex E) can introduce separate accessible routes without any normative assessment of their equivalence to the standard visitor experience. The certification framework is designed to support public procurement conditions, heritage management planning and national standardization roadmaps.
Degree of energy utilization	This module establishes energy performance requirements for accessibility interventions that introduce or modify energy-consuming systems in cultural heritage buildings, addressing the complete absence of any energy dimension in ISO 5727:2024. It defines minimum energy efficiency criteria for mechanical accessibility systems including lifts, platform lifts, stair lifts, automated doors, hearing loop amplifiers and environmental control systems. Multiple case studies in Annex E document the installation of such systems: lifts and platform lifts at St Paul's Cathedral, Santa Giulia in Brescia, Akershus Castle and Kenban, as well

	as hearing enhancement systems referenced in Annex B. None of these installations is subject to any energy assessment under the standard. The module aligns these requirements with the Energy Performance of Buildings Directive (EPBD, recast 2024) and with national frameworks applicable to publicly owned heritage sites. It establishes a methodology for integrating energy performance assessment into the existing access study and intervention plan stages of the ISO 5727:2024 methodology, enabling coordinated planning of accessibility and energy renovation works. It also defines reporting requirements for the ongoing energy consumption of installed accessibility systems, supporting institutional sustainability reporting obligations for publicly funded cultural heritage institutions.
Technical Operations and Monitoring	This module addresses the combined absence of intelligent systems provisions, assistive technology specifications and mobility management requirements in ISO 5727:2024. On intelligent systems, it establishes performance and interoperability requirements for smart accessibility tools deployed within cultural heritage sites, including IoT-based accessibility monitoring, indoor positioning and wayfinding systems, real-time route and occupancy management and AI-assisted visitor support. This extends the recognition in clause 5.5.1 that information and communication technologies can serve as means of achieving accessibility objectives into a structured technical framework. On assistive technologies, it establishes minimum technical specifications and procurement criteria for tactile orientation systems, induction loops, audio description systems, sign language interpretation infrastructure and digital assistive devices, building on the practical deployments documented in Annex E at Santa Giulia (p.26) and Valle Salado and on the accessibility needs identified in Annex A. It extends the WCAG Level AA requirement currently confined to access guide documents in Annex D to all digital visitor interfaces within the cultural object. On mobility management, it establishes requirements for transport connectivity information, accessible parking provision, pedestrian route continuity between public transport stops and heritage site entrances and real-time mobility information, addressing the broken accessibility chain identified in the gap analysis. It draws on the parking provision documented at Jesús de Tavarangué (Annex E) and the transport and location information requirements of Annex A and Annex D as starting points for a comprehensive mobility framework.
Uncertainty and Risk Quantification	This module establishes a structured risk and accountability framework for accessibility interventions in immovable cultural heritage, addressing the absence of defined stakeholder roles, governance models and risk assessment requirements in ISO 5727:2024. It defines RACI matrices for all professional categories identified in the scope, specifying who is Responsible, Accountable, Consulted and Informed at each stage of the five-step methodology. It establishes formal protocols for the constitution, operation and decision-making authority of reference groups as required by clause 5.2.1, ensuring that user participation is substantive rather than procedural. It introduces risk assessment requirements covering heritage impact risk, short-term accessibility disruption during implementation as partially referenced in clause 5.6(e)(2), financial risk and legal compliance risk. It establishes uncertainty quantification methods for situations where accessibility objectives cannot be fully achieved, building on the partial accessibility scenarios documented at Kenban (Annex E) and Akershus Castle (Annex E), and requires that these situations be formally documented with mitigation measures and review timelines. It also establishes requirements for post-implementation feedback collection from reference groups, users and

	heritage experts as referenced in clause 5.6(f), translating this into a structured monitoring and continuous improvement obligation that feeds back into the accessibility maintenance protocols acknowledged in Annex B.
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Conclusion

ISO 5727:2024 establishes a methodologically coherent and conceptually sound framework for planning accessibility interventions in immovable cultural heritage. Its five-step methodology, its heritage value analysis requirements and its recognition of the diversity of physical, sensory and cognitive accessibility needs represent a solid foundation for standardization in this domain. However, the standard operates exclusively at a strategic and procedural level, produces no binding compliance obligations and contains no normative references. It does not align with EU legislative instruments including the European Accessibility Act (Directive 2019/882) and the recast Energy Performance of Buildings Directive. It defines no roles or accountability structures, no coverage metrics, no energy performance requirements, no technical specifications for assistive technologies and no framework for intelligent systems or mobility management. The five standardization modules proposed in this analysis address these gaps in a targeted and modular way, building directly on the methodology and the good practice evidence already present in ISO 5727:2024 while extending it into a legally grounded, technically specific and verifiable framework suited to the needs of EU Member States, publicly funded heritage institutions and the diverse communities of users who depend on accessible cultural heritage for their full participation in social and cultural life.

