EDU4 Standards.eu

Webinar Series

Standardisation in research and technology for practitioners

Knut Blind, Fraunhofer ISI

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Content

- Background: EDU4Standards
- Pilot EARTO

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EDU4Standards's structure at a glance

EDU4Standards.eu - Empowering Standardisation through Education in Europe

OBJECTIVES

- **Obj.1**: Develop and disseminate teaching material about standardisation
- **Obj.2**: Increase the visibility via "Academic Standardisation Days" (ASDs)
- **Obj.3**: Increase the number of HEI & universities offering teaching on standardisation
- **Obj.4**: Increase number of teachers offering courses and students attending courses about standardisation
- **Obj.5**: Set up a Students' Standardisation Association (SSA)

Community

- Standardisation Student Association created
- 100+ HEIs exposed to standard education
- 100+ teachers with standardisation knowledge
- 500 students educated in pilots
- 1,500+ engaged community members
- EURAS
- External Advisory Group (EAG)

Innovative Teaching Concept of Standardisation (ITCoS)

Web Platform

Student Standardisation Association & Academic Standardisation Days

EDU4Standards.eu
Empowering Standardisation through Education
ecosystem

Pilots

a. B.Sc course
b. M.Sc course
c. In-company Training
d. Extra-curricular format
e. Seasonal university school
f. Pan-EU EARTO
g. Distance learning

EU & International Synergies

- > 10 Mutual cooperations with National, European, and Int'l organisations and initiatives
- Continuous engagement and exchanges on all ICT standards topics
- Interaction with Policy makers: (Including: EURAS, MSPs, Sherpa Groups of the High-level Standardisation Forum, STAIR, ISO, IEC, ITU & IEEE etc
- Collaborations with HE Standards projects:

HSbooster.eu · StandICT.eu · STAND4EU

Outreach

- 4 Pilot Workshops
- 10 Webinars
- 5 Academic Standardisation Days
- 2 CEN Workshop Agreement Meetings
- 1 Final event
- 12 newsletters
- 3 Press Releases
- 10 Professional Videos
- Visibility at >15 3rd party events
- PPC Campaign
- Social media channels

Reports & other value-add output

- Whitepapers & Scientific Publications
- Online Teaching Content
- CEN Workshop Agreement
- Pilot evaluation reports
- Sustainability strategy
- Policy Recommendations
- EU Standardisation Roadmap
- All Results published via zenodo

SG 1 HEIs/universities

SG 2 Teachers & standards educators

SG 3 Students & Student Associations

SG 4 Standard Development Organisations

SG 5 Policy Makers

SG 6 Environmental and consumer organisations

SG 7 Research organisations & EU projects

SG 8 Industry & SMEs

SG 9 Citizens and citizen groups

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Target groups:

- Beginners “Research & Development and Standardisation” course provides a concise yet in-depth understanding of standardisation as relevant from an Research and Technology (RTO) perspective.
- Intermediate experts “Effectively participating in standardisation bodies” course addresses skills to operate in standards bodies.
- Sophisticated experts “Strategic standardization for RTOs” high-level course, aimed at senior researchers, offers a tailored format for standardisation topics for management level also related to RTO’s business models (e.g. IPRs, SEPs, Open Source)

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Contents

Webinar series Standardisation in research and technology for practitioners:

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- Modul 2: Types and Impacts of Standards 13.11. 2025
- Modul 3: Research and Standardisation 20.11. 2025
- Modul 4: IPRs and Standardisation 27.11. 2025
- Modul 5: Open Source and Standardisation with Mirko Böhm LF 4.12. 2025
- Modul 6: Geopolitics, Values and Standardisation with Barbara Reiter Uni Graz 11.12. 2025

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Module 6
Geopolitics, Values and Standardisation

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General Information

Accompanying scientific articles:

- Edler, J.; Blind, K.; Kroll, H.; Schubert, T. (2023): Technology sovereignty as an emerging frame for innovation policy. Defining rationales, ends and means, Research Policy, Volume 52, Issue 6, 104765
  - Available at: https://www.sciencedirect.com/science/article/pii/S0048733323000495
- Blind, K. (2025): Standardization and Standards: Safeguards of Technological Sovereignty?, Technological Forecasting and Social Change, Volume 210, 2025, 123873, https://doi.org/10.1016/j.techfore.2024.123873
  - Available at: https://www.sciencedirect.com/science/article/pii/S0040162524006711

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Geopolitics, technological sovereignty and standardisation

- The learning objectives of this part of the webinar are:
  - To know the **geopolitical dimensions** relevant for **standardisation**
  - To understand the concept of **technological sovereignty**
  - To **explain the role of standardisation** and standards in contributing to achieving and safeguarding **technological sovereignty**
  - To **apply standardisation** and standards **for safeguarding technological sovereignty in specific contexts**
  - To analyse the **challenges** faced by countries in **leveraging standardisation for technological sovereignty**

1. Introduction

- Technological competition intensifying
  - ...with Europe fearing to fall behind in critical technologies, and this time compared to China and India
  - ...linked to systems and value competition (see EU Standardisation Strategy, 2022 and US Standardisation Strategy, 2023)
- Global interconnectedness provides great benefits, but can also create vulnerabilities further triggered by the Russian attack of the Ukraine
- Tension: A protectionist race vs legitimate ambition to determine one's own future independently
- Innovation policy rationales (competitiveness, transformation) challenged, but also industrial policy by a "new" concern (including security, defense and value discussion)

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2. Standards and Geopolitics: Contextual Dimensions

- Geographical Dimension
  - Physical location of states = exogenous
  - Standards enable infrastructure (e.g., railways), affect mobility & geopolitics
  - Example: China's Belt and Road Initiative promotes Chinese standards abroad
- Cultural Dimension
  - Comprises language, identity, ethics
  - Limited short-term relevance of standards
  - EU Strategy (2022): Push for embedding democratic values in standards
- Environmental Dimension
  - Natural resource access tied to geography
  - Standards enhance: Mining efficiency Climate goals (e.g., GHG reduction, energy efficiency) SDGs & empirical backing (e.g., Prakash & Potoski, 2014

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2. Standards and Geopolitics: Contextual Dimensions

