PowerizeD

Digitalization of Power Electronic Applications within Key Technology Value Chains

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1 Publishable summary

Project Acronym	***PowerizeD***
Project Logo	
Project full title	Digitalisation of Power Electronic Applications within Key Technology Value Chains
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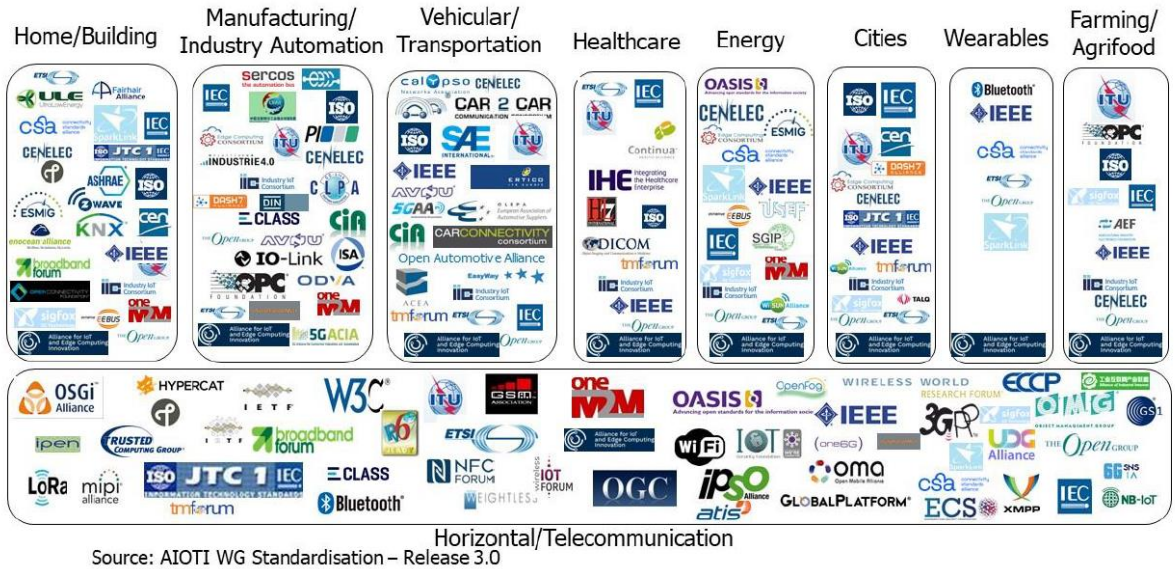
This document provides a general overview about the huge standardization landscape for the manufacturing industry, which is relevant for the various areas of interest of the Use Cases and CDTs (Cross Domain Topics).

The Standardization Task is a support task for the partners working on Use Cases and Cross Domain topics in the Work Packages. The objectives and methodology applied are explained. Therefore, the first joint activity was to distribute a questionnaire to all partners, and particular to the work package and use case leads, to assess the interest and involvement of partners and their companies/organizations. The result is presented. Furthermore, some concrete activities, contacts to standardization committees, dissemination activities with respect to the standardization activities and of internal support are summarized. The next steps as result of the survey are explained in the conclusions. Standardization is an ongoing activity beyond the duration of the project which lifetime is shorter than standardization life cycles are. The utilization of results in standardization contributions depends very much on the progress in the work packages and demonstrators.

2 Introduction & Scope

2.1 Handling the Standardization Landscape

The standardization landscape is built and managed by different types of SDOs (Standardization Organizations) and Industrial Alliances as well as in the international standardization of ISO and IEC (and the Joint Committees of ISO/IEC, mainly JTC1 for all IT and ICT-related issues). An overview to provide some impression is given in Figure 1, already ordered by application domains, several of them relevant for PowerizeD:



Source: AIOTI WG Standardisation – Release 3.0

FIGURE 1: INTERNATIONAL STANDARDIZATION ORGANIZATIONS (SDOS) AND INDUSTRIAL/BUSINESS/DOMAIN ALLIANCES

Another approach, particularly important for PowerizeD, is the identification of standardization groups/SDOs according to the application layers:

TABLE 1: APPLICATION LAYERS, CROSS DOMAIN TOPICS AND GROUPS OF STANDARDS

Application Layer	Cross Domain Topic	Groups of Standards
Materials	Substrates, Metallization and Packaging, Intelligent Control, Reliability, Modelling, Artificial Intelligence and software (SW) & hardware (HW) Tools for simulations	Mainly Industrial Alliances, SEMI, OMG,, „de facto standards“ (tools)
Components	Artificial Intelligence, Modelling, and SW & HW Tools for simulations and measurements for components optimization.	AI-Standards ISO/IEC JTC1 SC42, OMG, Industrial Alliances
System	Modelling, Digital Twins, Intelligent Control and SW & HW Tools for simulations and measurements for converters.	ISO, IEC, ISO/IEC JTC1 SC7, ISO/IEC JTC1 SC41
System of Systems	Modelling, Digital Twins, Intelligent Control and SW & HW Tools for simulations and measurements for complex system operation.	ISO, IEC, ISO/IEC JTC1 SC7, ISO/IEC JTC1 SC41

Groups of Standards from different sources are building in some cases clusters and eco-systems and are becoming relevant in complex systems and systems-of-systems applications, because they are interacting and influencing (impacting) each other. Therefore, a broader view will be more efficient. Examples are:

1) Dependability (see section 4.1)

2) IoT and Digital Twin Eco-System (see following figure):

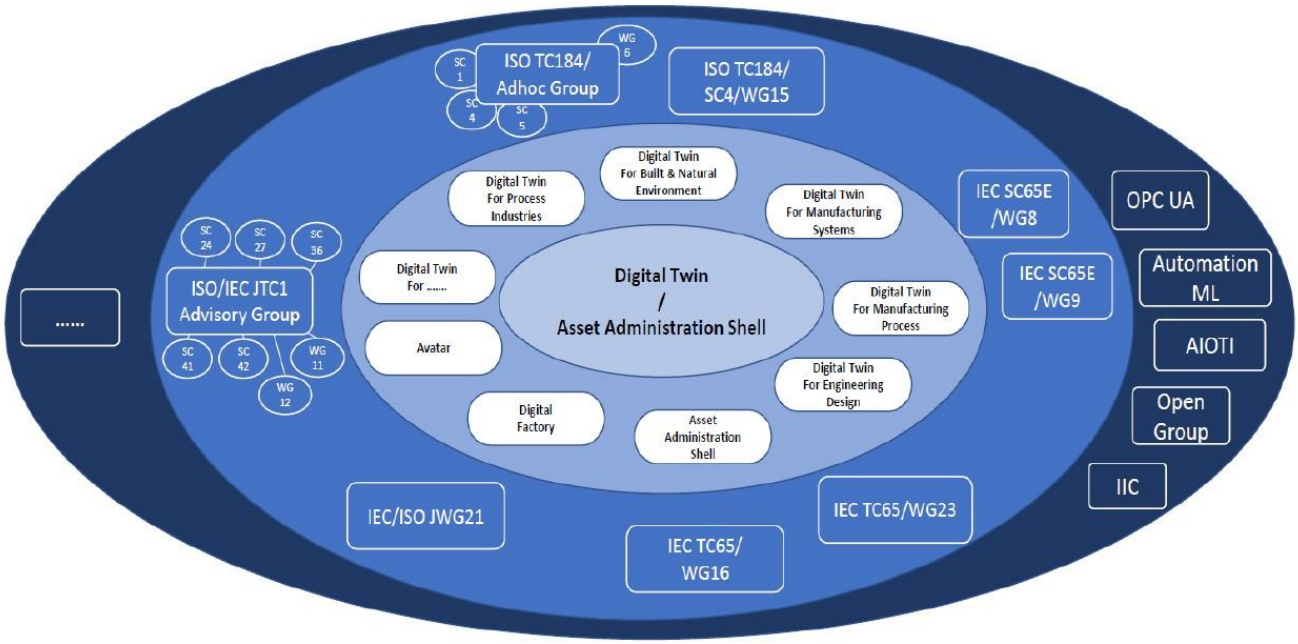


FIGURE 2: IOT AND DIGITAL TWIN ECO-SYSTEM

3) Automotive safety and AI:

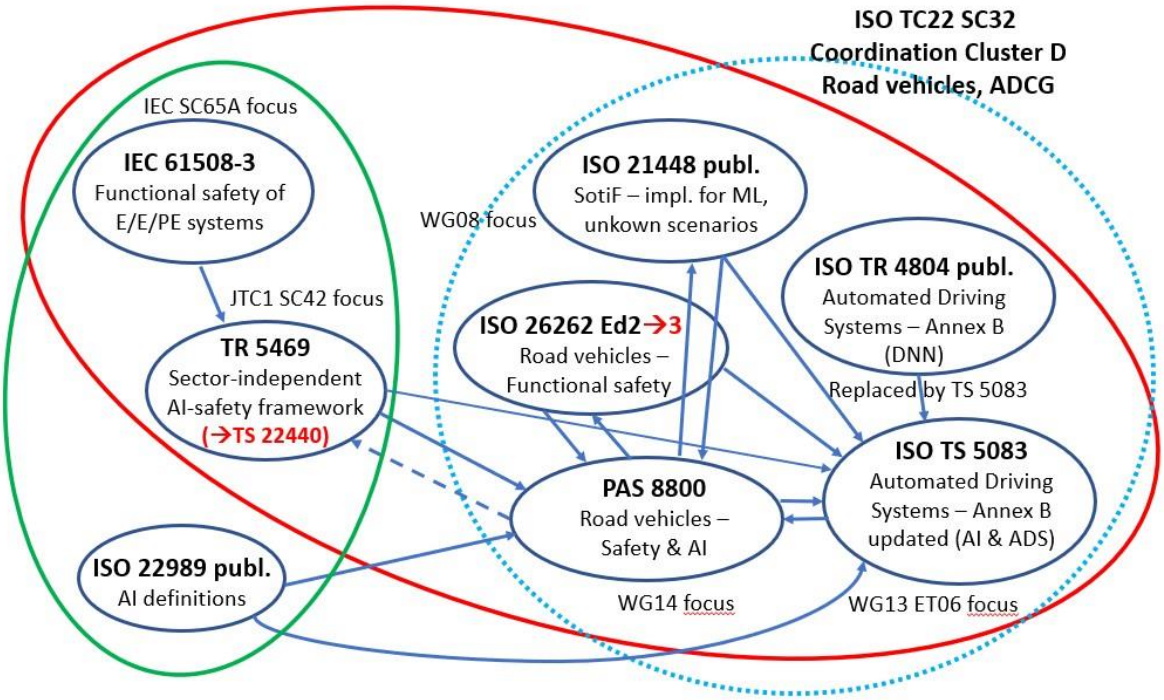


FIGURE 3: CLUSTER AUTOMOTIVE SAFETY AND AI

4) Industrial Standards cluster – many domains and topics to be covered:

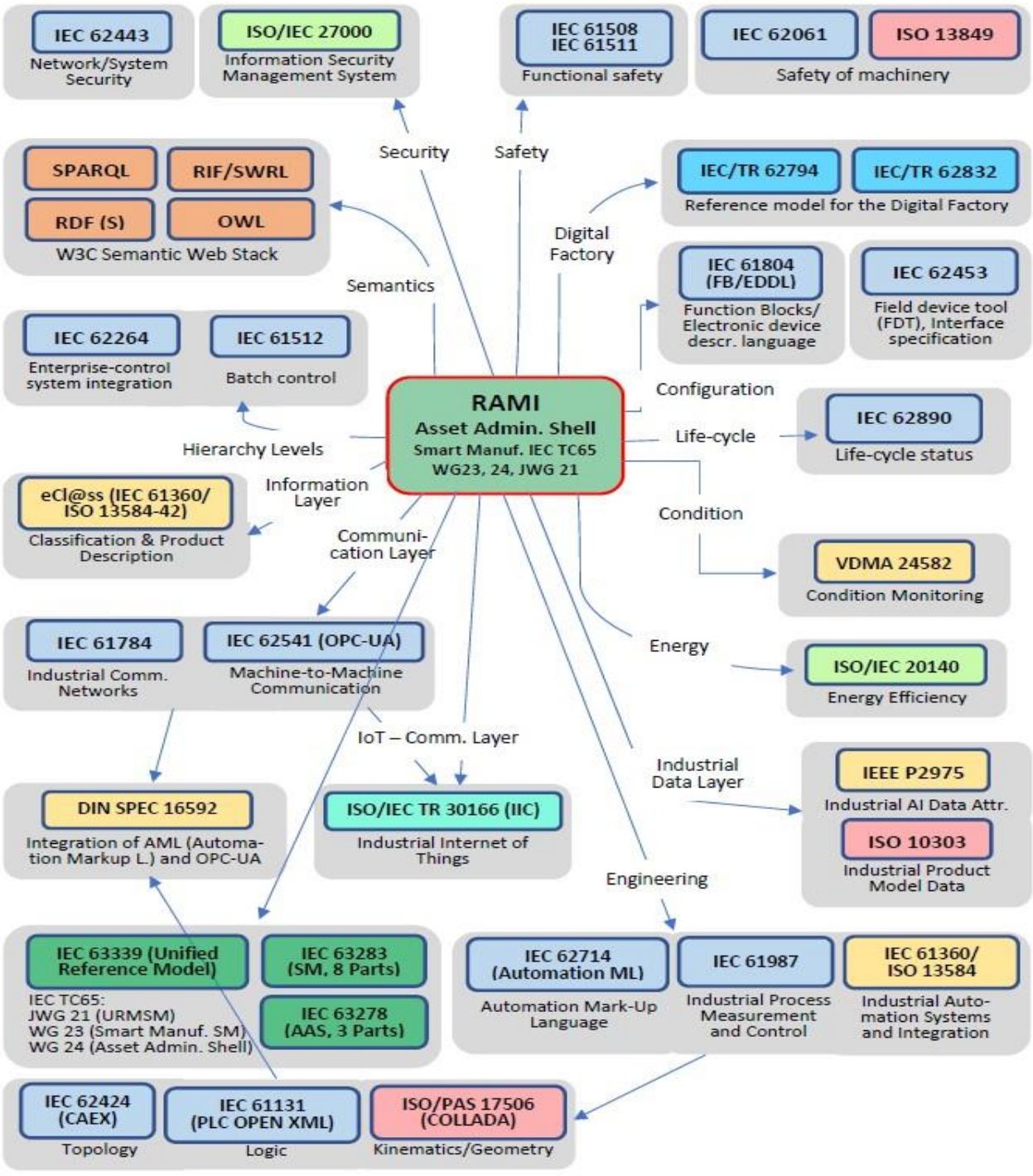


FIGURE 4: CLUSTER OF INDUSTRIAL STANDARDS

5) AI standardization-progressing (too?) fast, AI-Act standardization requests of the EC to CEN/CLC further speeds up activities (CEN/CLC JTC 21):

