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List of acronyms

Acronym	Description
4Cs	Critical Thinking, Communication, Collaboration and Creativity
AI	Artificial Intelligence
AIED	Artificial Intelligence in Education
augMENTOR	Augmented Intelligence for Pedagogically Sustained Training and Education
CEN	European Committee for Standardization (Comité Européen de Normalisation
CENELEC	European Committee for Electrotechnical Standardization
CERTH	Centre for Research and Technology Hellas
DCAT-AP	Data Catalog Vocabulary - Application Profile
EC	European Commission
ECTEL	European Conference on Technology Enhanced Learning
EEAIP	Explainable Educational AI Protocol
EU	European Union
FATE	Fairness, Accountability, Transparency and Ethics
GA	Grant Agreement
GDPR	General Data Protection Regulation
HITL	Human-in-the-Loop
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
ITI	Information Technologies Institute
ITU	International Telecommunication Union
JTC	Joint Technical Committee
KPIs	Key Performance Indicators
LMS	Learning Management System
LPIM	Learner Profile Interoperability Model
MOOC	Massive Open Online Courses
OECD	Organisation for Economic Co-operation and Development
PeDeMET	Pedagogical Design Model with Emerging Technologies
SALA	Semantic Alignment for Learning Analytics
StandICT	Standards in Information and Communication Technologies
TESA	Technology-augmented Educational Scenarios and e-Activities
TÜV	Technischer Überwachungsverein (Technical Inspection Association)
UNI	Ente Italiano di Normazione (Italian Standardization Body)
WP	Work Package
XAI	Explainable Artificial Intelligence

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Executive summary

The aim of D7.2 "Dissemination and Communication Final Report" is to provide a comprehensive account of all communication and dissemination activities carried out throughout the augMENTOR project. This document consolidates the full set of actions implemented, the Key Performance Indicators (KPIs) established for the project, and the extent to which these KPIs were met, accompanied by the main achievements and highlights. It summarises the overall communication and dissemination strategy followed during the project's lifecycle and details the tools, channels, and approaches used to promote augMENTOR's activities, results, and impact to targeted audiences. Finally, D7.2 summarizes the work carried out at T7.3 and T7.4.

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1 Introduction

1.1 Purpose of the dissemination and communication final report

The purpose of the dissemination and communication final report is to provide a complete overview of all communication and dissemination activities carried out during the augMENTOR project. It consolidates the project's strategy, actions, tools, and channels used to engage stakeholders and promote augMENTOR's objectives, results, and impact. In addition, this report briefly presents the work undertaken within specific dissemination-related tasks, namely T7.3 and T7.4, highlighting their contribution to stakeholder engagement, standardisation uptake, and capacity building.

1.2 Objectives, risks and risk mitigation measures

This section provides a comprehensive analysis of the dissemination and communication risks, and corresponding mitigation measures initially identified in D7.1 at the start of the augMENTOR project. It reviews how these objectives guided the project's outreach strategy. By presenting this progression from early risk identification to successful mitigation, the section highlights the effectiveness and adaptability of the project's communication and dissemination approach.

1.2.1 Potential risks/barriers and solutions approaches

The following section presents the key communication and dissemination risks that were initially identified in D7.1 at the start of the augMENTOR project, along with the mitigation measures implemented throughout the project's duration. By outlining both the anticipated challenges and the actions taken to address them, this overview demonstrates how the consortium proactively managed risks, ensured smooth coordination, and successfully delivered all communication and dissemination objectives.

R30: Building and managing a contact list is hindered by compliance with GDPR.: Risk of difficulties in building and handling contact lists while ensuring full compliance with data protection regulations.

Measure: Consent forms were prepared and used in every workshop and event to collect explicit permission from participants before gathering any personal data. In parallel, the project website was developed with a clear Privacy Policy and Cookie Policy, aligned with EU data-protection requirements. All procedures and documentation were reviewed and validated by the Ethics Manager, ensuring full compliance throughout the project.

R31: Ensuring effective coordination of communication activities across the consortium partners: Risk that partners across different countries and disciplines might struggle to coordinate communication and dissemination activities effectively.
Measure: To ensure effective coordination across the distributed consortium, each work package held monthly meetings, complemented by regular cross–WP leader meetings to maintain alignment and continuous information flow. These structured touchpoints enabled consistent communication among partners and early identification of needs or challenges. In addition, SciCo, as the WP7 leader, maintained ongoing contact with all partners to coordinate contributions to social media content, website news items, newsletters, and other dissemination activities, ensuring cohesive and timely communication throughout the project.

R32: Branding and messages not coherently adopted across the consortium: Risk that there will be difficulty for partners to adopt the braiding and the main messages of the project.

Measure: To address this risk, clear branding and communication guidelines were shared with all partners. Branding assets, including logos, colour schemes, fonts, and key messages, were made available to all consortium members in multiple file formats and stored in shared, easily accessible repositories. The project branding and key messages were designed to allow adaptation to different national and linguistic contexts, while maintaining a coherent visual and narrative identity. In addition, standardised templates for deliverables, PowerPoint presentations, and poster presentations were developed and distributed across the consortium. Furthermore, whenever a partner intended to produce local dissemination material, SciCo, as the WP7 leader, either created the material directly or oversaw and validated its development, ensuring full compliance with the project's branding, messaging, and quality standards.

R33: Resources not sufficient to provide support required by the partners for communication /outreach: Risk that the workload required for communication and dissemination could exceed the capacity or available time of partners.
Measure: To address the risk of limited partner capacity for communication activities, the consortium adopted a streamlined and supportive approach. SciCo, as the WP7 leader, took full responsibility for producing all visual materials—including graphics, infographics, newsletter layouts, and social media visuals—reducing the workload for other partners. Partners were contacted individually, either by email or during in-person meetings, and were asked to contribute specific inputs regarding content that aligned with their expertise and fit comfortably within their workload. To maintain consistent and regular content creation, SciCo—as WP7 leader—proactively engaged partners throughout the project.

Partners were continuously invited to contribute to a variety of communication activities, including written interviews, online workshops, podcast episodes, and the review of infographics. This ensured diverse content and strong representation from all consortium members. In addition, a structured social media calendar was developed, assigning each partner a specific month during which they provided material for posts. SciCo then prepared the visuals and published the content across the project's channels. This coordinated system kept communication output steady, varied, and aligned with project goals.

2 Communication and Dissemination Strategy

2.1 Target audience, objectives and key messages

In D7.1, the project identified its key target audiences:

- Education professionals and pedagogical societies
- Technology-enhanced learning and MOOC platforms developers and providers
- Technology-enhanced learning and MOOC platforms developers and providers
- Start-up community with a commercialization interest on products and services developed in the context of the augMENTOR project
- Learners
- Citizens

Throughout the project, augMENTOR effectively addressed all identified target groups through a diversified and targeted communication strategy combining workshops, public events, policy dialogues, social media campaigns, podcasts, website news, and participation in major conferences. Education professionals and pedagogical communities were reached through hands-on workshops, teacher training sessions, summer schools, and festival activities. Technology-enhanced learning developers and MOOC providers engaged through conference presentations, research events, and technical dissemination actions. Educational leaders and policy-makers were addressed through targeted policy outreach, high-level discussions, and the publication of the *Policy and Outreach Reflections Across Europe*. The start-up community and EdTech innovators were engaged through innovation-focused conferences and networking events highlighting augMENTOR's technological and business potential. Learners and the general public were reached through public festivals, social media, podcasts, videos, and accessible website content. Across all channels, messaging consistently showcased augMENTOR's pedagogical value, technological innovation, and long-term impact, ensuring that each audience received relevant and meaningful information and that all objectives outlined in D7.1 were successfully met.

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2.2 Important KPIs and Main Communication & Dissemination Highlights

The augMENTOR project's communication and dissemination activities achieved strong visibility and engagement, reflected in several key performance indicators and major outreach highlights. Through a coordinated mix of digital platforms, newsletters, social media, videos, events, and academic contributions, the project achieved strong visibility and sustained engagement across its target audiences.

2.2.1 Important KPIs

To ensure progress toward the project's most important KPIs, augMENTOR established a dedicated monitoring system based on a shared live Excel document accessible to all partners. This tool allowed each partner to record their communication and dissemination activities, update metrics, and track outputs in real time. The document was reviewed and updated on a monthly basis, enabling consistent oversight, early detection of gaps, and coordinated action across the consortium.