- Military Dimension
  - Rise in importance due to geopolitical conflict (e.g., Ukraine)
  - NATO standards key for procurement, ICT, cybersecurity
  - Standards like ISO 27001 relevant for defense & resilience
- Technological Dimension
  - Technologies affect global power relations
  - Standards drive: Economies of scale; Network externalities
  - Mobile communication standards = strategic assets
- Economic Dimension
  - Tied to market size, firm strength, and global competitiveness
  - Standards shape: Trade flows, Global value chains, Influence in international standard setting

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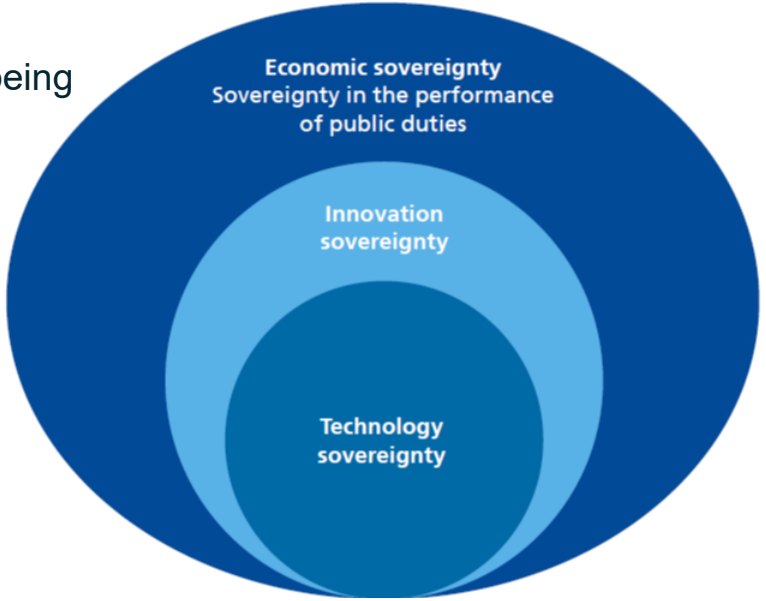
3. Definition of Technological Sovereignty and basic understanding

Ability of a state or a federation of states to develop technologies it deems critical for its welfare, competitiveness, and ability to act

or source them from other economic areas without one-sided structural dependency

Dynamic concept: preserve future ability to determine well-being and value system

Striving for “domestic” competencies and structural interdependence rather than autarky



- Based on: Edler, J.; Blind, K.; Frietsch, R.; Kimpeler, S.; Kroll, H.; Lerch, C.; Reiss, T.; Roth, F.; Schubert, T.; Schuler, J.; Walz, R. (2020): Technology sovereignty. From demand to concept; Karlsruhe. urn:nbn:de:0011-n-5997578
- See also Edler, J.; Blind, K.; Kroll, H.; Schubert, T. (2023): Technology sovereignty as an emerging frame for innovation policy. Defining rationales, ends and means, Research Policy, Volume 52, Issue 6, 104765 https://www.sciencedirect.com/science/article/pii/S0048733323000495

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Source: Edler et al. (2020)

4. Standardisation and standards safeguarding mechanisms for TS

Objectives

- identification of the role of standardisation and standards within technological sovereignty (TS) and try to answer whether and under which conditions they can serve as its safeguards
- elaboration on how standardisation and standards can help secure or achieve TS considering different context factors
- derivation pf recommendations to promote standardisation as a safeguard of TS
- identification of challenges for standardisation and standards to secure TS

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4. Standardisation and standards safeguarding mechanisms for TS

- no established conceptual framework, approach focuses on innovation, trade, and public policies, particularly the regulatory framework, as essential instruments to assure TS (e.g., Edler et al., 2020) because they can immediately be supported by standardisation and standards
- starting point: standardisation as a knowledge and technology transfer channel (Blind and Gauch, 2009, Blind et al., 2024) and its interlinkages to other channels because it has an essential role for innovation (see a review by Blind 2022)
- standards influence trade flows (Swann 2010) and therefore TS
- standards play in the context of the European Union (EU) an essential role for the specification and eventually the implementation of regulations and other public policies, in particular, to generate an innovation fostering framework (e.g., Blind 2016), in recent EU standardisation strategy (European Commission, 2022), standardisation for shaping technical regulations will play an even more critical role to secure competitiveness and values of EU

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Source: Blind (2023)

4. Standardisation and standards safeguarding mechanisms for TS

Components to be considered

- R&D input incl. skilled labor force necessary for standardisation
- R&D output, as scientific publications, patents and standard-essential patents as input for standards
- software in general and open source in particular as further input into standards
- trade flows, e.g. role of standards. certifications and accreditation for ex- and imports
- public policies, e.g. regulation and public procurement, are specified by standards