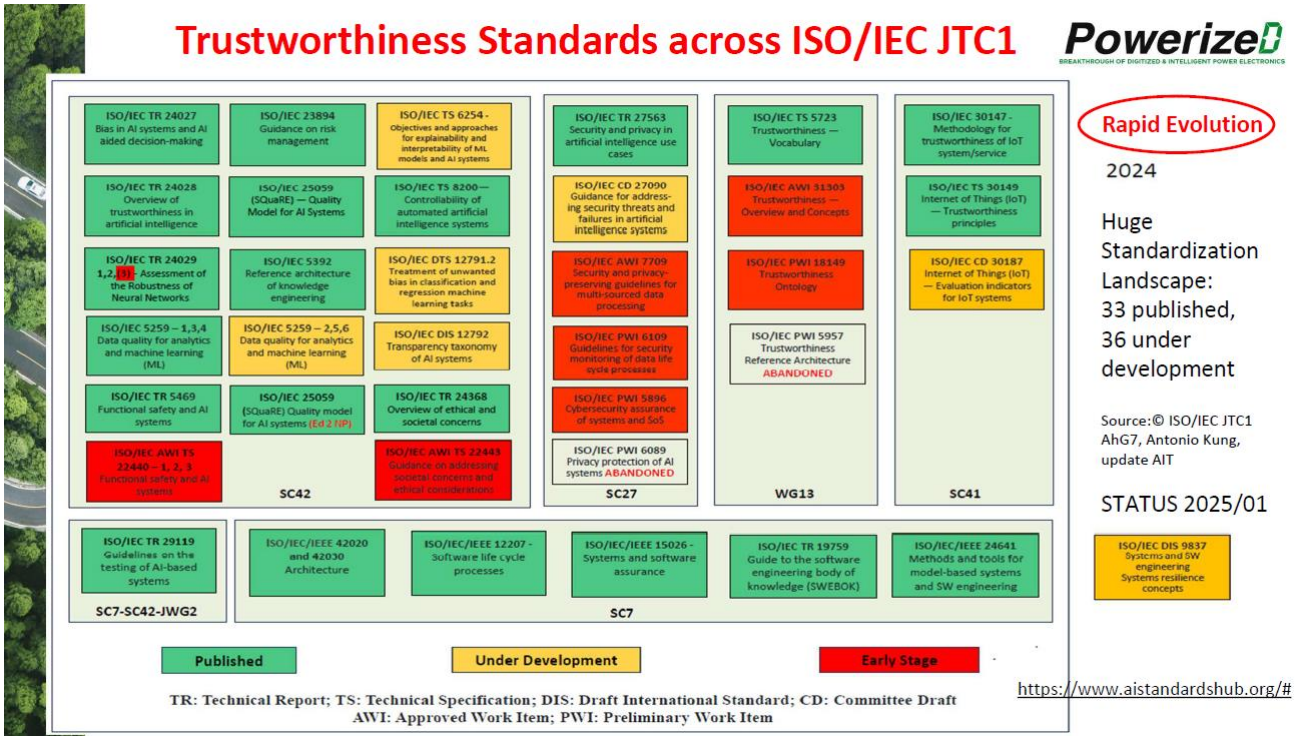


FIGURE 5: AI TRUSTWORTHINESS STANDARDS ACROSS ISO/IEC JTC1 (2025-01)

2.2 The PowerizeD Standardization Task

2.2.1 Objectives:

- **Facilitating the uptake** of the PowerizeD technologies through regulatory alignment and standardization efforts.
- Preserving the **public stakeholders' interests** in quality, safety, security, dependability, performance and ethically aligned design, following European Recommendations, Directives and Regulations.
- **Raising awareness** for existing and emerging standards and provide information and support in implementation (facilitating “future-proof” developments).
- **Support transfer of results** to standardization (project-driven contributions) .

2.2.2 Methodology

- Holistic approach to meet major **standardization challenges of the Technology WPs & Use Cases.**
- **Analysis of standardization needs of CDTs and UCs vs. involvement of partners in Standardization.**
- **Selection** of the proper subsets from the huge **standardization landscape** (Standardization Organizations (SDOs) and (Industrial) Alliances).

- Taking into account **„Windows of Opportunity“ (**Standards under development or maintenance).
- **Motivating use of standards or pre-standards.**
- **Motivating active involvement & transfer of results/experiences to standardization groups.**

KPI: ***Contribution to ≥ 5 Standards groups – ACHIEVED, activities in more than 20 committees and working groups on international and national level.***

The Standardization task aims at a holistic view on all standardization challenges in context of PowerizeD (Overview section 2.3). The first activity will be a survey over the WPs and Use cases to get a full picture of standards of interest, maybe used or being interested in their development, and to extend these landscapes where appropriate with specific standards on more detailed topics (Section 3.1).

The second task is to motivate use of standards, raise awareness and identify gaps, particularly where project-driven contributions are to be expected (information on request by partners, presentations at project meetings).