Table 1. Dissemination and communication-related KPIs status

KPI	Number achieved	Target Number	% of Target
Posters	4	4	100%
Logos	3	2	150%
Materials download	563	450	125%
Newsletters	6	6	100%
Subscribers to the newsletter mailing list	106	100	106%
Informational leaflets	1	1	100%
Brochures	3	1	300%
Website unique visitors	1400	800	175%
Social media activities & blog posts	445	200	223%
Followers on social media	773	450	172%
Video uploads	15	3	500%
Views across videos	1358	150	905%
Research publications	15	15	100%
Partner participation in academic events/conferences	21	8	263%
Participants in stakeholder workshops	272	20	1360%
Number of streamed events	5	2	250%
Other written dissemination and communication actions	33	15	220%
Liaison with other 2 projects	12	3	400%

2.2.2 Highlights

Below, we present the key highlights of our communication and dissemination strategy. These examples showcase how the project engaged audiences, promoted its results, and strengthened its overall visibility and impact.

Social media calendar for partners

Each month, one partner was designated to provide input for social media content. This was facilitated through a shared spreadsheet, where partners submitted updates, news, or relevant insights related to their work in the project. This collaborative approach ensured that content reflected the diverse activities and achievements across the consortium throughout the period 2023-2024.

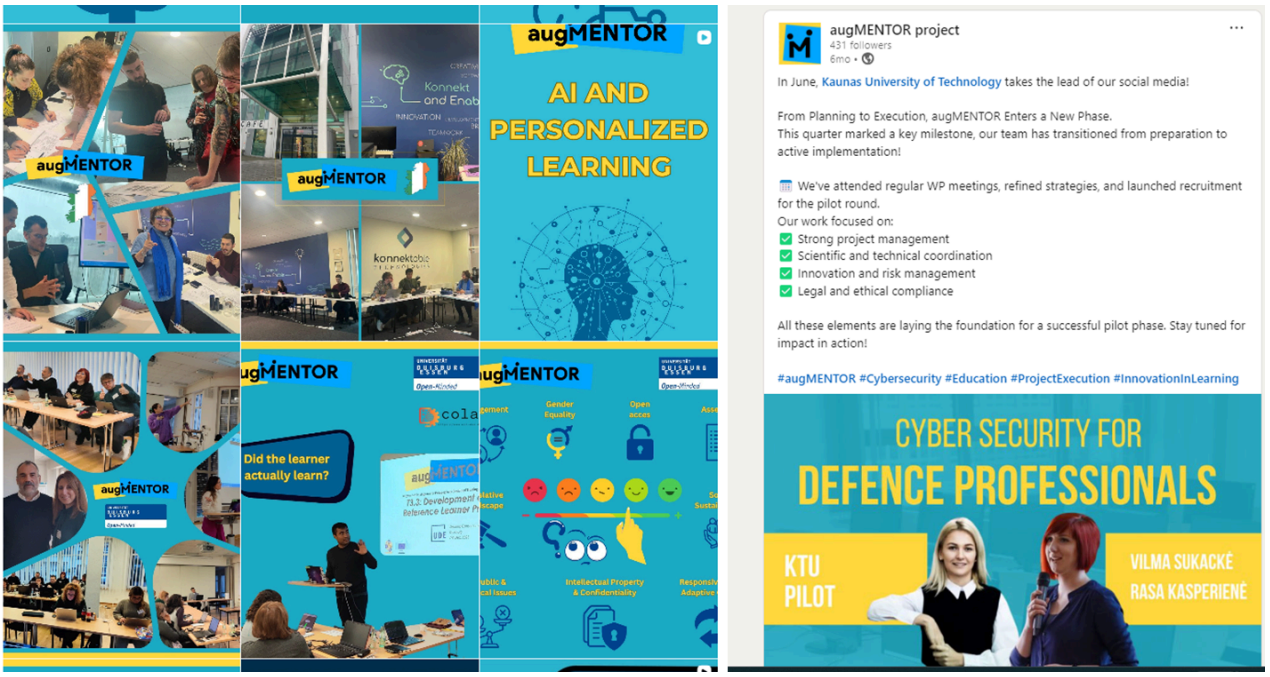

Figure 1. Examples of social media posts with content from partners.

Podcast episodes

Another significant highlight of the project was the production of 10 podcast episodes, hosted by SciCo as the WP7 leader. Each episode featured a guest from the augMENTOR consortium, and in some cases, a combination of partners from augMENTOR and sister EU projects, creating rich discussions on AI, education, and innovation. Episodes such as *"Teaching Sustainability with Online Learning and AI: The EASD Pilot"* and *"Monitoring AI's Impact on Education"* showcased the depth of these conversations. In addition, the project

produced four dedicated podcast episodes for each pilot, with partners sharing their experiences, challenges, and insights.

Figure 2. Examples of podcast episodes

Explainer video

A key communication highlight was the animated explainer video produced at the beginning of the project. Using simple and accessible language, the video introduced the core idea of augMENTOR and helped audiences quickly understand the project's purpose and approach. It was used consistently at all subsequent events, workshops, and presentations, becoming a central tool in our outreach efforts. The video attracted strong engagement, reaching almost 740 views.

Athens Science Festival/ECTEL conference

The Athens Science Festival 2023 and Athens Science Festival 2024 served as significant highlights for the project. We featured a fully-branded booth and led two dynamic workshops across the two years, respectively whether for educators or general public attendees. These activities allowed us to directly engage diverse participants, spark interest in cutting-edge educational technologies, and raise awareness about the project's aims. In addition, augMENTOR was represented at the European Conference on Technology

Enhanced Learning (ECTEL), one of Europe's foremost research conferences on technology-enhanced learning, held annually and attracting researchers, practitioners, and policy-makers from across the field. At ECTEL, augMENTOR organised a dedicated workshop on Artificial Intelligence in Education (AIED) focusing on how AI can enhance the development and assessment of transversal competencies—the 4Cs: Critical Thinking, Communication, Collaboration and Creativity, providing an opportunity to engage an international academic and professional audience with the project's vision and outputs.

Technology projects cluster

A major outcome of augMENTOR's networking and cooperation efforts has been the creation and formalisation of the Beyond XR cluster—an initiative uniting EU-funded projects and partners committed to the ethical and impactful use of emerging technologies, such as AI and XR, in education and beyond. Led and coordinated by augMENTOR, the cluster fosters a collaborative ecosystem aligned with human-centric, AI-driven, and innovation-focused approaches. Participating projects include: augMENTOR, CORTEX2, XR5.0, MASTER, HECOF, XR2Learn, SERMAS, TRANSMIXR, SPIRIT, MotivateXR, OPENVERSE, XR2INDUSTRY, and XR4ED. The cluster has delivered tangible outcomes, including strengthened social media presence, cross-promotion of events and webinars, joint participation in conferences, easier identification of common-interest events, and the organisation of joint webinars.

2.3 Communication and Dissemination tools and activities

2.3.1 Website

The official augMENTOR website (https://augmentor-project.eu/) serves as the central hub for communication and dissemination activities. It provides comprehensive information about the project's objectives, consortium partners, pilot activities, news, and events. The site is designed to ensure accessibility and user-friendly navigation, enabling both experts and the general public to engage with project outcomes. Key features include regular news updates on events, publications, and milestones, along with access to public deliverables, policy briefs, press materials, and multimedia content.

2.3.2 Social Media & Youtube

Throughout the augMENTOR project, social media played a central role in raising awareness, sharing updates, and building an active digital community around our work. We maintained a steady presence on LinkedIn, Facebook, Instagram, and YouTube, using each platform to highlight milestones, pilots, events, and new content. Over time, LinkedIn and YouTube

3 augMENTOR workshops and training events

3.1 Information packages

Project partners have worked closely to interweave activities happening in different tasks and WPs to ensure a seamless implementation of the project. In the context of T7.4 and particularly regarding designing innovative information packages, the consortium has developed a comprehensive set of resources to accompany and complement the detailed guidebook and videos delivered through the work done in T5.5. These resources include:

1. How to adopt augMENTOR in your teaching - An infographic[1] briefly presenting how to link augMENTOR to a learning management system and use it alongside a course
2. Getting started: Work Methodologies for Educators - A crash course presentation[2] to the augMENTOR solution designed for educators
3. PeDeMET: The macro-level of augMENTOR's pedagogical framework - An infographic[3] presenting the 'Pedagogical Design Model with Emerging Technologies', the macro-level of augMENTOR's pedagogical framework
4. TESA: The micro-level of augMENTOR's pedagogical framework - An infographic[4] presenting the 'Technology-augmented Educational Scenarios and e-Activities', the micro-level of augMENTOR's pedagogical framework
5. The TESA phases - An infographic[5] presenting an analysis of the TESA phases to help educators design their courses)
6. 4Cs – The essential 21st century competences - An infographic[6] presenting the 4Cs; the essential 21st century competences
7. augMENTOR subject agnostic rubrics for the 4Cs - An infographic[7] presenting how the 4Cs can be broken down to components and be assessed through rubrics)
8. Adding rubrics in an augMENTOR Moodle course - An infographic[8] presenting how to add rubrics for the 4Cs in an augMENTOR Moodle course.