Analysis 3

Introduction

ISO/IEC 10779:2020 provides accessibility guidelines for office equipment, focusing on usability for older persons and individuals with disabilities. It defines functional and design requirements covering physical interfaces, software behavior, and user interaction. While the standard offers comprehensive design guidance aligned with frameworks such as WCAG and EN 301 549, it remains largely prescriptive and hardware-oriented. This GAP analysis identifies some limitations in governance, technical implementation, and operationalization, and proposes extensions toward a more robust, auditable, and future-proof accessibility framework.

Gap Analysis

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight	The standard does not consider environmental conditions.	Increased energy consumption due to always-on accessibility features.
Stakeholder Roles	No explicit definition of roles (e.g., manufacturer, software provider, accessibility auditor, service provider).	Ambiguity in responsibility allocation, limiting accountability in design, deployment, and maintenance of accessible systems.
Ethics and Societal Impact	The standard focuses on functional accessibility but lacks guidance on inclusion, fairness, and broader societal implications (e.g., digital exclusion, stigmatization).	Risk of technically compliant systems that still fail to meet real user needs or reinforce inequalities.
Regulatory Integration	Limited explicit linkage to EU frameworks, despite alignment with WCAG and EN 301 549.	Potential legal misalignment, making compliance verification difficult.
Certification Framework	No defined conformity assessment, certification scheme, or measurable compliance criteria.	Difficulties in benchmarking, auditing, and market acceptance; inconsistent interpretation of requirements.

Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design	Accessibility is treated independently of sustainability (e.g., energy consumption of accessibility features, material choices).	Potential inefficiencies in energy/resource use.
Degree of Coverage of the Building	The standard focuses on individual devices, not their integration within building-level accessibility (e.g., placement, connectivity, spatial accessibility).	Accessibility barriers may appear at system level (e.g. poorly located accessibility devices).
Assistive Technologies for Accessibility	While standard connections are required, there is no detailed guidance on interoperability, compatibility testing, or integration with assistive technologies.	Inconsistent user experience and potential incompatibility with external assistive tools (screen readers, alternative input devices).
Primary Energy Savings for the Building	No consideration of how accessibility features interact with energy efficiency (e.g., always-on displays).	Increased operational costs and energy inefficiencies, especially in large-scale deployments.
Intelligent Systems	Limited coverage of smart/adaptive systems (e.g., AI-based interfaces, context-aware adjustments).	Risk of standard becoming outdated for modern office environments and smart buildings.
Mobility Management	Does not address user movement, navigation, or interaction across multiple devices within a workspace.	Fragmented accessibility experience, especially for users with mobility impairments navigating complex environments.

Proposed Standardization Items

A modular structure is proposed to extend the analysed standard into legally enforceable and operationally robust standards, tailored to EU needs and accessibility/mobility risk profiles.

Area	Scope & Description
Accessibility and Sustainable Awareness	Introduce integrated guidelines combining accessibility and sustainability, including energy-efficient accessibility features and environmentally adaptive interfaces.
Common Evaluation and Certification Framework	Develop measurable criteria, testing protocols, and certification schemes aligned with EU standards, enabling consistent compliance verification.
Degree of Energy Utilization	Define requirements for optimizing energy consumption of accessibility features (e.g., adaptive brightness, intelligent audio activation).
Technical Operations and Monitoring	Introduce lifecycle management requirements, including monitoring, logging, maintenance, and validation of accessibility features post-deployment.

Uncertainty and Risk Quantification	Establish metrics and methodologies to evaluate accessibility performance, usability risks, and uncertainty (e.g., variability in user needs, environmental conditions).
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Conclusion

ISO/IEC 10779:2020 provides a strong foundation for accessibility in office equipment, particularly at the device level, focusing on design and functional requirements. However, when assessed against the predefined areas of interest, gaps emerge in system-level integration, sustainability, certification, and alignment with modern intelligent environments. Addressing these gaps would enable the evolution of the standard toward a holistic, measurable, and future-proof framework, capable of supporting accessibility across devices, buildings, and user contexts within the European regulatory landscape.

