EDU4 Standards.eu

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Intended Learning Outcomes (ILOs) for Standardisation Education

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D2.1 – Intended Learning Outcomes (ILOs) for Standardisation Education

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Table of Abbreviations

AI HLEG	the High-Level Expert Group on Artificial Intelligence
Cedefop	the European Centre for the Development of Vocational Training
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
DigComp	the Digital Competence Framework for Citizens
EC	European Commission
ECJ	European Court of Justice
EDU4Standards.eu	Education for Standardisation in the EU
EQF	European Qualifications Framework for Lifelong Learning
EU	European Union
EURAS	European Academy on Standardisation
GreenComp	the European Sustainability Competence Framework
HFDT	Human Factor in Digital Transformation
ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
ILOs	Intended Learning Outcomes
ISCED	International Standard Classification of Education
ISO	the International Organization for Standardization
ITCoS	Innovative Teaching Concept for standardisation
IWA	International Workshop Agreement
NA	the New Approach
NGOs	Non-governmental organisation
NLF	New Legislative Framework
OJ	Official Journal
SDGs	Sustainable Development Goals
SDOs	Standards development organisations
SMEs	Small and medium-sized enterprises
TBT	Technical Barriers to Trade
TEU	Treaty of the European Union
UNESCO	the United Nations Educational, Scientific and Cultural Organization
VET	Vocational Education and Training
VSD	Value sensitive design
WTO	World Trade Organisation

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Executive summary

This deliverable is prepared as part of the EDU4Standards.eu project, WP2 *Design teaching concepts of standardisation*. The objective of this WP is to design an innovative teaching concept for standardisation (ITCoS) that will incorporate industrial and societal facets together with aspects of responsible, human-centric standardisation and the EU core values into standards-development processes.

As part of this deliverable, a value-based Intended Learning Outcomes (ILOs) framework for standardisation education, also called EDU4Standards.eu value-based ILOs framework, is developed. This framework is an important part of the development of the Innovative Teaching Concept for Standardisation (ITCoS) in T2.3 *Produce the innovative teaching concept* and the implementation of the pilots in WP3 *Implementation*. It addresses the issue of fragmented standardisation education by providing a comprehensive structure and guidance on ILOs and levels of qualification and demonstrating how values can be integrated into standardisation education.

The development of the ILOs framework is based on an analysis of standardisation documents, a literature review on values and expert talks. It builds on the European Qualifications Framework for Lifelong Learning (EQF), the International Standard Classification of Education (ISCED) and Bloom's taxonomy as well as considers WTO's principles and the IWAs 30. The framework distinguishes nine levels of qualification that are matched with nine levels of formal education, ranging from Level 0 (Early Childhood Education) and extending up to Level 8 (Doctoral level), for which ILOs are defined. At the same time, the framework covers levels of qualifications attained outside of the formal educational system. This structure will facilitate the connection between the ILOs and the pilots in WP3.

In defining the ILOs, existing work on standardisation education was consulted and complemented with a value-based approach to explicitly include value considerations at each level.

The EDU4Standards.eu value-based ILOs framework consists of three parts: a general value-based ILOs framework for standardisation education, an ILOs framework focusing explicitly on values, i.e. European values, and an ILOs framework incorporating green, digital and gender skills.

The EDU4Standards.eu value-based ILOs framework should assist lecturers on standardisation in designing their value-based standardisation courses. It should also be used as guidance to support the design and development of value-based standardisation curricula to be integrated systematically in educational systems and national education strategies. The primary stakeholders of the framework are lecturers and learners in standardisation, but other stakeholders such as standardisation bodies, industry, NGOs and research organisations, SMEs and citizens, can also benefit from it.

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Introduction

The EDU4Standards.eu project has the overall objective to innovate standardisation education within European Higher Education Institutes. It addresses this objective through five key strategic objectives, one of which is the development and piloting of an innovative teaching concept for standardisation (ITCoS). The ITCoS represents a hierarchical model for curricula development of education on standardisation and an implementation guide and follows a human-centric and EU-values focused approach. D2.1 contributes to the development of the ITCoS by providing a value-based ILOs framework for standardisation education, also called EDU4Standards.eu value-based ILOs framework. The EDU4Standards.eu ILOs framework addresses the issue of fragmented standardisation education by providing a clear structure and guidance on ILOs and levels of qualification and defining the knowledge and skills of future standards professionals. It also shows how values can be integrated into standardisation education. This is in line with the actions set out in the EU legislation (details in Appendix 1) as well as the EU Standardisation Strategy to develop standards that promote EU values and interests: “The special status of the European standardisation organisations comes with responsibilities. More than ever, standards do not only have to deal with technical components, but also incorporate core EU democratic values and interests, as well as green and social principles” (EU Strategy on Standardisation, COM(2022) 31 final).

The document is structured as follows. The first chapter begins with a brief explanation of values and what it means to make values an integral part of standardisation (both of standards creation and standardisation processes) and standardisation education. The second chapter presents the development of the EDU4Standards.eu value-based ILOs framework. The methodology, the pillars, the approach, the parts, the stakeholders, terminology and core values are discussed in more detail. The third chapter presents the EDU4Standards.eu value-based ILOs framework. The fourth chapter provides guidance on how to use the framework. The fifth chapter is the conclusion. The document concludes with two appendices. Appendix 1 discusses the interrelation between legislation and standardisation. Appendix 2 includes a glossary of terms used in T2.1.

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1. Values

This chapter has a threefold goal:

- To elucidate the concept of values from a philosophical perspective.
- To raise awareness of the importance of explicitly considering a wider range of values in standardisation processes and standards development.
- To demonstrate how values, as abstract concepts, can be made an integral part of standardisation education.

1.1. Values in general

Values can be understood as standards of orientation or guiding principles by which our actions are directed (Höffe 2008). Values have always been at the centre of ethical discourse in European traditions: the good life, virtue, moral responsibility, duty. Before the modern concept of a value was coined in connection with the mercantile notion of a value, there had been quite some concepts that are connected to the very core of a value. They go back to ancient Greek virtue ethics on the one hand, and to modern forms of ethics on the other: "How should I live?" (Williams, 2011) and "What is the action I have to choose?" in the rationalist modern philosophies of deontology and utilitarianism. Deontological thinking is related to Kant's idea of the moral imperative that tells us what to do no matter what the consequences are. Utilitarianism, going back to Jeremy Bentham and John Stuart Mill, tells us which action is the best one in light of the consequences for all stakeholders.

When we discuss values on an individual and personal level, we ask for what a person values, what is really important to her and what makes her the person she is. At this individual level, we consider the person's own intuitions (Moore, 1993) and the privileged access she has to them. Values on the individual level are highly personal (private and even idiosyncratic) in their nature and often are shared in small groups. The more values are shared with another person, the closer they are. It is important to keep this dimension of values in mind when we turn to policymaking since it is these values that motivate people.

Values can be understood also on a societal level. They have to be discussed and agreed upon in a given society by everyone and also between societies.

The universal values theory maintains the position that there are universal values (Schwartz 2009). Schwartz identifies ten broad personal values that are universal. These include self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence and universalism. He argues that these

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values can be considered universal since they help humans deal with the three requirements of existence: needs of individuals as biological organisms, requisites of coordinated social interaction and survival and welfare need of groups.

In a different view, values construe a shared societal worldview. In this view three levels of values are differentiated: instrumental values, pragmatic values, and moral values (Höffe, 2008). On the first, lowest level, are the instrumental values. Instrumental values are not good in themselves and need motivation from the next level. They shape behaviour when it comes to reaching goals in one's life: "if you want to be rich, you must spend less than you earn" is one typical formulation. These instrumental values are extrinsic and need a moral reason in order to be good. On the second level are the pragmatic values. Pragmatic values rule the going-ons in a society and keep a society together (Joas, 2001). Even without referring to moral values all the time, values on the pragmatic level are to be understood as standards of orientation for one´s actions and underlying maxims. The third level make up the moral values. The European values, human dignity, freedom, equality, democracy and the rule of law, set out in Article 2 of the TEU are moral values, which means that they are intrinsic, pursued for their own sake and can be understood without referring to even more general values. A similar set of intrinsic values can be found in the constitutions of modern societies.

1.2. Values in standardisation

"Standards are technical specifications defining requirements for products, production processes, services or test-methods" (European Commission n.d.). Standards can support the integration of values into the design, development and implementation of technologies. At the same time, the inclusion of (moral) values and value considerations in the standardisation process can make standards and the field of standardisation more responsible and human-centred. The relationship between values and standards has led to the coining of the term "value-based standardisation". Value-based standardisation takes into account moral values throughout the whole standardisation process. This means the inclusion of value-based requirements in the technical requirements of a standard (the actual writing of the standard) and also the inclusion of value considerations in the whole standard-development process such as inception-conception-drafting-approval phases (see Abdelkafi et al. 2021), but also decision-making, consensus building, adoption, implementation.

Integrating values into standardisation is not new. Values have always been part of the traditional technical field of standardisation. Safety, security, or efficiency are some of the values that have prevailed in standards documents over the years. However, with the increasing complexity of technology, there has been a wind of change and a need to reconsider a wider range of values. An example of a set of values that have shaped the

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EU policy level and can be used as a starting point for value discussions in the field of standardisation are the European values as listed in Article 2 of the Treaty on European Union, such as human dignity, freedom, equality, democracy and the rule of law. These European values have a long tradition and form the basis of many EU documents. Another example are the World Trade Organisation's (WTO) principles. In 2000, the Technical Barriers to Trade (TBT) Committee of the World Trade Organisation (WTO) established six principles for the development of international standards. These include transparency, openness, impartiality and consensus, effectiveness and relevance, coherence and development dimension. The goal of these principles is to serve as a guide in the development of international standards. Even though they focus more on the process itself rather than on the content of the standard and how values can be integrated into the technical specifications of standards, the WTO's principles still play an important role in global trade.[1] Similarly, the HSbooster.eu and StandICT.eu report "Human Rights and ICT Standardisation" discusses how human rights are and should be integrated into the technical specifications of ICT standardisation (Bedoya et al. 2024).

1.3. Values in standardisation education

An important aspect of pursuing the idea of a responsible and value-based standardisation (Wiarda et al. 2022; Meijer et al. 2023) is raising awareness of the importance of values in standards development. In that regard, the Council and the Commission have recently reinforced their support by publishing several recommendations specifically aimed at higher education institutions (HEIs), including:

- Recommendation (EU) 2024/774 of 1 March 2024 on a Code of Practice for industry-academia co-creation in knowledge valorisation, C/2024/601 (OJ L, 2024/774, 5.3.2024, ELI: [link](http://data.europa.eu/eli/reco/2024/774/oj))
- Commission Recommendation (EU) 2023/498 of 1 March 2023 on a Code of Practice for standardisation within the European Research Area, C/2023/1320 (OJ L 69, 07/03/2023, p. 63–74)

More broadly, value-based standardisation is recognised as both an economic necessity, as highlighted by the Council in Recommendation (EU) 2022/2415 of 2 December 2022 on guiding principles for knowledge valorisation (ST/14448/2022/INIT, OJ L 317, 09/12/2022, pp. 141–148), and as a societal challenge, underlined in Commission Recommendation (EU) 2024/736 of 1 March 2024 on a Code of Practice for citizen engagement in knowledge valorisation (C/2024/600, OJ L, 2024/736).

[1] For more see: https://www.wto.org/english/tratop_e/tbt_e/principles_standards_tbt_e.htm

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In Austria, the government has also underscored the importance of standardisation through its 2024 Strategy on Standardisation, which calls for the integration of standardisation within the educational system, specifically referencing schools as well as vocational education and training (BMAW 2024).

While education on standardisation has long been recognised as crucial — the European Academy on Standardisation (EURAS), established in 1993, has focused on this area for decades — the current approach aims to build on existing concepts by integrating values and advancing European interests, including competitiveness and growth.

One way to sensitise people about values is by making values an integral part of standardisation education. But how to operationalise very abstract concepts such as values?

Value sensitive design (VSD) is "a theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process" (Friedman, Kahn and Borning 2006). In that sense, it bears relevance also for accounting for values in standards and standardisation. Developed in the 1990s by Batya Friedman and her colleagues, the VSD methodology encompasses three types of investigations:

- Conceptual investigation: it contains a philosophically informed analysis of values. It looks at the affected stakeholders, their values and situations of value conflicts that should be considered in the design process.
- Empirical investigation: it is based on qualitative and quantitative social sciences methods, such as interviews, surveys, or observations. The empirical investigation is interested in the experiences and views of the affected stakeholders by the technology.
- Technical investigation: it focuses on how concrete technical designs can support the values identified in the conceptual investigation (Friedman 1997; Friedman and Kahn 2003; Friedman, Kahn and Borning 2006).

The use of this methodology can help to understand which steps and which aspects need to be considered when breaking down abstract concepts such as values. The VSD methodology can complement another well-known approach in the field of education, the formulation of learning outcomes, i.e. value-based learning outcomes. Learning outcomes are "statements of what an individual should know, understand and/or be able to do at the end of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy" (Council Recommendation 2017). The learning outcomes principle, with its focus on learners and the knowledge and skills they acquire at the end of the learning process, is a vital part of enhancing the quality and relevance of education and training in Europe. Learning outcomes contribute to strengthening the feedback loop (dialogue) between vocational education and training (VET) providers and the labour market

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in the sense that learning outcomes reflect the demands of the market, on the one hand, and the skills and knowledge provided by training institutions, on the other hand (Cedefop 2021). They also serve as a basis for the development of qualifications frameworks, curricula or assessment criteria (Cedefop 2022).

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2. Development of the EDU4Standards.eu value-based ILOs framework for standardisation education

The third chapter outlines the development of the EDU4Standards.eu value-based ILOs framework. It begins with a brief explanation of the methodology. The second and third subchapters discuss the framework's pillars and the approach, while the fourth subchapter introduces its parts. The fifth subchapter elaborates on the stakeholders for whom the framework is intended. The sixth subchapter addresses the core values at the centre of the ILOs framework. Finally, the last subchapter addresses some key terms used throughout the framework.

2.1. The methodology

The methodology for developing the EDU4Standards.eu ILOs framework involved three key steps.

1. **Analysis of relevant studies and documents related to standardisaton:** In the first step, relevant studies and documents on standardisation and standardisation education were analysed, including works by Blind and Drechsler (2017, 2020), Abdelkafi et al. (2021), Mijatovic (2020), IWA 30-1 and IWA 30-2, the ISO Competency framework for standards development professionals (2023), Grillo et al. (2024), de Vries and Veurink (2017), WTO's principles, Bedoya et al. (2024), the European Standardisation Strategy, the DigComp 2.2. (Vuorikari et al. 2022) and the GreenComp (Bianchi et al. 2022). This analysis aimed to understand the current state-of-the-art in standardisation education and identify potential challenges and gaps.
2. **Literature review on values:** The second step involved an academic literature review on values, focusing on how values as abstract constructs can be broken down into concrete elements to be included in the ILOs. Key literature consulted included the AI HLEG Ethics Guidelines for Trustworthy AI (2019) and the AI HLEG Assessment List for Trustworthy Artificial Intelligence (ALTAI) (2020), the Value sensitive design methodology (Friedman and Kahn 2003; Friedman and Hendry 2019; Friedman, Kahn and Borning 2002, 2006), the Sustainable Development Goals (SDGs) (UN), the work by the AI4People Institute (Floridi et al. 2018, Schafer et al. 2024) and the IEEE Code of Ethics (2020).
3. **Talks with experts:** In the third step, talks in various formats were conducted with experts experienced in standardisation education. The goal of the talks was to inquire about the role and range of values explicitly considered and discussed in their teachings. Additional feedback was obtained through discussions and written responses. For example, the experts were asked to align their teaching content on standardisation with the levels of qualification outlined in the EQF and the levels of education in ISCED. Moreover, in the period from January to September 2024, three one-

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day workshops were organised in Graz, Austria, with the internal HFDT-EDU4Standards.eu-Advisory Board[2], more precisely in May, June and September. The aim of the last workshop was to discuss the final draft of the value-based ILOs framework for standardisation education.[3]

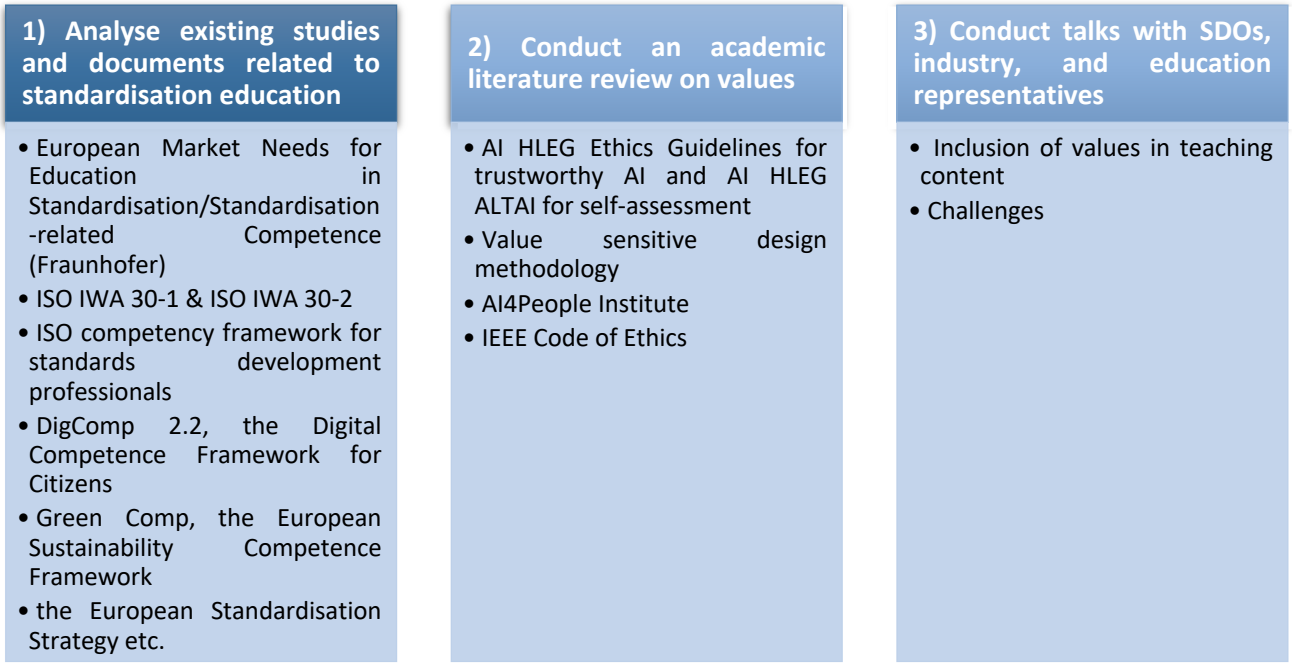

Figure 1: The methodology for developing the EDU4Standards.eu value-based ILOs framework

These steps led to several preliminary insights:

- *Similarities in the content or what is taught as part of standardisation education.*

  There are notable similarities in the topics covered by standardisation lecturers and the expected knowledge and skills in competence models. These include, for example, knowledge of basic terms in standardisation, standards development organisations (SDOs), the standardisation process, the benefits of and needs for standards, standards and regulatory frameworks etc.

[2] HFDT (Human Factor in Digital Transformation) is an interdisciplinary research network at the University of Graz. The HFDT-EDU4Standards.eu-Advisory Board was established to support the work on D2.1.

[3] The workshop consisted of three parts. In the first two-hour session, the ILOs framework was presented by the University of Graz team and discussed with the workshop participants. In the second part of the workshop, the participants delved deeper into the ILOs framework and were asked to provide specific feedback. The third part consisted of an online session, where the University of Graz team reported on and discussed the workshop results with the EDU4Standards.eu partners. The workshop was organised as an internal event, primarily attended by members of the interdisciplinary research network HFDT (Human Factor in Digital Transformation) at the University of Graz. Conducted mostly in German, the event was attended by participants from various backgrounds, including law, philosophy, education, economics, psychology and standardisation. The participants included professors, standardisation experts, PhD students and industry representatives.

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- *Diversity as to when that content is taught, that is, at what level of qualification.*

  Although experts generally cover similar topics in their teachings, diversity can still be observed, particularly regarding the timeline or the levels of education at which those topics are introduced. This underscores the need for a more unified approach to standardisation education.

- *Limited inclusion of a wider range of values in standardisation education.*

  As part of the expert talks, the experts were asked to deliberate on the values they explicitly and intentionally incorporate in the lectures on standardisation. The values that mostly dominated were safety, security, sustainability. When presented with further values[4] that are common in the ethics discourse on values such as transparency, responsibility, autonomy, respect, care, non-discrimination or gender equality, the responses differed. For some of the values such as privacy, responsibility or gender-equality, the experts had a rough idea of what these values stand for and what aspects related to the values can be incorporated in standardisation courses. For other values, such as care, autonomy or trust, the experts had more difficulties to provide an explanation.

  Additionally, the review of the standardisation materials revealed a strong focus on technical aspects in existing competence models and materials such as in Blind and Drechsler (2017, 2020), the ISO Competency framework for standards development professionals (2023) or the IWA 30-1 and IWA 30-2. Interestingly, the two IWAs as well as the ISO Competency framework apart from the usual categories such as knowledge and skills, distinguish the category “attributes” and/or “abilities”, which contain references to values e.g. transparent, non-discriminatory, culturally sensitive, responsible (ISO 2023: 12, 15, 25). Nevertheless, the “attributes” and “abilities” are defined as personal traits or qualities, and no emphasis is made on how to integrate value considerations in standards specifications.

The preliminary insights were an important step toward defining the framework’s pillars, approach and its parts, which are detailed in the next subchapters.

[4] For the sake of the expert talks, the team prepared a list of 13 values that should be considered in standardisation processes and standardisation education and discussed these values with the experts. The list included the following values: non-discrimination, fairness, gender equality, sustainability, responsibility, autonomy, privacy and data protection, respect, care, transparency, protection (safety and security), trust and trustworthiness.

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2.2. The pillars of the EDU4Standards.eu value-based ILOs framework

The development of the EDU4Standards.eu value-based ILOs framework is built upon four main pillars:

- existing work on standardisation such as handbooks, competence models and other resources and content
- the European Qualifications Framework for Lifelong Learning (EQF), the International Standard Classification of Education (ISCED) and Bloom's Taxonomy
- Article 2 of the Treaty on European Union, where the European values upon which the EU is based are explicitly mentioned and the European interests as pinpointed by the priorities of the European Commission
- Cedefop materials (the European Centre for the Development of Vocational Training).