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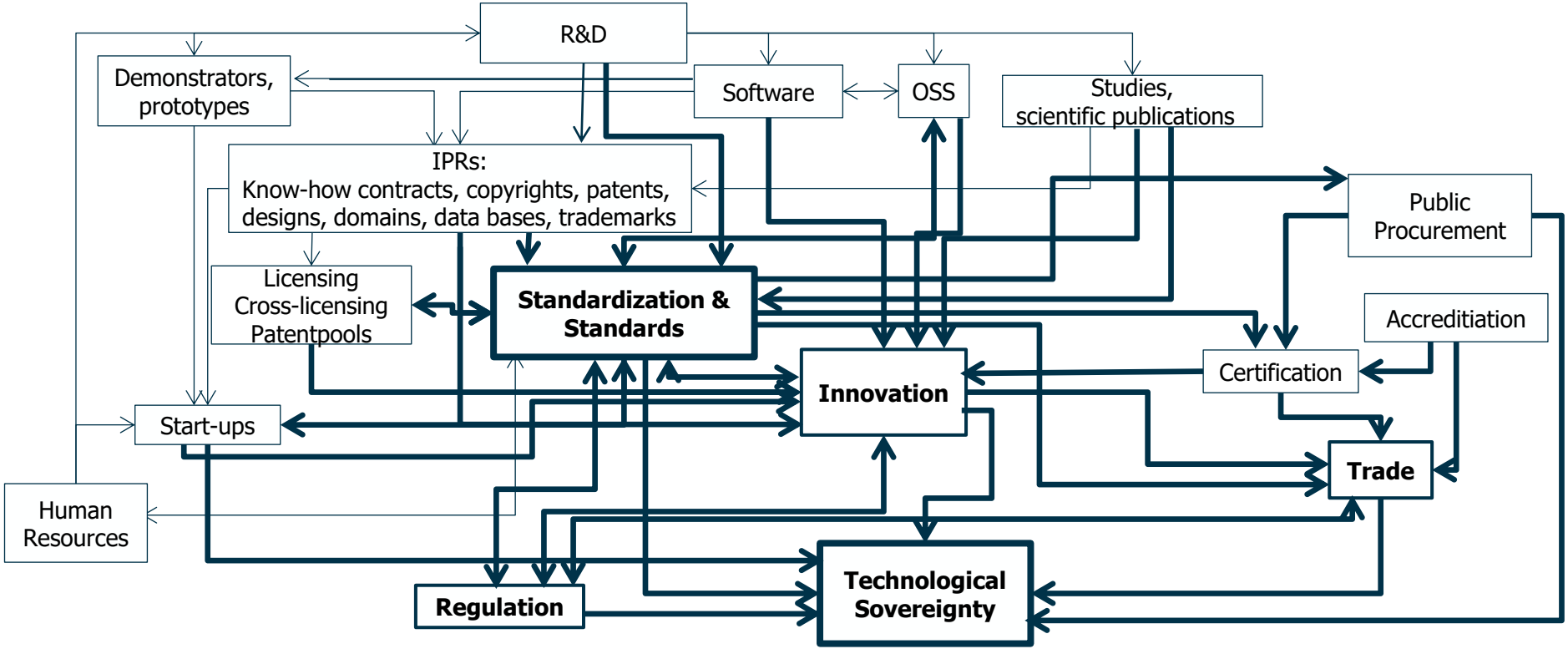
Source: Blind (2023)

4. Standardisation and standards safeguarding mechanisms for TS



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Source: Blind (2023)

4. Standardisation and standards safeguarding mechanisms for TS

Driver	Description	Safeguarding mechanism related to technological sovereignty
Human Resources	Involvement of researchers and experts in standardization processes Indirectly, HR are the essential requirement for R&D and innovation activities	to secure TS by integrating own contents, preventing other countries' content and keep technology use open
R&D	Implicit and proprietary R&D results as input in standardization processes	to secure TS by integrating own contents, preventing other countries' content and keep technology use open
Publications	Publications can be the base for standards	to secure TS by diffusing their contents broadly and in general without limitations
Patents	Patents declared to be standard-essential	to secure TS by being available for all companies world-wide and, therefore, counriesinterested in implementing the standards
Software	Software, particularly Open Source Software, can be the base for standards	to secure TS by being available according to the applicable Open Source licenses for all companies and countries interested in implementing the standards
Innovation	Involvement in standardization and the implementation of standards can promote the innovation capabilities of companies and countries	securing TS by generating product innovation expanding the already existing products and set of suppliers
Trade	Involvement in standardization and the implementation of standards can promote the capabilities of companies and companies to trade goods and services	securing TS by promoting export and import of goods for a larger group of companies and countries
Policy/ Regulation	Policy initiatives, like public procurement referring to international standards or referencing standards in regulations	can secure TS by expanding the number of companies being able to deliver products to public tenders and by harmonizing the regulatory frameworks across countries

Source: Blind (2025)

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4. Standardisation and standards safeguarding mechanisms for TS

Propositions:

- R&D active countries can influence the trajectories in standardisation processes to secure their technological sovereignty (Blind and von Laer, 2021)
- Standards can serve as a backup for technological sovereignty for those countries that do not invest heavily in R&D, similar to their hedging function for companies (Foucart and Li, 2021). However, a minimum level of R&D is necessary to ensure countries' absorptive capacity (Cohen and Levinthal, 1990) to implement them, e.g., in developing countries (Zoo et al., 2017).
- Patent-active countries can influence both the direction of standardisation processes (Buggenhagen and Blind, 2022) and the implementation of standards, e.g., via economically feasible licensing conditions (FRAND) and, therefore, technological sovereignty.
- Standardization and standards are more critical for assuring technological sovereignty related to hardware, whereas OSS is more relevant for software and digital sovereignty

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Source: Blind (2025)

4. Standardisation and standards safeguarding mechanisms for TS

Propositions:

- Public procurement can promote the implementation of international standards to increase the diversity in the supply chain, e.g., supporting innovative start-ups and SMEs to secure countries' technological sovereignty.
- International standards are crucial for supporting domestic exporters' competitive advantage and promoting imports (Swann, 2010), which is even more relevant for technological sovereignty.
- In particular, international standards can complement the primarily nationally specified regulations in heavily regulated sectors to secure technological sovereignty by promoting innovation (Blind and Münch, 2024) and a broad portfolio of suppliers.
- If governmental regulations are not necessarily needed, international standards can provide an open, innovation-friendly framework for emerging technologies, securing countries' technological sovereignty (Blind et al., 2017).

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Source: Blind (2025)

5. Mobile communication standardisation as an illustration

Why 5G & 6G?

- Cited in literature as critical for technological sovereignty (Edler et al., 2020)
- Central to military, economic, and infrastructure domains
- High geopolitical sensitivity due to cybersecurity and global power dynamics

Key Mechanisms & Evidence

- Standardization critical to rollout and innovation in 5G & 6G
- Scientific publications: Non-proprietary knowledge enhances openness
- Open Source Software (OSS): Gaining relevance (e.g., Open RAN)
- Standard-Essential Patents (SEPs): Facilitate global access via FRAND
- Patent pools: Potential to reduce costs & increase licensing efficiency
- Testbeds & demonstrators: Promote 5G adoption and standard alignment
- Start-ups: Over 1,000 linked to 5G standards—an underexplored area

Outlook

- Regulation–standard linkage in EU exists but is underutilized for 5G
- Public procurement & certification weakly tied to 5G standards
- 5G provides a strategic case to examine standardisation's role
- Calls for empirical validation across domains of sovereignty incl. broader tech comparison (e.g., AI, blockchain)

Source: Blind (2025)

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5. Mobile communication standardisation as an illustration