All developed materials, along with the guide book, the videos and the 'Tips for for assessing and integrating the 4Cs' (developed in WP4) are currently available on the project website and have been structured as a dedicated resources library within the augMENTOR platform to ensure accessibility for the wider stakeholder community.

[1] https://augmentor-project.eu/wp-content/uploads/2025/12/Workflow.png
[2] https://augmentor-project.eu/wp-content/uploads/2025/12/augMENTOR_Work-Methodologies-for-Educators.pdf
[3] https://augmentor-project.eu/wp-content/uploads/2025/12/PeDeMET.png
[4] https://augmentor-project.eu/wp-content/uploads/2025/12/TESA_phases.png
[5] https://augmentor-project.eu/wp-content/uploads/2025/12/TESA_phases_analysis.png
[6] https://augmentor-project.eu/wp-content/uploads/2025/12/4Cs.png
[7] https://augmentor-project.eu/wp-content/uploads/2025/12/4Cs_analysis.png
[8] https://augmentor-project.eu/wp-content/uploads/2025/12/4Cs_setup.pdf

3.2 Training events for educators

Regarding stakeholder involvement and pilot training, the consortium organized a series of iterative feedback workshops focused on the use of the platform. While several events focused on training partners and educators involved in the pilots took place during the pilot period in the framework of WP6, the team also delivered a total of four training and feedback events in the post-pilot period to extend the reach of the project and train additional educators:

- **08/05/2025:** Training workshop for IASIS trainers (19 attendees).
- **20/10/2025:** Training workshop for UPATRAS pre-service teachers (65 attendees).
- **20/10/2025:** Training workshop for EASD educators (50 attendees).
- **11/12/2025:** Training workshop for KTU educators (10 attendees).

These activities were meant to provide training and convey the required knowledge to educators that wish to use the platform in the post-project era. The workshops were performed online and the recordings were made available to the participants after the completion of the workshop, for future reference.

3.3 Training and outreach workshops

On top of the aforementioned events, a series of additional outreach workshops took place focusing beyond educators and extending to additional educational stakeholders. These workshops were used to gather information and enhance stakeholder involvement and awareness of the project. Between month 19 and month 36, the augMENTOR project delivered a comprehensive series of workshops and training events designed to deepen understanding of AI in education, support policy dialogue, and gather evidence-based insights from diverse educational, cultural, and institutional contexts. These activities formed the backbone of augMENTOR's policy and outreach work, establishing a solid foundation for cross-European reflection on the implications of the EU AI Act, national readiness, and the opportunities and risks associated with AI adoption in real educational settings.

Across seven (7) workshops in six (6) countries, Lithuania, France, Greece, Cyprus, and Serbia, augMENTOR engaged 119 participants drawn from educators, policymakers, researchers, civil society actors, vocational trainers, and EdTech stakeholders. These national workshops were delivered in the framework of T7.4 and were followed by a dedicated policy event delivered under T7.2. The team collected the feedback from the national workshops to deliver combined insights to directly inform the EU project cluster workshop that took place in Brussels, enabling cross-country dialogue and alignment with EU-level priorities.

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Through this coordinated approach, augMENTOR strengthened stakeholder understanding of regulatory responsibilities, surfaced classroom-level challenges, and helped articulate a shared European narrative on AI in education.

It should be noted that even though the EU project cluster event was organised under T7.2 and was originally meant to be reported in D7.3 for reasons of continuity and seamless reading, we present it in this deliverable as the natural progression and culmination of our seven national workshops. The key insights of these seven (national) plus one (European) workshops are also briefly presented in D7.6 serving as evidence-based foundation for the augMENTOR policy briefs.

3.3.1 Objectives and Key Messages

The workshops and training events were designed to fulfil several key objectives:

- **Raise awareness** of the EU AI Act and its implications for educational AI systems, particularly high-risk systems.
- **Collect national perspectives** on the opportunities, concerns, and needs associated with AI in education and training.
- **Identify implementation gaps** between EU regulations and day-to-day practice in schools, universities, and vocational environments.
- **Promote ethical, transparent, and inclusive AI adoption**, ensuring that AI in education supports equity and human rights.
- **Strengthen educator capacity** by highlighting practical, safe, and legally compliant AI use.
- **Support EU and national policymakers** through evidence gathered from diverse European contexts.

Across countries, common messages emerged: widespread enthusiasm for AI's potential; significant concerns regarding bias, privacy, and transparency; and a clear need for training, guidance, and equitable access to digital tools.

3.3.2 Reaching Target Groups Across Europe

The workshops successfully reached a broad range of stakeholder groups through tailored activities and structured discussion formats. Participants included:

- **Education professionals and pedagogical communities** (teachers, trainers, curriculum designers).
- **Educational leaders and policymakers**, offering insights on governance and institutional responsibilities.
- **Technology-enhanced learning developers and EdTech innovators**, contributing perspectives on transparency, explainability, and ethical design.

- **Learners and community actors**, particularly through ACP's PeaceTech framing, which emphasised inclusion and civic perspectives.
- **Mental health, sustainability, and social innovation practitioners** (e.g., IASIS and EASD), broadening the scope of reflections.

Participation across national workshops was as follows:

- Lithuania (Kaunas University of Technology): 11 participants
- France (Université Côte d'Azur / Nice): 13 participants
- Greece – IASIS: 11 participants
- Greece – University of Patras: 11 participants
- Austria – Austrian Centre for Peace (ACP): 45 participants
- Cyprus – Centre for Social Innovation: 18 participants
- Serbia – Environmental Ambassadors for Sustainable Development (EASD): 10 participants

This broad distribution ensured that augMENTOR captured perspectives reflecting differences in digital readiness, linguistic contexts, school infrastructure, regulatory maturity, and community engagement models across Europe.

3.3.3 KPIs and main workshop highlights

Although this workstream did not include formal KPIs equivalent to those tracking communication outputs, internal monitoring demonstrates strong engagement and impact:

- **119 participants** engaged across all workshops.
- **Six countries** are represented, ensuring geographical and institutional diversity.
- **Seven national reflection reports** were produced using harmonised templates.
- **One Brussels consolidation workshop** with cross-country representation; **Findings presented** at the EU Project Cluster Workshop: Evidence-Based Policies for the Future of Educational Technology[9] (20 participants in total).

These results highlight the depth of engagement achieved during months 19–36 and underscore the workshops' crucial role in generating a robust, comparative evidence base.

[9] https://nettskjema.no/a/clusterpolicyworkshop#/page/1

3.3.4 Key Highlights and National Perspectives

Lithuania – Kaunas University of Technology

Lithuania identified clear benefits in administrative efficiency, personalisation, and learner engagement. Key concerns included the lack of policy guidance, privacy and bias risks, and uneven access to digital tools. Needs centred on stronger institutional frameworks, more hands-on training, and support for local-language AI tools.

France – Université Côte d'Azur / Nice

France benefits from structured national frameworks that prioritise ethics, pedagogy, and human oversight, but gaps persist in teacher training coverage and in digital inequalities. Risks include vendor dependency and sustainability concerns. Opportunities focus on universal AI literacy, open-source digital commons, and explainable AI.

Greece – IASIS

AI was found to support creativity, administrative workflows, and mental health service tasks. Yet, significant concerns were raised about privacy, misuse of unfiltered outputs, and the limited awareness of safe AI practices. Needs include targeted training, community awareness programmes, affordable tools, and strengthened data protection.

Greece – University of Patras

AI supports personalised feedback, efficient data processing, and real-time assistance for large student groups. Concerns included bias, hallucinations, vendor dependence, accessibility issues, and academic integrity. Greece requires clear frameworks for responsible AI use, institutional support, and continuous professional development.

Austria – Austrian Centre for Peace (ACP)

Austria's PeaceTech lens emphasises inclusion, cultural relevance, and community-driven governance of AI systems. Benefits include personalised learning and reduced administrative burden. Concerns include biased datasets, surveillance fears, and exclusion of marginalised groups. Opportunities lie in participatory design, open data commons, and human-rights-centred governance processes.