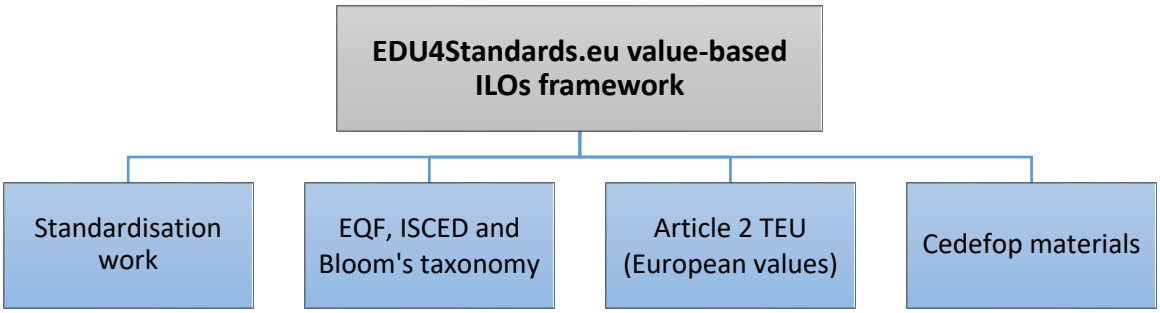

Figure 2: The pillars of the EDU4Standards.eu value-based ILOs framework

In addition to these four pillars, existing competence frameworks outside of the field of standardisation were also consulted, such as DigComp 2.2 - The Digital Competence Framework for and GreenCom - The European sustainability competence framework.

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2.3. The approach to developing the EDU4Standards.eu value-based ILOs framework

The approach to developing the EDU4Standards.eu value-based ILOs framework consists of three key steps:

1. Determine the basis of the framework.
2. Determine the structure and the levels.
3. Define ILOs for each level.

1. Determine the basis of the framework.

In the first step, three well-known frameworks were chosen upon which to build the ILOs framework: the European Qualifications Framework for Lifelong Learning (EQF), the International Standard Classification of Education (ISCED) and Bloom's Taxonomy.

- **The European Qualifications Framework (EQF)**

  The European Qualifications Framework is a reference framework developed by the EU. It serves as a translation tool to help compare and better understand different national qualifications frameworks in Europe. In this way, the EQF can facilitate cross-border mobility of learners and workers, promote lifelong learning and professional development throughout Europe. It is a learning outcomes-based framework consisting of eight levels, from level 1 to level 8, that describe the knowledge, skills, and responsibility and autonomy required at each level, ranging from basic knowledge and skills to the most advanced.

  Within the EQF knowledge is understood as theoretical and/or factual. Skills are cognitive (including logical, intuitive and creative thinking) and practical (including manual dexterity and using methods, materials, tools and instruments). Responsibility and autonomy refer to the ability of the learner to apply knowledge and skills autonomously and responsibly. (Europass, n.d.)

  The EQF was established in 2008 and later revised in 2017. The legal basis of the EQF is the Recommendation on the European qualifications framework for lifelong learning from 2008 (2008/C 111/01).

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Level 1 - learning outcomes

Knowledge	Skills	Responsibility and autonomy
Basic general knowledge	Basic skills required to carry out simple tasks	Work or study under direct supervision in a structured context

Level 2 - learning outcomes

Knowledge	Skills	Responsibility and autonomy
Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	Work or study under supervision with some autonomy

Level 3 - learning outcome

Knowledge	Skills	Responsibility and autonomy
Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems

Level 4 - learning outcomes

Knowledge	Skills	Responsibility and autonomy
Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities

Level 5 - learning outcomes

Knowledge	Skills	Responsibility and autonomy
Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others

Level 6 - learning outcomes

Knowledge	Skills	Responsibility and autonomy
Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups

Level 7 - learning outcomes

Knowledge	Skills	Responsibility and autonomy
Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research Critical awareness of knowledge issues in a field and at the interface between different fields	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams

Level 8 - learning outcomes

Knowledge	Skills	Responsibility and autonomy
Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research

Figure 3: The European Qualifications Framework for Lifelong Learning (Image: Europass, EU)

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- **The International Standard Classification of Education (ISCED)**

  The International Standard Classification of Education (ISCED) is a classification framework developed by UNESCO in the 1970s and last revised in 2011. It focuses on organising education programmes and qualifications by education levels and fields. It uses internationally recognised concepts and definitions. There are nine education levels covered by ISCED, from level 0 to level 8. The scope of ISCED is both formal and non-formal education programmes (short courses, workshops or seminars). Similar to the EQF, ISCED is also used as a tool to compare educational aspects across countries more easily and understandably. ISCED differs from the EQF in that it is applied for statistical purposes, that is, to categorise and report education statistics nationally and internationally, such as participation, entrants, graduates and educational enrolment (UNESCO-UIS 2012).

ISCED Levels of education, age of entry and duration		
ISCED 0	Early childhood education	age 0/3 to 3/6
ISCED 1	Primary education	age 5/7 to 10/12
ISCED 2	Lower secondary education	age 10/13 to 14/16
ISCED 3	Upper secondary education	age 14/16 to 17/18
ISCED 4	Post-secondary non-tertiary education	
ISCED 5	Short-cycle tertiary education	
ISCED 6	Bachelor's or equivalent level	
ISCED 7	Master's or equivalent level	
ISCED 8	Doctoral or equivalent level	

Table 1: ISCED Levels (UNESCO-UIS 2012)

- **Bloom's taxonomy**

  Bloom's taxonomy is a framework for categorising educational objectives to support the communication between educators regarding examining and curricula development. It was developed by Benjamin Bloom, an American educator, and his collaborators in 1956 in *Taxonomy of Educational Objectives* (Bloom et al. 1956). The taxonomy consists of six categories: *Knowledge, Comprehension, Application, Analysis, Synthesis* and *Evaluation*.

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In 2001 the taxonomy was revised by Anderson et al. in *A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives* (2001). The revised version of the framework is two-dimensional, compared to the one-dimensional original framework. It contains the dimensions cognitive process and knowledge. The cognitive process dimension consists of six categories: *Remember, Understand, Apply, Analyse, Evaluate* and *Create*, which rise in cognitive complexity. The knowledge dimension consists of four categories: *Factual, Conceptual, Procedural* and *Metacognitive*, starting from concrete to more abstract knowledge.

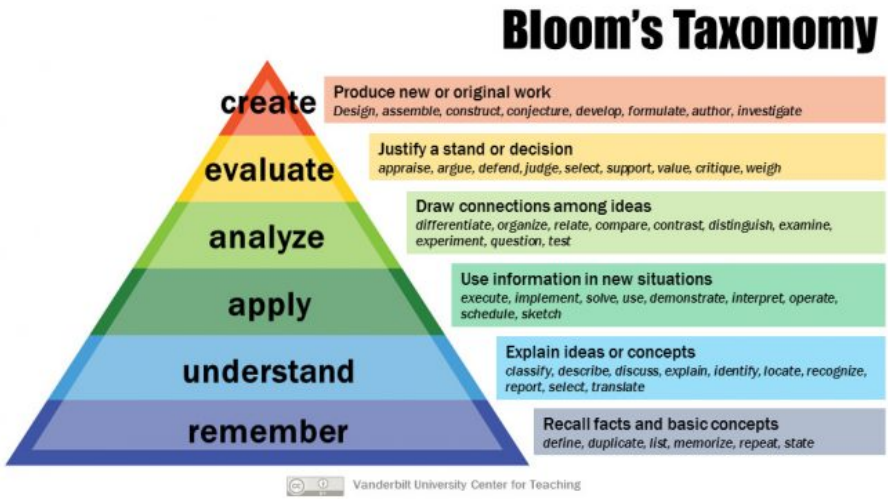

Figure 4: Bloom's taxonomy (Image: Vanderbilt University Center for Teaching n.d.)

2. Determine the structure and the levels of the EDU4Standards.eu value-based ILOs framework.

In the second step, based on the EQF, ISCED and Bloom's framework, the structure and different levels of qualification of the EDU4Standards.eu value-based ILOs framework were determined.

Merging values and standardisation in education is a complex process. Therefore, the EDU4Standards.eu value-based ILOs framework builds on the following elements of the three frameworks:

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EQF	ISCED	Bloom's framework
Focuses on learning outcomes, what learners knows, are able to do after obtaining a qualification	Distinguishes nine levels of education and the focus is on the different stages of the education journey	The six categories are based on active verbs such as remember, understand, apply, analyse, etc., that are used in the formulation of learning outcomes.
The learning outcomes can be matched with educational levels	Age bound	Contains a knowledge dimension
Levels of qualification to facilitate comparability across countries	Uses a well-defined terminology for the different levels	Follows the same logic of rising in cognitive complexity, starting from simpler to more complex cognitive skills.

Table 2: EDU4Standards.eu value-based framework, EQF, ISCED and Bloom's framework

These are the main characteristics of the EDU4Standards.eu value-based ILOs framework:

- The EDU4Standards.eu value-based ILOs framework is a learning outcomes-based. Learning outcomes are defined in terms of knowledge, skills, responsibility and autonomy.
- It consists of nine levels of qualification that are matched with the nine levels of the education system.
- The levels of qualification focus on the knowledge and skills that are attained, whereas the levels of education indicate the stage of learning in the education system. By combining them, the EDU4Standards.eu value-based ILOs framework shows after the completion of what stage of the education system what qualification in standardisation can be gained. Here the relevance of EQF and ISCED becomes evident.
- At the same time, the EDU4Standards.eu value-based ILOs framework follows the same pattern in rising of cognitive complexity as in Bloom's framework.
- Age range is included for each of the levels of education.[5]
- The framework starts with L0 (Early childhood education). The goal is to argue that learning about values starts at a very early age, hence learning about values in standardisation should also start at that age. First as an implicit knowledge of value, brought to us by parents, family, friends, which then transforms into explicit knowledge as part of formal settings. This is in line with Kohlberg's theory on moral development (Kohlberg 1981). Moral development is considered to be the process of being able to make a distinction between what is morally right and morally wrong. According to Kohlberg's theory, moral development takes place in six stages throughout a person's life, with the first stage starting at the age 0.

[5] The age ranges listed for each level are an approximate age of entry and duration as suggested by ISCED.

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- The EDU4Standards.eu value-based ILOs framework is designed to also cover levels of qualifications attained outside of the formal educational system where age does not play a central role (as it does in levels of education). This makes it possible to incorporate life-long learning, also including in-company training and practitioners of standardisation who have no formal education.
- By merging elements from both EQF and ISCED, the EDU4Standards.eu ILOs framework can be implemented in the education system, and can be as well applied at any time, regardless of age or educational system, in any course on standardisation.

The EDU4Standards.eu value-based ILOs framework		
Levels of qualification	**Levels of formal education, age entry and duration**	**Non-formal education (ex. in-company training)**
Level 0	**Early childhood education** age 0/3 to 3/6	Not age-bound, qualifications matter
Level 1	**Primary education** age 5/7 to 10/12	
Level 2	**Lower secondary education** age 10/13 to 14/16	
Level 3	**Upper secondary education** age 14/16 to 17/18	
Level 4	**Post-secondary non-tertiary education** ca. age 18-20	
Level 5	**Short-cycle tertiary education**	
Level 6	**Bachelor's level**	
Level 7	**Master's level**	
Level 8	**Doctoral level**	

Table 3: The structure and the levels of the EDU4Standards.eu value-based ILOs framework

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3. Define ILOs for each level.

In the third step, for each of the levels of qualifications, a set of ILOs were defined. Having a structure like this will facilitate the connection between the ILOs and the pilots to be launched in WP3 *Implementation*.

When defining the ILOs, the following approach was used:

- For defining the ILOs relevant work on standardisation education was consulted, such as Blind and Drechsler 2017 and 2020, Abdelkafi et al. 2021, Mijatovic 2020, IWA 30-1 and IWA 30-2, the European Standardisation Strategy, the ISO Competency framework for standards development professionals (2023), Grillo et al. (2024), de Vries and Veurink (2017), Bedoya et al. (2024).
- The existing work on standardisation education was complemented with a value-based approach. For the ILOs for each of the levels, value considerations were explicitly included.
- Existing materials from Cedefop (the European Centre for the Development of Vocational Training) were consulted, in particular on how to write and develop ILOs, such as the European Handbook – Defining, writing and applying learning outcomes (Cedefop 2022).

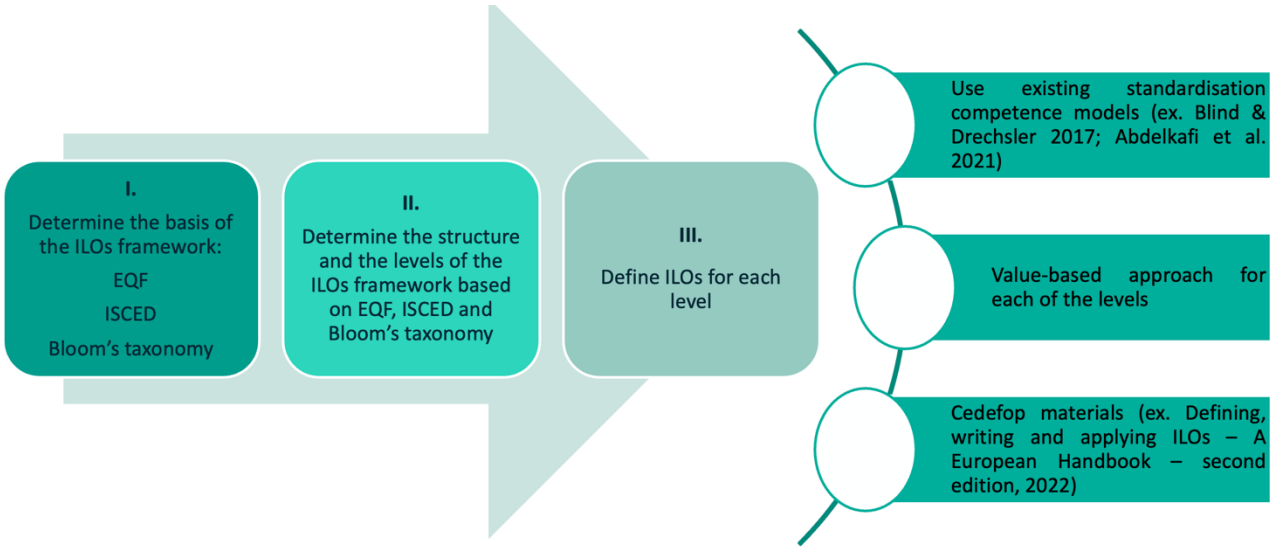

Figure 5: The approach to developing the EDU4Standards.eu value-based ILOs framework

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2.4. The three-part EDU4Standards.eu value-based ILOs framework

The EDU4Standards.eu value-based ILOs framework consists of three parts:

i. The first part represents a general value-based ILOs framework for standardisation education. This framework has a twofold goal:v
   - To address the issue of fragmented standardisation education by providing a framework with a clear structure and guidance on ILOs and levels of qualification.
   - To demonstrate how values in general can be integrated into standardisation education.

   The general framework contains descriptors in the form of generic statements. When applied to a specific discipline and study programme, the generic statements should be tailored accordingly.

ii. The second part represents an ILOs framework focusing on the European values in standardisation education. This framework shows how concrete values can be translated into ILOs for each of the identified levels. For this purpose, the five EU core values human dignity, freedom, equality, democracy and the rule of law as set out in Article 2 of TEU are used as an example.

iii. In the third part, the focus is on green, digital and gender skills in standardisation education. Since green, digital and gender skills take up an important place in the project and are explicitly referred to in EU policy documents e.g. the European Green Deal, the EC's Communication: Shaping Europe's Digital Future, the New Industrial Strategy for Europe etc., in the third part it is shown how they can be formulated throughout all levels.

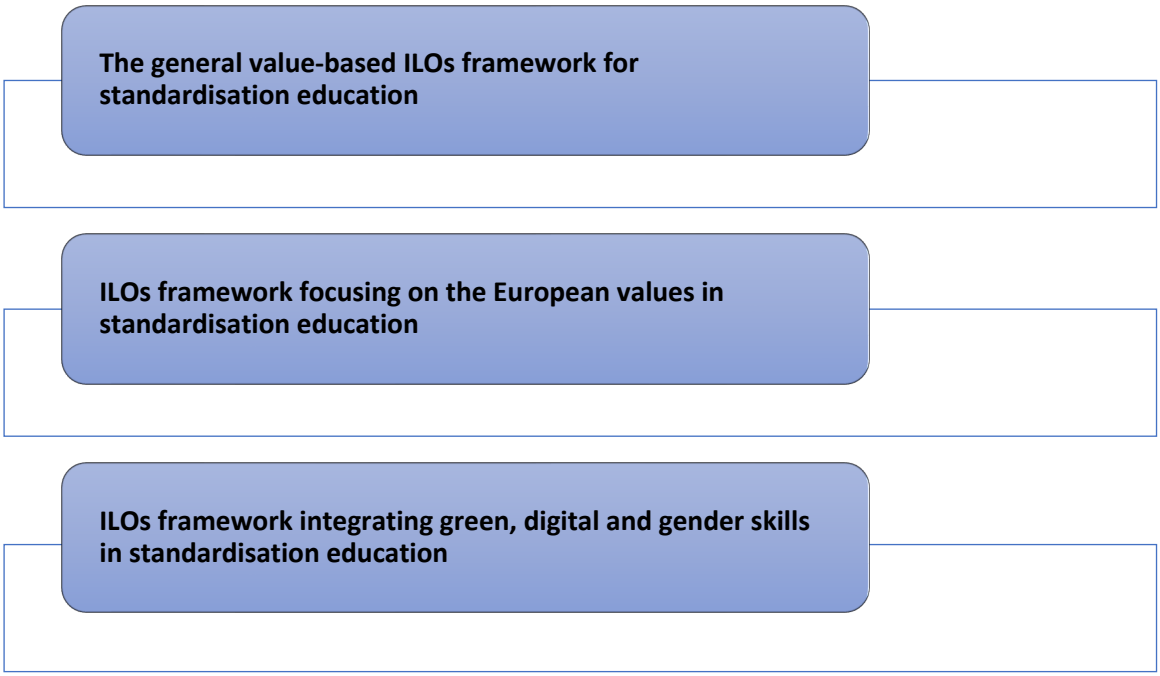

Figure 6: The three-part EDU4Standards.eu value-based ILOs framework

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2.5. The stakeholders

The EDU4Standards.eu value-based ILOs framework is designed for several stakeholders. The primary stakeholders are lecturers of standardisation and learners.

- **Lecturers of standardisation, both experienced and new ones.** It provides a clear structure and guidance on the teaching content on standardisation, adapting it to the different levels of education and qualification. The ILOs are formulated in such a way that they do not restrict lecturers in terms of content and also leave enough room for innovation.
- **Learners.** This group includes two subgroups of stakeholders. The first subgroup are **learners as future standards professionals.** The framework provides a clear structure and guidance on what is expected of learners at the end of a standardisation course or programme in terms of knowledge, skills and responsibility and autonomy, while taking into account the different levels of qualifications. Additionally, through the explicit inclusion of values, it prepares them to recognise and deal more responsibly with any ethical issues and dilemmas that may arise in the standardisation process. The second subgroup are **learners in a broader sense**, which includes those interested to learn about standardisation, who do not necessarily become standards professionals.

Other stakeholders, direct and indirect, can also benefit from the ILOs framework:

- **Standardisation bodies.** The future standards professionals participating in SDOs will be equipped with knowledge and skills not only about standards and standardisation, but also about values and how to incorporate value requirements into standards. This will enable them to respond to any ethical issues and dilemmas that may arise in the standardisation process, thus contributing to responsible standardisation.
- **Industry.** The future standards professionals working for industry will be skilled in developing and implementing value-driven standards that promote innovation in a socially and environmentally responsible way.
- **Research organisations.** According to Recommendation (EU) 2024/774 of 1 March 2024 on a Code of Practice for industry-academia co-creation in knowledge valorisation, C/2024/601 (OJ L, 2024/774, 5.3.2024, ELI: [link](http://data.europa.eu/eli/reco/2024/774/oj)) and Commission Recommendation (EU) 2023/498 of 1 March 2023 on a Code of Practice for standardisation within the European Research Area, C/2023/1320 (OJ L 69, 07/03/2023, p. 63–74), research organisation should actively engage in standardisation. Research organisations should engage researchers who have the knowledge and skills to contribute to the field of responsible and human-centred

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standardisation. This will enable them to participate in projects on the topic of standardisation and standardisation education.

- **NGOs**. According to Annex III of the Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council (Text with EEA relevance)Text with EEA relevance, ELI: http://data.europa.eu/eli/reg/2012/1025/2023-07-09, NGOs, in particular, European organisations representing SMEs, consumers, environmental interests, and social interests, should engage actively in standardisation. NGOs should make use of standards professionals' knowledge and skills of value-based standardisation to advocate for the development of responsible and human-centred standards as well as to participate in SDOs.
- **Public sector**. The public sector can indirectly leverage the expertise of future standards professionals by implementing standards that are EU values-based and take into consideration ethical and societal aspects. In Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC Text with EEA relevance, OJ L 94, 28/03/2014, p. 65–242 eng, the link between standardisation and public procurement, in particular, is emphasised.
- **Citizens**. According to Commission Recommendation (EU) 2024/736 of 1 March 2024 on a Code of Practice for citizen engagement in knowledge valorisation (C/2024/600, OJ L, 2024/736), citizens should participate in the valorisation of knowledge. To do that, they need the knowledge and skills as described in the EDU4Standards.eu value-based ILOs framework.

2.6. Core values

Values are at the heart of the ILOs framework for standardisation education, in particular, the European values as set out in Article 2 of the TEU. As these are the values on which the European Union is founded, they should, therefore, be taken into account in standardisation and standardisation education in Europe, as well as in what Europe can represent on the global scene. *"The Union is founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities. These values are common to the Member States in a society in which*

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pluralism, non-discrimination, tolerance, justice, solidarity and equality between women and men prevail" (Article 2, The Treaty on European Union).

Around the five core values, other values can be grouped. For example, with the core value of human dignity, one could relate values such as respect, care or protection in the sense of safety and security. With the core value of equality, values like non-discrimination can be linked. Or around the core value of freedom, values such as autonomy or privacy can be grouped. These additional values are considered central to ethical discourses.

The following figure provides examples of values that can be grouped around the five core values.