Driver	Indicator (Source)	Empirical evidence (Source)
Human Resources	Involvement of researchers and experts in standardization processes (Da Ponte et al. 2023)	Individuals' ascension to 3GPP leadership positions primarily driven by their individual achievements (Baron & Kanevskaia, 2023).
R&D	Share of 5G R&D investment over total R&D investment within top 2500 companies worldwide (EU Industrial R&D Scoreboard)	Contribution to 5G TS (Da Ponte et al. 2023)
Publications	5G related publications listed in the Web of Science (WoS).	Positive correlation with contributions to 5G standardization (Buggenhagen and Blind, 2022)
Patents	Declared patents to the 5G standard, disclosed by the declaring organization (ETSI database; IPLytics)	Contribution to 5G TS (Da Ponte et al. 2023) Positive correlation with contributions to 5G standardization (Buggenhagen and Blind, 2022)
Software	Open RAN enables interoperability among the RAN components and interfaces and. It increases the flexibility of network deployment through the development and use of open interfaces and open hardware/software (O-RAN Alliance, 2020)	Open RAN as open source initiative reacting to China's lead in 5G standardization via patents (Kim et al. 2023)
Innovation	Share of 5G related firms over total firms (EU Industrial R&D Scoreboard)	Domestic innovation capabilities contribute to 5G TS (Da Ponte et al. 2023)
Trade	Stock of SEPs in ICT (IPlytics)	SEPs related to ICT mainly, i.e. the predecessors of 5G, promote exports and reduce import pressure (Von Laer et al. 2022)
Policy/ Regulation	The EU toolbox for 5G cybersecurity was outlined to guide Member States in tackling the main 5G-related cybersecurity risks, incl. suggestions ensuring a diverse supply chain of vetting equipment suppliers. (NIS 2020)	Securing TS by expanding number of companies being able to deliver products to public tenders and by harmonizing the regulatory frameworks incl. for public procurement across countries

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Source: Blind (2025)

6. Recommendations

- support human resources for R&D (see EU, but also US standardisation strategy), not only technologically skilled engineers but also complementary economic and strategic knowledge needed (Blind and Drechsler, 2020)
- more courses provided by Higher Education Institutes (see also EU Standardization strategy and new project EDU4Standards https://www.edu4standards.eu/).
- interfaces of the already existing publicly funded programs to standardization have to be extended to strengthen the role of standardization and standards (EU standardization strategy, HSBooster, European Standardization Panel)
- reducing participation costs for researchers related to OSS and standardisation (Nagle 2021, Blind et al. 2018)
- improve interface between OSS and standardisation
- assure that governance of standardisation to follow WTO principles plus increase inclusiveness
- look for bilateral and multilateral collaborations
- increase diversity in supply chains via standardization
- promoting patent pools to push market entry of start-ups (Funk and Luo 2020)
- aligning SSOs to needs of start-ups
- reference international standards in public procurement
- using standards to promote open technical infrastructures, like GAIA-X

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Source: Blind (2025)

7. Challenges

- researchers and their institutions still driven by scientific excellence and reputation (Blind et al. 2018) or companies' interests (Blind et al. 2022)
- whereas patents important for funding of R&D, e.g., via licensing revenues, their integration into standardization still - despite licensing regimes under FRAND conditions - challenged
- standards not used as knowledge source for product development (Grossmann et al., 2016), but positively correlate with product innovation (Blind et al. 2022)
- international standards best for international trade (Swann, 2010), global value chains (Blind et al., 2018b) and preferred within trade agreements (Blind and Müller, 2018), but deviations from international standards used to protection of domestic industries
- international standards compete with policymakers' preferred national regulations (OECD, 2021), another option to implement protectionist trade policies
- international standardization consortia and OSS communities not embedded into national regulatory framework although potential to contribute to TS
- large, primarily US-based bigtechs have power to set de facto standards within global value chains (Dinges et al., 2021), which cannot be easily steered towards TS

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Source: Blind (2023)

8. References

- Baron, J., Kanevskaia, O. (2023): Wearing multiple hats—The role of working group chairs' affiliation in standards development, Research Policy, 52, 9, 104822, https://doi.org/10.1016/j.respol.2023.104822.
- Blind, K. (2025): Standardization and Standards: Safeguards of Technological Sovereignty?, Technological Forecasting and Social Change, Volume 210, 123873, https://doi.org/10.1016/j.techfore.2024.123873.
- Blind, K., Müller, J.-A. (2018): The role of standards in the policy debate on the EU-US trade agreement. Journal of Policy Modeling, 42(1): 21-38.
- Blind, K., Münch, F. (2024): The interplay between innovation, standards and regulation in a globalising economy, Journal of Cleaner Production, 445, 141202, https://doi.org/10.1016/j.jclepro.2024.141202.
- Blind, K., Pohlisch, J., Zi, A. (2018a): Publishing, patenting, and standardization: Motives and barriers of scientists, Research Policy, Volume 47, Issue 7, 1185-1197, https://doi.org/10.1016/j.respol.2018.03.011.
- Blind, K., Mangelsdorf, A., Niebel, C., Ramel, F. (2018b). Standards in the global value chains of the European Single Market. Review of International Political Economy, 25(1): 28-48. https://doi.org/10.1080/09692290.2017.1402804.
- Blind, K., Krieger, B., Pellens, M. (2022b): The interplay between product innovation, publishing, patenting and developing standards, Volume 51, Issue 7, 104556.
- Blind, K., von Laer, M. (2022): Paving the path: drivers of standardization participation at ISO. Journal of Technology Transfer. https://doi.org/10.1007/s10961-021-09871-4
- Blind, K., Filipović, E., Lazina, L. K. (2022a): Motives to Publish, to Patent and to Standardize: An Explorative Study Based on Individual Engineers' Assessments, Technological Forecasting and Social Change, 175, 121420, https://doi.org/10.1016/j.techfore.2021.121420
- Buggenhagen, M.; Blind, K. (2022): Development of 5G – Identifying organizations active in publishing, patenting, and standardization, Telecommunications Policy, Volume 46, Issue 4, 102326, https://doi.org/10.1016/j.telpol.2022.102326.
- Cohen, W. M., Levinthal, D. A. (1990): Absorptive Capacity: A New Perspective on Learning and Innovation. Administrative Science Quarterly, 35(1), 128–152. https://doi.org/10.2307/2393553