Cyprus – Centre for Social Innovation

With 18 participants, Cyprus highlighted AI's strengths in lesson enrichment, simulations, content creation, and personalised learning. Concerns included misinformation, linguistic limitations, misuse by students, and fears of teacher displacement. Needs centre on responsible-use frameworks, human oversight, and safeguards against over-standardisation.

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Serbia – Environmental Ambassadors for Sustainable Development (EASD)

Serbia identified AI's usefulness in test creation, lesson preparation, and directing teachers toward further training. Significant constraints include the lack of national AI regulation, limited understanding of data protection, inequality in access to modern technology, and poor recognition of Serbian-language capabilities in AI tools. Opportunities include targeted training, provision of licensed tools, and national guidance. Needs focus on regulation, infrastructure improvements, and tools adapted to local linguistic and curricular contexts.

3.3.5 EU project cluster workshop

The EU project cluster workshop called 'Evidence-based policies for the future of educational technology'[10], held in Brussels on the 29th of September, enabled participants to collectively reflect on:

- Worries around classroom relevance, creativity, and over-dependence on AI.
- The lack of clarity regarding responsibilities under the EU AI Act.
- Gaps between regulatory frameworks and real educational practice.
- The need for representative datasets and stronger accountability mechanisms.
- Broader reflections on data sovereignty and the environmental impacts of AI.

A recurring theme was the concern that European education systems risk depending on large language models developed outside Europe, raising questions about sovereignty, equity, and long-term sustainability.

Figure 3. augMENTOR Policy workshop in Brussels

[10] https://nettskjema.no/a/clusterpolicyworkshop#/page/1

3.3.6 Tools and Activities Supporting Workshop Delivery

The workshop series was supported by:

- A shared methodological framework ensuring consistency and comparability.
- Standardised templates for documenting strengths, concerns, opportunities, and needs.
- Facilitated group activities enabling equal participation across varying levels of digital literacy.
- Systematic documentation allowing the integration of workshop outputs into augMENTOR's policy work.
- Engagement with EU-level project clusters to disseminate insights and align with broader policy developments.

These tools ensured that evidence from month 19 to 36 could be thoroughly and consistently synthesised.

3.3.7 Summary

The workshops and training events conducted between month 19 and month 36 played a central role in shaping augMENTOR's communication, dissemination, and policy outreach activities. Through seven national workshops across six countries, supported by a consolidation session in Brussels, the project established a comprehensive, comparative understanding of how AI is perceived, adopted, and regulated across diverse European educational environments.

By engaging 119 participants representing educators, policymakers, researchers, civil society organisations, EdTech actors, and community groups, the project ensured that its insights reflected the realities of classroom practice and broader institutional and societal considerations. Across these varied contexts, a consistent set of themes emerged: enthusiasm for AI's potential to support personalisation, efficiency, and new learning opportunities; concern regarding data governance, bias, transparency, and unequal access; and a widespread need for more explicit institutional guidance and targeted professional development.

Participants pointed to the importance of human-centric, ethically grounded approaches to AI in education, emphasising transparency, inclusivity, and the preservation of educator autonomy. The national workshops also revealed structural challenges, including disparities in digital infrastructure, limited local-language AI tools, and reliance on external technology providers, which may hinder equitable implementation across Europe.

The Brussels consolidation workshop added a valuable cross-European perspective, highlighting concerns about data sovereignty, accountability across the AI value chain,

and the environmental impacts of AI technologies. These reflections underscored the need for coherent, clearly communicated frameworks that bridge EU-level regulation with the practical realities faced by educational institutions.

Overall, the workshops and training events substantially enriched augMENTOR's engagement with its target audiences and strengthened its capacity to support evidence-based, inclusive, and responsible dialogue on AI in education. The insights gathered through this process will remain a key component of augMENTOR's contribution to ongoing European discussions on ethical and sustainable technological innovation in learning and skills development.

4 Standardization, Conformity Assessment and Assurance

4.1 Strategic rationale and cross-project alignment

The approach to standardisation, conformity assessment, and assurance in augMENTOR was not developed in isolation. Instead, it was parallel work, with the ORBIS and AI4GOV EU projects, which also address AI governance, trustworthiness, explainability, and democratic accountability on a scale. These projects provided:

- Mature conceptual frameworks for ethical, transparent, and human-centred AI.
- Practical experience in mapping AI-driven systems to existing international standards.
- Early engagement with standardisation bodies and regulatory frameworks.

augMENTOR leveraged this groundwork to ensure that its educational AI ecosystem could be positioned as standard-aware, regulation-ready, and certifiable, rather than as a purely experimental research prototype. In addition, it aimed to align with the following emerging EU frameworks

- Digital Education Action Plan (2021–2027): By promoting high-quality digital learning, personalised instruction and data-driven teaching practices across diverse educational sectors.
- EU AI Act: By ensuring transparency, explainability, human oversight and safeguards against algorithmic bias across all AI-driven components.
- OECD AI Principles & EU Ethics Guidelines for Trustworthy AI: By integrating fairness, accountability, transparency and ethics (FATE) throughout the methodological framework and system architecture.
- GDPR & EU Data Protection Framework: By implementing data minimisation, anonymisation, secure storage mechanisms and strictly controlled, role-based access to personal data.

- Open Science Agenda: By ensuring transparency, reproducibility, open documentation and reusability of datasets, tools and methodological outputs.
- EU 21st-Century Skills Agenda: By embedding creativity, collaboration, critical thinking and digital competence within the pedagogical framework and AI-enhanced analytics.
- EU Inclusion & Equity Priorities: By providing evidence-based decision-support tools that identify learning gaps, support diverse learner needs and inform equitable educational policies.

4.2 Identification of relevant standards

The first operational step was systematic screening and selection of relevant standards, along with ORBIS and AI4GOV mapping exercises. This activity focused on identifying standards that were:

- Directly applicable to AI systems, data governance, and knowledge representation.
- Relevant to education, learning services, and institutional governance.
- Aligned with emerging EU regulatory frameworks.

Key families of standards considered included:

- ISO/IEC JTC 1/SC 42 (Artificial Intelligence) for AI concepts, trustworthiness, bias, and risk management.
- ISO/IEC 27000 series for information security and data protection.
- ISO 21001 for management systems for educational organisations.
- ISO/IEC 22989, 23053, 24028, 23894 for AI terminology, system frameworks, trustworthiness, and risk.
- Metadata and interoperability standards (e.g., ISO/IEC 11179, knowledge graph–related IEEE work).

This mapping ensured that augMENTOR's architecture and processes were traceable to recognised international norms, rather than relying on ad-hoc design decisions.

4.3 Translation of standards into design and development principles

Rather than treating standards as post-hoc compliance checks, augMENTOR adopted a "standards-by-design" approach, along with ORBIS and AI4GOV. This involved:

- Translating abstract standard requirements (e.g. transparency, accountability, traceability) into concrete technical and pedagogical design constraints.

- Embedding human-in-the-loop, explainability-by-design, and fairness-by-design principles directly into AI pipelines.
- Aligning learner profiling, recommendation logic, and analytics workflows with ISO 21001 principles on learner-centred processes and organisational accountability.

For example:

- Knowledge Graph–based architectures supported semantic interoperability and provenance, aligning with metadata and data governance standards.
- Explanation Generators and reporting mechanisms operationalised trustworthiness and explainability requirements beyond purely technical XAI.

4.4 Expert consultation and validation of emerging standardisation directions

As a final and consolidating step in the standardisation, conformity assessment, and assurance process, augMENTOR together with ORBIS and AI4GOV undertook a targeted expert consultation activity aimed at validating and prioritising emerging AI-related standardisation directions.

4.4.1 Rationale for the consultation

The engagement with standardisation bodies within the ORBIS, augMENTOR and AI4GOV projects pursued a dual purpose.

First, it aims to initiate exploratory interactions with selected standardisation organisations to assess how the innovations emerging from both projects—particularly in the areas of AI, data governance, and democratic participation—can inform existing or emerging standards, or highlight gaps that may require the development of new ones.

Second, further engagement seeks validation and constructive feedback from additional bodies to ensure that the alignment between project outcomes and broader regulatory or technical frameworks is both meaningful and impactful, supporting the strategic objectives of ORBIS, AI4GOV, and augMENTOR alike.