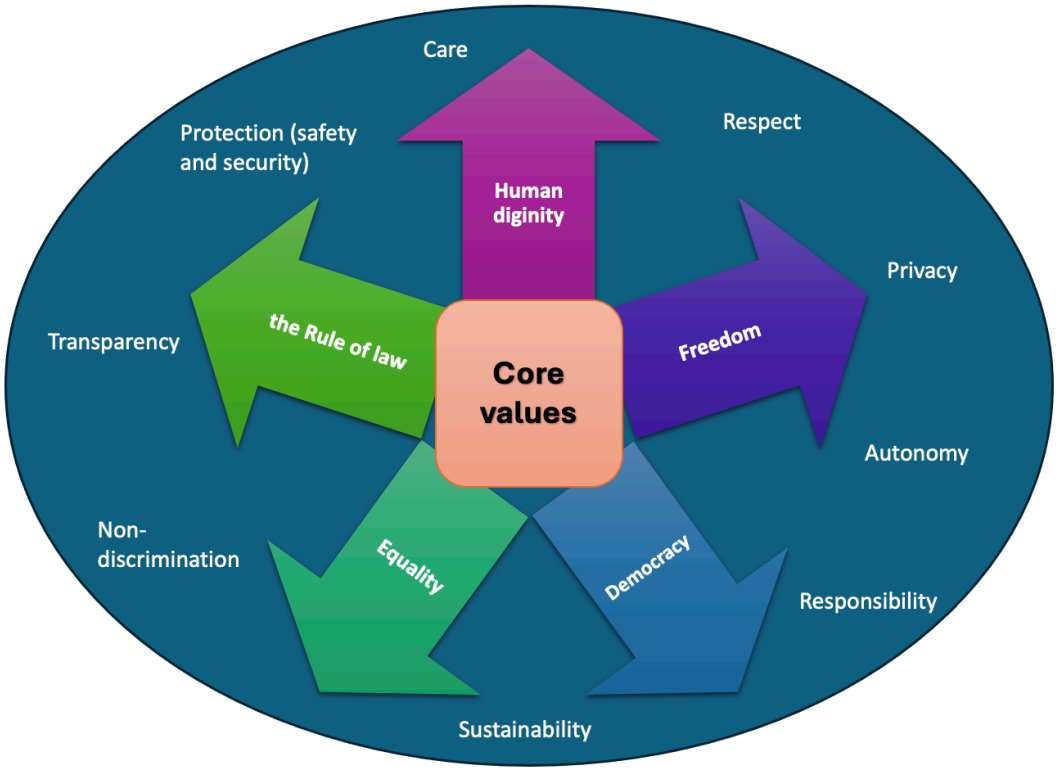

Figure 7: The five EU core values and examples of values groups (Authors' own figure)

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2.7. The terminology

An important part of the development of the EDU4Standards.eu value-based ILOs framework was to establish the terminology to be used. For this purpose, well-established definitions and sources were consulted. The table below provides an overview of a few key terms and their definitions. Appendix 1 contains a glossary with a more comprehensive list of terms and concepts.

Learning outcomes	Learning outcomes are statements of what an individual should know, understand and/or be able to do at the end of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy [1]. The term learning outcomes is introduced from the 1970s and onwards, signalling a more learner-centred approach [2]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01) [2] Cedefop. *Defining, writing and applying learning outcomes. A European handbook*. Luxembourg: Publications Office of the European Union, 2017. Retrieved from: https://www.cedefop.europa.eu/files/4156_en.pdf
Knowledge	Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
Skills	The ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments) [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
Responsibility and autonomy (in an	The ability of the learner to apply knowledge and skills autonomously and with responsibility [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April

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educational setting)	2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
Standardisation	Standardisation is the activity of establishing and recording a limited set of solutions to actual or potential matching problems directed at benefits for the party or parties involved, balancing their needs and intending and expecting that these solutions will be repeatedly or continuously used during a certain period by a substantial number of the parties for whom they are meant [1]. Activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context. In particular, standardisation consists of the processes of formulating, issuing and implementing standards [2]. **Source:** [1] De Vries, H. (1998) "The Classification of Standards". *Knowledge Organisation* 25, No.3. [2] ISO/IEC (2004). ISO/IEC Guide 2:2004 Standardisation and related activities — General vocabulary. Retrieved from: https://isotc.iso.org/livelink/livelink/Open/8389141
Standards	A "standard" is "a widely agreed way of doing something". Depending on the specific area of application, "doing something" may be replaced by, for example, "designing a product", "building a process", "implementing a procedure", or "delivering a service" [1]. Standards are technical specifications defining requirements for products, production processes, services or test-methods. These specifications are voluntary. They are developed by industry and market actors following some basic principles such as consensus, openness, transparency and non-discrimination. Standards ensure interoperability and safety, reduce costs and facilitate companies' integration in the value chain and trade [2]. They are established by consensus and approved by a recognised body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context [3]. Standards are at the core of the European Union (EU) internal market's machinery. They ensure that products and services are interoperable with one another, are safe to use and will not harm people's health or the environment. They generate confidence that a product or service is fit for purpose and allow businesses to compete throughout the EU and globally. Standards also have a key role to play in enabling innovation: they provide a common framework on which to build by setting out the essential characteristics of a product or service and defining common vocabularies [4]. Source: [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf [2] European Commission. *European Standards.* Retrieved from: https://single-market-economy.ec.europa.eu/single-market/european-standards_en#:~:text=European%20Standards%20are%20under%20the,support%20EU%20legislation%20and%20policies [3] ISO/IEC Guide 2:2004 Standardisation and related activities — General vocabulary. Retrieved from: https://isotc.iso.org/livelink/livelink/Open/8389141 [4] EUR-Lex. *Standardisation.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/standardisation.html

Table 4: Example of key terms

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3. The EDU4Standards.eu value-based ILOs framework for standardisation education

Having explained the process behind the development of the EDU4Standards.eu value-based ILOs framework, in this chapter the framework will be presented. As already briefly elaborated in subchapter *3.4 The three-part framework*, the EDU4Standards.eu value-based ILOs framework consists of three parts:

- A general value-based ILOs framework for standardisation education
- An ILOs framework focusing on European values in standardisation education
- An ILOs framework integrating green, digital and gender skills in standardisation education.

The framework is presented in a tabular form. It consists of four columns.

1. The first column outlines the levels of qualification and education. The framework distinguishes 9 levels (same as ISCED), starting with Level 0 Early childhood education and extending up to Level 8 Doctoral level. Including Level 0 emphasises the importance of introducing value-based standardisation education at an early age. Each level also specifies an age range providing an approximate indication of the age group it targets.
2. The second column is the knowledge column, focusing in on what the learner is expected to know. The formulations in this column follow the EQF, while also taking into account the knowledge dimension from Bloom's Taxonomy.
3. The third column contains examples of skills or what the learner is able to do at each of the levels. This column varies across the three tables provided below. The general ILOs framework provides examples of skills at a more general level. The framework focusing on European values presents examples of skills explicitly related to these five values. The last table includes examples of green, digital and gender skills. Nevertheless, the complexity level remains consistent across the three tables.
4. The fourth is the responsibility and autonomy column, as defined in the EQF. Here for each level the degree of responsibility and autonomy are briefly explained. The formulations in this column follow those from the EQF with some adaptations to fit the educational setting.

a. The general value-based ILOs framework for standardisation education

The general value-based ILOs framework for standardisation education has a twofold goal:

- To address the problem of fragmented standardisation education by providing a framework with a clear structure and guidance on ILOs and levels of qualification.
- To demonstrate how values in general can be integrated into standardisation education.

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Levels		Knowledge	Examples of skills	Responsibility and autonomy
Level 0	**Early childhood education (age 0/3 to 3/6)**	The learner is expected to: • **K0.1:** know that standards are similar to guidelines and rules and that they make sure that things work safely and consistently • **K0.2**: understand the importance of having and following standards, rule, guidelines to make sure that things are understandable for all • **K0.3**: understand simple examples of standardised products and services such as electricity, traffic lights colours, emergency and rescue services (police, ambulance, fire brigade) etc. • **K0.4:** form a sense of right and wrong	The learner is able to: • **S0.1:** follow simple rules and routines • **S0.2:** role-play situations of rule-following and point at the rules that are followed • **S0.3:** in an interactive game or activity discuss with the group examples of simple standardised products or services from everyday life and why they are important	The learner can engage in simple play and creative activities with guidance and under direct supervision in a structured context.
Level 1	**Primary education (age 5/7 to 10/12)**	The learner is expected: • **K1.1:** to have a basic general knowledge of standards and standardisation • **K1.2:** to have a basic general knowledge of values in standardisation	The learner is able to: • **S1.1:** define the concept of standards and standardisation by using examples • **S1.2:** outline the purpose of standards and standardisation (to ensure consistency, safety, understandability) and the benefits of having standardised products, services and processes in general • **S1.3:** list simple examples of standardised products, services and processes and recognise what values they support (ex. traffic signs & values such as safety, or transparency) • **S1.4:** list values and outline examples of standardised products, services and processes that they support	The learner can perform basic tasks under direct supervision in a structured context. They can participate in and contribute to group activities.

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Level 2	**Lower secondary education (age 10/13 to 14/16)**	The learner is expected: • **K2.1:** to have a basic factual knowledge of standardisation • **K2.2:** to have a basic factual knowledge of values in standardisation • **K2.3:** to have basic knowledge of legal, ethical, environmental and gender aspects related to standardisation	The learner is able to: • **S2.1:** explain the basic concepts in the field of standardisation • **S2.2:** name and describe few existing standards • **S2.3:** clarify why concrete standards are important • **S2.4:** give examples of important milestones in the history of standardisation • **S2.5:** understand the concept of value • **S2.6:** compare simple standards to one another and the values they promote • **S2.7:** explain ideas and concepts of values relevant for a concrete standardisation case	The learner can study under supervision with some autonomy, for example, in carrying out their tasks, doing homework, planning the learning process. They can contribute to group activities.
Level 3	**Upper secondary education (age 14/16 to 17/18)**	The learner is expected: • **K3.1:** to have knowledge of facts, principles, processes, general concepts and players regarding standardisation • **K3.2:** to have knowledge of facts, principles, processes, general concepts and players related to values in standardisation • **K3.3:** to have knowledge of the legal, ethical, environmental and gender aspects related to standardisation	The learner is able to: • **S3.1:** explain more complex concepts used in standards and standardisation • **S3.2:** sketch the standardisation process (standards-development) at a glance • **S3.3:** analyse the standards ecosystem • **S3.4:** compare the SDOs in terms of scope, geographical focus, decision-making processes, standards development processes, structure, types of standards etc. • **S3.5:** explore the difference between various types of standards • **S3.6:** develop a deeper understanding of the history of standardisation • **S3.7:** explore the benefits and risks of standardisation • **S3.8:** integrate green/digital/gender considerations to existing standards use cases • **S3.9:** apply value-based concepts, terms and content to different industry-relevant or sector-specific contexts, scenarios	The learner can take responsibility for completion of tasks and for their learning process. They can participate in group projects meaningfully.

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Level 4	**Post-secondary non-tertiary education (ca. age 18-20)**	The learner is expected: • **K4.1:** to have a factual and theoretical knowledge in broad contexts regarding standardisation • **K4.2:** to have a factual and theoretical knowledge in broad contexts of values in standardisation • **K4.3:** to have factual and theoretical knowledge of the legal, ethical, environmental and gender aspects related to standardisation	The learner is able to: • **S4.1:** explain the functions of standardisation institutions and their processes • **S4.2:** select appropriate standardisation organisations • **S4.3:** search for and select appropriate standards for different scenarios and contexts • **S4.4:** determine which form of standardisation (formal vs. informal) is appropriate • **S4.5:** explain the impact of implementing standards • **S4.6:** analyse, interpret and evaluate values in different standardisation scenarios and (industry) sectors • **S4.7:** identify strategies to ensure more value-based approach in standardisation processes	The learner can take responsibility for planning and managing their learning process. At the same time, they can participate actively in collaborative projects by providing meaningful contribution.
Level 5	**Short-cycle tertiary education**	The learner is expected: • **K5.1:** to have comprehensive, specialised, factual and theoretical knowledge of standardisation within one's field and an awareness of the boundaries of that knowledge • **K5.2:** to have comprehensive, specialised, factual and theoretical knowledge of values in standardisation within one's field and an awareness of the boundaries of that knowledge • **K5.3:** to have comprehensive, specialised, factual and theoretical knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field	The learner is able to: • **S5.1:** assess the need for standards • **S5.2:** assess the need for getting involved in standardisation • **S5.3:** propose new work items in standardisation • **S5.4:** explain the steps needed to identify and use standards relevant to a specific topic of interest • **S5.5:** analyse the interactions between standards and the regulatory framework • **S5.6:** outline the professional activities of a standardisation expert during committee meetings, between organisation meetings, inside his/her own organisation, further activities as a national delegate • **S5.7:** be passively involved in standardisation processes (observer) • **S5.8:** implement standards in product or process development • **S5.9:** reflect on possible (positive and negative) relations between the values relevant to a standardisation case • **S5.10:** carry out analysis of the value relations	The learner can manage and organise their learning process with very limited supervision. They can participate in collaborative group projects, make decisions, proposing steps and solutions.

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Level 6	**Bachelor's level**	The learner is expected: • **K6.1:** to have advanced knowledge of standards and standardisation within one's field, involving a critical understanding of theories and principles • **K6.2:** to have advanced knowledge of values in standards and standardisation within one's field, involving a critical understanding of theories and principles • **K6.3:** to have advanced knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field	The learner is able to: • **S6.1:** be actively involved in standardisation processes (participant) • **S6.2:** illustrate the interactions between standards and the regulatory framework • **S6.3:** carry out deeper analysis of the value relations • **S6.4:** determine and analyse value conflicts in a standardisation use case • **S6.5:** propose solutions on simple value conflicts • **S6.6:** promote green/digital/gender aspects in standardisation through active participation in various initiatives	The learner can manage and organise their learning process autonomously and independently. They can participate in collaborative projects by carrying out more complex tasks and taking more responsibility for decision-making within the team.

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Level 7	**Master's level**	The learner is expected: • **K7.1:** to have highly specialised knowledge, some of which is at the forefront of knowledge in standards and standardisation within one's field and at the interface between different fields, as the basis for original thinking and/or research • **K7.2:** to have highly specialised knowledge, some of which is at the forefront of knowledge of values in standards and standardisation within one's field and at the interface between different fields • **K7.3:** to have highly specialised knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field and at the interface between different fields	The learner is able to: • **S7.1:** evaluate existing policy documents on standardisation within one's field and at the interface between fields • **S7.2:** strategically influence the agenda in standardisation processes • **S7.3:** understand the key determinants of successful standardisation • **S7.4:** support the development of new more value-sensitive standards within their field • **S7.5:** influence the development of standardisation policies at national and international level • **S7.6:** lead standardisation committees • **S7.7:** depict the interdependencies between standardisation and innovation • **S7.8:** depict the relation between standardisation and IPR (relevance of patents, tension between patents and standards) • **S7.9:** propose solutions on more complex value conflicts in a standardisation use case • **S7.10:** understand standardisation in the context of the national quality infrastructure and the macroeconomic environment • **S7.11:** actively contribute to making standardisation processes and the standardisation working environment more respectful, inclusive, open and accessible	The learner can carry out tasks with high level of independence. They can mentor and guide others, take part in more complex collaborative projects, propose strategies.

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Level 8	**Doctoral level**	The learner is expected: • **K8.1:** to have knowledge on standards and standardisation at the most advanced theoretical level within one's field and at the interface between fields • **K8.2:** to have knowledge about values in standardisation at the most advanced theoretical level • **K8.3:** to have knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field at the most advanced theoretical level	The learner is able to: • **S8.1:** participate in discourse on standards and standardisation at the most advanced level • **S8.2:** critically evaluate existing policy documents on standardisation within one's field and at the interface between fields • **S8.3:** critically evaluate existing policy documents on values in standardisation within one's field and at the interface between fields • **S8.4:** propose solutions, new ideas, new work items and processes of standardisation within one's field and at the interface between fields • **S8.5:** write policy documents on standardisation • **S8.6:** reflect on European values and interests in standardisation on a meta-level • **S8.7:** conduct policy negotiations on values in standardisation in international settings • **S8.8:** lead complex projects on standardisation within one's field and at the interface between fields	The learner can carry out tasks independently. They can mentor and guide others, contribute to the development of new ideas or processes with minimal guidance.

Table 5: The general value-based ILOs framework for standardisation education

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b. An ILOs framework focusing on European values in standardisation education

The ILOs framework focusing on the European values in standardisation education shows how concrete values can be translated into ILOs for each of the identified levels. For this purpose, as an example are used the five EU values as stated in Article 2 TEU.

In the table, the column "Examples of skills" relates to the awareness about values in standardisation, but for the sake of consistency "skills" is further used.

Levels	Knowledge (as defined in Table 5)	Examples of skills					Responsibility and autonomy
		Human dignity	**Freedom**	**Democracy**	**Equality**	**The rule of law**	
Level 0 Early childhood education (age 0/3 to 3/6)	The learner is expected: • **K0.1:** form a sense of right and wrong	The learner is able to: • **S0.1:** demonstrate friendliness, kindness, compassion and respect to one another • **S.02:** reflect on one's and other's feelings in role-playing activities • **S.03:** understand the importance of having a space where everyone feels valued, safe and respected • **S.04:** understand the importance of using technology responsibly and respectfully	The learner is able to: • **S0.1:** exercise autonomy by carrying out simple tasks and make choices on one's own • **S0.2:** respect other's autonomy by respecting their choices • **S0.3:** express one's feelings and thoughts and respect other's feelings and thoughts in role-playing activities	The learner is able to: • **S0.1:** contribute to the group or a common goal by fulfilling simple tasks related to the classroom • **S0.2:** participate in co-shaping the rules of the group • **S0.3:** understand the concept of voting and decision-making by voting on decisions concerning the group (ex. what to play)	The learner is able to: • **S0.1:** in an interactive game or activity discuss with the group about cultural diversity, different traditions • **S0.2:** in an interactive game or activity discuss with the group about the importance of inclusion and equal treatment of all group members	The learner is able to: • **S0.1:** take responsibility for one's actions and reflect on that • **S0.2:** discuss the importance of respecting authority • **S0.3:** participate in conflict resolution situations	The learner can engage in simple play and creative activities with guidance and under direct supervision in a structured context.

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Level 1 Primary education (age 5/7 to 10/12)	The learner is expected: • **K1.1:** to have a basic general knowledge of values in standardisation	The learner is able to: • **S1.1:** name some aspects that make up human dignity • **S1.2:** recognise situations where human dignity is not respected • **S1.3:** list simple examples of standardised products, services and processes and how they support human dignity	The learner is able to: • **S1.1:** name some aspects that make up the value "freedom" • **S1.2:** recognise situations where freedom is not respected • **S1.3:** list simple examples of standardised products, services and processes and how they support freedom	The learner is able to: • **S1.1:** name some aspects that make up the value "democracy" • **S1.2:** recognise situations where democracy is not respected • **S1.3:** list simple examples of standardised products, services and processes and how they support democracy	The learner is able to: • **S1.1:** name some aspects that make up the value "equality" • **S1.2:** recognise situations where equality is not respected • **S1.3:** list simple examples of standardised products, services and processes and how they support equality and non-discrimination	The learner is able to: • **S1.1:** name some aspects that make up the value "the rule of law" • **S1.2:** recognise situations where the rule of law is not respected • **S1.3:** list simple examples of standardised products, services and processes and how they support the rule of law	The learner can perform basic tasks under direct supervision in a structured context. They can participate in and contribute to group activities.
Level 2 Lower secondary education (age 10/13 to 14/16)	The learner is expected: • **K2.1:** to have a basic factual knowledge of values in standardisation • **K2.2:** to have basic knowledge of legal, ethical, environmental and gender aspects related to standardisation	The learner is able to: • **S2.1:** explain the value "human dignity" • **S2.2.:** discuss how human dignity can be enhanced in standardisation • **S2.3:** compare simple standards and how they promote human dignity	The learner is able to: • **S2.1:** explain the value "freedom" • **S2.2.:** discuss how freedom can be enhanced in standardisation • **S2.3:** compare simple standards and how they promote freedom	The learner is able to: • **S2.1:** explain the value "democracy" • **S2.2.:** discuss how democracy can be enhanced in standardisation • **S2.3:** compare simple standards and how they promote human dignity	The learner is able to: • **S2.1:** explain the value "equality" • **S2.2.:** discuss how equality can be enhanced in standardisation • **S2.3:** compare simple standards and how they promote equality and non-discrimination	The learner is able to: • **S2.1:** explain the value "the rule of law" • **S2.2.:** discuss how the rule of law can be enhanced in standardisation • **S2.3:** compare simple standards and how they promote human dignity	The learner can study under supervision with some autonomy, for example, in carrying out their tasks, doing homework, planning the learning process. They can contribute to group activities.

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Level 3 Upper secondary education (age 14/16 to 17/18)	The learner is expected: • **K3.1:** to have knowledge of facts, principles, processes, general concepts and players related to values in standardisation • **K3.2:** to have knowledge of the legal, ethical, environmental and gender aspects related to standardisation	The learner is able to: • **S3.1:** evaluate one's own value and the value of others • **S3.2:** apply the value "human dignity" to sector-specific contexts • **S3.3:** explore the relationship between "human dignity" and standardisation	The learner is able to: • **S3.1:** explore and use the range of one's own freedom (ex. voting) • **S3.2:** apply the value "freedom" to sector-specific contexts • **S3.3:** explore the relationship between "freedom" and standardisation	The learner is able to: • **S3.1:** explore the importance of decision making and participation • **S3.2:** apply the value "democracy" to sector-specific contexts • **S3.3:** explore the relationship between "democracy" and standardisation	The learner is able to: • **S3.1:** explore the importance of equal treatment of all group members • **S3.2:** apply the value "equality" to sector-specific contexts • **S3.2:** explore the relationship between "equality" and standardisation	The learner is able to: • **S3.1:** understand the importance of adhering to the law when being part of a community • **S3.2:** apply the value "the rule of law" to sector-specific contexts • **S3.3:** explore the relationship between "the rule of law" and standardisation	The learner can take responsibility for completion of tasks and for their learning process. They can participate in group projects meaningfully.
Level 4 Post-secondary non-tertiary education (ca. age 18-20)	The learner is expected: • **K4.1:** to have a factual and theoretical knowledge in broad contexts of values in standardisation • **K4.2:** to have factual and theoretical knowledge of the legal, ethical, environmental and gender aspects related to standardisation	The learner is able to: • **S4.1:** analyse, interpret and evaluate the value "human dignity" in different standardisation scenarios and (industry) sectors • **S4.2:** identify strategies to ensure more respectful cooperation in standardisation processes	The learner is able to: • **S4.1:** analyse, interpret and evaluate the value "freedom" in different standardisation scenarios and (industry) sectors • **S4.2:** identify strategies how to ensure more respectful cooperation in standardisation processes	The learner is able to: • **S4.1:** analyse, interpret and evaluate the value "democracy" in different standardisation scenarios and (industry) sectors • **S4.2:** identify strategies how to ensure more democratic standardisation and participatory decision-making processes	The learner is able to: • **S4.1:** analyse, interpret and evaluate the value "equality" in different standardisation scenarios and (industry) sectors • **S4.3:** identify strategies how to ensure more inclusive participation in standardisation • **S4.4:** identify cases of inequality and discrimination in existing standards	The learner is able to: • **S4.1:** analyse, interpret and evaluate the value "the rule of law" in different standardisation scenarios and (industry) sectors • **S4.2:** identify strategies how to ensure more transparency and accountability in standardisation processes	The learner can take responsibility for planning and managing their learning process. At the same time, they can participate actively in collaborative projects by providing meaningful contribution.