The third task is to monitor standardization evolution, support participation and contribution to current standardization activities and to check for adaption of qualification/certification processes and methods concerning the new technologies developed (active participation in standardization Committees and working groups, Section 4). However, it should be noted that certification or qualification as concrete activity are NOT part of a research project.

2.3 Standardization Challenges

Standardization is key for a fair, competitive economy, by preserving the public stakeholders interests in safety, security, dependability, performance, and ethical aligned design, following European recommendations, Directives, and Regulations (some at the moment still under (further) development).

Increasing usage of AI technologies for development, monitoring, predictive health and maintenance, digital twins, self- and environmental awareness, and highly automated/autonomous decision making raise many concerns which are already now considered in evolving generic as well as domain/application specific standardization work.

Key topics addressed in standardization cover a large landscape of standards organizations and industrial associations. Derived from the project principles mentioned above, the standardization landscape, that is already monitored and actively participated by partner companies on national and international level, includes:

- Generic functional safety and cybersecurity standards (IEC MT 61508, preparing Ed. 3, covering more than before new hardware, software and system technologies, e.g., AI and safety, object-oriented programming, hardware architectural, and dependability considerations) and IEC 62443 IACS (Industrial automation and control systems security, developing towards a generic technical security standard),
- Generic and specific Dependability (Reliability) standards in IEC TC56, covering all sorts of reliability models and calculations for hardware and systems,
- Automotive, (ISO TC22 SC32, Functional safety, Safety of the intended Functionality (considering limitations of sensor/HW also), Automated Driving systems (TS 5083, including AI decision making in Editor Team 06), update of ISO 26262 for next edition (including PAS 8800,

AI and safety, ISO 26262 part 11 (semiconductor part)), standards for electric vehicles (TC 22 SC37) and connected vehicles (TC 22 SC31, including “vehicle to grid” standards, Extended vehicles, Remote diagnosis etc.),

- Railway standards on safety, cybersecurity, RAMS engineering, communications, and signalling: Mainly done in CEN/CENELEC TC9X (later on transferred to IEC getting an IEC number as well), many developments on European level particularly on signalling (ETCS system).
- Machinery standards related to safety, dependability, and security, in IEC TC44 and ISO TC 184 (“Machinery Safety, E/E/PE aspects”, and “Automation systems and integration”)
- AI standards related to safety, dependability, and security: ISO/IEC JTC1 SC42, covering in many standards, reports, and technical specifications all aspects of trustworthiness (including bias, controllability of automated AI systems, robustness of DNN, Explainability, Transparency, Ethics, and societal aspects, etc.); functional safety (TR 5469) is developed together with IEC SC65A 61508-3, Validation and security together with the Systems and SW Engineering Group ISO/IEC SC7 resp. SC27,
- Thermal testing standards of semiconductor device packages developed and maintained by the JEDEC JC15 technical committee. Currently there is one single standard that deals with thermal testing of power semiconductor devices packages (JEDEC JESD51-14) that was published 10 years ago as result of a cooperation between IFAG and BME. Also, IFAG and BME commonly published a concept of a new standard on thermal characteristics of multi heat-source packages/modules. Recent trends, especially in case power semiconductor device packages require revision/scope extension, especially that of JEDEC standard JESD51-14. This process was initiated by a recent publication and to process needs to be further continued. The JC15 committee is also responsible for developing concepts and standards for compact thermal models of packages (digital twins in the thermal domain) and all thermal aspects covered by the JEDEC JEP30 standard’s XML schema of parts definitions. These activities need to be harmonized with the new results of PowerizeD, through the JC15 committee memberships of partners personnel from the PowerizeD project.
- Standards of the AEC council (Automotive Electronics Council) (Standards for qualification of reliable, high quality electronic components),
- ECPE (European Center for Power Electronics) guideline AQG324 (for power electronic devices qualification).
- IoT and Digital Twin standards (ISO/IEC JTC1 SC41): semantic and syntactic interoperability, Digital twin under different aspects from architecture to security, trustworthiness, etc.