By outlining the scope and novelty of each project, this overview aimed at identifying relevant standardisation bodies to engage in a targeted dialogue around their potential applicability and alignment with existing or emerging standards.

Across the three projects, extensive experimentation with AI-enabled systems in public sector, civic, democratic, and educational contexts revealed a shared and systematic gap. While existing standards on AI governance, explainability, and data management provide strong technical foundations, they insufficiently address how AI-generated outputs, such as insights, summaries, recommendations, and analytical representations, are communicated, interpreted, and made actionable by human stakeholders.

This gap is particularly critical in contexts where:

- Decisions must be understandable, contestable, and legitimate (e.g. democratic participation, public governance),
- AI outputs influence pedagogical, institutional, or policy decisions,
- End users include non-technical actors such as citizens, educators, facilitators, and policymakers.

To address this issue, ORBIS, AI4GOV, and augMENTOR jointly formulated a consolidated set of potential standardisation directions, grounded in three years of real-world pilots, cross-platform deployments, and interdisciplinary research.

4.4.2 Method and instrument

To assess the relevance, maturity, and feasibility of these proposed directions, the projects launched a short, structured expert survey targeting professionals with experience in:

- AI standardisation and regulation
- Public-sector digital systems
- Ethical and trustworthy AI
- Education, governance, and civic technologies.

The consultation was implemented through an official EU Survey instrument[11], designed to minimise respondent burden while maximising analytical value:

- Format: Likert-scale assessment (1–5),
- Dimensions: relevance, maturity, interoperability potential, ethical and social value, feasibility, complementarity with existing standards, scalability,
- No open-ended responses required, ensuring consistency and comparability.

This lightweight but structured approach reflects good practice in early-stage standardisation validation, where exploratory expert judgement complements technical mapping.

4.4.3 Role in conformity assessment and assurance

The consultation served a dual function within augMENTOR's assurance strategy:

1. Validation of directional soundness. Expert ratings provided external confirmation that the identified directions address real and recognised gaps, rather than project-specific or idiosyncratic concerns.

[11] https://ec.europa.eu/eusurvey/runner/Standardisation-Directions

2. Prioritisation for future standardisation pathways. By analysing aggregated scores, the consortium was able to:
    - Distinguish high-impact, high-feasibility directions from more exploratory ones,
    - Identify areas where existing standards could be extended or complemented, rather than duplicated,
    - Support evidence-based dialogue with standardisation bodies (ISO, IEEE, CEN/CENELEC, StandICT).

This step strengthens augMENTOR's conformity narrative by demonstrating that its standardisation-related claims are not only internally justified, but also externally scrutinised and expert-informed.

4.4.4 Results

In this section the results of the standardisation consultation are reported. The standardisation and standardisation-related bodies that participated in the consultation were the following:

- ITU – International Telecommunication
- UNI – Ente Italiano di Normazione
- TÜV Thüringen Italia
- CERTH – Centre for Research and Technology Hellas
- ITI – Information Technologies Institute (CERTH)

The ten standardisation directions submitted for evaluation are:

- Grammar for AI-Supported Deliberation and Policy Argumentation
- Sensemaking-Oriented Explainability
- Metadata & Provenance for AI-Enhanced Outputs and Traceability
- Trustworthiness, Risk & Bias Indicators for Civic and Educational AI
- Co-creation, Testing and Ethical Governance Frameworks for Human-Centred AI
- Human-in-the-Loop (HITL) Protocols for Civic and Educational Decision-Making
- Ethical Governance & Accountability Frameworks for AI Systems in Public Institutions
- Explainable Educational AI Protocol (EEAIP)
- Learner Profile Interoperability Model (LPIM)
- Semantic Alignment for Learning Analytics (SALA)

The consultation demonstrates strong expert consensus that existing AI standards insufficiently address how AI-generated insights are communicated, interpreted, and made actionable by human users. Across all evaluated directions, ethical and social value consistently received high scores, confirming the importance of sensemaking, transparency, and human oversight beyond purely technical explainability. Four directions emerged as clear priorities due to consistently high ratings across relevance, ethical value, and feasibility:

- Human-in-the-Loop (HITL) protocols – highest relevance score overall, confirming the critical role of human agency and accountability in AI-supported decision-making.
- Trustworthiness, risk, and bias indicators – strong alignment with the EU AI Act and ISO/IEC 24028, highlighting the need for interoperable trust signals.
- Metadata and provenance for AI outputs – highest interoperability score, indicating readiness for cross-sector standardisation and alignment with frameworks such as DCAT-AP.
- Sensemaking-oriented explainability – highest ethical and social value, underscoring demand for explainability approaches that support understanding, not just model transparency.

The most widely applicable cross-project directions according to our analysis are:

- Metadata & Provenance for AI-Enhanced Outputs and Traceability
- Trustworthiness, Risk & Bias Indicators for Civic and Educational AI
- Co-creation, Testing and Ethical Governance Frameworks for Human-Centred AI

Finally, the domain-specific highlights with a focus on education are:

- Explainable Educational AI Protocol (EEAIP)
- Learner Profile Interoperability Model (LPIM)
- Semantic Alignment for Learning Analytics (SALA)

Detailed analytical results supporting these findings are presented in Annex I.

5 Conclusions

The communication and dissemination activities carried out throughout the augMENTOR project successfully delivered strong visibility, engagement, and impact across all key stakeholder groups. By implementing a coordinated strategy—combining digital outreach, events, policy engagement, academic contributions, and innovative media formats—the consortium ensured that the project's aims, tools, and results reached educators, researchers, policymakers, EdTech actors, and the wider public. The project not only met but consistently surpassed its KPIs, demonstrating the effectiveness of the methods and channels used. Highlights such as the animated explainer video, the podcast series, the Athens Science Festival activities, cross-European workshops, high-level policy events, and the creation of the Beyond XR cluster further strengthened augMENTOR's presence and long-term influence. Overall, the strategic, collaborative, and sustained communication efforts have laid a strong foundation for the continued uptake, exploitation, and sustainability of augMENTOR's outcomes beyond the project's duration.

Annex I

AI systems increasingly shape how institutions process, interpret, and communicate knowledge, especially in the public sector. Yet **existing standards on explainability (XAI)** focus predominantly on making **AI models technically transparent**, rather than addressing the **broader challenge of how to make AI-generated data knowledge understandable, meaningful, and actionable** for people in real-world contexts.

Projects like **ORBIS, AI4GOV, and augMENTOR** propose a shift: treating explainability as a **sensemaking and communication challenge**. Three projects collaboratively designed and implemented this standardisation-oriented activity. Their synergy reflects not only a shared commitment to human-centred and accountable AI, but also the importance of engaging with diverse perspectives like spanning civic, policy, and educational domains, to develop more complementary, robust, and holistic approaches to future AI standards. Below is a short description of the two projects augMENTOR collaborated with.

ORBIS. Augmenting participation, co-creation, trust and transparency in Deliberative Democracy at all scales (GA: 101094765; cordis; project website)
ORBIS is a Horizon Europe-funded research and innovation project that addresses the urgent need to revitalize democratic processes in the face of declining trust, participation gaps, and information overload. It aims to enhance democratic participation and public deliberation through the responsible design and use of AI technologies. At its core, ORBIS seeks to augment and improve participation, co-creation, trust, and transparency in deliberative democratic processes across different governance levels—from local to European scale. To do that, it develops and deploys a suite of AI-enhanced tools for online and hybrid deliberation, working in real-world pilot environments to test how emerging technologies can foster richer civic discourse. To align technological innovation with democratic values, ORBIS integrates design thinking, co-creation methods, and explainable By augmenting human participation with artificial intelligence—rather than replacing it—ORBIS provides a **modular toolkit** that transforms raw, large-scale citizen input into structured, explainable, and actionable insights, directly supporting **evidence-based policy-making**. AI. All components are co-created with stakeholders to ensure social acceptance, ethical compliance, and democratic legitimacy.

AI4Gov. Trusted AI for Transparent Public Governance fostering Democratic Values (GA: 101094905; project website)
Project description. AI4Gov is a Horizon Europe research and innovation project dedicated to fostering trustworthy AI for transparent public governance. The project responds to pressing **societal** challenges around fairness, bias, and reliability in algorithmic decision-making. In that context, democratic values, human rights, and ethical principles are embedded by design into the overall development of AI-based applications and tools, aiming to the provision of tools and frameworks that ensure transparency, explainability, and accountability to the public authorities, policymakers, and citizens. Through interdisciplinary collaboration across technical, legal, and social sciences, AI4Gov develops methodologies and technological solutions to monitor fairness, explain and interpret AI outcomes and policy recommendations, and strengthen citizen trust. Beyond technological solutions, AI4Gov places strong emphasis on citizen and stakeholder empowerment. The project actively involves civil society, policymakers, and affected communities in co-designing ethical frameworks, assessing societal impacts, and shaping how AI is deployed in governance. This ensures that the voices of citizens are heard, their concerns about fairness and rights are addressed, and that digital governance solutions are legitimate, inclusive, and socially acceptable. Its outputs directly support evidence-based policymaking, participatory democracy, and the responsible use of AI in governance.