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Level 5 Short-cycle tertiary education	The learner is expected: • **K5.1:** to have comprehensive, specialised, factual and theoretical knowledge of values in standardisation within one's field and an awareness of the boundaries of that knowledge • **K5.2:** to have comprehensive, specialised, factual and theoretical knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field	The learner is able to: • **S5.1:** reflect on possible (positive and negative) relations between human dignity and other values relevant to a standardisation case • **S5.2:** carry out analysis of the value relations	The learner is able to: • **S5.1:** reflect on possible (positive and negative) relations between freedom and other values relevant to a standardisation case • **S5.2:** carry out analysis of the value relations	The learner is able to: • **S5.1:** reflect on possible (positive and negative) relations between democracy and other values relevant to a standardisation case • **S5.2:** carry out analysis of the value relations	The learner is able to: • **S5.1:** reflect on possible (positive and negative) relations between equality and other values relevant to a standardisation case • **S5.2:** carry out analysis of the value relations	The learner is able to: • **S5.1:** reflect on possible (positive and negative) relations between the rule of law and other values relevant to a standardisation case • **S5.2:** carry out analysis of the value relations	The learner can manage and organise their learning process with very limited supervision. They can participate in collaborative group projects, make decisions, proposing steps and solutions.

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Level 6 Bachelor's level	The learner is expected: • **K6.1:** to have advanced knowledge of values in standards and standardisation within one's field, involving a critical understanding of theories and principles • **K6.2:** to have advanced knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field	The learner is able to: • **S6.1:** carry out deeper analysis of the value relations • **S6.2:** determine and analyse value conflicts in a standardisation use case • **S6.3:** propose solutions on simple value conflicts related to human dignity in standardisation	The learner is able to: • **S6.1:** carry out deeper analysis of the value relations • **S6.2:** determine and analyse value conflicts in a standardisation use case • **S6.3:** propose solutions on simple value conflicts related to freedom in standardisation	The learner is able to: • **S6.1:** carry out deeper analysis of the value relations • **S6.2:** determine and analyse value conflicts in a standardisation use case • **S6.3:** propose solutions on simple value conflicts related to democracy in standardisation	The learner is able to: • **S6.1:** carry out deeper analysis of the value relations • **S6.2:** determine and analyse value conflicts in a standardisation use case • **S6.3:** propose solutions on simple value conflicts related to equality in standardisation	The learner is able to: • **S6.1:** carry out deeper analysis of the value relations • **S6.2:** determine and analyse value conflicts in a standardisation use case • **S6.3:** propose solutions on simple value conflicts related to the rule of law in standardisation	The learner can manage and organise their learning process autonomously and independently. They can participate in collaborative projects by carrying out more complex tasks and taking more responsibility for decision-making within the team.

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Level 7 Master's level	The learner is expected: • **K7.1:** to have highly specialised knowledge, some of which is at the forefront of knowledge of values in standards and standardisation within one's field and at the interface between different fields • **K7.2:** to have highly specialised knowledge, some of which is at the forefront of knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field and at the interface between different fields	The learner is able to: • **S7.1:** propose solutions on more complex value conflicts related to human dignity in a standardisation use case • **S7.2:** develop standards that are respectful towards all stakeholders • **S7.3:** actively contribute to making standardisation processes and the standardisation working environment more respectful, inclusive, open and accessible • **S7.4:** support the development of new standards that consider human dignity	The learner is able to: • **S7.1:** propose solutions on more complex value conflicts related to freedom in a standardisation use case • **S7.2:** actively contribute to making standardisation processes and the standardisation working environment more respectful, inclusive, open and accessible • **S7.3:** support the development of new standards that consider freedom	The learner is able to: • **S7.1:** propose solutions on more complex value conflicts related to democracy in a standardisation use case • **S7.2:** actively contribute to making standardisation processes and the standardisation working environment more respectful, inclusive, open and accessible • **S7.3:** support the development of new standards that consider democratic principles	The learner is able to: • **S7.1:** propose solutions on more complex value conflicts related to equality in a standardisation use case • **S7.2:** design standards that are non-discriminatory and do not favour ex. any gender • **S7.3:** actively contribute to making standardisation processes and the standardisation working environment more respectful, inclusive, open and accessible • **S7.4:** support the development of new standards that consider equality	The learner is able to: • **S7.1:** propose solutions on more complex value conflicts related to the rule of law in a standardisation use case • **S7.2:** actively contribute to making standardisation processes and the standardisation working environment more respectful, inclusive, open and accessible	The learner can carry out tasks with high level of independence. They can mentor and guide others, take part in more complex collaborative projects, propose strategies.

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Level 8 Doctoral level	The learner is expected: • **K8.1:** to have knowledge about values in standardisation at the most advanced theoretical level • **K8.2:** to have knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field at the most advanced theoretical level	The learner is able to: • **S8.1:** reflect on European values and interests in standardisation on a meta-level and in a global setting • **S8.2:** critically evaluate existing policy documents regarding the value "human dignity" in standardisation within one's field and at the interface between fields • **S8.3:** conduct policy negotiations on enhancing the value "human dignity" in standardisation in international settings • **S8.4:** write policy documents on standardisation while including human dignity considerations	The learner is able to: • **S8.1:** reflect on European values and interests in standardisation on a meta-level and in a global setting • **S8.2:** critically evaluate existing policy documents regarding the value "freedom" in standardisation within one's field and at the interface between fields • **S8.3:** conduct policy negotiations on enhancing the value "freedom" in standardisation in international settings	The learner is able to: • **S8.1:** reflect on European values and interests in standardisation on a meta-level and in a global setting • **S8.2:** critically evaluate existing policy documents regarding the value "democracy" in standardisation within one's field and at the interface between fields • **S8.3:** conduct policy negotiations on enhancing the value "democracy" in standardisation in international settings	The learner is able to: • **S8.1:** reflect on European values and interests in standardisation on a meta-level and in a global setting • **S8.2:** critically evaluate existing policy documents regarding the value "equality" in standardisation within one's field and at the interface between fields • **S8.3:** conduct policy negotiations on enhancing the value "equality" in standardisation in international settings	The learner is able to: • **S8.1:** reflect on European values and interests in standardisation on a meta-level and in a global setting • **S8.2:** critically evaluate existing policy documents regarding the value "the rule of law" in standardisation within one's field and at the interface between fields • **S8.3:** conduct policy negotiations on enhancing the value "the rule of law" in standardisation in international settings	The learner can carry out tasks independently. They can mentor and guide others, contribute to the development of new ideas or processes with minimal guidance.

Table 6: An ILOs framework focusing on European values in standardisation education

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c. An ILOs framework integrating green, digital and gender skills in standardisation education

The third part emphasises the integration of green, digital and gender skills within standardisation education. Given their significance in the project and in EU policy documents e.g. the European Green Deal, the EC's Communication: Shaping Europe's Digital Future, the New Industrial Strategy for Europe etc., this subchapter demonstrates how they can be incorporated across all nine levels.

Levels		Knowledge (as defined in Table 5)	Examples of skills			Responsibility and autonomy
			Green skills	Digital skills	Gender skills	
Level 0	**Early childhood education (age 0/3 to 3/6)**	The learner is expected: • **K0.1:** form a sense of right and wrong	The learner is able to: • **S0.1:** in an interactive game or activity discuss with the group about the importance of caring for the environment, preserving resources etc. • **S0.2:** in an interactive game or activity discuss with the group about ways how to protect and care for the environment (ex. waste separation, recycling) • **S0.3:** participate in different activities for protecting the environment (ex. planting trees, reusing old materials, plastic free days etc.)	The learner is able to: • **S0.1:** in an interactive game or activity discuss with the group about the benefits and risks of digital technologies (ex. internet safety and online privacy) • **S0.2:** in an interactive game or activity discuss with the group about healthy screen time habits • **S0.3:** use basic functions of digital tools	The learner is able to: • **S0.1:** in an interactive game or activity discuss with the group about the importance of equal treatment of all group members regardless of their gender • **S0.2:** in an interactive game or activity discuss with the group about the importance of inclusion and respect of all group members regardless of their gender • **S0.3:** participate in different activities without labelling them to a certain gender (ex. girls play only with dolls, boys only with cars)	The learner can engage in simple play and creative activities with guidance and under direct supervision in a structured context.

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Level 1	**Primary education (age 5/7 to 10/12)**	The learner is expected: • **K1.1:** to have a basic general knowledge of values in standardisation	The learner is able to: • **S1.1:** name some aspects that make up the value "sustainability" • **S1.2:** list a few examples of unsustainable behaviour from everyday life • **S1.3:** list simple examples of products, services and processes that are gender-biased • **S1.4:** explain the 3 R's in waste management (reduce, reuse, recycle)	The learner is able to: • **S1.1:** demonstrate basic computer literacy (managing files, browsing the internet, digital communication, interacting with digital tools etc.) • **S1.2:** demonstrate basic coding skills • **S1.3:** participate in group activities by using digital tools • **S1.4:** list simple examples of values that can be promoted and demoted in the digital realm	The learner is able to: • **S1.1:** name some aspects that make up the value "gender equality" • **S1.2:** list a few examples of stereotypes from everyday life • **S1.3:** list simple examples of products, services and processes that are gender-biased	The learner can perform basic tasks under direct supervision in a structured context. They can participate in and contribute to group activities.
Level 2	**Lower secondary education (age 10/13 to 14/16)**	The learner is expected: • **K2.1:** to have a basic factual knowledge of values in standardisation • **K2.2:** to have basic knowledge of legal, ethical, environmental and gender aspects related to standardisation	The learner is able to: • **S2.1:** explain the value "sustainability" • **S2.2:** discuss how sustainability can be enhanced in products, services and processes • **S2.3:** compare standards to one another and how they promote sustainability	The learner is able to: • **S2.1:** discuss how human rights apply in the digital realm as well • **S2.2.:** explain the concept of digital citizenship • **S2.3:** discuss about the importance of online safety and privacy • **S2.4:** demonstrate computer literacy on a higher level • **S2.5:** discuss the importance of standardising digital tools • **S2.**6: give examples of important milestones in the history of ICT	The learner is able to: • **S2.1:** explain the value "gender equality" • **S2.2:** discuss how gender equality can be enhanced in products, services and processes • **S2.3:** compare standards to one another and how they promote gender equality and non-discrimination	The learner can study under supervision with some autonomy, for example, in carrying out their tasks, doing homework, planning the learning process. They can contribute to group activities.

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Level 3	**Upper secondary education (age 14/16 to 17/18)**	The learner is expected: • **K3.1:** to have knowledge of facts, principles, processes, general concepts and players related to values in standardisation • **K3.2:** to have knowledge of the legal, ethical, environmental and gender aspects related to standardisation	The learner is able to: • **S3.1:** explore the importance of sustainability standards • **S3.2:** apply the value "sustainability" to sector-specific contexts • **S3.3:** explore the relationship between "sustainability" and standardisation	The learner is able to: • **S3.1:** use digital tools confidently • **S3.2:** use collaboration tools • **S3.3:** explain the concept of disinformation • **S3.4:** conduct web searches to find information • **S3.5:** determine the reliability of online sources and the truthfulness of online information and digital content • **S3.6:** explore the importance of digital standards	The learner is able to: • **S3.1:** explore the importance of equal treatment of all group members • **S3.2:** apply the value "gender equality" to sector-specific contexts • **S3.3:** explore the relationship between "gender equality" and standardisation	The learner can take responsibility for completion of tasks and for their learning process. They can participate in group projects meaningfully.
Level 4	**Post-secondary non-tertiary education (ca. age 18-20)**	The learner is expected: • **K4.1:** to have a factual and theoretical knowledge in broad contexts of values in standardisation within one's field • **K4.2:** to have factual and theoretical knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field	The learner is able to: • **S4.1:** analyse, interpret and evaluate the value "sustainability" in different standardisation scenarios and (industry) sectors • **S4.2:** identify strategies to ensure more inclusion of green aspects in standardisation • **S4.3:** identify cases of unsustainable aspects in existing standards	The learner is able to: • **S4.1:** demonstrate knowledge in digital and ICT standards • **S4.2:** search for and select appropriate digital and ICT standards for different scenarios and contexts • **S4.3:** analyse, interpret and evaluate values in different ICT standardisation scenarios and (industry) sectors • **S4.4:** identify strategies to ensure more responsible, respectful and ethical dealing with digital tools • **S4.5:** manage more complex tasks that demand more complex information research, data creation and analysis.	The learner is able to: • **S4.1:** interpret and evaluate the value "gender equality" in different standardisation scenarios and (industry) sectors • **S4.2:** identify strategies to ensure more gender-inclusive participation in standardisation • **S4.3:** identify cases of gender-bias and discrimination in existing standards	The learner can take responsibility for planning and managing their learning process. At the same time, they can participate actively in collaborative projects by providing meaningful contribution.

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Level 5	**Short-cycle tertiary education**	The learner is expected: • **K5.1:** to have comprehensive, specialised, factual and theoretical knowledge of values in standardisation within one's field and an awareness of the boundaries of that knowledge • **K5.2:** to have comprehensive, specialised, factual and theoretical knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field	The learner is able to: • **S5.1:** propose new green-sensitive work items in standardisation • **S5.2:** analyse the interactions between standards and the regulatory landscape for sustainability • **S5.3:** reflect on possible (positive and negative) relations between sustainability and other values relevant to a standardisation case • **S5.4:** carry out analysis of the value relations	The learner is able to: • **S5.1:** analyse the interactions between standards and the regulatory landscape for ICT • **S5.2:** reflect on possible (positive and negative) relations between various values relevant to a standardisation case • **S5.3:** carry out analysis of the value relations	The learner is able to: • **S5.1:** propose new gender-sensitive work items in standardisation • **S5.2:** analyse the interactions between standards and the gender equality regulatory framework • **S5.3:** reflect on possible (positive and negative) relations between gender equality and other values relevant to a standardisation case • **S5.4:** carry out analysis of the value relations	The learner can manage and organise their learning process with very limited supervision. They can participate in collaborative projects , make decisions, proposing steps and solutions.

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Level 6	**Bachelor's level**	The learner is expected: • **K6.1:** to have advanced knowledge of values in standards and standardisation within one's field, involving a critical understanding of theories and principles • **K6.2:** to have advanced knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field	The learner is able to: • **S6.1:** carry out deeper analysis of the value relations • **S6.2:** determine and analyse value conflicts in a standardisation use case • **S6.3:** propose solutions on simple value conflicts • **S6.4:** promote green aspects in standardisation through active participation in various initiatives	The learner is able to: • **S6.1:** illustrate the interactions between standards and the ICT regulatory framework • **S6.2:** determine and analyse value conflicts in an ICT standardisation use case • **S6.3:** propose solutions on simple value conflicts • **S6.4:** demonstrate more advanced knowledge in cybersecurity, risk and data management	The learner is able to: • **S6.1:** carry out deeper analysis of the value relations • **S6.2:** determine and analyse value conflicts in a standardisation use case • **S6.3:** propose solutions on simple value conflicts • **S6.4:** promote gender aspects in standardisation through active participation in various initiatives	The learner can manage and organise their learning process autonomously and independently. They can participate in collaborative projects by carrying out more complex tasks and taking more responsibility for decision-making within the team.

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Level 7	**Master's level**	The learner is expected: • **K7.1:** to have highly specialised knowledge, some of which is at the forefront of knowledge of values in standards and standardisation within one's field and at the interface between different fields • **K7.2:** to have highly specialised knowledge, some of which is at the forefront of knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field and at the interface between different fields	The learner is able to: • **S7.1:** propose solutions on more complex value conflicts in a standardisation use case • **S7.2:** support the development of new standards that consider green aspects • **S7.3:** strategically influence the agenda in standardisation processes to encompass green considerations • **S7.4:** influence the development of green-sensitive standardisation policies at national and international level • **S7.5:** carry out sustainability impact assessment	The learner is able to: • **S7.1:** evaluate existing policy documents on ICT standardisation within one's field and at the interface between fields • **S7.2:** support the development of new more value-sensitive ICT standards • **S7.3:** propose solutions on more complex value conflicts in an ICT standardisation use case • **S7.4:** influence the development of ICT standardisation policies at national and international level	The learner is able to: • **S7.1:** propose solutions on more complex value conflicts in a standardisation use case • **S7.2:** support the development of new standards that consider gender aspects • **S7.3:** strategically influence the agenda in standardisation processes to encompass gender considerations • **S7.4:** influence the development of gender-sensitive standardisation policies at national and international level • **S7.5:** carry out gender impact assessment • **S7.6:** actively contribute to making standardisation processes and the standardisation working environment more respectful, inclusive, open and accessible	The learner can carry out tasks with high level of independence. They can mentor and guide others, take part in more complex collaborative projects, propose strategies.

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Level 8	**Doctoral level**	The learner is expected: • **K8.1:** to have knowledge about values in standardisation at the most advanced theoretical level • **K8.2:** to have knowledge of the legal, ethical, environmental and gender aspects related to standardisation within one's field at the most advanced theoretical level	The learner is able to: • **S8.1**: reflect on European values and interests in standardisation on a meta-level and in a global setting • **S8.2:** critically evaluate existing policy documents regarding the value "sustainability" in standardisation within one's field and at the interface between fields • **S8.3:** conduct policy negotiations on enhancing the value "sustainability" in standardisation in international settings • **S8.4:** write policy documents on standardisation while including green considerations	The learner is able to: • **S8.1:** participate in discourse on standards and standardisation at the most advanced level • **S8.2:** critically evaluate existing policy documents on standardisation within one's field and at the interface between fields • **S8.3:** critically evaluate existing ICT policy documents on values in standardisation within one's field and at the interface between fields • **S8.4:** write policy documents on ICT standardisation	The learner is able to: • **S8.1**: reflect on European values and interests in standardisation on a meta-level and in a global setting • **S8.2:** critically evaluate existing policy documents regarding the value "gender equality" in standardisation within one's field and at the interface between fields • **S8.3:** conduct policy negotiations on enhancing the value "gender equality" in standardisation in international settings • **S8.4:** write policy documents on standardisation while including gender considerations	The learner can carry out tasks independently. They can mentor and guide others, contribute to the development of new ideas or processes with minimal guidance.

Table 7: An ILOs framework integrating green, digital and gender skills in standardisation education

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d. Example of the application of the ILOs in practice in the field of electrical engineering

This part provides an example of how the EDU4Standards.eu value-based ILOs framework can be applied in practice. For the purposes of this example, the field of electrical engineering has been selected. Electrical engineering is considered to be a very technical, male-dominated field, making it an ideal case for demonstrating how values and value-based requirements can be integrated into technical study programs. The example begins with the concept of electricity, a topic familiar to everyone from a very early age. As the levels progress, the complexity of the requirements in the ILOs increases, so that the last few levels focus on electrical engineering as a separate study programme.

Levels		Knowledge	Example of skills	Responsibility and autonomy
Level 0	**Early childhood education (age 0/3 to 3/6)**	The learner is expected to: • **K0.1:** know that standards are similar to guidelines and rules that make sure that things work safely and consistently • **K0.2**: understand the importance of having and following standards, rule, guidelines to make sure that things are understandable for everyone • **K0.3:** understand simple examples of standardised electrical products and services • **K0.4:** understand basic safety rules and principles • **K0.5:** form a sense of right and wrong	The learner is able to: • **S0.1:** follow basic safety rules and principles like not playing with wires or outlets • **S0.2:** in an interactive game or activity discuss with the group examples of simple standardised electrical products from everyday life and why they are important • **S0.3:** point at sources of electricity such as outlets or batteries • **S0.4:** role-play situations of rule-following and point at the rules that are followed	The learner can engage in simple play and creative activities with guidance and under direct supervision in a structured context.
Level 1	**Primary education (age 5/7 to 10/12)**	The learner is expected: • **K1.1:** to have a basic general knowledge of electrical standards and standardisation • **K1.2:** to have a basic general knowledge of values in electrical standardisation	The learner is able to: • **S1.1:** define in simple words the concept of “electricity” • **S1.2:** list simple examples of electrical equipment and appliances and recognise what values they support • **S1.3:** name basic electrical components like light bulbs or switches • **S1.4:** describe in more detail basic safety rules and principles	The learner can perform basic tasks under direct supervision in a structured context. They can participate in and contribute to group activities.

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Level 2	**Lower secondary education (age 10/13 to 14/16)**	The learner is expected: • **K2.1:** to have a basic factual knowledge of electrical standardisation • **K2.2:** to have a basic factual knowledge of values in electrical standardisation • **K2.3:** to have basic knowledge of the legal, ethical, environmental and gender aspects related to standardisation around electrical engineering	The learner is able to: • **S2.1:** explain basic concepts related to electricity such as voltage, electrical circuit, current • **S2.2:** differentiate between different types of circuit • **S2.3:** construct a simple electric circuit • **S2.4:** discuss more in detail safety rules • **S2.5:** name and describe a few existing electrical standards • **S2.6:** clarify why concrete electrical standards are important • **S2.7:** compare a few aspects of electrical standards and the values they promote	The learner can study under supervision with some autonomy, for example, in carrying out their tasks, doing homework, planning the learning process. They can contribute to group activities.
Level 3	**Upper secondary education (age 14/16 to 17/18)**	The learner is expected: • **K3.1:** to have knowledge of facts, principles, processes and general concepts regarding standardisation within the field of electrical engineering • **K3.2:** to have knowledge of facts, principles, processes and general concepts related to values in standardisation within the field of electrical engineering • **K3.3:** to have knowledge of the legal, ethical, environmental and gender aspects related to standardisation around electrical engineering	The learner is able to: • **S3.1:** explain more complex concepts related to electricity • **S3.2:** explain electrical theory and fundamental laws • **S3.3:** construct and analyse more complex electric circuits • **S3.4:** determine issues related to sustainability and environmental responsibility • **S3.5:** explore the benefits and risks of standardisation of electrical devices	The learner can take responsibility for completion of tasks and for their learning process. They can participate in group projects meaningfully.
Level 4	**Post-secondary non-tertiary education (ca. age 18-20)**	The learner is expected: • **K4.1:** to have a factual and theoretical knowledge in broad contexts regarding standardisation within the field of electrical engineering • **K4.2:** to have a factual and theoretical knowledge in broad contexts of values in standardisation within the field of electrical engineering • **K4.3:** to have factual and theoretical knowledge of the legal, ethical, environmental and gender aspects related to standardisation around electrical engineering	The learner is able to: • **S4.1:** explain and compare existing electrical regulations and standards • **S4.2:** explain electrical theory and fundamental laws on a more advanced level • **S4.3:** construct, test and identify faults in complex electrical circuits and electrical systems • **S4.4:** analyse issues related to sustainability and environmental responsibility • **S4.5:** explain the impact of implementing electrical standards based on few examples	The learner can take responsibility for planning and managing their learning process. At the same time, they can participate actively in collaborative projects by providing meaningful contribution.