Analysis 4

Introduction

ISO 21542:2021 provides internationally recognized requirements and recommendations for accessibility and usability of the built environment, addressing buildings, external areas, and evacuation scenarios.

Gap Analysis

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight	The standard refers to indoor air quality (IAQ) and the pollutants that may be present in the environment, but does not define environmental performance indicators, monitoring mechanisms or sustainability objectives related to accessibility solutions in the built environment.	Prevents integration with EU sustainability frameworks (e.g. Green Deal, EPBD), making it difficult to assess trade-offs between accessibility, materials, energy use, and lifecycle impacts.
Stakeholder Roles	ISO 21542 does not define roles or responsibilities for stakeholder	Creates ambiguity in responsibility allocation during design, construction, operation, and maintenance phases
Ethics and Societal Impact	Standard grounded in the UN Convention on the Rights of Persons with Disabilities but without measurable criteria or impact assessment processes.	Limits the ability to assess social impact,
Regulatory Integration	The standard does not provide guidance on harmonisation with EU or national legislation on accessibility.	Requires additional interpretation or transposition efforts by Member States
Certification framework	ISO 21542 does not provide any attestation of conformity.	Prevents the use of ISO 21542 as a standalone basis for certification

Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design	The document sets out the essential requirements for creating a safe, inclusive, age-friendly and sustainable built environment that is accessible and usable by all. These principles are reinforced by the United Nations 2030 Agenda for Sustainable Development,	Accessibility solutions cannot be assessed in terms of life cycle impact, circularity or resource efficiency.

	in particular the Sustainable Development Goals, but do not include technical requirements or metrics linking accessibility to environmental sustainability.	
Degree of coverage of the building	The standard indicate Audible emergency signals with an output between 60 dB and 80 dB shall be provided to ensure full coverage within the building. Low-output audible signals shall be used for effectiveness.	-
Assistive Technologies for Accessibility	The standard refers to the use of information and communication technologies such as beacons, online support and two-way communication, provided they are in accessible formats to provide sensory information. It also refers to recommendations for emerging technologies related to fire safety.	No applicability identified in forward-looking digital environments and smart buildings.
Primary energy savings for the building	Energy efficiency is outside the scope of the standard.	Limits its usefulness in operational contexts where energy-related recommendations in accessibility is required
Intelligent Systems	The standard refers only to the use of ICT and emerging technologies related to fire safety, such as intelligent fire evacuation management systems, together with technologies such as the Internet of Things (IoT), augmented reality and artificial intelligence (AI).	Lack of recommendations for intelligent systems to dynamically improve accessibility in construction.
Mobility management	Mobility management is addressed in detail in the standard (routes, ramps, lifts).	-

Proposed Standardization Items

A modular structure is proposed to extend the analysed standard into legally enforceable and operationally robust standards, tailored to EU needs and accessibility/mobility risk profiles.

Area	Scope & Description
Accessibility and Sustainable Awareness	Develop measurable indicators that link accessibility solutions to environmental sustainability, life cycle assessment, and climate resilience.
Common evaluation and	Establish certification systems for accessible built environments.

certification framework	
Degree of energy utilization	Integrate accessibility design with energy efficiency and renewable energy considerations in the building.
Technical Operations and Monitoring	Define the requirements for operational monitoring, maintenance, and continuous improvement of accessibility features.
Uncertainty and Risk Quantification	Introduce methods for assessing risk and uncertainty in emergency scenarios.

Analysis 5

Introduction

EN 63080:2017 provides a harmonized set of terms and definitions related to accessibility, aiming to establish a common language for standard writers, policymakers, industry, and other stakeholders. However, due to its purely terminological nature, EN 63080 does not address implementation, governance, technical requirements, or regulatory compliance mechanisms.

Gap Analysis

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight	The standard does not define environmental performance indicators, monitoring mechanisms, or sustainability targets related to accessibility solutions in the built environment.	The standard does not define environmental performance indicators.
Stakeholder Roles	The standard does not define roles or responsibilities for stakeholders	Limits its usefulness in operational contexts where Stakeholder Roles definitions is required
Ethics and Societal Impact	Definitions of inclusive design, universal design, and design for all but not the impact in the society	There is no clear definition of ethical aspects in design
Regulatory Integration	The standard does not establish integration with regulatory frameworks or legislation.	The standard aims to be integrated into future policy, regulatory, and academic documents to ensure consistency with global compatibility and understanding.
Certification framework	IEC itself does not provide any attestation of conformity.	-

Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design	No sustainable or environmental design criteria are established.	Limits applicability in sustainable product, service, or building design processes.