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8. References

- Da Ponte, A., Leon, G., Alvarez, I. (2023): Technological sovereignty of the EU in advanced 5G mobile communications: An empirical approach, Telecommunications Policy, 47(1), 102459.
- Dinges, M.; Leitner, K.-H.; Wasserbacher, D.; Dachs, B.; Blind, K.; Camps, P.; Delaere, S.; Deshpande, A.; Gunashekar, S.; Virdee, M. (2021): 5G Supply Market Trends, https://op.europa.eu/en/publication-detail/-/publication/074df4ff-f988-11eb-b520-01aa75ed71a1/language-en/format-PDF/source-222511856
- Edler, J.; Blind, K.; Kroll, H.; Schubert, T. (2023): Technology sovereignty as an emerging frame for innovation policy. Defining rationales, ends and means, Research Policy, 52(6), 104765,
- Edler, J.; Blind, K.; Frietsch, R.; Kimpeler, S.; Kroll, H.; Lerch, C.; Reiss, T.; Roth, F.; Schubert, T.; Schuler, J.; Walz, R. (2020): Technology Sovereignty: from demand to concept. Perspectives-Policy Brief. Karlsruhe: Fraunhofer ISI.
- European Commission (2020): Shaping Europe's digital future. European Commission. ISBN 978-92-76-16363-3. DOI:10.2759/091014 . KK-03-20-102-EN-N. https://ec.europa.eu/info/publications/communication-shaping-europes-digitalfuture_en
- Foucart, R.; Li, C. (2021): The Role of Technology Standards in Product Innovation: Theory and Evidence from UK Manufacturing Firms Research Policy. Research Policy. 50, 2, 104157.
- Großmann, A.-M., Filipović E., Lazina, L. (2016): The strategic use of patents and standards for new product development knowledge transfer. R & D Management, 46.2, 312-325.
- Kim, M., Eom, D., Lee, H. (2023): The geopolitics of next generation mobile communication standardization: The case of open RAN, Telecommunications Policy, 47(10), https://doi.org/10.1016/j.telpol.2023.102625.
- NIS (2020): Cybersecurity of 5G networks EU Toolbox of risk-mitigating measures Online at: https://ec.europa.eu/digital-single-market/en/news/cybersecurity-5g-networks- eu-toolbox-risk-mitigating-measures.
- OECD (2021): Recommendation of the Council for Agile Regulatory Governance to Harness Innovation, OECD/LEGAL/0464.
- O-RAN Alliance. (2020): O-RAN use cases and deployment scenarios: Towards open and smart RAN. O-RAN Alliance White Paper. February 2020.
- Swann, G. (2010): International Standards and Trade: A Review of the Empirical Literature, OECD Trade Policy Papers, No. 97, OECD Publishing, Paris, https://doi.org/10.1787/5kmdbg9xktwg-en
- Von Laer, M., Blind, K., Ramel, F. (2022): Standard essential patents and global ICT value chains with a focus on the catching-up of China, Telecommunications Policy, 46, 2, 102110, https://doi.org/10.1016/j.telpol.2021.102110.
- Zoo, H., De Vries, H. J., Lee, H. (2017): Interplay of innovation and standardization: Exploring the relevance in developing countries. Technological Forecasting and Social Change 118, 334-348.

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Source: Blind (2023)

Integrating Ethical Considerations into Standards and Standardisation

Barbara Reiter
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Dr. Barbara Reiter

- Lecturer in the didactics of philosophy and ethics, University of Graz
- Former Professor of Philosophy, Ethics and Professional Ethics at Bern University of Applied Sciences for Social Work
- Scientific lead of the Code of Values and Conduct at the University of Graz
- Questions and topics of interest: How should I live? What makes up the good life?, feminism, didactics, education, aesthetics, film, chance, digitalization, humanisation

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Contents

1. Brief Introduction to Ethics
2. Ethics and Standardisation
3. Ethical Frameworks and Tools
4. Ethics in Edu4Standards.eu project
5. Q&A

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General Information

Accompanying scientific articles:

- Mosakas, K., Fomin, V., Veljanova, H., Staudegger, E., Kuzmuk, O., Bierbauer, D., Laužikas, R., & Reiter, B. (2025). Bringing values to standardisation: From policy concepts to a value-based framework for education about standardisation. Ethics and InformationTechnology, 27, 38
  - Available at: https://doi.org/10.1007/s10676-025-09833-6
- Veljanova, H., Reiter, B., Staudegger, E., Wendt, H. Savini, G. (2024): Intended Learning Outcomes (ILOs) for Standardisation Education,
  - Available at: https://zenodo.org/records/14850559

Ethics and standardisation

- The learning objectives of this part of the webinar are:
  - To know the **geopolitical dimensions** relevant for **standardisation**
  - To understand the concept of **technological sovereignty**
  - To **explain the role of standardisation** and standards in contributing to achieving and safeguarding **technological sovereignty**
  - To **apply standardisation** and standards **for safeguarding technological sovereignty in specific contexts**
  - To analyse the **challenges** faced by countries in **leveraging standardisation for technological sovereignty**

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A world without standards:

What if road signs and traffic lights had no standardised design and meaning?

How would that affect drivers, pedestrians, other road users and the transportation in general?

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Standards ensure for safety, reliability, consistency, understandability, trust.

But are standards ethical and why does embedding ethical considerations in standards and standardisation matter?

A Brief Introduction to Ethics

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- Ethics or moral philosophy is a discipline of philosophy and it is thus also the discipline where we ask a lot of "What is…"-questions. This usually starts a process of critical thinking and does not necessarily come up with answers in a way that people find practical in an obvious way.
- Ethics as a compass: What is the morally right thing to do?

  A means of orientation. To die for and to live by.
- Different motives:
  - *The good life*. Empowerment to live the life I want to live. Virtue Ethics.
  - *Contractualism*. Fairness and discussions.
  - *Care Ethics*. Make sure others are doing well.
  - *Utilitarianism*. Care for the suffering of others. Outcomes matter.
  - *Deontology*. Choose the right action. Categorical Imperative.