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Level 5	**Short-cycle tertiary education**	The learner is expected: • **K5.1:** to have comprehensive, specialised, factual and theoretical knowledge of standardisation within the field of electrical engineering and an awareness of the boundaries of that knowledge • **K5.2:** to have comprehensive, specialised, factual and theoretical knowledge of values in standardisation within the field of electrical engineering and an awareness of the boundaries of that knowledge • **K5.3:** to have comprehensive knowledge of the legal, ethical, environmental and gender aspects related to standardisation around electrical engineering	The learner is able to: • **S5.1:** assess the need for electrical standards • **S5.2:** propose new work items in electrical standardisation • **S5.3:** analyse the interactions between electrical standards and the regulatory framework • **S5.4:** reflect on possible positive and negative relations between values in the field of electrical standardisation or in a concrete standardisation case	The learner can manage and organise their learning process with very limited supervision. They can participate in collaborative group projects, make decisions, proposing steps and solutions.
Level 6	**Bachelor's level**	The learner is expected: • **K6.1:** to have advanced knowledge of standards and standardisation within the field of electrical engineering, involving a critical understanding of theories and principles • **K6.2:** to have advanced knowledge of values in standards and standardisation within the field of electrical engineering, involving a critical understanding of theories and principles • **K6.3:** to have advanced knowledge of the legal, ethical, environmental and gender aspects related to standardisation around electrical engineering	The learner is able to: • **S6.1:** be actively involved in standardisation processes (participant) • **S6.2:** carry out deeper analysis of value relations • **S6.3:** determine and analyse value conflicts in a standardisation use case • **S6.4:** propose solutions on simple value conflicts • **S6.5:** assess the interactions between standards and the regulatory framework	The learner can manage and organise their learning process autonomously and independently. They can participate in collaborative projects by carrying out more complex tasks and taking more responsibility for decision-making within the team.

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Level 7	**Master's level**	The learner is expected: • **K7.1:** to have highly specialised knowledge, some of which is at the forefront of knowledge in standards and standardisation within the field of electrical engineering and at the interface between different fields, as the basis for original thinking and/or research • **K7.2:** to have highly specialised knowledge, some of which is at the forefront of knowledge of values in standards and standardisation within the field of electrical engineering and at the interface between different fields • **K7.3:** to have highly specialised knowledge of the legal, ethical, environmental and gender aspects related to standardisation around electrical engineering	The learner is able to: • **S7.1:** strategically influence the agenda in standardisation processes • **S7.2:** support the development of new more value-sensitive standards within the field of electrical engineering • **S7.3:** influence the development of standardisation policies at national and international level • **S7.4:** propose solutions to more complex value conflicts in a concrete electrical standardisation use case	The learner can carry out tasks with high level of independence. They can mentor and guide others, take part in more complex collaborative projects, propose strategies.
Level 8	**Doctoral level**	The learner is expected: • **K8.1:** to have theoretical knowledge on standards and standardisation at the most advanced level within the field of electrical engineering and at the interface between fields • **K8.2:** to have knowledge about values in electrical standardisation at the most advanced theoretical level • **K8.3:** to have knowledge of the legal, ethical, environmental and gender aspects related to standardisation around electrical engineering at the most advanced theoretical level	The learner is able to: • **S8.1:** participate in discourse on electrical standards and standardisation at the most advanced level • **S8.2:** propose solutions, new ideas, new work items and processes of standardisation within the field of electrical engineering and at the interface between fields • **S8.3:** critically evaluate existing policy documents on standardisation within the field of electrical engineering and at the interface between fields • **S8.4:** critically evaluate existing policy documents on values such as sustainability, gender equality in standardisation within the field of electrical engineering and at the interface between fields • **S8.5:** propose solutions, new ideas, new work items and processes of standardisation within field of electrical engineering and at the interface between fields	The learner can carry out tasks independently. They can mentor and guide others, contribute to the development of new ideas or processes with minimal guidance.

Table 8: Example of the application of the ILOs in practice in the field of electrical engineering

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4. How to use the EDU4Standards.eu value-based ILOs framework?

This chapter provides guidance on how to use the EDU4Standards.eu value-based ILOs framework.

- Formal education: The EDU4Standards.eu value-based ILOs framework is designed to cover levels of *qualifications attained as part of the formal education*. It distinguishes nine levels of qualification that are matched with nine levels of formal education. The ILOs for each level should serve as an orientation point of what students are expected to know and be able to do *after the successful completion* of a level of education and obtaining a specific level of qualification. It also indicates the level of complexity of the knowledge and skills specific to that level.

- Non-formal education: The EDU4Standards.eu value-based ILOs framework is designed to also cover *levels of qualifications attained outside of the formal educational system* where age does not play a central role (as it does in levels of education). This makes it possible to incorporate shslife-long learning, also including in-company training and practitioners of standardisation who have no formal education. In this way, the EDU4Standards.eu ILOs framework can be implemented in the education system, and can be as well applied at any time, regardless of age or educational system, in any course on standardisation.

- The EDU4Standards.eu value-based ILOs framework is developed to help integrate standardisation into education and thus provide guidance on the knowledge and skills that future standards professionals should be equipped with.

- The EDU4Standards.eu value-based ILOs framework should assist lecturers on standardisation in *designing their value-based standardisation courses*. It should also be used as guidance to support the *design and development of value-based standardisation curricula* to be integrated systematically in educational systems and national education strategies.

- We are aware that the EDU4Standards.eu value-based ILOs framework places high demands on lecturers, standardisation courses and standardisation education in general, nevertheless, it should be seen as a normative framework that shows the direction of what should be done so that standardisation education can be improved.

- The EDU4Standards.eu value-based ILOs framework contains descriptors in the form of generic statements. When applied to a specific discipline and study programme, the generic statements

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should be *tailored accordingly*. Section 4d illustrates how this might be done, using electricity and the field of electrical engineering as an example.

- The ILOs apply to several layers at the same time. They are an integral part of a curriculum and also guide the modules and courses offered within that curriculum. For the sake of the argument, let us assume that a lecturer is planning her teaching course on standardisation for a group of first-year Bachelor students. In this case, the ILOs formulated at Level 6 should be taken as a point of reference. It should be noted that these ILOs indicate what students are expected to know and able to do after successful completion of the Bachelor's qualification. Assuming that the ILOs are already part of the curriculum within which the course is taught, the lecturer should adapt her course to the complexity of the educational level. Two possible scenarios can be identified here.

  The first scenario: Let us assume that the Bachelor students have little or no knowledge of value-based standardisation. This would correspond to Level 0 or 1 of the value-based ILOs framework, i.e. early child education and primary education. In terms of age, there seems to be a large gap. In such situations, it could be argued that the lecturer can adjust her course so that the first units can be devoted to familiarising the students with the basics of standardisation. The complexity of the teaching material can then increase as the course progresses so that eventually students can successfully complete the course. This example shows that the requirements for attending a standardisation course should be defined in a clear, transparent and coherent way.

  The second scenario: Suppose that the Bachelor students have knowledge of value-based standardisation that meets the entry requirements for Level 6. In that case, the lecturer will design the course so that the level of complexity matches the educational level from the very start.

- Other scenarios can also be considered:
  - A new course has to be developed from scratch that focuses on standardisation.
  - An existing standardisation course has to be evaluated concerning how values are incorporated in the course. When relevant, one or more elements of the ILOs may be implemented in that course. The focus on value-based standardisation could be one of the topics addressed in such a course.
  - An existing course on a broader topic has to be evaluated concerning how standardisation could be incorporated in the course. When relevant, one or more elements of the ILOs may be implemented in that course. The focus on value-based standardisation could be one of the topics addressed in such a course.

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- A new course on standardisation is developed as part of a curriculum focusing on the ethics of technology. That course could, e.g., address value-based standardisation in detail.

- An interesting example is cases where the *level of experience in standardisation does not correspond to the level of qualification* of a person. For example, let us say that a standards professional with many years of experience in standardisation has a Level 4 qualification, but would like to formally obtain a higher qualification level. Assuming that her experience and informal skills meet the entry requirements for a Level 6 qualification, she could be admitted to Level 6, instead of Level 5, with or without the requirement to take additional Level 5 examinations. (see European Commission, Education and Culture DG 2008)

- The ILOs framework is only one piece of the puzzle. Several *other factors can contribute to its successful implementation and integration into education*, such as funding opportunities, adequate training for the lecturers, a good selection of teaching methods and materials, or well-developed assessments to measure the achieved learning outcomes.

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5. Conclusion and next steps

This deliverable aimed to develop a value-based ILOs framework for standardisation education. The framework addresses the issue of fragmented standardisation education by providing a clear structure and guidance on ILOs and by differentiating levels of qualification starting from early childhood education to doctoral level. At the same time, it shows how values as abstract concepts can be integrated into standardisation education. In this way, the deliverable represents an attempt to bring together the fields of standardisation, education and values, thus going beyond the technical dimension of standards and standardisation to include a wider range of value considerations. The EDU4Standards.eu value-based ILOs framework for standardisation education consists of three parts: a general value-based ILOs framework for standardisation education, an ILOs framework focusing explicitly on values i.e. European values, and an ILOs framework integrating green, digital and gender skills.

The EDU4Standards.eu value-based ILOs framework represents an important part of the EDU4Standards.eu's Innovative Teaching Concept of Standardisation (ITCoS) that will be developed in T2.3 *Produce the innovative teaching concept*. Together with the other content produced in WP2 *Design teaching concepts of standardisation*, they will support the work on the WP3 *Implementation*, in particular the pilots, where the teaching concept will be validated.

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Appendix 1: On legislation and standardisation

Law and standardisation have in common that both promote the potential of technical progress while preventing damage as far as possible. It is a matter of fact that technical monitoring organisations, such as the Steam Boiler Monitoring Association ("Dampfkesselüberwachungsverein" DÜV, 1869), developed alongside the emergence of dangerous technologies. With the increasing mechanisation of everyday life in the 20th century, legislators increasingly turned to so-called "references to standards" i.e. references to the state-of-the-art, the rules of technology, or directly to technical standards. In the 1980s, legislation and standardisation explicitly joined forces at the EU level through the New Approach (NA).

As early as 1980, the European Parliament expressed significant concerns that "technical barriers to trade" with a protectionist effect could replace customs duties and thus lead to trade restrictions. It called on the European Commission (EC) to prioritise this issue. The European Parliament had already formulated guiding principles for European standardisation and called for increased cooperation between the EC, CEN (European Committee for Standardisation), CENELEC (European Committee for Electrotechnical Standardisation), and national standards institutes. (OJ 1980 C 291, p. 45). In response, the Council introduced a resolution on a new approach to technical harmonisation and standardisation in 1985, known as the New Approach (OJ 1985 C 136, p. 1).

The concept was undoubtedly motivated by the threat of technical barriers to trade. However, even in its early stages, the basic principles – aiming at a high level of protection of public interests and the free movement of goods throughout the EU within a flexible and innovation-friendly legal framework – included not only safety requirements but also broader requirements in the public interest. It was emphasised that, alongside economic interests, general public interests must also be considered. In our view, the objective of the NA is still mostly relevant and can be summarised as follows:

- Limiting legislative intervention to the definition of basic safety requirements
- Detailed specification through harmonised standards developed by standards development organisations (SDOs).

The cooperation between legislators and standardisation organisations was first formalised in Directive 83/189/EEC. In the following years, the NA was implemented step by step through the adoption of product safety directives (both general and sector-specific), the introduction of CE conformity marking, and the establishment of market surveillance mechanisms.

By the late 1990s, both the EC (COM/98/291 final) and the Council (OJ 2000 C 141, p. 1) reaffirmed the usefulness and practicality of the NA. The Council described the approach as highly "efficient," particularly in relation to the function of European standardisation. The 2003 evaluation report (COM/2003/240 final) also

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confirmed the fundamental soundness of the concept. Nevertheless, the report identified areas for improvement, leading to the introduction of the New Legislative Framework (NLF).

The NLF, enacted by Regulation (EU) 765/2008 and Decision 768/2008/EC, deepened the cooperation between legislators and standardisation institutions. Its overarching goal is to ensure a high level of public interest protection and the free movement of goods throughout the EU, all within a flexible and innovation-friendly legal framework.

1.1. Further developments in standardisation

In 2011, the communication "A Strategic Vision for European Standardisation" (COM/2011/311 final) established the guiding principles of the European standardisation system. These principles were codified in Regulation (EU) 1025/2012. At the core of this system are harmonised standards, created pursuant to Article 10 of Regulation (EU) 1025/2012. These standards are developed based on a legal act that specifies essential safety requirements, following a mandate from the EC. Once approved, the reference to the standard is published. According to Article 24 Regulation (EU) 1025/2012 by 31 December 2015 and every five years thereafter, the Commission has to present a report to the European Parliament and to the Council on the implementation of this Regulation. The report shall contain an analysis of the annual reports of the national standarisation bodies (NSB), an evaluation of the relevance of the standardisation activities receiving Union financing in the light of the requirements of Union legislation and policies as well as an assessment of potential new measures to simplify the financing of European standardisation and to reduce the administrative burden for the European standardisation organisations.

The 2016 evaluation (COM/2016/0212 final) identified areas for improvement, particularly concerning the speed, timeliness, and financing of standards. In response, the EC presented the "standardisation package" (COM/2016/0358 final), which also introduced the "Joint Standardisation Initiative" to support the internal market. This initiative takes a multi-stakeholder approach to ensure effective cooperation across sectors. Another evaluation report on Regulation (EU) 1025/2012 (COM/2022/30 final) followed in January 2022, which resulted in a new standardisation strategy (COM/2022/31).

1.2. Challenges in standardisation

The most recent evaluation report on the European standardisation system (COM/2022/312), covering the years 2016-2020 (and partially 2021), confirms that Article 4 of Regulation (EU) 1025/2012 ensures stakeholders' access to draft standards and standardisation documents, as intended. However, the report also

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indicates that civil society organisations and small and medium-sized enterprises (SMEs) continue to face challenges in accessing national standardisation activities. The report documents 44 standardisation requests from the EC between 2015 and 2020, of which six were rejected. Since harmonized standards are intended to provide essential complementary details to legal regulations, the negative consequences of these rejections are particularly significant. Moreover, despite CEN's acceptance of several standardisation requests, some were only partially implemented (COM/2022/30, p. 7).

The financing system is described in detail, highlighting total expenditures of €105.3 million, with €85 million allocated to European standardisation organisations and €20 million to Annex III institutions (COM/2022/30, p. 11). The report concludes that, while the system is fundamentally effective, there is room for improvement, particularly concerning inclusivity, the role of national standardisation organisations, and the timeline for delivering harmonised European standards to the EC. Both the European standardisation organisations and the EC are urged to "continue their efforts to increase efficiency" (COM/2022/30, p. 12).

The latest evaluation report on the NLF, presented in 2022 (SWD[2022]364), focuses explicitly on harmonised standards and confirms the overall effectiveness of the framework. However, it also highlights delays in the standardisation process as a notable weakness (SWD[2022]364, p. 20 et seq.).

The next five-year evaluation report according to Article 24 Regulation (EU) 1025/2012 is expected in December 2025. However, in September 2023, the European Commission initiated a Call for Evidence, followed by a public consultation on Regulation (EU) 1025/2012 from May to July 2024. The consultation emphasized that "since this legislation was adopted in October 2012, the standardisation environment has changed significantly." The initiative aims to evaluate whether the current Regulation can still adequately respond to the new opportunities and challenges presented by globalisation, ensure public safety, and support the green and digital transition.[6]

1.3. Harmonised standards as part of the European Union Law

According to article 10(6) of Regulation (EU)1025/2012 harmonised standards that satisfy the requirements which it aims to cover and which are set out in the corresponding Union harmonisation legislation, shall be published by the EC by reference in the Official Journal of the European Union. Thus, such standards are not published in full text but are referenced in the Official Journal (OJ), with only summaries made publicly accessible on the standardisation organisations' websites.

[6] For further details, see <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13446-European-standardisation-evaluation_en>

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This limited accessibility was the subject of the ECJ's 2024 judgment in the case C-588/21 P (Public.Resource.Org and Right to Know v Commission and others). The court made the following key rulings (original wording):

- Paragraph 70: "In that regard, it should, in the first place, be recalled that the Court has already held that a harmonised standard, adopted on the basis of a directive and the references to which have been published in the Official Journal of the European Union, forms part of EU law owing to its legal effects (see, to that effect, judgment of 27 October 2016, James Elliott Construction, C-613/14, EU:C:2016:821, paragraph 40)."
- Paragraph 71: "In particular, first, the Court has already held that harmonised standards may be binding on the public generally as long as they themselves have been published in the Official Journal of the European Union (see, to that effect, judgment of 22 February 2022, Stichting Rookpreventie Jeugd and Others, C-160/20, EU:C:2022:101, paragraph 48)."
- Paragraph 76: "Consequently, as the Advocate General observed in point 43 of her Opinion, where EU legislation provides that compliance with a harmonised standard gives rise to a presumption of conformity with the essential requirements of that legislation, that means that any natural or legal person who wishes effectively to challenge that presumption in respect of a given product or service must demonstrate that that product or service does not meet that standard or, alternatively, that that standard is not fit for purpose."
- Paragraph 79: "Although, as is apparent from paragraph 74 of the present judgment, compliance with harmonised standards is not generally mandatory, that standard is, in the present case, manifestly mandatory, since Regulation No 1907/2006 provides, in paragraph 3 of entry 27 of the table set out in Annex XVII thereto, that, as regards nickel, the standards adopted by CEN are to be used as test methods for demonstrating the conformity of the products concerned with paragraphs 1 and 2 of entry 27."
- Paragraph 80: "In the light of the foregoing considerations, it must be held, in accordance with the case-law referred to in paragraph 70 of the present judgment, that the requested harmonised standards form part of EU law."
- Paragraph 81: "In the second place, as the Advocate General noted in point 52 of her Opinion, Article 2 TEU provides that the European Union is based on the principle of the rule of law, which requires free access to EU law for all natural or legal persons of the European Union, and that individuals must be able to ascertain unequivocally what their rights and obligations are (judgment of 22 February 2022, Stichting Rookpreventie Jeugd and Others, C-160/20, EU:C:2022:101, paragraph 41 and the case-law cited). That free access must in particular enable any person whom

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legislation seeks to protect to verify, within the limits permitted by law, that the persons to whom the rules laid down by that law are addressed actually comply with those rules."

- Paragraph 83: " In the third place, it must be recalled that the principle of transparency is inextricably linked to the principle of openness, which is enshrined in the second paragraph of Article 1 and Article 10(3) TEU, in Article 15(1) and Article 298(1) TFEU and in Article 42 of the Charter. It makes it possible, inter alia, to ensure that the administration enjoys greater legitimacy and is more effective and more accountable to the citizen in a democratic system (see, to that effect, judgment of 22 February 2022, Stichting Rookpreventie Jeugd and Others, C-160/20, EU:C:2022:101, paragraph 35 and the case-law cited)."
- Paragraph 84: "To that end, a right of access to documents is ensured under the first subparagraph of Article 15(3) TFEU and enshrined in Article 42 of the Charter, a right which has been implemented, inter alia, by Regulation No 1049/2001, Article 2(3) of which provides that it applies to all documents held by the Parliament, the Council or the Commission (see, to that effect, judgment of 22 February 2022, Stichting Rookpreventie Jeugd and Others, C-160/20, EU:C:2022:101, paragraph 36)."
- Paragraph 85: "In those circumstances, it must be held that there is an overriding public interest, within the meaning of the last clause of Article 4(2) of Regulation No 1049/2001, justifying the disclosure of the requested harmonised standards."

Without any doubt, Union law must be freely accessible. If harmonised norms are held "part of the European Union Law", European standardisation organisations face the potential loss of revenue. Efforts are underway to find a legally compliant solution.

1.4. Conclusions

Overall, the agenda between legislation and standardisation has shifted with increasing technologisation. Through the European Standardisation Strategy, standardisation has evolved from a mere private business field into a meaningful and necessary complement to the legislative process. However, this also means that the principles of the rule of law as well as other fundamental European values must be taken into account in standardisation to a much greater extent. The current initiatives seek to recognise this changing societal significance and adequately address it. That "education in/for standardization" will make a valuable contribution to this challenge.

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Appendix 2: Glossary

The goal of the glossary is to provide working definitions to be used primarily as part of 2.1 but also to contribute to the consolidation of a common terminology used throughout the EDU4Standards.eu project.

The Glossary is divided into six sections. The first section focuses on the five EU core values as stated in Article 2 of TEU that constitute the basis for defining the ILOs in standardisation education. The second section presents other values that can be grouped from the five core values. The third section defines terms related to standards and standardisation. On the one hand, this includes terms such as standards, standardisation, standardisation body, standards development organisation or committee, which are commonly used in the field of standardisation. On the other hand, it also includes terms such as EU core values, ethical principles, human-centric approach or virtues, which should shape and support standards and standards development processes in the sense of the EU's new standardisation strategy. Section four centres around terms that dominate (standardisation) education, such as learning outcomes, learning objectives, learning aims, knowledge, skills or competences. Section five provides a list and descriptions of standardisation relevant organisations such as CEN, CENELEC, ETSI or ISO. Finally, the last section, section six, contains the terms and definitions as referred to in Regulation (EU) No 1025/2012 (Standardisation Regulation).

For the terms related to standards, standardisation and (standardisation) education, well-established definitions are used from sources such as the Regulation (EU) 2012/1025, Cedefop documents (European Centre for the Development of Vocational Training), the book Sustainable Development – Knowledge and Education about Standardisation (Idowu et al. 2020), the ETSI Handbook 2nd edition – Understanding ICT Standardisation: Principles and Practice (Abdelkafi et al. 2021), the ISO Online Browsing Platform (OBP), or the IWA 30-1 and IWA 30-2. For the five core values and the other relevant values, philosophical literature is consulted as well as legal documents such as Article 2 TEU and EU policy documents. Such an approach proved necessary in order to provide a basic understanding of these abstract concepts and thus facilitate their implementation in standards, standardisation and standardisation education.[7]

The Glossary is to be seen as a tool to help to better understand D2.1 - as a living document it will be further developed and considered as part of future publications.

[7] The last date of access to all links listed in the glossary is September 30, 2024.