This reflects the aim of laying the groundwork for standardisation directions that guide how AI-derived insights such as argument structures, feedback clusters, policy recommendations, explainability artefacts, bias and fairness indicators, uncertainty estimates, auditability and traceability metadata, and human-in-the-loop validation outcomes can be consistently represented, communicated, co-created, and shared with citizens, policymakers, and other stakeholders. The goal is to ensure these outputs are not only technically interoperable but also ethically transparent, socially meaningful, and actionable across diverse contexts. This is especially critical in civic and democratic settings, where decisions must be understandable and contestable by a wide range of publics and not just technical experts.

Despite its growing relevance, this area is currently not covered by existing ISO, IEEE, or CEN standards, highlighting both its complementarity and its potential for scalable, high-impact standardisation.

Methodology

The standardisation engagement process was developed through a coordinated, multi-phase effort involving the representatives of the three projects to ensure alignment across domains (democracy, public governance, and education), and reinforced the cross-sector relevance of the proposed directions.

The methodology articulated in the following phases:

1. **Joint identification of standardisation needs and co-design of standardisation directions.** The three projects initiated the process by identifying complementary or overlapping challenges related to AI governance and human-centred design. Through multiple internal workshops and knowledge sharing, representatives from the projects co-designed a set of candidate standardisation directions, each rooted in real-world implementations across civic, educational, and policymaking contexts.
2. **Co-drafting of the engagement methodology.** Building on this foundation, the projects collaboratively defined a shared evaluation methodology to ensure consistency in the engagement with standardisation bodies. This included the definition of rating dimensions, survey structure, and scope of feedback required.
3. **Development of survey and legal documentation.** A unified EU Survey instrument was developed, accompanied by a shared privacy policy that covered the data protection and consent requirements across all three projects.
4. **Outreach to expert stakeholders.** An integrated outreach strategy was implemented to engage relevant standardisation and standardisation-related bodies. This included:
    - Direct contacts held by partners across the three projects
    - Expert networks from StandICT.eu
    - Engagement of individuals listed in the HSBooster.eu pool of experts

Co-Design and Framing of the Standardisation Directions

The three projects joined forces to share their knowledge and propose a shared set of **candidate directions for AI-related standards**, informed by real-world implementation across civic, educational, and policy settings, addressing persistent challenges like:

- How to visually represent AI-derived insights (e.g., summaries, argument maps, clusters)
- How bias, fairness, and auditability of AI systems can be translated into machine-readable metrics and formats, without overloading users or undermining trust in AI-supported decision-making?
- How to signal trustworthiness, uncertainty, or human oversight
- How to design outputs that share **ethical scaffolding** (e.g., trustworthiness tags, transparency scores, and human oversight markers)

The focus was therefore placed on high-priority challenges such as:

- **Representation and communication of AI-derived insights** (e.g., summaries, argument maps, or policy options)
- **Translating bias, fairness, and auditability into machine-readable metrics** that inform rather than overwhelm users
- **Tagging outputs with trustworthiness signals** (e.g., uncertainty levels, oversight markers, ethical scores)
- **Enabling co-creation and participatory testing** as part of AI governance pipelines

Each direction was therefore derived from concrete use cases and research activities carried out within the ORBIS, AI4Gov, and augMENTOR projects. These span **governance scales** (local to European), **application domains** (education, civic engagement, deliberative democracy), and **platform types** (AI-enhanced dashboards, deliberation tools, learning analytics systems).

The ten standardisation directions submitted for evaluation are summarised in the table below, along with a short description and the originating projects.

Informed by	Standardisation direction	Short description
ORBIS & AI4Gov	**Grammar for AI-Supported Deliberation and Policy Argumentation**	Define interoperable data structures and human-centred logic for capturing, linking, and presenting argumentation, feedback, policy options, and AI-generated insights in democratic and policy-making contexts. This grammar should apply to deliberation, policy analytics outputs and decision rationales.
ORBIS & AI4Gov	**Sensemaking-Oriented Explainability**	Establish design- and governance-oriented guidelines that go beyond traditional XAI, advancing situation awareness, and supporting communicative, ethical, and cognitive interpretability of AI-generated outputs (e.g., summaries, visual clusters, recommendations).
ORBIS, AI4Gov & augMENTOR	**Metadata & Provenance for AI-Enhanced Outputs and Traceability**	Define standards for metadata tagging, provenance documentation, and traceability of AI outputs (recommendations, arguments, summaries) across sectors. Include data sources, processing steps, inference confidence, and human oversight checkpoints. Align with DCAT-AP to describe datasets, derived insights, processing steps, inference confidence, and human oversight checkpoints.

Funded by the European Union

Informed by	Standardisation direction	Short description
ORBIS, AI4Gov, & augMENTOR	**Trustworthiness, Risk & Bias Indicators for Civic and Educational AI**	Provide interoperable formats for tagging AI outputs with trust signals (confidence, reliability, bias flags, compliance markers), applicable in civic and learning contexts. Align with ISO/IEC 24028 and EU AI Act.
ORBIS, AI4Gov, & augMENTOR	**Co-creation, Testing and Ethical Governance Frameworks for Human-Centred AI**	Define methods and benchmarks for involving target users (citizens, educators, students, policymakers) in the design (co-creation to co-design), evaluation, and governance of AI-enhanced platforms and tools. Supports inclusive and domain-sensitive system development.
augMENTOR, AI4Gov, & ORBIS	**Human-in-the-Loop (HITL) Protocols for Civic and Educational Decision-Making**	Standardise when and how humans (e.g., facilitators, educators) should intervene in interpreting, approving, or challenging algorithmic outputs, preventing over-automation while ensuring accountability.
augMENTOR & AI4Gov	**Ethical Governance & Accountability Frameworks for AI Systems in Public Institutions**	Standardise organisational processes for documenting risks, maintaining algorithmic registers, dataset descriptions, conducting periodic audits and transparent communication of AI system capabilities and limitations to stakeholders.
augMENTOR	**Explainable Educational AI Protocol (EEAIP)**	Establish guidelines for educationally meaningful explainability, ensuring that AI-driven insights (e.g., recommendations, alerts, predictions) are interpretable by teachers, learners and organisations, following ISO 21001 principles of transparency and accountability.
augMENTOR	**Learner Profile Interoperability Model (LPIM)**	Define a standardised, machine-readable schema for representing learner profiles, integrating cognitive, behavioural, emotional and competency-based indicators aligned with ISO 21001 requirements for learner-centred processes.

Funded by the European Union

Informed by	Standardisation direction	Short description
augMENTOR	**Semantic Alignment for Learning Analytics (SALA)**	Define a semantic ontology and metadata grammar for describing learning activities, skills, assessments and learner states, ensuring interoperability between LMS platforms, learning graphs and analytics tools.

Standardisation and standardisation-related bodies are asked to rate all the direction provided through the assessment dimension through

- Closed-ended Likert-scale ratings (1 to 5) for each proposed direction,
- Across six dimensions: relevance, maturity, interoperability potential, ethical and social value, complementarity with existing standards, scalability,

The Closed-ended Likert-scale asked rating from 1= None; 5 = Extremely, across the following 6 dimensions:

Dimension	Assessment focus
Relevance	Is the proposed direction addressing a real and pressing gap in current AI/data/democracy practices?
Interoperability	Will this direction enhance cross-platform, cross-system compatibility and semantic coherence?
Ethical & social value	Does it contribute to human-centered, transparent, and just applications of AI?
Technical and organisational feasibility	Can it be feasibly scoped, tested, and validated by existing standardisation bodies?
Complementarity	Does it build upon or complement existing standards (e.g., ISO/IEC, DCAT-AP, IEEE, CEN, …)?
Scalability and transferability	Can the standard be applied across local, national, and transnational governance contexts?

No open-ended questions were included to streamline participation and enhance the comparability of responses. This lightweight but structured format reflects good practice in early-phase standardisation exploration, where expert judgement is used to assess the directional potential and readiness of emerging innovations.