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- Values -- What we really care about.
- On an individual level: who we are.
- What makes our lives in a society possible and worthwhile
- Values on different levels
  - Instrumental values: punctuality, conventions, can change over time.
  - Pragmatic values: keep a society together, ensure good lives, change slowly.
  - Moral values: universal, don´t change, intrinsic, valuable in themselves.
- *Technology, usually not a place for ethics, rather of economic interests and guided by efficiency. But more about that later.*

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Core values

Human dignity

Care

Respect

Protection

Freedom

Equality

Autonomy

Sustainability

Responsibility

Trust

Democracy

Rule of law

Participation

- *Who do we want to be?*
- *Which world do we want to live in?*
- *Abstract ideas need context*

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Ethics and Standardisation

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- ✓ Responsible innovation and standardisation
- ✓ Human-centred and trustworthy technology, services, processes…


What are the ethical issues in standards and standardisation?

Two dimensions

Process

Content

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I. Ethical issues at the process level

- Lack of representation
- Lack of interdisciplinary expertise and qualifications
- Lack of transparency and accountability
- Dominance in decision-making
- Strained interpersonal relations

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I. Ethical issues at the process level

Ethical considerations should be integrated at the very beginning of the standards development process and throughout all its stages.

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II. Ethical issues at the content level

- What constitutes an unethical standard?

- Standard that
  - … disadvantages certain groups over others.
  - … is not gender-responsive.
  - … does not consider sustainability aspects.
  - … does not reflect ethical values and principles.
  - … does not consider the interests of all affected stakeholders.

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II. Ethical issues at the content level

Example: Crash test dummies

- Most dummies used in car crash tests are represented by the standardised 50th percentile male body (175cm tall, weighing 78kg, NHTSA).
- Scaled-down version of the male dummy used for women (149cm tall, weighing 48kg, NHTSA).
- Females were at a greater risk of dying from a car crash and more prone to severe injuries in accidents.
- The world's first female crush test dummy developed by a team of Swedish engineers (162cm tall, weighing 62kg).

☞ Gender bias

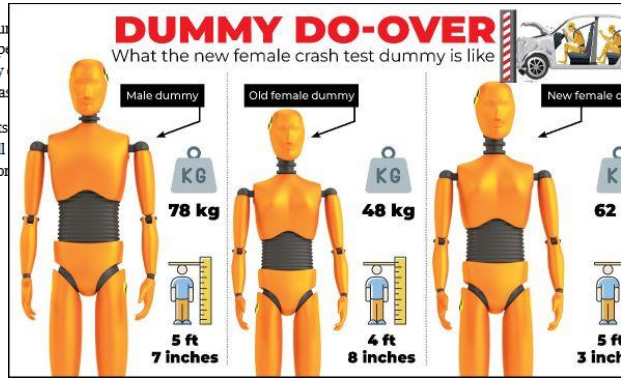
The Crash Test Bias: How Male-Focused Testing Puts Female Drivers at Risk

Researchers have known for decades that women are more likely to be killed or injured in a car crash. Why haven't safety regulators done anything about it?

By Keith Barry. Visualizations by Andy Bergmann.
October 23, 2019

The face of a crash test du
eyes, a pointy nose, and p
expressionless–especially
barrier at speeds as high a

You might assume from its
dummy is an avatar for all
the dummies used in autor



https://www.consumerreports.org/car-safety/crash-test-bias-how-male-focused-testing-puts-female-drivers-at-risk/

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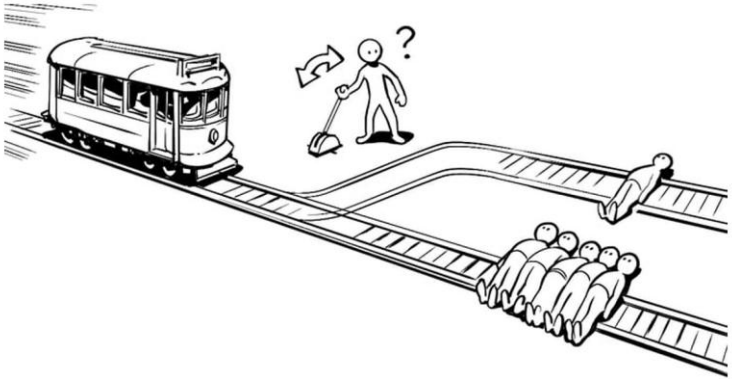
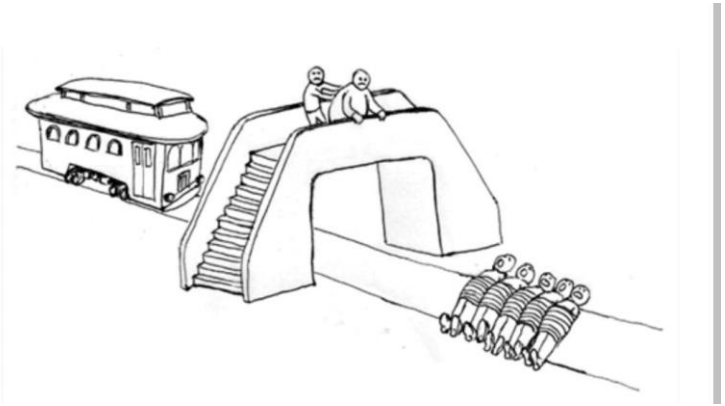
An example from philosophy: The Trolley problem

- Well-known philosophical thought experiment
- Goal: to test our moral intuitions
- First introduced by the British philosopher Philippa Foot in 1967
- The original trolley problem and variations



https://www.reddit.com/r/philosophy/comments/5pjtuw/the_trolly_problem_fully_explained_including/



https://www.reddit.com/r/theydidthemath/comments/17rrfk0/request_how_fat_would_a_man_have_to_be_in_order/?rdt=36001