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1.1. Core values

	Term	Definition[8]/ Common understanding & Source
1.	**Democracy**	"Democracy" refers very generally to a method of collective decision making characterised by a kind of equality among the participants at an essential stage of the decision-making process. The most important element of democracy as a form of government is self-rule, equally distributed among the people. Other noteworthy elements include respect for minority rights, rule of law, protection of human rights, and mechanisms for accountability and participation [1] [2]. **Sources**: [1] Christiano, Tom and Sameer Bajaj. "Democracy". *The Stanford Encyclopedia of Philosophy* (Spring 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from: https://plato.stanford.edu/archives/spr2024/entries/democracy [2] Political Science. *Democracy: Definition and Explanation*. Retrieved from: https://www.politicalsciencenotes.com/democracy/democracy-definition-and-explanation/831
2.	**Dignity**	"Dignity" is a complex and contested concept that, in general terms, refers to absolute, intrinsic, and unconditional value. It is a sense of self-worth, which we have a duty to develop and respect in ourselves and a duty to protect in others. The concept of human dignity features in ethical, legal, and political discourse as a foundational commitment to human value or human status, but the source of that value, or the nature of that status, are contested [1] [2] [3]. **Sources:** [1] The Ethics Centre. *Ethics Explainer: Dignity*. Retrieved from: https://ethics.org.au/ethics-explainer-dignity/ [2] The Conversation. *How to define dignity and its place in human rights – a philosopher's view*. Retrieved from: https://theconversation.com/how-to-define-dignity-and-its-place-in-human-rights-a-philosophers-view-81785 [3] Riley, Stephen. "Human Dignity". *Internet Encyclopedia of Philosophy*. Retrieved from: https://iep.utm.edu/human-dignity/#H4
3.	**Equality**	"Equality" is a contested concept that signifies correspondence between a group of different objects, persons, processes, or circumstances that have the same qualities in at least one respect, but not all respects, i.e., regarding one specific feature, with differences in other features. "Equality" can be used in the very same sense both to describe (e.g., when two people

[8] Definitions are taken directly from the sources listed.

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		are said to have the same weight) and prescribe (e.g., when it is said people ought to be equal before the law). The fundamental idea between the widely accepted principle of human equality is that human beings, despite their differences, are to be regarded as one another's equals in terms of their worth, dignity, and respect they deserve [1]. The principle of equality as one of the EU's fundamental values was set out in the Lisbon Treaty and, more specifically, Articles 2 and 3(3) of the Treaty on European Union, Articles 8, 10, 19, 153 and 157 of the Treaty on the Functioning of the European Union and Articles 21 and 23 of the EU Charter of Fundamental Rights [2]. **Source**: [1] Gosepath, Stefan. "Equality". *The Stanford Encyclopedia of Philosophy* (Summer 2021 Edition), Edward N. Zalta (ed.). Retrieved from: https://plato.stanford.edu/archives/sum2021/entries/equality [2] EUR-Lex. *Equality between women and men*. Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/equality-between-women-and-men.html
4.	**Freedom**	Freedom (or liberty) in a general sense refers to the quality or state of being free: the absence of necessity, coercion, or constraint in choice or action. Negative freedom is the absence of obstacles, barriers or constraints. One has negative freedom to the extent that actions are available to one in this negative sense. Positive freedom is the possibility of acting—or the fact of acting—in such a way as to take control of one's life and realise one's fundamental purposes [1] [2]. Freedom is also mentioned in Article 3 of the TEU according to which the EU offers its citizens an area of freedom, security and justice (AFSJ) without internal frontiers. This is an area in which the free movement of persons is ensured in conjunction with appropriate measures with respect to external border controls, asylum, immigration and preventing and combating crime [3]. **Sources**: [1] Merriam Webster Dictionary. *Freedom*. Retrieved from: https://www.merriam-webster.com/dictionary/freedom [2] Carter, Ian. "Positive and Negative Liberty". *The Stanford Encyclopedia of Philosophy* (Spring 2022 Edition), Edward N. Zalta (ed.). Retrieved from: https://plato.stanford.edu/archives/spr2022/entries/liberty-positive-negative [3] EUR-Lex. *Area of freedom, security and justice*. Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/area-of-freedom-security-and-justice.html
5.	**The Rule of Law**	*The* Rule of Law is one of the ideals of our political morality and it refers to the ascendancy of law as such and of the institutions of the legal system in a system of governance. It comprises a number of principles of a formal and procedural

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		character, addressing the way in which a community is governed. The formal principles concern the generality, clarity, publicity, stability, and prospectivity of the norms that govern a society. The procedural principles concern the processes by which these norms are administered, and the institutions—like courts and an independent judiciary that their administration requires [1]. The rule of law is enshrined in Article 2 of the Treaty on European Union as one of the common values for all EU Member States. Under the rule of law, all public powers always act within the constraints set out by law, in accordance with the values of democracy and fundamental rights, and under the control of independent and impartial courts. Respect for the rule of law is essential for the very functioning of the EU: for the effective application of EU law, for the proper functioning of the internal market, for maintaining an investment-friendly environment and for mutual trust [2]. **Source**: [1] Waldron, Jeremy. "The Rule of Law". *The Stanford Encyclopedia of Philosophy* (Fall 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from: https://plato.stanford.edu/archives/fall2023/entries/rule-of-law [2] EUR-Lex. *Rule of law*. Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/rule-of-law.html

Table 9: Core values

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1.2. Other values

	Term	Definition[9] / Common understanding & Source
1.	**Autonomy**	*Individual (or personal) autonomy* is an idea that is generally understood to refer to the capacity to be one's own person, to live one's life according to reasons and motives that are taken as one's own and not the product of manipulative or distorting external forces, to be in this way independent [1]. *Moral autonomy* is associated with the work of Kant, and is also referred to as 'autonomy of the will' or 'Kantian autonomy.' This form of autonomy consists in the capacity of the will of a rational being to be a law to itself, independently of the influence of any property of objects of volition [2]. **Sources:** [1] Christman, John. "Autonomy in Moral and Political Philosophy". *The Stanford Encyclopedia of Philosophy* (Fall 2020 Edition), Edward N. Zalta (ed.). Retrieved from: https://plato.stanford.edu/entries/autonomy-moral/ [2] Piper, Mark. "Autonomy: Normative". *Internet Encyclopedia of Philosophy*. Retrieved from: https://iep.utm.edu/normative-autonomy/#SH2a
2.	**Care**	Care is the central notion in "care ethics", a moral theory that implies that there is moral significance in the fundamental elements of relationships and dependencies in human life. It involves maintaining the world of, and meeting the needs of, ourself and others. It builds on the motivation to care for those who are dependent and vulnerable, and it is inspired by both memories of being cared for and the idealisations of self [1]. **Source:** [1] Sander-Staudt, Maureen. "Care Ethics". *Internet Encyclopedia of Philosophy*. Retrieved from: https://iep.utm.edu/care-ethics/
3.	**Fairness**	Fairness has both a substantive and a procedural dimension. The substantive dimension implies a commitment to: ensuring equal and just distribution of both benefits and costs, and ensuring that individuals and groups are free from unfair bias, discrimination and stigmatisation. The procedural dimension of fairness entails the ability to contest and seek effective

[9] Definitions are taken directly from the sources listed.

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		redress [...]. In order to do so, the entity accountable for the decision must be identifiable, and the decision-making processes should be explicable [1]. **Source:** [1] AI HLEG (8 April 2019). *Ethics guidelines for trustworthy AI*. European Commission. Retrieved from: https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai

4.	**Gender equality**	Policies and programmes that take into account the particularities pertaining to the lives of both women and men, while aiming to eliminate inequalities and promote gender equality, including an equal distribution of resources, therefore addressing and taking into account the gender dimension [1].
		
		A series of EU laws (directives) has broadened the principle of equality between women and men to cover working conditions, social security, access to goods and services, work-life balance, maternity protection, parental leave and equal treatment in work in a self-employed capacity [2].
		
		Gender equality, as one of the 20 key principles of the European Pillar of Social Rights, seeks to ensure:
		
		• the right to equal pay for equal work or work of equal value;
		• equality of treatment and opportunities between women and men in all areas, including in:
		  • the labour market,
		  • terms and conditions of employment,
		  • career progression [2].
		
		Source:
		[1] European Commission (1998). *100 Words for Equality: A Glossary of Terms on Equality between Women and Men*. Retrieved from: https://eige.europa.eu/publications-resources/thesaurus/terms/1324?language_content_entity=en
		[2] EUR-Lex. *Equality between women and men.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/equality-between-women-and-men.html

5.	**Interoperability**	Ability of two or more systems or components to exchange information and to use the information that has been exchanged [1]. **Source:** [1] ISO/TS 27790:2009(en), 3.39.

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6.	**Non-discrimination**	The aim of non-discrimination is to allow all individuals an equal and fair chance to access opportunities available in a society. This means that individuals or groups of individuals which are in comparable situations should not be treated less favourably simply because of a particular characteristic such as their sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation [1]. **Source:** [1] EUR-Lex. *Non-discrimination (the principles of)*. Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/non-discrimination-the-principle-of.html
7.	**Privacy and data protection**	Privacy as the control over how information about a person is handled and communicated to others [1]. Data protection refers to rules regarding the rights of natural persons (individuals) to have their personal data (any information that relates to an identified or identifiable living person) protected and the duties of public authorities, businesses and other organisations to protect these data. The right to the protection of personal data is a fundamental right enshrined in the EU Charter of Fundamental Rights. It belongs to the set of values protected under Article 2 of the Treaty on European Union and it contributes to the realisation of the EU's objectives under Article 3 of the treaty [2]. **Sources:** [1] Westin, A.F. (1968). *Privacy and freedom*. Washington and Lee Law Review, 25(1), p.166. [2] EUR-Lex. *Data protection*. Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/data-protection.html
8.	**Protection (security and safety)**	Protection stands for keeping someone or something safe from injury, damage, or loss [1]. The underlying concepts of safety and security are indeed not identical, they're complementary. In both cases we have a "system" in an environment. The system might be able to have an undesirable effect on its environment, but the environment can equally well have an undesirable effect on the system. The inability of the system to affect its environment in an undesirable way is usually called safety; the inability of the environment to affect the system in an undesirable way is usually called security. Depending on the type of system, its environment and the types of undesirable effects one can have on the other we get a multitude of definitions for safety and security [2]. **Sources:**

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		[1] Cambridge Dictionary. *Protect*. Retrieved from: https://dictionary.cambridge.org/dictionary/english/protect [2] Line, M.B., Nordland, O., Røstad, L. and Tøndel, I.A. (2006, May). "Safety vs security?". In *PSAM Conference, New Orleans, USA*. sn.
9.	**Raising awareness by participation**	Awareness-raising is a process that seeks to inform and educate people about a topic or issue with the intention of influencing their attitudes, behaviours and beliefs towards the achievement of a defined purpose or goal. It can mobilise the power of public opinion in support of an issue and thereby influence the political will of decision makers. There are multiple awareness-raising strategies, methods and tools that can be used to convey and spread messages, and to gather the support necessary to influence public opinion [1]. **Source:** [1] *SDG Accountability Handbook. Raising Awareness through Public Outreach Campaigns*. Retrieved from: https://www.sdgaccountability.org/working-with-informal-processes/raising-awareness-through-public-outreach-campaigns/#easy-footnote-bottom-1-1051
10.	**Reliability**	Ability to perform as required, without failure, for a given time interval, under given conditions [1]. **Source:** [1] IEC 60050-192:2015, 192-01-24]
11.	**Respect**	Respect is a form of regard: a mode of attention to and acknowledgment of an object as something to be taken seriously; Respect is also perspectival: we can respect something from a moral perspective, or from prudential, evaluative, social, or institutional perspectives; respect is deliberate, a matter of directed rather than grabbed attention, of reflective consideration and judgment [1]. Kant considers respect for persons in his moral theory, i.e. in the Humanity Formula: "Act in such a way that you treat humanity, whether in your own person or the person of any other, never simply as a means but always at the same time as an end" [2]. **Source:** [1] Dillon, Robin S. "Respect". *The Stanford Encyclopedia of Philosophy* (Fall 2022 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from: https://plato.stanford.edu/archives/fall2022/entries/respect [2] Immanuel Kant. *Grundlegung zur Metaphysik der Sitten* (*Groundwork of the Metaphysics of Morals)* 1785, 4:429.

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12.	**Responsibility**	*Individual moral responsibility*: Making judgments about whether a person is morally responsible for her behaviour, and holding others and ourselves responsible for actions and the consequences of actions [1]. *Collective moral responsibility:* it associates both causal responsibility and blameworthiness with groups and locates the source of moral responsibility in the collective actions taken by these groups understood as collectives [2]. *Legal responsibility (or liability):* means legal responsibility for one's acts or omissions. Failure of a person or entity to meet that responsibility leaves him/her/it open to a lawsuit for any resulting damages or a court order to perform (as in a breach of contract or violation of statute) [3]. *Causal responsibility* occurs when one event causes another. That is, that which is seen as a cause of an effect by the correct theory of causation is causally responsible for that effect [4]. **Source:** [1] Talbert, Matthew. "Moral Responsibility". *The Stanford Encyclopedia of Philosophy* (Fall 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from: https://plato.stanford.edu/archives/fall2023/entries/moral-responsibility [2] Smiley, Marion. "Collective Responsibility". *The Stanford Encyclopedia of Philosophy* (Fall 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from: https://plato.stanford.edu/archives/fall2023/entries/collective-responsibility [3] Legal dictionary. *Liability*. Retrieved from: https://dictionary.law.com/Default.aspx?selected=1151 [4] Sartorio, Carolina. "Responsibility and Causation". In Dana Kay Nelkin, and Derk Pereboom (eds), *The Oxford Handbook of Moral Responsibility* (2022; online edn, Oxford Academic, 14 Feb. 2022), 348-362. Retrieved from: https://doi.org/10.1093/oxfordhb/9780190679309.013.8
13.	**Social inclusion**	Social inclusion is a process that ensures citizens have the opportunities and resources necessary to participate fully in economic, social and cultural life and to enjoy a standard of living and well-being that is considered normal in the society in which they live. It encompasses, but is not restricted to, social integration or better access to the labour market, and also includes equal access to facilities, services and benefits [1]. **Source:** [1] Eurofound. *Social inclusion*. Retrieved from: https://www.eurofound.europa.eu/en/topic/social-inclusion

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14.	**Solidarity**	Since the early- to late-nineteenth century, when the term "solidarity" became prevalent, it has always been used to describe a special relationship of unity and mutual indebtedness within a group. In social and political philosophy, the concept of solidarity is primarily used to evaluate, guide, and describe activities within groups and between individuals and groups. The concept of solidarity has been invoked with increasing regularity in contemporary social movements (Movement for Black Lives, Occupy, MeToo, climate change activism), law and politics (COVID, EU, constitutions around the world, human rights), and even bioethics [1]. **Source**: [1] Sangiovanni, Andrea and Juri Viehoff. "Solidarity in Social and Political Philosophy". *The Stanford Encyclopedia of Philosophy* (Summer 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from https://plato.stanford.edu/archives/sum2023/entries/solidarity
15.	**Sustainability and Sustainable Development Goals (SDGs)**	In 1987, the United Nations Brundtland Commission defined sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" [1]. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. The 17 SDGs are integrated—they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability [2]. The EU played an instrumental role in developing the United Nations' Sustainable Development Goals (SDGs). Since the 1990s, sustainable development has been enshrined in the EU treaties as one of the EU's long-term goals and a priority for both its external and internal policies. The references to sustainable development as an EU goal are currently found under Article 3 of the Treaty on European Union [3]. **Source:** [1] United Nations. *Sustainability*. Retrieved from: https://www.un.org/en/academic-impact/sustainability#:~:text=In%201987%2C%20the%20United%20Nations,to%20meet%20their%20own%20needs.%E2%80%9D [2] UNDP. *What are the Sustainable Development Goals?*. Retrieved from: https://www.undp.org/sustainable-development-goals

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		[3] EUR-Lex. *Sustainable development goals.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/sustainable-development-goals.html
16.	**Tradition**	An inherited, established, or customary pattern of thought, action, or behaviour (such as a religious practice or a social custom); cultural continuity in social attitudes, customs, and institutions [1]. **Source:** [1] Merriam Webster Dictionary. *Tradition*. Retrieved from: https://www.merriam-webster.com/dictionary/tradition
17.	**Transparency**	Explicitly and openly available (disclosing) some information that can then be exploited by potential users for their decision-making processes; Information transparency, understood in terms of disclosed information [...] The information disclosed, when implementing information transparency, is supposed to consist of meaningful, veridical, comprehensible, accessible and useful data [1]. **Source:** [1] Turilli, Matteo, and Floridi, Luciano. (2009). "The ethics of information transparency". *Ethics and Information Technology*, *11*, pp.105-112.
18.	**Trust & trustworthiness**	Trust is an attitude we have towards people whom we hope will be trustworthy, where trustworthiness is a property. Trusting requires that we can, (1) be vulnerable to others—vulnerable to betrayal in particular; (2) rely on others to be competent to do what we wish to trust them to do; and (3) rely on them to be willing to do it. Clear conditions for trustworthiness are that the trustworthy person is competent and willing to do what they are trusted to do. Yet this person may also have to be willing for certain reasons or as a result of having a certain kind of motive for acting (e.g., they care about the trustor) [1]. **Source:** [1] McLeod, Carolyn. "Trust". *The Stanford Encyclopedia of Philosophy* (Fall 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from: https://plato.stanford.edu/entries/trust/
19.	**Well-being**	In a general philosophical sense, well-being describes what is non-instrumentally or ultimately good *for* a person. The question of what well-being consists in is of independent interest in moral philosophy, but it is of particular importance in the case of utilitarianism, according to which the only moral requirement is that well-being be maximised. In social sciences, well-being is seen as a broad and multifaceted construct that can essentially be divided into two large domains: objective

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		and subjective well-being. Subjective well-being refers to a person's self-reported "global assessment of all aspects" of their life. Objective well-being often refers to a set of societal circumstances generally captured by material, tangible, and quantitative indicators [1] [2] [3]. **Sources**: [1] Crisp, Roger. "Well-Being". *The Stanford Encyclopedia of Philosophy* (Winter 2021 Edition), Edward N. Zalta (ed.). Retrieved from: https://plato.stanford.edu/entries/well-being/ [2] Lee Kum Sheung Center for Health and Happiness. *Well-being measurement*. Retrieved from: https://www.hsph.harvard.edu/health-happiness/research-new/positive-health/measurement-of-well-being/ [3] ABC Religion & Ethics. *What is "wellbeing" – and why should we measure it?*. Retrieved from: https://www.abc.net.au/religion/what-is-wellbeing-and-what-is-it-for/13516018

Table 10: Other values

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1.3. Terms related to standards and standardisation

	Term	Definition[10] / Common understanding & Source
1.	**Accreditation**	According to Regulation (EU) 765/2008, accreditation means the attestation by a National Accreditation Body that a Conformity Assessment Body meets the requirements set by harmonised standards and, where applicable, any additional requirements including those set out in relevant sectoral schemes, to carry out a specific conformity assessment activity. Accreditation operates in the public interest across all market sectors. It provides an attestation that accredited bodies offering testing, examination, calibration, certification, inspection and verification services have the technical competence and impartiality to check the conformity of products and services with the relevant standards and regulations [1]. **Source:** [1] EFTA. *Accreditation and Conformity Assessment*. Retrieved from: https://www.efta.int/eea-relations-eu/policy-areas/free-movement-goods/accreditation-and-conformity-assessment
2.	**Certification**	Certification is the provision by an independent body of written assurance (a certificate) that the product, service or system in question meets specific requirements [1]. **Source:** [1] ISO. *Certification*. Retrieved from: https://www.iso.org/certification.html
3.	**Committee**	Set of standardisation professionals working on a specific topic. It can be a full organisation or a sub-group of an organisation [1]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf

[10] Definitions are taken directly from the sources listed.

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4.	**Compliance**	Compliance means respecting the law [1]. **Source:** [1] European Commission. *Law – Competition Policy - Compliance*. Retrieved from: https://competition-policy.ec.europa.eu/antitrust-and-cartels/compliance_en#:~:text=Compliance%20means%20respecting%20the%20law,means%20proactively%20respecting%20competition%20rules.
5.	**Ethical principles**	In the context of ethics, principles set out standards or criteria for evaluation of actions. While they do not offer a straightforward formula for determining the right course of action, they provide essential considerations to weigh when faced with ethical dilemmas. Ethical principles prescribe actions that promote certain moral values such as autonomy, beneficence, nonmaleficence, and justice. Principles that are highly specific are typically referred to as rules [1] [2] [3]. **Sources**: [1] Driver, Julia. "Moral Theory". *The Stanford Encyclopedia of Philosophy* (Fall 2022 Edition), Edward N. Zalta & Uri Nodelman (eds.), Retrieved from: https://plato.stanford.edu/archives/fall2022/entries/moral-theory/ [2] Pallipedia. *What is Ethical principles - Meaning and definition*. Retrieved from: https://pallipedia.org/ethical-principles/ [3] Beauchamp, T., and J. F. Childress (2001). *Principles of Biomedical Ethics* (5th ed.). New York: Oxford University Press.
6.	**European Standardisation Organisations**	European standardisation is a consensus-building process that involves many players. As the development of standards is mainly initiated by market needs, industry plays an important role. European standards are then developed through one of the three European Standards Organisations: the European Committee for Standardisation (CEN), the European Committee for Electrotechnical Standardisation (CENELEC), and the European Telecommunications Standards Institute (ETSI). The European Standardisation Organisations are officially recognised by Regulation (EU) No 1025/2012 as providers of European standards [1]. **Source:** [1] European Commission. *Key Players in European Standardisation.* Retrieved from: https://single-market-economy.ec.europa.eu/single-market/european-standards/key-players-european-standardisation_en
7.	**EU core values**	Article 2 TEU: The Union is founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities. These values are common to the

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		Member States in a society in which pluralism, non-discrimination, tolerance, justice, solidarity and equality between women and men prevail [1] [2]. **Sources:** [1] European Commission. *The EU values*. Retrieved from: https://ec.europa.eu/component-library/eu/about/eu-values/ [2] Official Journal of the European Union. Consolidated version of the Treaty of on European Union (2012). Retrieved from: https://eur-lex.europa.eu/resource.html?uri=cellar:2bf140bf-a3f8-4ab2-b506-fd71826e6da6.0023.02/DOC_1&format=PDF
8.	**EU fundamental rights**	The term 'fundamental rights' is used to express the concept of 'human rights' within the European Union (EU). The term 'human rights' is generally used in international law and refers to rights pertaining to all humans irrespective of their nationality, race, caste, creed, gender, etc. The EU tends to use the term 'human rights' in the context of its external relations and development cooperation policies [1]. EU fundamental rights are the rights that people in the EU enjoy. They are enshrined in the EU Charter of Fundamental Rights, which contains rights and freedoms grouped under six titles: dignity, freedoms, equality, solidarity, citizens' rights and justice [2] [3]. **Sources:** [1] EUR-Lex. *Fundamental rights.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/fundamental-rights.html [2] European Commission. *Why do we need the Charter?.* Retrieved from: https://commission.europa.eu/aid-development-cooperation-fundamental-rights/your-rights-eu/eu-charter-fundamental-rights/why-do-we-need-charter_en [3] Charter of Fundamental Rights of the European Union. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12012P/TXT
9.	**EU interests**	Interests indispensable for the continued preservation of the EU as a well-functioning entity with its fundamental institutions and democratic values intact [1] [2]. **Sources:** [1] European Commission. *Foreign Policy.* Retrieved from: https://fpi.ec.europa.eu/what-we-do/advancing-eu-interests-and-values-

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		world_en#:~:text=The%20EU%20cooperates%20with%20partners%20around%20the%20world,EU%20political%20objectives%20and%20commitments%20into%20concrete%20results [2] GMF. *The European Interests: Redefining the European Debate*. Retrieved from: https://www.gmfus.org/european-interests-redefining-european-debate
10.	**Human-centric approach**	The human-centric approach has the objective to foster inclusive digital economies and societies in which all citizens—notably women and young people—have equal opportunities to participate in the digital world. The human-centric approach puts people at the heart of the digital transformation—driven by people's needs, fundamental rights and intersectional challenges to closing digital divides [1]. **Source:** [1] The Digital for Development (D4D) Hub. Retrieved from: https://d4dhub.eu/
11.	**Human rights**	Human rights are rights inherent to all human beings, regardless of race, sex, nationality, ethnicity, language, religion, or any other status. Human rights include the right to life and liberty, freedom from slavery and torture, freedom of opinion and expression, the right to work and education, and many more. Everyone is entitled to these rights, without discrimination. International human rights law lays down the obligations of Governments to act in certain ways or to refrain from certain acts, in order to promote and protect human rights and fundamental freedoms of individuals or groups. The United Nations has created a comprehensive body of human rights law whose foundations are the Charter of the United Nations and the Universal Declaration of Human Rights, adopted by the General Assembly in 1945 and 1948, respectively [1]. Respect for human rights and dignity is one of the EU's core values. Together with the principles of freedom, democracy, equality and the rule of law, it guides EU action both within and beyond its borders. The EU uses the term 'human rights' to refer to such rights beyond its borders, such as in the context of its external relations or development cooperation policies [2]. **Source:** [1] United Nations. *Human Rights*. Retrieved from: https://www.un.org/en/global-issues/human-rights [2] EUR-Lex. *Human rights.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/human-rights.html
12.	**International standardisation body**	The International Organisation for Standardisation (ISO), the International Electrotechnical Commission (IEC) and the International Telecommunication Union (ITU) [1].