Degree of coverage of the building	The standard does not refer to buildings or construction infrastructure.	Its usefulness is limited in operational contexts where definitions related to accessibility and coverage levels in the building are required.
Assistive Technologies for Accessibility	The standard includes definitions of assistive technology (AT) and definitions of such technologies as audio and spoken captions, audio captioning, audio description, subtitles, and clean audio	Assistive technologies are defined conceptually, without performance, interoperability, or implementation requirements.
Primary energy savings for the building	Energy efficiency are outside the definitions in the standard.	Limits its usefulness in operational contexts where energy-related definitions is required
Intelligent Systems	The intelligent systems covered by the standard are those related to assistive technology (AT).	Missed opportunity to align accessibility terminology with smart and AI-enabled systems.
Mobility management	Mobility is referenced only indirectly through terminology persons with age-related disabilities with reduced mobility	Cannot support integrated mobility or smart city accessibility strategies.

Proposed Standardization Items

A modular structure is proposed to extend the analysed standard into legally enforceable and operationally robust standards, tailored to EU needs and accessibility/mobility risk profiles.

Area	Scope & Description
Accessibility and Sustainable Awareness	Introduce standardised links between accessibility terminology and sustainability, climate resilience and environmental performance.
Common evaluation and certification framework	
Degree of energy utilization	Align accessibility-related terminology with energy efficiency and smart energy management standards.
Technical Operations and Monitoring	Establish accessibility terms in operational requirements for monitoring and technical operations.
Uncertainty and Risk Quantification	Establishes terminology for risk, uncertainty, and degraded operational scenarios related to accessibility.

Analysis 6

Introduction

EN 17210:2021. Accessibility and usability of the built environment - Functional requirements, is intended to describe basic, common minimum functional requirements and recommendations, applicable across the full spectrum of the built environment, for an accessible and usable built environment, following the Design for All/Universal Design principles which will facilitate equitable and safe use for a wide range of users, including persons with disabilities.

The functional accessibility and usability requirements and recommendations described in this standard are relevant to the design, construction, refurbishment, adaptation, and maintenance of built environments including outdoor pedestrian and urban areas.

EN 17210:2021 was developed on the basis of consensus and in close collaboration with relevant stakeholders: ANEC (European Association for the Coordination of Consumer Representation in Standardisation), EDF (European Disability Forum), AGE platform Europe, the European Commission, ENAT (European Network for Accessible Tourism), SBS (Small Business Standards) and ETSA (European Textile Services Association). CEN-CLC/JTC 11 also worked closely with CEN/TC 10 'Lifts, escalators and moving walks.

Gap Analysis

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight	Like many built-environment standards, EN 17210 focuses on the design phase. Real-world feedback shows a high failure rate in the maintenance phase (e.g., accessible routes being blocked by temporary displays or elevators being out of service), which the standard only addresses in a non-mandatory Annex B.	The standard does not define environmental performance indicators.
Stakeholder Roles	Based on the provided search results, the development and implementation of EN 17210:2021 (Accessibility and usability of the built environment) involved collaboration with key stakeholders, including disability organizations (EDF), consumer representatives (ANEC), and industry bodies	Limits its usefulness in operational contexts where Stakeholder Roles definitions are required

Ethics and Societal Impact	N/A	There is no clear definition of ethical aspects or societal impact in accessibility and usability
Regulatory Integration	EN 17210:2021 sets basic, minimum functional requirements and recommendations for the accessibility of the built environment (buildings, pedestrian areas, and urban infrastructure) based on Universal Design principles.	Because EN 17210 is being revised to explicitly provide a presumption of conformity with the EAA, the European Commission is actively preparing its citation in the Official Journal of the European Union (OJEU) as a harmonised standard.
Certification framework	Forum discussions among building auditors highlight that CEN/TR 17622 (Conformity Assessment) is often ignored. This creates a risk where developers claim "alignment" with the standard without undergoing the rigorous verification needed to ensure the accessibility chain is unbroken.	EN 17021:2021 focusing on Universal Design principles. It defines functional requirements to ensure buildings and public spaces are safe and equitable for everyone, including persons with disabilities and older individuals.

Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design	The standard focuses heavily on design and construction, with limited guidance on the operational management and maintenance of these spaces, which are critical for long-term accessibility.	The standard describe basic, common minimum functional requirements and recommendations, applicable across the full spectrum of the built environment, for an accessible and usable built environment, following the Design for All/Universal Design principles which will facilitate equitable and safe use for a wide range of users, including persons with disabilities.
Degree of coverage of the building	The standard does not refer to buildings or construction infrastructure.	Its usefulness is limited in operational contexts where definitions related to accessibility and coverage levels in the building are required.
Assistive Technologies for Accessibility	While it is better than older standards, scientific critiques suggest it still lacks depth regarding neurodiversity (e.g., sensory overload in transit hubs) compared to its robust physical requirements.	Assistive technologies are defined conceptually, without performance, interoperability, or implementation requirements.

Primary energy savings for the building	The standard does not directly target its energy-saving capabilities, but rather its functional, accessibility, and implementation aspects, which indirectly interact with building energy efficiency goals.	Limits its usefulness in operational contexts where energy-related definitions are required
Intelligent Systems	The intelligent systems covered by the standard are those related to assistive technology (AT).	It integrates physical accessibility with intelligent building systems and IoT sensors to create inclusive, navigable spaces for individuals with disabilities.
Mobility management	Real-world feedback shows a high failure rate in the maintenance phase (e.g., accessible routes being blocked by temporary displays or elevators being out of service), which the standard only addresses in a non-mandatory Annex B.	Like many built-environment standards, EN 17210 focuses on the design phase.

Proposed Standardization Items

Area	Scope & Description
Accessibility and Sustainable Awareness	Transition from "passive design" to "active management." Use EN 17161 (Design for All) as a management layer to ensure that the functional accessibility designed under EN 17210 is maintained through staff training and regular facility audits.
Common evaluation and certification framework	Organizations should begin auditing their physical assets against the Annex A (Conformity) of the new draft revision now. The European Accessibility Act (EAA) transition periods are ending, and functional non-compliance will soon carry significant legal and financial penalties.
Degree of energy utilization	N/A
Technical Operations and Monitoring	Real-world feedback shows a high rate of failures during the maintenance phase (e.g. accessible routes blocked by temporary displays or elevators out of service), an aspect addressed by the standard only in a non-mandatory Annex B. Revision of Annex B should be considered
Uncertainty and Risk Quantification	As the main body of EN 17210 contains functional requirements rather than specific figures, this can lead to subjective interpretations. Without using the accompanying Technical Reports (CEN/TR), architects may inadvertently design spaces that are "compliant" but physically unusable. Greater rigour in the functional requirements is desirable for the next edition.

Analysis 7

Introduction

pr17210 Accessibility and usability of the built environment - Requirements and recommendations, describes functional requirements and recommendations for an accessible and usable built environment, following a "Universal Design"/"Design for All" approach which will facilitate equitable and safe use for a wide range of users, including persons with disabilities. This document also describes performance requirements as applicable for an accessible and usable built environment.

The requirements and recommendations given in this document are applicable across the full spectrum of the built environment.

These requirements and recommendations for an accessible and usable built environment are relevant to design, construction, refurbishment or adaptation, and maintenance, including outdoor pedestrian and urban areas.

The pr17210 will be published in the autumn of 2027.

Gap Analysis

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight	No gap. The standard is increasingly connecting accessibility with the sustainability of the built environment, ensuring that accessible designs are also resource-efficient and sustainable.	The standard integrates accessibility with the environment by establishing Design for All (Universal Design) principles. It requires physical spaces and outdoor areas to be safe and inclusive, while demanding that environmental conditions (acoustics, lighting, air quality) support independent use
Stakeholder Roles	No gap. The stakeholder's role is increase	The new prEN 17210 establishes universal design principles for an accessible, safe, and usable built environment. It ensures equitable access for individuals with disabilities and older people. Stakeholders, including user advocacy groups and industry bodies, play a critical role in its ongoing harmonization
Ethics and Societal Impact	No gap. The most significant finding in the 2025/2026 draft is the addition of Annex A. While the main body remains "functional"	It promotes the principle of "Design for All," ensuring spaces are equitable and safe