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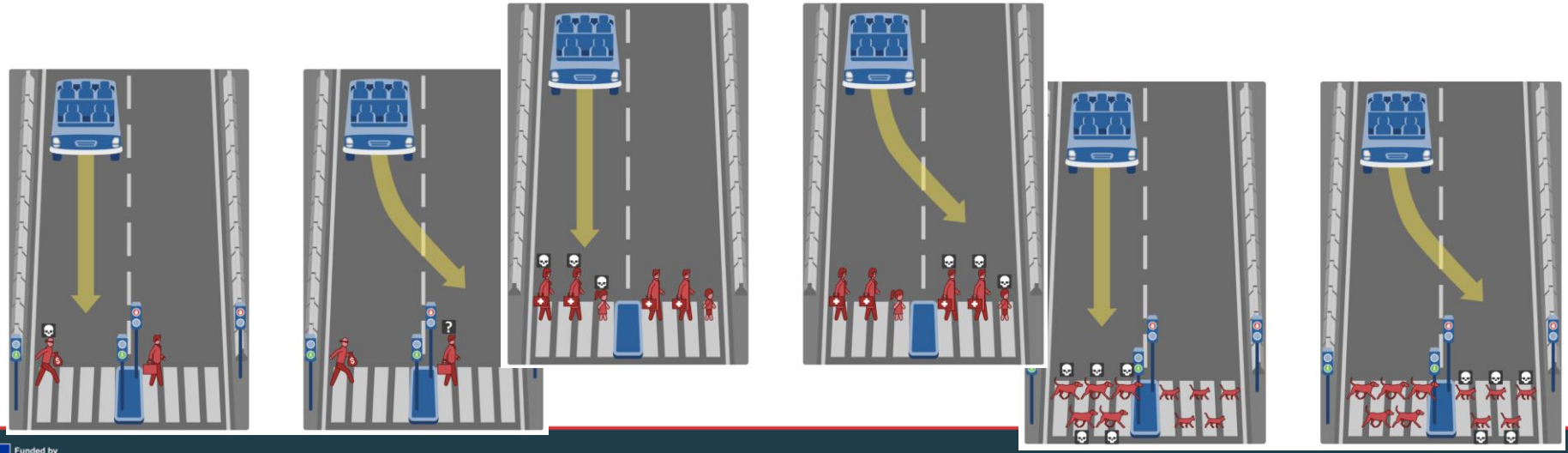
- The Moral Machine
  - platform for gathering human opinion on how machines should make decisions when faced with moral dilemmas
  - moral decisions made by machine intelligence (self-driving cars)
  - https://www.moralmachine.net/



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Examples of ethical values to be considered

Human dignity

Care

Respect

Protection
(safety and security)

Freedom

Sustainability

Autonomy

Non-discrimination

Responsibility and accountability

Fairness

Inclusion

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Positive examples

- ISO 53800:2024 Guidelines for the promotion and implementation of gender equality and women's empowerment
- ISO 19869:2019 Clean cookstoves and clean cooking solutions — Field testing methods for cookstoves

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Ethical Frameworks and Tools

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Frameworks and Tools

1. IEEE 7000-2021
2. Ethics by Design Approach for AI
3. Value sensitive design
4. AI HLEG & ALTAI

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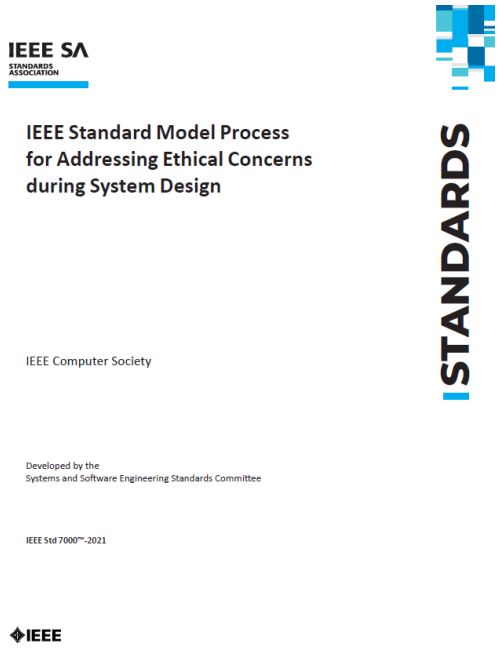
IEEE 7000-2021 Standard Model Process for Addressing Ethical Concerns during System Design

- Establishes a set of well-defined processes to include ethical values considerations during system design and deployment.
- Used for new design and development and for improvement of the ethical attributes of existing systems.
- Supports organisations in creating ethical value through system design.
- Applicable to all kinds of products and services, including AI systems.



https://standards.ieee.org/ieee/7000/6781/

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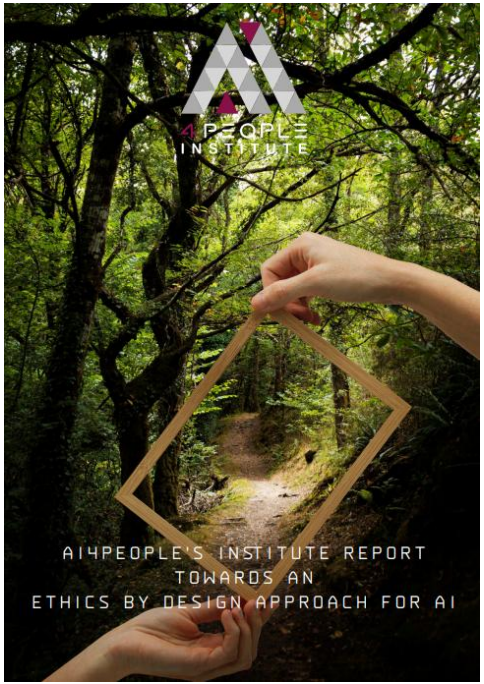
Ethics by Design Approach for AI

- Report by the AI4People Institute
- To support organisations and enterprises of all sizes in proactively designing, developing and maintaining AI systems that are in line with the law, ethical principles and values that underpin the EU.
- Provides a step-by-step description of an EbD process.
- Guidance on how to implement each process phase.
- References to existing best practice methodologies and tools.
- Recommendations for EU institutions on how to better foster and support the adoption of the EbD process.
- Publicly available



https://ai4people.org/wp-content/uploads/2024/06/Towards-an-Ethics-by-Design-Approach-for-AI.pdf