Funded by the European Union

Rationale, objective, and tool of engagement

The engagement with standardisation bodies conducted, pursued a dual purpose.

- First, it aims to initiate exploratory interactions with selected standardisation organisations to assess how the innovations emerging from both projects, particularly in the areas of AI, data governance, and democratic participation, could contribute to shaping existing or emerging standards. In doing so, the process may also help identify **gaps** that require the development of new frameworks or technical specifications.
- Second, the engagement seeks to obtain **constructive validation and feedback** from a broader range of standard-setting bodies, ensuring that the proposed directions are aligned with wider **regulatory and technical frameworks**. This alignment is intended to enhance the operationalisation and **practical relevance, interoperability and legitimacy** of the proposed directions, while supporting the strategic aims of ORBIS, AI4Gov, and augMENTOR in fostering **human-centred, trustworthy, and inclusive AI systems** across domains.

To assess the relevance, maturity, and feasibility of these proposed directions, the projects launched the expert survey targeting professionals with experience in:

- AI standardisation and regulation
- Public-sector digital systems
- Ethical and trustworthy AI
- Education, governance, and civic technologies.

The consultation was implemented through an official **EU Survey**[12] titled "Towards standards and guidelines for awareness on AI-enhanced data and knowledge generation. Exploring: Human-Centered/Sensemaking AI-generated outputs, visualizations and AI derived insights", designed to minimise respondent burden while maximising analytical value.

Standardisation or standardisation-related bodies engaged

The standardisation engagement activity brought together a diverse set of organisations with **deep expertise in standard-setting, technical validation, and applied AI governance**. Participating bodies included:

- **ITU – International Telecommunication Union**, the United Nations specialised agency for information and communication technologies, which plays a central role in developing international standards for digital infrastructure, including emerging work on AI governance, trust, and data interoperability.
- **UNI – Ente Italiano di Normazione**, Italy's official standardisation body, responsible for adopting and developing national standards across sectors, and a key actor in aligning national practices with European and international frameworks such as CEN, ISO, and IEC.

[12] https://ec.europa.eu/eusurvey/runner/Standardisation-Directions

- **TÜV Thüringen Italia**, a certification and conformity assessment body focused on quality, safety, and compliance in complex systems, including AI-driven and digital platforms—making it a critical stakeholder for assessing the technical feasibility and certification potential of emerging AI standards.
- **CERTH – Centre for Research and Technology Hellas**, one of the largest research centres in Greece, with recognised expertise in AI, data infrastructures, and smart governance; its involvement strengthens the bridge between applied research and practical standardisation.
- **ITI – Information Technologies Institute**, a CERTH-affiliated research entity with a strong portfolio in digital governance, semantic interoperability, and AI systems architecture—making it highly relevant for validating cross-sector AI standardisation directions.

As a whole, these organisations contributed **multi-level insights**, spanning regulatory, technical, research, and conformity assessment perspectives, enhancing the robustness and cross-domain relevance of the proposed standardisation directions.

Below is the table presenting the evaluation results of the ten proposed standardisation directions. It is structured with the **standardisation directions presented vertically, and the evaluation dimensions listed vertically horizontally**. For the latter, each evaluation cell reports the **average score** across the five participating standardisation and standardisation-related bodies. The data reflects **aggregated values**, not individual inputs, in order to ensure anonymity and to highlight collective trends rather than isolated opinions.

Averages per Standardisation direction

Relevance	Interoperability	Ethical & social value	Technical and organisational feasibility	Comple-mentarity	Scalability and transferability
Grammar for AI-Supported Deliberation and Policy Argumentation					
Informed by ORBIS & AI4Gov					
4	3.6	4.4	4.2	3.8	3.2
Sensemaking-Oriented Explainability					
Informed by ORBIS & AI4Gov					
4.6	3	4.8	3.4	3.6	3.4
Metadata & Provenance for AI-Enhanced Outputs and Traceability					
Informed by ORBIS, AI4Gov & augMENTOR					
4.4	4.8	4.6	4.2	4	4
Trustworthiness, Risk & Bias Indicators for Civic and Educational AI					
Informed by ORBIS, AI4Gov, & augMENTOR					
4.6	4.2	4.6	3.8	4.2	4
Co-creation, Testing and Ethical Governance Frameworks for Human-Centred AI					

Informed by ORBIS, AI4Gov, & augMENTOR					
4.2	3.4	4.6	3.8	3.8	3.6
Human-in-the-Loop (HITL) Protocols for Civic and Educational Decision-Making					
Informed by augMENTOR, AI4Gov, & ORBIS					
4.8	3.6	4.2	4.2	3.8	3.8
Ethical Governance & Accountability Frameworks for AI Systems in Public Institutions					
Informed by augMENTOR & AI4Gov					
4.4	3.2	4.6	3.8	3.4	3.8
Explainable Educational AI Protocol (EEAIP)					
Informed by augMENTOR					
4.4	3.2	4.6	3.8	4	4.25
Learner Profile Interoperability Model (LPIM)					
Informed by augMENTOR					
4.2	3.6	4.2	3.4	3.6	3.8
Semantic Alignment for Learning Analytics (SALA)					
Informed by augMENTOR					
4	4.2	4	3.8	3.8	3.8

The paragraphs that follow provide a detailed interpretation of these results, highlighting key insights, priorities, and areas for further exploration.

Initial summary of standardisation-related bodies feedback

The responses to the standardisation scoping questionnaire, based on directions proposed by ORBIS, AI4Gov, and augMENTOR, provide a good snapshot of the perceived relevance and feasibility of advancing common standards for human-centered AI systems. Overall, directions related to **Human-in-the-Loop protocols**, **Trustworthiness and Bias Indicators**, and **Metadata & Provenance for AI Outputs** received consistently high scores across all evaluation dimensions, including relevance, ethical-social value, and interoperability, demonstrating their strong potential for cross-sector standardisation.

Particularly notable was the high interest in **Sensemaking-Oriented Explainability**, which respondents viewed as essential for moving beyond traditional model transparency to more communicative and context-aware forms of AI output interpretation. Although this direction showed slightly lower scores in technical feasibility and complementarity, its high ethical value underscores a clear gap in existing standards that future work could help address.

Meanwhile, **domain-specific directions from augMENTOR**, such as learner profile interoperability and explainable educational protocols, were also positively evaluated,

though with slightly lower interoperability or scalability ratings, suggesting they may benefit from targeted piloting or further alignment with broader frameworks.

Finally, directions related to **co-creation, participatory testing, and ethical governance** were also strongly endorsed, especially in terms of their ethical and societal value, though with slightly more moderate feasibility scores. These results indicate a solid foundation for launching cross-sector pre-standardisation efforts, especially in areas that cut across civic, policy, and educational use cases of AI.

Below there are **dedicated analytical paragraphs** for each **standardisation direction**, interpreting the scores across the six evaluation dimensions: **Relevance**, **Interoperability**, **Ethical & Social Value**, **Technical & Organisational Feasibility**, **Complementarity**, and **Scalability & Transferability**.

1. Grammar for AI-Supported Deliberation and Policy Argumentation

This direction received a strong score on relevance (4.0) and an even higher score for ethical and social value (4.4), confirming its importance in fostering transparent public reasoning and policy legitimacy. Its technical feasibility (4.2) also suggests that early efforts are viable. However, interoperability (3.6) and complementarity (3.8) were slightly more moderate, likely reflecting the novelty of this concept and its partial overlap with existing deliberation frameworks. Notably, scalability (3.2) was the lowest among all directions, indicating the need for further work on generalising its grammar across systems, platforms, and governance levels.

2. Sensemaking-Oriented Explainability

This direction achieved the highest ethical and social value (4.8) and a strong relevance score (4.6), underscoring wide support for moving beyond traditional model-centric XAI. Respondents valued its contribution to interpretability and user understanding, though interoperability (3.0) and feasibility (3.4) were notably lower. This suggests that while the concept is widely appreciated, its implementation is still emergent and not yet well aligned with technical standards. Complementarity (3.6) and scalability (3.4) also reflect this early-stage maturity. Despite these challenges, this direction signals a promising innovation space for standards work that bridges technical outputs and human sensemaking.