	(describing outcomes), Annex A contains specific technical values (dimensions, clear widths, contrast ratios). This is designed to give service providers legal certainty when being audited for EAA compliance.	for everyone, including the aging European population, families with strollers, and those with temporary injuries
Regulatory Integration	Technical forums highlight that prEN 17210 values sometimes conflict with national building codes (e.g., German DIN or French NF standards). This creates a "Regulatory Collision" where a building might be accessible by EU standards but technically non-compliant with local safety or heritage laws.	It is highly related to ISO 21542, but its main body contains functional requirements instead of values. That approach does not change much in relation to its main body, but as the European Commission intends to cite the document in the Official Journal of the European Union (OJEU), which will make EN 17210 a harmonized standard, it is important to ensure that the requirements that provide presumption of conformity with the EAA are objectively verifiable.
Certification framework	The standard, supported by CEN/TR 17621 (technical performance criteria) and CEN/TR 17622 (conformity assessment), is set to be used more extensively as a requirement for awarding public contracts. Future, more rigorous assessment methods (perhaps moving toward third-party certification) are being developed to measure compliance with these standards.	

Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design	N/A	The standard describe basic, common minimum functional requirements and recommendations, applicable across the full spectrum of the built environment, for an accessible and usable built environment, following the Design for All/Universal Design principles which will facilitate equitable and safe use for a wide range of users, including persons with disabilities.
Degree of coverage of the building	The standard does not refer to buildings or construction infrastructure.	Its usefulness is limited in operational contexts where definitions related to accessibility and coverage levels in the building are required.
Assistive Technologies for Accessibility	The standard does not yet sufficiently address the integration of IoT and smart-building features (like automated doors triggered by disability-ID beacons) which are essential for true modern accessibility.	Assistive technologies are defined conceptually, without performance, interoperability, or implementation requirements.

Primary energy savings for the building	No gap. Future revisions will better align with the Energy Performance of Buildings Directive (EPBD), ensuring that building renovations for energy efficiency also improve accessibility.	While prEN 17210 focuses purely on making buildings safe, functional, and barrier-free for individuals with disabilities, its principles must be implemented in tandem with European energy-saving regulations. The relationship between these two areas centers on how they interact during building renovations
Intelligent Systems	No gap. Future developments aim to blend physical accessibility with digital, "intelligent" systems (e.g., smart buildings, navigation, and automated vehicle services) to enhance the independence of people with disabilities.	It integrates physical accessibility with intelligent building systems and IoT sensors to create inclusive, navigable spaces for individuals with disabilities.
Mobility management	No gap. Future updates emphasize that accessibility is not just for initial construction, but for ongoing management, maintenance, and regular audits of built environments.	Like many built-environment standards, prEN 17210 focuses on the design phase.

Proposed Standardization Items

Area	Scope & Description
Accessibility and Sustainable Awareness	N/A
Common evaluation and certification framework	The most significant finding in the 2025/2026 draft is the addition of Annex A. While the main body remains "functional" (describing outcomes), Annex A contains specific technical values (dimensions, clear widths, contrast ratios). This is designed to give service providers legal certainty when being audited for EAA compliance.
Degree of energy utilization	N/A
Technical Operations and Monitoring	It lacks enforceable requirements for the real-time operational state of accessibility (e.g., ensuring an elevator remains working or that braille signs aren't painted over during renovations).
Uncertainty and Risk Quantification	A concern could be in relation with the "Functional Main Body" and a "Technical Annex A," developers might cherry-pick requirements. There is a risk that "Functional" requirements will be treated as optional "fluff" while the "Technical" Annex becomes a minimum-effort checkbox.

Conclusions

Until the final 2027 publication, organizations should design to the Draft Annex A values. These are almost certain to be the legal baseline for EAA compliance, and designing to lower 2021 values now will lead to "compliance debt" and expensive retrofits next year.

Because the EAA links the built environment to the service provided, the future implementation of prEN 17210 alongside EN 17161. This ensures that staff behavior and digital check-in systems match the physical accessibility of the building.

Organizations should actively participate in their National Standard Bodies or to influence the final resolution of comments.

Analysis 8

Introduction

ISO/IEC 29138-3:2022 provides a structured methodology for "User Needs Mapping." It bridges the gap between the high-level needs of diverse users (defined in ISO/IEC 29138-1) and the specific technical provisions in standards like WCAG or EN 301 549.

This document provides guidance on the mapping of a set of user accessibility needs with the provisions of a particular standard, technical report, or set of guidelines. It provides both basic guidance that should be used for all user accessibility needs mapping and optional guidance that may be added to the basic guidance.