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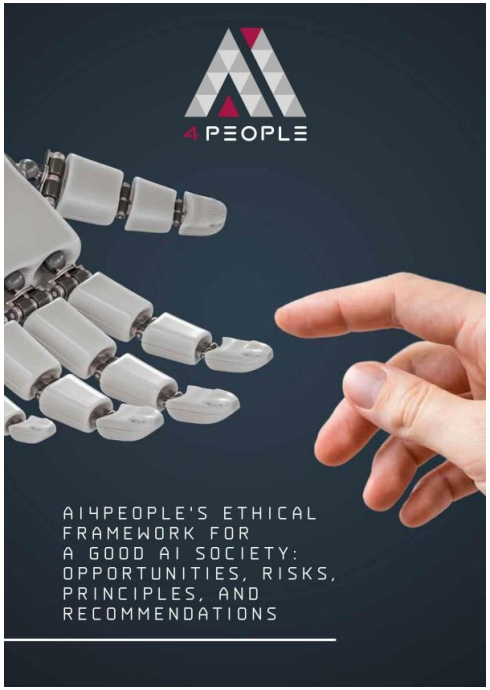
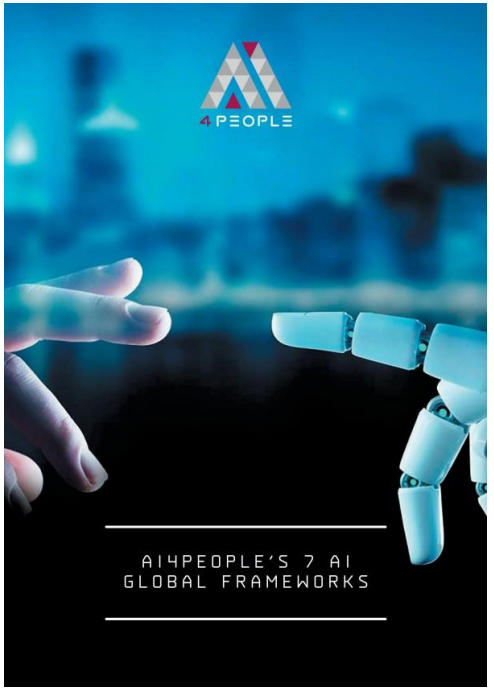


https://ai4people.org/PDF/AI4People_Ethical_Framework_For_A_Good_AI_Society.pdf



https://ai4people.org/PDF/AI4People_7_AI_Global_Frameworks.pdf

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AI HLEG Ethics Guidelines for Trustworthy AI & ALTAI

- Framework for achieving Trustworthy AI, fostering and securing ethical and robust AI.
- Horizontal framework for AI in general
- Context specific application of AI would demand sectorial approach
- Provides guidance on how ethical principles can be operationalised in socio-technical systems
- 3 layers: ethical principles, key requirements and questions
- ALTAI web-based tool

AI HLEG (2019): Ethics Guidelines for Trustworthy AI. [online] https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai .
AI HLEG (2020): The Assessment List For Trustworthy Artificial Intelligence (ALTAI). [online] https://ec.europa.eu/digital-single-market/en/news/assessment-list-trustworthy-artificial-intelligence-altai-self-assessmen .

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Value sensitive design

- A theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process.
- Developed by Friedman et al. in the 1990s
- Tripartite methodology: conceptual, empirical and technical investigations
- Practical suggestions: How do I do it?
- Value sensitive design lab: https://vsdesign.org/

VALUE SENSITIVE DESIGN LAB

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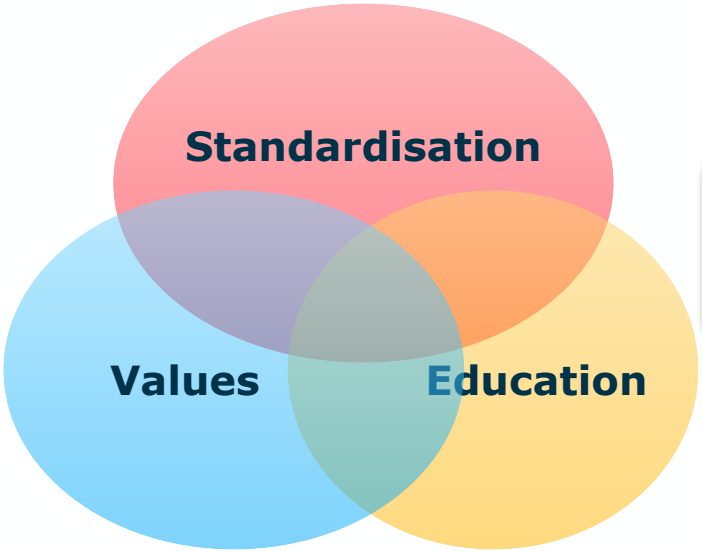
EDU4Standards.eu
Empowering Standardisation through Education



EDU4Standards.eu value-based ILOs framework for standardisation education

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The Edu4Standards.eu ILOs framework

Three-part framework

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

- addresses the issue of fragmented standardisation education by providing a framework with a clear structure and guidance on ILOs and levels of qualification
- shows how values in general can be integrated into standardisation education

2. ILOs framework focusing on the European values in standardisation education (Art. 2 TEU)

- shows how concrete values can be translated into ILOs for each of the levels

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

- shows green, digital and gender skills at all levels

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

Levels		Knowledge as defined in the EQF	Examples of skills	Responsibility and autonomy as defined in the EQF adapted to the educational context
Level 0	**Early childhood education (ex. 0 - 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 (ex. 5 - 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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2. ILOs framework focusing on the European values in standardisation education (Art. 2 TEU)

Levels	Knowledge	Examples of skills					Responsibility and autonomy
		Human dignity	Freedom	Democracy	Equality	The rule of law	
Level 3 Upper secondary education (ex. 14-18)	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 (ex. 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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3. ILOs framework integrating green, digital and gender skills in standardisation education

Levels		Knowledge (as defined in Table 5)	Examples of skills			Responsibility and autonomy
			Green skills	Digital skills	Gender skills	
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.

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Summary

- ✓ Ethical considerations are part of our everyday lives and help us lead our lives.
- ✓ Standards need to be ethical.
- ✓ Ethical considerations should be integrated into standards and standardisation early on, as well as throughout all stages.
- ✓ Ethics and values should be made an integral part of education on standardisation.

How We Shape Standards Defines How We Shape Our Future!

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