3. Metadata & Provenance for AI-Enhanced Outputs and Traceability

This direction was one of the strongest overall, with top scores in interoperability (4.8) and consistently high ratings across ethical value (4.6), relevance (4.4), and feasibility (4.2). The strong support reflects a shared recognition of the need for transparent data lineage, traceability, and accountability in AI systems—especially in public and civic contexts. Complementarity (4.0) and scalability (4.0) also indicate alignment with existing frameworks

(e.g., DCAT-AP), making it both actionable and extensible across domains. It stands out as a near-ready candidate for cross-sector standardisation.

4. Trustworthiness, Risk & Bias Indicators for Civic and Educational AI

This proposal achieved near-perfect scores in multiple categories, especially relevance (4.6), ethical value (4.6), and interoperability (4.2), showing that trust mechanisms are universally valued in both educational and civic applications. Its feasibility (3.8) and scalability (4.0) suggest implementation is attainable, and its complementarity (4.2) indicates alignment with ISO/IEC 24028 and the EU AI Act. The consistency across dimensions highlights this direction as a strong foundation for establishing shared trust frameworks across sectors.

5. Co-creation, Testing and Ethical Governance Frameworks for Human-Centred AI

This direction received strong endorsement for ethical and social value (4.6) and relevance (4.2), reinforcing the centrality of participatory methods and governance in human-centred AI. It scored slightly lower on interoperability (3.4) and feasibility (3.8), suggesting challenges in harmonising participatory processes across different technical environments. Complementarity (3.8) and scalability (3.6) were positive but moderate, indicating a need for clearer mapping to existing governance and evaluation frameworks. Nevertheless, its high ethical score makes it a compelling direction for further development.

6. Human-in-the-Loop (HITL) Protocols for Civic and Educational Decision-Making

This standardisation direction achieved the highest relevance score overall (4.8), with equally strong feasibility (4.2) and ethical value (4.2) ratings. These results affirm the critical importance of preserving human agency and oversight in AI-mediated decisions. Though interoperability (3.6) and complementarity (3.8) were slightly lower, they remain solid, and scalability (3.8) indicates cross-domain applicability. The balance between governance and technical realism makes HITL one of the most actionable and timely directions across all evaluated proposals.

7. Ethical Governance & Accountability Frameworks for AI Systems in Public Institutions

This augMENTOR- and AI4Gov-linked direction received high marks for ethical value (4.6) and relevance (4.4), confirming the importance of formalising AI governance processes. Scores for feasibility (3.8) and scalability (3.8) suggest that practical implementation is realistic. However, interoperability (3.2) and complementarity (3.4) were somewhat lower, likely due to the variation in institutional practices and the early-stage maturity of public sector AI registers and audit trails. Still, the concept presents a solid basis for initiating policy-level standardisation efforts.

8. Explainable Educational AI Protocol (EEAIP)

This education-specific direction was well received, with high scores for ethical and social value (4.6) and relevance (4.4). It also had one of the highest scalability and transferability scores (4.25), highlighting its potential across educational levels and institutions. Lower scores in interoperability (3.2) and feasibility (3.8) suggest that technical implementation may still be fragmented or context-dependent. Nevertheless, the strong conceptual foundation and alignment with ISO 21001 suggest a promising pathway for sector-specific standards.

9. Learner Profile Interoperability Model (LPIM)

This direction received solid support across most dimensions, with relevance (4.2) and ethical value (4.2) confirming its importance in the future of personalised learning. Interoperability (3.6) and scalability (3.8) were promising, while feasibility (3.4) was slightly lower—likely due to the complexity of harmonising diverse learner data types. While slightly more niche, LPIM presents a clear opportunity for standardising learner data exchange aligned with ISO 21001 principles.

10. Semantic Alignment for Learning Analytics (SALA)

SALA scored highly for interoperability (4.2), indicating strong alignment with the goals of platform-agnostic learning analytics. Its relevance (4.0) and ethical value (4.0) also demonstrate general support. Feasibility (3.8) and scalability (3.8) reflect cautious optimism for implementation. While this direction is more technical and domain-specific, it plays a vital role in ensuring consistent and meaningful learning data interpretation across platforms.

Key insights, priorities, and standout observations

Below, data is analysed organised by key insights, priorities, and standout observations.

Highest-rated standardisation priorities

Among the standardisation directions assessed, several emerged as clear priorities based on their consistently high scores across multiple evaluation dimensions. **Human-in-the-Loop (HITL) Protocols** received the highest average relevance score (4.8), with strong marks across all other dimensions, reflecting a shared understanding of their essential role in ensuring responsible AI use. The emphasis on maintaining human agency and oversight resonates strongly in both civic and educational settings. Similarly, the proposal on **Trustworthiness, Risk & Bias Indicators** was recognised as critical for fostering public trust, especially in light of the EU AI Act and ISO/IEC 24028; it scored 4.6 in both relevance and ethical value, alongside high ratings for interoperability and scalability. **Sensemaking-Oriented Explainability** also stood out, particularly for its ethical and social value (4.8) and relevance (4.6), underscoring a widespread demand to move beyond

model-centric XAI toward more communicative and context-aware approaches to AI transparency. Finally, the direction on **Metadata & Provenance for AI Outputs and Traceability** achieved the highest interoperability score (4.8) and was highly rated overall, confirming its foundational role in enabling cross-platform traceability and alignment with frameworks such as DCAT-AP.

Most widely applicable cross-project directions

Three standardisation areas clearly emerged as **shared priorities with high results** demonstrating high feasibility and strong potential for cross-sector transferability:

Directions	Average Score Highlights
Metadata & Provenance	**4.4–4.8** across all dimensions
Trustworthiness & Bias Indicators	**4.2–4.6** across all dimensions
Co-creation & Ethical Governance Frameworks	Highly rated for ethical/social value (**4.6**) and relevance (**4.2**)

These directions stood out for their consistent performance across relevance, ethical impact, technical feasibility, and scalability. **Metadata & Provenance** was especially well-regarded, with top interoperability scores and widespread recognition of its importance in ensuring transparency, accountability, and traceability in AI-enhanced systems. Likewise, the direction on **Trustworthiness and Bias Indicators** received uniformly high ratings, confirming its foundational role in supporting reliability, fairness, and alignment with frameworks such as the EU AI Act and ISO/IEC 24028. Finally, the emphasis on **Co-creation and Ethical Governance** reflected a strong endorsement of participatory and inclusive processes in the development and oversight of AI systems—particularly in public sector and educational applications. Collectively, these directions provide a solid foundation for developing harmonised standards that bridge multiple domains.

Areas with Moderate Scalability or Complementarity

A few of the proposed standardisation directions received **lower scores in complementarity and scalability**, suggesting that while they are recognised as **innovative and ethically important**, they may still be **early-stage** in terms of readiness for formal standardisation. In particular, the direction on **Grammar for AI-Supported Deliberation** received a **scalability score of 3.2**, reflecting both the **context sensitivity of deliberative processes** and the challenge of defining a one-size-fits-all grammar for public reasoning. This does not diminish its perceived value—indeed, it was rated highly for ethical relevance—but rather points to the **need for flexibility** and domain adaptation. Its lower scalability rating highlights the importance of piloting and prototyping across varied deliberative settings before it can

mature into a standard. Similarly, the **Sensemaking-Oriented Explainability** direction received moderate scores for **complementarity (3.6)** and **scalability (3.4)**. These values suggest that while the concept is innovative—especially in moving beyond model-centric XAI—it may not yet align with existing standards and may require further conceptual and technical development. Its lower complementarity signals its role as a **frontier area**, demanding **new frameworks and interdisciplinary innovation**. Both proposals would therefore benefit from **pre-standardisation activities**, such as cross-sector prototyping, working groups, or scenario-based testing, to refine their scope and establish paths toward broader adoption.

Domain-Specific Highlights: Focus on Education

Within augMENTOR-specific items, the following were well-rated but showed **slightly lower interoperability or technical feasibility** scores, likely due to their narrower domain applicability:

The **Explainable Educational AI Protocol (EEAIP)** was highly valued for its ethical and social contribution (4.6), though it received a more modest rating for interoperability (3.2), reflecting the challenge of aligning educational explainability practices with broader technical frameworks. Similarly, the **Learner Profile Interoperability Model (LPIM)** scored well on relevance (4.2) but saw lower technical feasibility (3.4), suggesting implementation complexities in harmonising diverse learner data. The **Semantic Alignment for Learning Analytics (SALA)** direction stood out for its strong interoperability (4.2), though its perceived relevance was slightly lower (4.0), perhaps reflecting its technical specificity. Despite these variations, all three directions remain **highly valuable contributions**, particularly in advancing the **integration, transparency, and personalisation of educational AI systems**.

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