User accessibility needs mapping is intended to help improve accessibility for all users and, in particular, for users with special needs that can be overlooked. User accessibility needs mapping is not intended to be used to evaluate or certify a given standard or set of guidelines.

Gap Analysis

Governance and System-Level Gaps

Area	Gap	Technical/Operational Impact
Environmental Oversight	N/A	Is an information technology standard that provides requirements and recommendations for mapping user accessibility needs to specific guidelines, reports, and standards.
Stakeholder Roles	A single technical requirement might serve five different user needs, while one user need might require ten different technical fixes. This complexity can lead to "mapping fatigue" where developers over-simplify the matrix to save time.	The document focuses on accessibility needs mapping ICT. The standard defines key stakeholder roles responsible for identifying, implementing, and reporting user accessibility requirements to ensure software and digital systems are inclusive.
Ethics and Societal Impact	The standard encourages the investigation and assessment of ethical and social concerns regarding user interfaces, ensuring that technology serves a broad population and promotes equality.	The standard explicitly contributes to the UN's Sustainable Development Goal 10 (Reduced Inequalities) by ensuring that technology does not overlook users with special needs or disabilities

Regulatory Integration	A completed ISO/IEC 29138-3 map is not a certification of accessibility. It is a planning and documentation tool.	European Union regulations mandate that products and services are accessible to people with disabilities. Organizations use ISO/IEC 29138-3:2022 to connect these legal mandates to their specific technical requirements.
Certification framework	ISO/IEC 29138-3:2022 is not intended to be used to evaluate or certify a given standard or set of guidelines.	ISO/IEC 29138-3:2022 is an advisory and reference standard rather than a specification or management system standard.

Technical and Engineering Gaps

Area	Gap	Technical/Operational Impact
Sustainable Design	N/A	The document focuses specifically on User Interface Accessibility rather than environmental or product design. It provides a standardized methodology for mapping specific user accessibility needs to exist technical standards and guidelines
Degree of coverage of the building	The standard does not refer to buildings or construction infrastructure.	The document does not directly contain structural specifications for physical buildings
Assistive Technologies for Accessibility	The standard does not provide enough guidance on "Dynamic Mapping"—how to update your needs-map when the underlying software or user expectations shift.	Provides guidance on mapping user accessibility needs to the provisions of specific standards, technical reports, or guidelines. It outlines requirements for identifying, recording, and reporting on how well technology addresses these needs.
Primary energy savings for the building	N/A	The document does not addressed energy savings
Intelligent Systems	While primarily ICT-focused, the mapping methodology is designed to be "domain-agnostic," making it useful for office equipment, built environments, and public kiosks.	The document outlines requirements and recommendations for mapping user accessibility needs to technical standards and guidelines. It ensures that intelligent and ICT systems account for diverse user abilities—particularly those of older individuals and people with disabilities.
Mobility management	N/A	-

Proposed Standardization Items

Area	Scope & Description
Accessibility and Sustainable Awareness	N/A. It provides a standardized framework for developers to ensure specific accessibility requirements are accounted for in products, software, and services.
Common evaluation and certification framework	N/A
Degree of energy utilization	N/A
Technical Operations and Monitoring	By mapping user needs to a target standard, developers should see which needs are "unsupported" by current technical rules, allowing for proactive, custom accessibility solutions.
Uncertainty and Risk Quantification	A single technical requirement might serve five different user needs, while one user need might require ten different technical fixes. This complexity can lead to "mapping fatigue" where developers over-simplify the matrix to save time with low results.

Conclusions

It is better to use the document during the Requirements Gathering phase and not wait until a product is finished. Use it to ensure that the "Definition of Done" includes all relevant user needs.

The mapping matrix could be used as a communication tool between User, Researchers (who identify the needs) and Software Engineers (who implement the fixes). It provides a common language that validates the work of both teams.

Since the standard is "not intended to judge a standard" (Clause 1), always validate your ISO 29138-3 map with real-world usability testing. A technical mapping proves intent; user testing proves impact.

For large-scale projects, it is better to invest in Requirements Management Software that can ingest the ISO 29138-1 needs list and link them to your JIRA or GitHub tickets. Manual spreadsheets for this standard are a high-risk for error.

Enhancing Accessibility and Sustainability in Smart Cities and Smart Buildings: The Universal Accessibility Suite Initiative



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