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		Source: [1] Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council Text with EEA relevance. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012R1025
13.	**Moral duties**	In its most fundamental sense, a moral duty or obligation refers to a moral requirement to follow a certain course of action, that is, to do, or refrain from doing, certain things. It is not tied to any legal requirement, whether perfect or imperfect, nor is it connected to receiving any material or pecuniary benefit. Moral duty springs from a sense of justice and equity that an honourable person would have, and not from a mere sense of doing benevolence or charity [1] [2]. Moral duty is one of the leading concepts of Kant's moral theory, which is considered a form of deontology [3]. **Source**: [1] Introduction to Ethical Concepts. Retrieved from: https://web.mit.edu/course/2/2.95j/readings/introethics_pt2.html [2] USLegal. *Moral Obligation Law and Legal Definition*. Retrieved from: https://definitions.uslegal.com/m/moral-obligation/ [3] Jankowiak, Tim. "Immanuel Kant". *Internet Encyclopedia of Philosophy*. Retrieved from: https://iep.utm.edu/kantview/
14.	**Morality**	At the most minimal, morality is a set of norms and principles that govern our actions with respect to each other and which are taken to have a special kind of weight or authority. More fundamentally, we can also think of morality as consisting of moral reasons, either grounded in some more basic value, or, the other way around, grounding value [1]. **Source**: [1] Driver, Julia. "Moral Theory". *The Stanford Encyclopedia of Philosophy* (Fall 2022 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from: https://plato.stanford.edu/archives/fall2022/entries/moral-theory/
15.	**National standardisation body**	A body notified to the Commission by a Member State in accordance with Article 27 of the Regulation on European standardisation [1]. **Source:**

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		[1] Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council Text with EEA relevance. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012R1025
16.	**Precautionary principle**	The precautionary principle is an approach to risk management, where, if it is possible that a given policy or action might cause harm to the public or the environment and if there is still no scientific agreement on the issue, the policy or action in question should not be carried out. However, the policy or action may be reviewed when more scientific information becomes available. The principle is set out in Article 191 of the Treaty on the Functioning of the European Union (TFEU). The concept of the precautionary principle was first set out in a European Commission communication adopted in February 2000, which defined the concept and envisaged how it would be applied. The precautionary principle may only be invoked if there is a potential risk and may not be used to justify arbitrary decisions [1]. **Source:** [1] EUR-Lex. *Precautionary principle.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/precautionary-principle.html
17.	**Quality Infrastructure (QI)**	The members of the International Network on Quality Infrastructure (INetQI) have recently agreed upon the new definition of Quality Infrastructure (QI) as “the system comprising the organisations (public and private), together with the policies, relevant legal and regulatory framework, and practices needed to support and enhance the quality, safety and environmental soundness of goods, services, and processes” [1]. Effective QI is required for successful activities of both domestic and foreign markets, thereby encouraging sustainable development and environmental and social well-being [1]. QI relies on: [1] ○ metrology, ○ standardisation, ○ accreditation, ○ conformity assessment, and ○ market surveillance. Many countries have established national policies to develop and sustain efficient and effective QI [1].

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		Source: [1] INETQI (2022). *Quality Infrastructure*. Retrieved from: https://www.inetqi.net/documentation/quality-infrastructure-definition/
18.	**Rapporteur**	Standardisation professional responsible for the drafting of a specific standard [1]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf
19.	**Recommendation**	Article 288 of the Treaty on the Functioning of the European Union lists the various forms that EU acts may take. Recommendations are one of two forms of non-binding EU acts cited in the article, the other form being opinions. Although recommendations do not have legal consequences, they may offer guidance on the interpretation or content of EU law. The European Commission issues recommendations on subjects as wide-ranging as the rights of suspects in criminal cases, policy guidance on individual EU countries' public finances and promoting zero-energy buildings. Other EU institutions, such as the European Parliament, the Council and the European Central Bank, also issue recommendations [1]. **Source:** [1] EUR-Lex. *Recommendation.* Retrieved from : https://eur-lex.europa.eu/EN/legal-content/glossary/recommendation.html
20.	**Regulation**	Regulations are legal acts defined by Article 288 of the Treaty on the Functioning of the European Union (TFEU). They have general application, are binding in their entirety and are directly applicable in all European Union (EU) Member States. A regulation is part of the EU's secondary law, the body of law that derives from the principles and objectives set out in the EU treaties (primary law). A regulation is addressed to abstract categories of persons, not to identified persons. A regulation must be complied with fully by those to whom it applies. It is a legal act binding upon: • the EU institutions, • Member States,

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		• the individuals to whom it applies. A regulation is applicable in all Member States from the date of its entry into force (a date that it sets or, failing that, 20 days after its publication in the EU's Official Journal). Its legal effects are simultaneously, automatically and uniformly binding in all the national legislations [1]. **Source:** [1] EUR-Lex. *Regulation.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/regulation.html
21.	**Standard**	A "standard" is "a widely agreed way of doing something". Depending on the specific area of application, "doing something" may be replaced by, for example, "designing a product", "building a process", "implementing a procedure", or "delivering a service" [1]. Standards are technical specifications defining requirements for products, production processes, services or test-methods. These specifications are voluntary. They are developed by industry and market actors following some basic principles such as consensus, openness, transparency and non-discrimination. Standards ensure interoperability and safety, reduce costs and facilitate companies' integration in the value chain and trade [2]. They are established by consensus and approved by a recognised body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context [3]. Standards are at the core of the European Union (EU) internal market's machinery. They ensure that products and services are interoperable with one another, are safe to use and will not harm people's health or the environment. They generate confidence that a product or service is fit for purpose and allow businesses to compete throughout the EU and globally. Standards also have a key role to play in enabling innovation: they provide a common framework on which to build by setting out the essential characteristics of a product or service and defining common vocabularies [4]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf [2] European Commission. *European Standards.* Retrieved from: https://single-market-economy.ec.europa.eu/single-market/european-standards_en#:~:text=European%20Standards%20are%20under%20the,support%20EU%20legislation%20and%20policies

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		[3] ISO/IEC Guide 2:2004 Standardisation and related activities — General vocabulary. Retrieved from: https://isotc.iso.org/livelink/livelink/Open/8389141 [4] EUR-Lex. *Standardisation.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/standardisation.html
		• **Anticipatory standards** "Forward-looking" answers to expected interoperability problems. They are essential for successful network systems. Examples of anticipatory standards are: X.25, Integrated Services Digital Network (ISDN), Secure Sockets Layer (SSL), Bluetooth, Universal Mobile Telecommunications System (UMTS) [1]. • **De-facto standard** A "de facto standard", also known as "standard in actuality", arises when a winning solution is widely and independently adopted by different industries within a market segment and products developed on such a basis are widely accepted by customers [1]. • **Draft standard** A document containing the text of the technical specifications concerning a given subject, which is being considered for adoption in accordance with the relevant standards procedure, as that document stands after the preparatory work and as circulated for public comment or scrutiny [2]. • **Enabling standards** Standards that proceed in parallel with market growth and improvement of technology and products to enhance the agreed-upon design by extending robustness and scale. One example of enabling standards is the V.90 client modem [1]. • **European standard** A standard adopted by a European standardisation organisation [2]. • **Harmonised standard** A European standard adopted on the basis of a request made by the Commission for the application of Union harmonisation legislation [2]. • **International standard** A standard adopted by an international standardisation body [2].

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		• **National standard** A standard adopted by a national standardisation body [2]. • **Responsive standards** Sometimes also called "business standards", as they contribute to achieving maximum returns associated with an already established technology. For instance, Transport Layer Security (TLS) is a responsive standard following the establishment of Secure Sockets Layer (SSL). TLS/SSL are cryptographic protocols to secure communication over a computer network [1]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf [2] Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council Text with EEA relevance. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012R1025
22.	**Standards professional**	Person who has the competence to perform a job or tasks related to standardisation activities in a company or an organisation performing standardisation activities [1]. **Source:** [1] IWA 30-1:2019 Competence of standards professionals Part 1: In companies. Retrieved from: https://www.iso.org/standard/75875.html
23.	**Standards strategy**	Plan of action designed to obtain a standards portfolio in line with corporate business goals [1]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf

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24.	**Standards Development Organisation (SDO)**	An organisation devoted to developing standards and that puts in place well-defined procedures to guarantee a fair development process, which is aimed at building consensus among involved contributors and ensuring the quality of the final deliverables [1]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf
		• **International SDO** International SDOs have members worldwide, sometimes also including representatives of National or Regional standard bodies, and their deliverables have worldwide coverage. • **National SDO** National SDOs (NSDOs or NSB) operate at the single country level and issue country-specific standards; they often collaborate with International and Regional SDOs. • **Recognised SDO** SDOs that are officially recognised by regulation systems as providers of standards. • **Regional SDO** Regional SDOs include members (industry, academia and national SDOs) from a set of countries that usually share, or are interested in promoting, common practices and regulations [1]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf
25.	**Standardisation**	Standardisation is the activity of establishing and recording a limited set of solutions to actual or potential matching problems directed at benefits for the party or parties involved, balancing their needs and intending and expecting that these solutions will be repeatedly or continuously used during a certain period by a substantial number of the parties for whom they are meant [1].

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		Activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context. In particular, standardisation consists of the processes of formulating, issuing and implementing standards [2]. **Source:** [1] De Vries, H. (1998) "The Classification of Standards". *Knowledge Organisation* 25, No.3. [2] ISO/IEC (2004). ISO/IEC Guide 2:2004 Standardisation and related activities — General vocabulary. Retrieved from: https://isotc.iso.org/livelink/livelink/Open/8389141
		• **Formal standardisation** Formal standardisation is a well-defined process, open to any individual or organisation, and its results are produced in consensus with all interested parties. Formal standardisation is inspired by international directives on standardisation, the most important being the principles produced by the Technical Barriers to Trade (TBT) Committee of the Word Trade Organization (WTO). The TBT committee proposed six principles for the development of international standards: transparency, openness, impartiality and consensus, effectiveness and relevance, coherence, and development dimension [1]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf
26.	**Standardisation stakeholder**	Parties impacted by the publication of standards, e.g., corporate organisations, user groups or national authorities [1]. **Source:** [1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf
27.	**Technical body**	Generic term designating technical committees, sub-committees and working groups that bring together delegates to produce standards [1]. **Source:**

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		[1] Abdelkafi, N. et al. (2021). *Understanding ICT Standardization. Principles and Practice 2nd edition*. ETSI. Retrieved from: https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf
28.	**Technical specification**	A document that prescribes technical requirements to be fulfilled by a product, process, service or system and which lays down one or more of the following: ○ the characteristics required of a product including levels of quality, performance, interoperability, environmental protection, health, safety or dimensions, and including the requirements applicable to the product as regards the name under which the product is sold, terminology, symbols, testing and test methods, packaging, marking or labelling and conformity assessment procedures ○ production methods and processes used in respect of agricultural products as defined in Article 38(1) TFEU, products intended for human and animal consumption, and medicinal products, as well as production methods and processes relating to other products, where these have an effect on their characteristics ○ the characteristics required of a service including levels of quality, performance, interoperability, environmental protection, health or safety, and including the requirements applicable to the provider as regards the information to be made available to the recipient, as specified in Article 22(1) to (3) of Directive 2006/123/EC ○ the methods and the criteria for assessing the performance of construction products, as defined in point 1 of Article 2 of Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products, in relation to their essential characteristics [1]. **Source:** [1] Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council Text with EEA relevance. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012R1025
29.	**Universalism**	There is a single true morality that applies to all individuals and groups, regardless of their beliefs, traditions, practices, sentiments, etc. [1]. **Source:**

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		[1] Pölzler, Thomas. "The relativistic car: Applying Metaethics to the debate about self-driving vehicles". *Ethical Theory and Moral Practice* (2021): *24*(3), pp.833-850.
30.	**Values (universal values)**	In the most abstract sense, values refer to valuable and desirable aspects or qualities of something that motivate one's action. Values and disvalues are expressed through certain evaluative concepts, such as "good" and "bad", "better" and "worse," "right" and "wrong," "just" and "unjust," and so forth. Personal values are personal beliefs about right and wrong, whereas cultural values are values accepted by religions or societies and reflect what is important in each context. Personal and cultural values may or may not align with moral values, which are typically seen as objectively valid and binding, regardless of whether they are accepted or not [1] [2] [3] [4]. **Source**: [1] Merriam-Webster. *Value Definition & Meaning*. Retrieved from: https://www.merriam-webster.com/dictionary/value [2] Schroeder, Mark, "Value Theory", *The Stanford Encyclopedia of Philosophy* (Fall 2021 Edition), Edward N. Zalta (ed.). Retrieved from: https://plato.stanford.edu/entries/value-theory/#BasQue [3] Ethics Sage. *What are Values?*. Retrieved from: https://www.ethicssage.com/2018/08/what-are-values.html [4] Joyce, Richard, "Moral Anti-Realism", *The Stanford Encyclopedia of Philosophy (Summer 2020 Edition)*, Edward N. Zalta (ed.). Retrieved from: https://plato.stanford.edu/archives/sum2020/entries/moral-anti-realism/
31.	**Virtues**	A virtue is an excellent trait of character. It is a disposition, well entrenched in its possessor to notice, expect, value, feel, desire, choose, act, and react in certain characteristic ways. To possess a virtue is to be a certain sort of person with a certain complex mindset. A significant aspect of this mindset is the wholehearted acceptance of a distinctive range of considerations as reasons for action [1]. Virtues are at the heart of virtue ethics, one of the three main theories in normative ethics. Virtue ethics focuses on the role of moral character compared to duties (deontology) or consequences (consequentialism) [2]. **Source:** [1] Hursthouse, Rosalind and Glen Pettigrove. "Virtue Ethics", *The Stanford Encyclopedia of Philosophy* (Fall 2023 Edition), Edward N. Zalta & Uri Nodelman (eds.). Retrieved from: https://plato.stanford.edu/archives/fall2023/entries/ethics-virtue/ [2] Athanassoulis, N. "Virtue Ethics". *Internet Encyclopedia of Philosophy* (IEP). Retrieved from: https://iep.utm.edu/virtue/

Table 11: Terms related to standards and standardisation

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1.4. Terms related to (standardisation) education

	Term	Definition[11] / Common understanding & Source
1.	**Assessment of learning outcomes**	Process of appraising knowledge, know-how, skills and/or competences of an individual against predefined criteria (learning expectations, measurement of learning outcomes). Assessment is typically followed by certification. In the literature, 'assessment' generally refers to appraisal of individuals whereas 'evaluation' is more frequently used to describe appraisal of education and training methods or providers [1]. **Source:** [1] Cedefop; Tissot, P. (2004). *Terminology of vocational training policy – A multilingual glossary for an enlarged Europe*. Luxembourg: Publications office.
2.	**Attitude**	Attitudes represent the motivators of performance, the basis for continued competent performance. They include values, aspirations and priorities [1]. **Source:** [1] Vuorikari, Riina, Stefano Kluzer and Yves Punie (2022). *DigComp 2.2. The Digital Competence Framework for Citizens – With new examples of knowledge, skills and attitudes*. Retrieved from: https://publications.jrc.ec.europa.eu/repository/handle/JRC128415
3.	**Attribute**	Attribute is considered to be an inherent characteristic of a person [1]. **Source:** [1] IWA 30-1:2019 Competence of standards professionals Part 1: In companies. Retrieved from: https://www.iso.org/standard/75875.html
4.	**Basic ICT skills**	The skills needed to use efficiently the elementary functions of information and communication technologies to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the internet [1].

[11] Definitions are taken directly from the sources listed.

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		Source: [1] European Parliament and Council of the European Union (2006). Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning (2006/962/EC). Retrieved from: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF
5.	**Certification of learning outcomes**	Process of issuing a certificate, diploma or title formally attesting that a set of learning outcomes (knowledge, knowhow, skills and/or competences) acquired by an individual have been assessed by a competent body against a predefined standard [1]. **Source:** [1] Cedefop (2008). *Terminology of European education and training policy – A selection of 100 key terms*. Luxembourg: Publications Office. Retrieved from: http://www.cedefop.europa.eu/en/files/4064_en.pdf
6.	**Competence**	Ability to apply learning outcomes adequately in a defined context (education, work, personal or professional development) [1]. Ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development [2]. Competence is not limited to cognitive elements (involving the use of theory, concepts or tacit knowledge); it also encompasses functional aspects (including technical skills) as well as interpersonal attributes (e.g. social or organisational skills) and ethical values [3]. **Source:** [1] Cedefop. *Terminology of European education and training policy. A selection of 130 key terms. Second edition*. Luxembourg: Publications Office of the European Union, 2014. Retrieved from: https://www.cedefop.europa.eu/files/4117_en.pdf [2] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03) [3] Cedefop. *Terminology of European education and training policy. Competence.* Retrieved from: https://www.cedefop.europa.eu/hr/tools/vet-glossary/glossary/kompetenz

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7.	**Competency framework**	A competency framework is a structured and comprehensive outline of the knowledge, skills, abilities, behaviours and attributes required for successful performance in a particular role or profession. It serves as a tool for defining, assessing and developing the competencies needed to achieve individual and organizational objectives [1]. **Source:** [1] ISO competency framework for standards development professionals (2023). Retrieved from: https://www.iso.org/publication/PUB100475.html
8.	**Credit**	Confirmation that a part of a qualification, consisting of a coherent set of learning outcomes has been assessed and validated by a competent authority, according to an agreed standard; credit is awarded by competent authorities when the individual has achieved the defined learning outcomes, evidenced by appropriate assessments and can be expressed in a quantitative value (e.g. credits or credit points) demonstrating the estimated workload an individual typically needs for achieving related learning outcomes [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
9.	**Digital competence / digital literacy**	Ability to use information and communication technology (ICT). Digital competence is underpinned by basic skills in ICT: use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the internet [1] [2]. **Source:** [1] Cedefop (2008). *Terminology of European education and training policy – A selection of 100 key terms*. Luxembourg: Publications Office. Retrieved from: http://www.cedefop.europa.eu/en/files/4064_en.pdf [2] European Parliament and Council of the European Union (2006). Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning (2006/962/EC). Retrieved from: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF
10.	**Education**	Article 14 of the European Union (EU) Charter of Fundamental Rights states that 'everyone has the right to education and to have access to continuing and vocational training'.

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		EU Member States are responsible for the organisation of their education and training systems and the content of teaching programmes. Under Article 165 of the Treaty on the Functioning of the European Union, the EU contributes to the development of quality education by encouraging and facilitating cooperation between its Member States, and by supporting and supplementing their action. In addition, the 27 Member States and the European Commission are working towards a wide-ranging improvement of the EU's education and training sector. This shared vision is called the European education area (EEA), and aims at creating a genuine common European space of learning, which will benefit all learners, teachers and institutions, by 2025, through: • improving the quality of education and training for all; • ensuring inclusion and gender equality; • promoting policies and investments to bring about the green and digital transitions; • enhancing competence and motivation in the education profession; • reinforcing higher education institutions; • promoting lifelong learning and mobility; and • strengthening the geopolitical dimension of the EEA [1]. **Source:** [1] EUR-Lex. *Education.* Retrieved from: https://eur-lex.europa.eu/EN/legal-content/glossary/education.html
11.	**European Qualifications Framework (EQF)**	The EQF is an 8-level, learning outcomes-based framework for all types of qualifications that serves as a translation tool between different national qualifications frameworks. This framework helps improve transparency, comparability and portability of people's qualifications and makes it possible to compare qualifications from different countries and institutions [1]. **Source:** [1] The European Qualifications Framework. Retrieved from: https://europass.europa.eu/en/europass-digital-tools/european-qualifications-framework#:~:text=The%20EU%20developed%20the%20European,and%20professional%20development%20across%20Europe

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12.	**Formal learning**	Learning that occurs in an organised and structured environment (such as in an education or training institution or on the job) and is explicitly designated as learning (in terms of objectives, time or resources). Formal learning is intentional from the learner's point of view. It typically leads to certification [1]. **Source:** [1] Cedefop (2008). *Terminology of European education and training policy – A selection of 100 key terms*. Luxembourg: Publications Office. Retrieved from: http://www.cedefop.europa.eu/en/files/4064_en.pdf
13.	**Formal recognition of learning outcomes**	The process of granting official status by a competent authority to acquired learning outcomes for purposes of further studies or employment, through (i) the award of qualifications (certificates, diploma or titles); (ii) the validation of non-formal and informal learning; (iii) the grant of equivalence, credit or waivers [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
14.	**Green skills**	Abilities needed to live in, develop and support a society which aims to reduce the negative impact of human activity on the environment. ○ generic green skills help develop awareness-raising or implementation of resource-efficient activities, ecocitizenship, etc.; ○ specific green skills are required to implement standards and processes to protect ecosystems and biodiversity, and to reduce energy, materials and water consumption; ○ highly-specialised green skills are required to develop and implement green technologies such as renewable energies, sewage treatment or recycling [1]. **Source:** [1] Cedefop. *Terminology of European education and training policy. A selection of 130 key terms. Second edition*. Luxembourg: Publications Office of the European Union, 2014. Retrieved from: https://www.cedefop.europa.eu/files/4117_en.pdf

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15.	**High-level indicators for standardisation education (HLI)**	A key-aspect of standardisation education, which should be implemented in all forms of standardisation teaching accordingly and measured quantitatively or qualitatively (ECTS or other forms of micro-credits for professionals). Thus, the HLI comes with minimum and maximum values as preset. Starting point: 1) coverage of the standardisation under IEC, ISO, ITU-lead; 2) updates to global standardisation fora and consortia, 3) coverage of technical and societal aspects of standardisation (multidisciplinary orientation), 4) aspects of human-centric standardisation, European core-values, 5) green and digital skills through standardisation, 6) gender-responsive standardisation. The compliance with the teaching concept is measured in the # of academic hours dedicated to each of the five aspects [1]. **Source:** [1] GA 101135705 EDU4Standards.eu, Part B, p8.
16.	**Higher education institution (HEI)**	An institution which, in accordance with national law or practice, offers recognised degrees or other recognised tertiary level qualifications [1]. **Source:** [1] Erasmus+. *Glossary of terms.* Retrieved from: https://erasmus-plus.ec.europa.eu/programme-guide/part-d/glossary-higher-education#:~:text=Means%20an%20institution%20which%2C%20in,national%20authorities%20as%20eligible%20to
17.	**Informal learning**	Learning resulting from daily activities related to work, family or leisure. It is not organised or structured in terms of objectives, time or learning support. Informal learning is in most cases unintentional from the learner's perspective. ○ informal learning outcomes may be validated and certified; ○ informal learning is also referred to as experiential or incidental/random learning [1]. **Source:** [1] Cedefop (2008). *Terminology of European education and training policy – A selection of 100 key terms*. Luxembourg: Publications Office. Retrieved from: http://www.cedefop.europa.eu/en/files/4064_en.pdf

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18.	**Innovative Teaching Concept of Standardisation (ITCoS)**	In the context of the EDU4Standards.eu project, the ITCoS represents a hierarchical model for curricula development of education on standardisation. The ITCoS aims to bridge industrial and societal facets as well as integrate the aspects of responsible, human-centric standardisation and the EU core values into standards-development processes. ITCoS should foster the development of green and digital skills and underline their respective support through standardisation [1]. **Source:** [1]. EDU4Standards.eu Proposal, p. 26-27.
19.	**Knowledge**	Knowledge means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
20.	**Learning aim**	A broad statement of teaching intention, i.e. it indicates what the teacher intends to cover in a block of learning. Aims are usually written from the teachers' point of view to indicate the general content and direction [of a programme] [1] [2]. **Source:** [1] Cedefop. *Defining, writing and applying learning outcomes. A European handbook*. Luxembourg: Publications Office of the European Union, 2017. Retrieved from: https://www.cedefop.europa.eu/files/4156_en.pdf [2] Kennedy, D. et al. (2006). *Writing and using learning outcomes: a practical guide*. Quality Promotion Unit, University College Cork. Retrieved from: https://cora.ucc.ie/server/api/core/bitstreams/88bdd1f3-4e1c-4cf8-baf4-df28d4f094c5/content
21.	**Learning objective**	A specific statement of teaching intention, i.e. it indicates one of the specific areas that the teacher intends to cover in a block of learning [1] [2].

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		Source: [1] Cedefop. *Defining, writing and applying learning outcomes. A European handbook*. Luxembourg: Publications Office of the European Union, 2017. Retrieved from: https://www.cedefop.europa.eu/files/4156_en.pdf [2] Kennedy, D. et al. (2006). *Writing and using learning outcomes: a practical guide*. Quality Promotion Unit, University College Cork. Retrieved from: https://cora.ucc.ie/server/api/core/bitstreams/88bdd1f3-4e1c-4cf8-baf4-df28d4f094c5/content
22.	**Learning outcome**	Learning outcomes are statements of what an individual should know, understand and/or be able to do at the end of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy [1]. The term learning outcomes is introduced from the 1970s and onwards, signalling a more learner-centred approach. The distinction between objectives and outcomes can also be captured through the distinction between 'product' and 'process' models for curriculum development [2]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01) [2] Cedefop. *Defining, writing and applying learning outcomes. A European handbook*. Luxembourg: Publications Office of the European Union, 2017. Retrieved from: https://www.cedefop.europa.eu/files/4156_en.pdf
		• **Intended** vs **achieved learning outcomes** Intended learning outcomes are statements of intentions and expectations. They are not outcomes of learning, but desired targets. Achieved learning outcomes can only be identified following the learning process, through assessment and demonstration of achieved learning in real life, for example at work [1]. Improving the way learning outcomes are defined, described and used requires continuous dialogue (the feedback loop) between intended and actual outcomes. The experiences from actually achieved outcomes should be used systematically to improve statements of intentions, as for example found in curricula [1].

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		Source: [1] Cedefop. *Defining, writing and applying learning outcomes. A European handbook*. Luxembourg: Publications Office of the European Union, 2017. Retrieved from: https://www.cedefop.europa.eu/files/4156_en.pdf
23.	**Non-formal learning**	Non-formal learning is normally structured learning (e.g. in-company training) [1]. It is acquisition of knowledge, know-how, information, values, skills and competences in the framework of planned activities – in terms of learning objectives, time or resources – where some form of learning support is present (e.g. student-teacher/trainer relationships). • Non-formal learning is intentional from the learner's point of view; • it may cover programmes to impart work skills, adult literacy and basic education for early school leavers; very common cases of non-formal learning include in-company training, through which companies update and improve the skills of their workers such as ICT skills, structured on-line learning (e.g. by making use of open educational resources), and courses organised by civil society organisations for their members, their target group or the general public; • outcomes of non-formal learning may be validated and may lead to certification; • non-formal learning is sometimes described as semi-structured learning; • this term is close to, but not synonymous with: informal learning [2]. **Source:** [1] Europass. Europaen Union. *Validation of non-formal and informal learning*, Retrieved from: https://europass.europa.eu/en/validation-non-formal-and-informal-learning [2] Cedefop, Council of the European Union (2012). *Non-formal learning*. Retrieved from: https://www.cedefop.europa.eu/en/tools/vet-glossary/glossary?letter=N
24.	**Qualification**	A formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)

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		• **International qualification** a qualification awarded by a legally established international body (association, organisation, sector or company) or by a national body acting on behalf of an international body that is used in more than one country and that includes learning outcomes assessed with reference to standards established by an international body [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
25.	**Qualification system**	All activities related to the recognition of learning outcomes and other mechanisms that link education and training to the labour market and civil society. These activities include: ○ definition of qualification policy, training design and implementation, institutional arrangements, funding, quality assurance; ○ assessment and certification of learning outcomes. A national qualifications system may be composed of several subsystems and may include a national qualifications framework [1] [2]. **Source:** [1] Cedefop (2008). *Terminology of European education and training policy – A selection of 100 key terms*. Luxembourg: Publications Office. Retrieved from: http://www.cedefop.europa.eu/en/files/4064_en.pdf [2] European Parliament and Council of the European Union (2008). Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European qualifications framework for lifelong learning. Official Journal of the European Union, c 111, 6.5.2008, pp. 1-7. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008H0506(01)
26.	**Responsibility and autonomy (in an educational setting)**	The ability of the learner to apply knowledge and skills autonomously and with responsibility [1]. **Source:**

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		[1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
27.	**Skills**	The ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments) [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
28.	**Skill gap**	Situation where an individual does not have the level of skills required to perform his or her job adequately. ○ skill gaps can be analysed at individual level (using a skills audit), at company/sector level, or at regional, national or international levels; ○ skill gaps can be linked to an insufficient level of qualification; they may also refer to situations where the workforce has the right level of qualification but lacks specific types of skills (such as management skills) or experience required to perform a task or a job adequately [1]. **Source:** [1] Cedefop (2010). *The skill matching challenge – Analysing skill mismatch and policy implications*. Luxembourg: Publications Office. Retrieved from: https://www.cedefop.europa.eu/files/3056_en.pdf
29.	**Skill mismatch**	Situation of imbalance in which the level or type of skills available does not correspond to labour market needs. ○ Skills mismatch can be a surplus or a lack of knowledge, abilities and competences; ○ Skill mismatch can be analysed at different levels (individual, enterprise, sectoral, economy);

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		○ Experts distinguish between vertical mismatch (the level of education/skills is higher or lower than required) and horizontal mismatch (the level of education/skills matches job requirements, but the type of education/skills is inappropriate for the current job) [1]. **Source:** [1] Cedefop. *Terminology of European education and training policy. A selection of 130 key terms. Second edition*. Luxembourg: Publications Office of the European Union, 2014. Retrieved from: https://www.cedefop.europa.eu/files/4117_en.pdf
30.	**Validation of non-formal and informal learning**	The process of confirmation by a competent authority that an individual has acquired learning outcomes acquired in non-formal and informal learning settings measured against a relevant standard and consists of the following four distinct phases: identification through dialogue of particular experiences of an individual, documentation to make visible the individual's experiences, a formal assessment of those experiences and certification of the results of the assessment which may lead to a partial or full qualification [1]. **Source:** [1] Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03). Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)
31.	**Vocational education and training (VET)**	Vocational education and training prepares people for work and develops citizens' skills to remain employable and respond to the needs of the economy. Vocational education and training (VET) provides learners with essential skills enhancing their employability, supporting their personal development and encouraging active citizenship. VET boosts enterprise performance, competitiveness, research and innovation. VET systems in Europe rely on a well-developed network of VET stakeholders. These networks are governed with the involvement of social partners, such as employers and trade unions, and in different bodies, for example chambers, committees and councils [1]. **Source:**

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		[1] European Education Area. *Vocational education and training initiatives.* Retrieved from: https://education.ec.europa.eu/education-levels/vocational-education-and-training/about-vocational-education-and-training

Table 12: Terms related to (standardisation) education

1.5. Standardisation relevant organisations

	Term	Definition[12] / Common understanding & Source
1.	**Annex III organisations**	Three organisations have a special role in promoting the interests of civil society in the development of standards in Europe, and internationally: ○ ANEC: The European consumer voice in standardisation. ○ ECOS: The European Environmental Citizens' Organisation in Standardisation. ○ ETUC: The European Trade Union Confederation. Three organisations represent a wide range of national civil society organisations across the European Union, European Free Trade Association, and beyond. ANEC, ECOS and ETUC ensure the expertise needed for better standards and bring balance to a standardisation system which they legitimise through their participation and contributions. [1] **Source:** [1] CEN-CENELEC. *Civil Society.* Retrieved from: https://www.cencenelec.eu/media/CEN-CENELEC/Get%20Involved/Societal%20Stakeholders/civilsocietyleaflet.pdf

[12] Definitions are taken directly from the sources listed.

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2.	**European Association of National Metrology Institutes (EURAMET)**	At the European level, the European Collaboration in Measurement Standards (EUROMET) was established in 1987 in Madrid, as a legal entity, to coordinate European metrology [1]. In 2007 the European Association of National Metrology Institutes (EURAMET) was established as a registered association of public utility under German law [2]. The EURAMET aims to coordinate the cooperation of European NMIs in the areas such as ''research in metrology, traceability of measurements to the *SI* units, international recognition of national measurement standards and related Calibration and Measurement Capabilities (CMC) [3]. Through sharing knowledge and capabilities among its members, the EURAMET aims to encourage the development of national metrology infrastructures [3]. EURAMET is not a legally recognised SDO. To learn more about the EURAMET, please visit the following link: ○ https://www.euramet.org **Sources**: [1] Erard, L. et al. (2006). "Organisation of Metrology: Industrial, Scientific, Legal". In D., Placko (Ed.). *Metrology in industry - The Key for Quality (1st ed.)*. London: ISTE Ltd., pp. 51. [2] Howarth, P., Redgrave, F. (2008). *Metrology – In Short (EURAMET, 3rd ed.)*. Retrieved from: https://www.euramet.org/publications-media-centre/documents/metrology-in-short/?L=0, pp. 30. [3] EURAMET (2022). About EURAMET. Retrieved from: https://www.euramet.org/about-euramet/
3.	**European Committee for Electrotechnical Standardisation (CENELEC)**	CENELEC, the European Committee for Electrotechnical Standardisation, is an association that brings together the National Electrotechnical Committees of 34 European countries. CENELEC supports standardisation activities in relation to a wide range of fields and sectors including: Electromagnetic compatibility, Accumulators, primary cells and primary batteries, Insulated wire and cable, Electrical equipment and apparatus, Electronic, electromechanical and electrotechnical supplies, Electric motors and transformers, Lighting equipment and electric lamps, Low Voltage electrical installations material, Electric vehicles railways, smart grid, smart metering, solar (photovoltaic) electricity systems, etc. [1] [2]. CENELEC is officially recognised as a European standards body. **Source:** [1] CEN-CENELEC. (2023). *About CENELEC*. Retrieved from: https://www.cencenelec.eu/about-cenelec/ [2] European Commission (2023a). *Single Market and standards, European standards, Key players in European Standardisation*. Retrieved from: https://single-market-economy.ec.europa.eu/single-market/european-standards/key-players-european-standardisation_en
4.	**European Committee for Standardisation (CEN)**	CEN, the European Committee for Standardisation, is an association that brings together the National Standardisation Bodies of 34 European countries. CEN supports standardisation activities in relation to a wide range of fields and sectors including air and space, chemicals, construction, consumer products, defence and security, energy, the environment, food

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		and feed, health and safety, healthcare, ICT, machinery, materials, pressure equipment, services, smart living, transport and packaging [1] [2]. CEN is officially recognised as a European standards body. **Source:** [1] CEN-CENELEC. (2023). *About CENELEC*. Retrieved from: https://www.cencenelec.eu/about-cenelec/ [2] European Commission (2023a). *Single Market and standards, European standards, Key players in European Standardisation*. Retrieved from: https://single-market-economy.ec.europa.eu/single-market/european-standards/key-players-european-standardisation_en
5.	**European Telecommunications Standards Institute (ETSI)**	ETSI was set up in 1988 by the European Conference of Postal and Telecommunications Administrations in response to proposals from the European Commission [1]. It is a not-for-profit organisation with 900 member organisations drawn from over 60 countries and five continents, as an association under French law [1]. ETSI is recognised as a regional standards body dealing with telecommunications, broadcasting, and other electronic communications networks and services [1]. It provides the opportunities, resources, and platforms to understand, shape, drive and collaborate on globally applicable standards [2]. **Source**: [1] ETSI (2023). *About ETSI*. Retrieved from: https://www.etsi.org/about [2] ETSI (2022). *ETSI Structure*. Retrieved from: https://www.etsi.org/about/our-structure
6.	**Institute of Electrical and Electronic Engineers (IEEE)**	The Institute of Electrical and Electronics Engineers (IEEE) is a leading consensus building organisation that nurtures, develops and advances global technologies. It brings together experts from over 160 countries – "from a wide range of technical and geographical points, to collaborate on standards development" [1]. **Source:** [1] IEEE (2023). *IEEE: About Us.* Retrieved from: https://standards.ieee.org/about/
7.	**International Electrotechnical Commission (IEC)**	The IEC aims at bringing together thousands of experts to work within the IEC TCs and SCs. These experts are appointed by their National Committees (NCs) to share their knowledge, skills, and competence, and to develop voluntary consensus-based international standards [1]. Only National Committees may become IEC members, either as full or associate members and it may be only one National Committee per country [2]. The IEC also runs the Affiliate Country Programme, by enabling developing and/or newly developed countries to get involved in technical committees and standards development without financial costs [2].

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		To learn more about the IEC, please visit the following link: ○ https://iec.ch/ **Source:** [1] IEC. *Technical committees and subcommittees*. Retrieved from: https://www.iec.ch/technical-committees-and-subcommittees [2] IEC. *National Committees*. Retrieved from: https://iec.ch/national-committees
8.	**International Laboratory Accreditation Cooperation (ILAC) & International Accreditation Forum (IAF)**	At the international level, two key international organisations are the International Laboratory Accreditation Cooperation (ILAC) and the International Accreditation Forum (IAF) both having the aim of facilitating international trade through enhanced confidence [1]. The ILAC was established in 1977 to promote good practice solutions within testing and calibration and to promote the international acceptance of the activities of the laboratories conducting these activities [1]. The IAF was established in 1993 with similar aims related to quality management systems certification (e.g. conforming to ISO 9001) [1]. Subsequently, the scope of the IAF was extended to cover other management systems standards [1]. Since 2001, the ILAC and the IAF have been cooperating to achieve ''improved alignment of their work programmes, as this contributes to the effectiveness and efficiency of both organisations, their mutual members and delivery of value to their stakeholders'' [2]. These two organisations have established and managed MRAs among their members, whereby each member, by signing the MRA, accepts the inspection and test reports and certificates issued by another party in the system as being equal to the one issued by itself [3]. To learn more about the ILAC, please visit the following link: ○ https://ilac.org/ To learn more about the IAF, please visit the following link: ○ https://iaf.nu/en/home/ **Source**: [1] ISO/UNIDO (2010). *Building trust. The Conformity Assessment Toolbox*. Retrieved from: https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/casco_building-trust.pdf, pp. 25. [2] ILAC/IAF (2023). *ILAC/IAF Partnership*. Retrieved from: https://ilac.org/about-ilac/partnerships/international-partners/iaf/ [3] Kellerman, M. (2019). *Ensuring Quality to Gain Access to Global Markets (A Reform Toolkit)*. Retrieved from: https://thedocs.worldbank.org/en/doc/249621553265195570-0090022019/original/FullQIToolkitReport.pdf, pp. 101.

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9.	**International Organisation for Standardisation (ISO)**	As an independent, non-governmental, formal organisation for standardisation, ISO aims at bringing together members from 167 different countries to develop voluntary, consensus-based, international standards while contributing significantly to sustainable development [1]. Only national organisations for standardisation can become ISO members and there can be only one member per country [1]. There are three member categories: full members, correspondent members, and subscriber members, and each category enjoys different benefits within the ISO system [2]. To learn more about the ISO, please visit the following link: ○ https://www.iso.org/ **Source:** [1] ISO. *ISO: ABOUT US*. Retrieved from: https://www.iso.org/about-us.html [2] ISO. *ISO: MEMBERS*. Retrieved from: https://www.iso.org/members.html
10.	**International Organisation of Legal Metrology (OIML)**	The International Organisation of Legal Metrology (*Organisation Internationale de Métrologie Légale – OIML*) is an intergovernmental treaty organisation, established in 1955, at the Convention, and "aims to enable economies to put in place effective legal metrology infrastructures that are mutually compatible and internationally recognised, for all areas for which governments take responsibility, such as those which facilitate trade, establish mutual confidence and harmonise the level of consumer protection worldwide" [1]. In 2023, the OIML had 63 member countries and 64 corresponding member countries [2]. To learn more about the OIML, please visit the following link: ○ https://www.oiml.org/en **Source**: [1] OIML. *What is the OIML?*. Retrieved from: https://www.oiml.org/en/about/about-oiml [2] OIML. *Our members*. Retrieved from: https://www.oiml.org/en/structure/members
11.	**International Telecommunication Union**	As the United Nations specialised agency for information and communication technologies - ITU aims at developing voluntary consensus-based international standards to ensure that international networks and technologies may easily connect in communications networks [1]. Currently, the ITU brings together more than 20,000 experts from all over the world [1]. ITU members are mainly technology professionals from the government, micro, small, medium-sized, and, large enterprises, educational establishments, and national, regional, and international organisations [1]. With 193 Member States and over 900 companies, universities, and other organisations, ITU membership shapes the future of standards and standardisation [1]. To learn more about the ITU, please visit the following link: ○ https://www.itu.int/

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		Source: [1] ITU. *About International Telecommunication Union (ITU)*. Retrieved from: https://www.itu.int/en/about/Pages/default.aspx

Table 13: Standardisation relevant organisations

1.6. Terms and definitions as referred to in Regulation (EU) No 1025/2012

	Term	Definition[13] & Source
1.	**Draft standard**	A document containing the text of the technical specifications concerning a given subject, which is being considered for adoption in accordance with the relevant standards procedure, as that document stands after the preparatory work and as circulated for public comment or scrutiny.
2.	**European standard**	A standard adopted by a European standardisation organisation.
3.	**European standardisation deliverable**	Any other technical specification than a European standard, adopted by a European standardisation organisation for repeated or continuous application and with which compliance is not compulsory.
4.	**European standardisation organisation**	An organisation listed in Annex I.

[13] Definitions are taken directly from Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council Text with EEA relevance. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012R1025

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5.	**Harmonised standard**	A European standard adopted on the basis of a request made by the Commission for the application of Union harmonisation legislation.
6.	**ICT technical specification**	A technical specification in the field of information and communication technologies.
7.	**International standard**	A standard adopted by an international standardisation body.
8.	**International standardisation body**	The International Organisation for Standardisation (ISO), the International Electrotechnical Commission (IEC) and the International Telecommunication Union (ITU).
9.	**National standard**	A standard adopted by a national standardisation body.
10.	**National standardisation body**	A body notified to the Commission by a Member State in accordance with Article 27 of this Regulation.
11.	**Product**	Any industrially manufactured product and any agricultural product, including fish products.
12.	**Service**	Any self-employed economic activity normally provided for remuneration, as defined in Article 57 TFEU.
13.	**Standard**	A technical specification, adopted by a recognised standardisation body, for repeated or continuous application, with which compliance is not compulsory, and which is one of the following: (a) 'international standard' (b) 'European standard' (c) 'harmonised standard' (d) 'national standard'.

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14.	**Technical specification**	A document that prescribes technical requirements to be fulfilled by a product, process, service or system and which lays down one or more of the following: (a) the characteristics required of a product including levels of quality, performance, interoperability, environmental protection, health, safety or dimensions, and including the requirements applicable to the product as regards the name under which the product is sold, terminology, symbols, testing and test methods, packaging, marking or labelling and conformity assessment procedures; (b) production methods and processes used in respect of agricultural products as defined in Article 38(1) TFEU, products intended for human and animal consumption, and medicinal products, as well as production methods and processes relating to other products, where these have an effect on their characteristics; (c) the characteristics required of a service including levels of quality, performance, interoperability, environmental protection, health or safety, and including the requirements applicable to the provider as regards the information to be made available to the recipient, as specified in Article 22(1) to (3) of Directive 2006/123/EC; (d) the methods and the criteria for assessing the performance of construction products, as defined in point 1 of Article 2 of Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products, in relation to their essential characteristics.

Table 14: Terms and definitions as referred to in Regulation (EU) No 1025/2012

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