3 Assessment and Evaluation of Partners' Involvement in Standardization

3.1 Standardization Questionnaire (Annex 1)

The questionnaire was developed during the first reporting period, thus fulfilling the first part of the standardization task 4.1.3) and issued afterwards. Collection took some time and resulted in 25 replies from 61 partners (a few en-bloc, e.g., Infineon Technologies for all Infineon partners, or via direct communications). The questionnaire addressed two issues:

- Areas of interest, role of "Intelligence" (including reference to WP, CDT (Cross Domain Topic) and UC (Use Case), or comments) and
- Standards Involvement Assessment Table (also with reference to reference to WP, CDT (Cross Domain Topic) and UC (Use Case)).

It included explanations and an example (part from AIT), see Annex 1.

3.2 Result of the assessment of the "Areas of Interest":

The cores of the areas of interest showed the following (ordered by number of choices)

- **(16)** **Dependability/Reliability** (IEC TC56, for HW and Systems)
- **(9)** **Artificial Intelligence** ISO/IEC JTC1 SC42 (trustworthiness, ethical concerns, robustness, bias, safety (with IEC SC65A), security (with JTC1 SC27), and Testing (with SC7)), **AI Act**
- **(8)** **Functional Safety, Cybersecurity** (Generic & Industrial domain (IEC TC65)), **RED Directive, Cyber Resilience Act**
- **(8)** **Digital Twin** (ISO/IEC JTC1 SC41 (IoT and Digital Twin) and ISO TC184)
- **(8)** **JEDEC Standards, IEC TC56 (**Accelerated/Environmental Stress Testing)
- **(7)** **Mobility:** Automotive (ISO TC22), Railways (CEN/CLC TC9X), ARP
- **(7)** **ECPE (European Center for Power Electronics) guide AQG324** (best practices for evaluation and testing)
- **(6)** **Machinery Safety** (IEC TC44, ISO TC 184), **Machinery Directive**
- **(6)** **EMC Standards** (IEC, ISO, CENELEC, CEN, FCC, etc.) for process control and measurement, various domain standards, **EMC Directive**
- **(5)** **AEC Standards** (Automotive Electronics Council) (Reliable Electronics)
- **(4)** **Other Semiconductor Standards (e.g., IEC TC47) (added)**
- **(2)** **Modelling, Simulation and Prediction** (ASAM, XML, AML, ISO, IEC) **(area added by partners)**
- **(2)** **Intelligent control (area added by partners)**
- **(2)** **Eco-Design Intelligent control (area added by partners)**
- **(1)** **Industry 4.0/5.0, Robotics, Autonomous Systems (various Stds.)**

The list was defined as "not exhaustive", and partners added four additional areas.

3.3 Result of the Assessment of Standardization Committees and Groups

The questionnaire allowed to identify the role of the partner with respect to standards and standardization, either to groups of standards or individual standards. Roles are:

- I (interested), M (monitoring) (there was no clear distinction, so "I" stands for both)

- U (using),
- A (active in Std. group),
- C (chairing a group)

Most positions in the tables refer to “I” (includes “M”) or “U”.
Partners chairing a standardization committee are:

- SIGN – IEC TC64 SC64A WG4 (LED light sources, lamps and modules), standards IEC 62560, IEC 62031, etc
- AIT – ÖVE EG56, Austrian Mirror of IEC TC56 (Dependability)
- IFAT - ÖVE EG56, Austrian Mirror of IEC TC56 (co-chair) (Dependability)
- UNIBO – IEC 61851-1 (Rotating electrical machines - Part 18-41: Partial discharge free electrical insulation systems (Type I) used in rotating electrical machines fed from voltage converters - Qualification and quality control tests)
- SIGN – IEC TC77 (EMC standardization), IEC 61000 series (chairing some working groups)

Partners are actively participating in a series of international or national standardization groups (besides those already mentioned as “chairing”):

- AIT is active in many standards of IEC TC56 “Dependability” and IEC T65 (Industrial-process measurement, control and automation, particularly in the functional safety and cybersecurity area of interest, and the smart manufacturing standards), both in international and national level. The same applies to AI standards (ISO/IEC JTC1 SC42 and CEN/CLC JTC21, on national and partial on international level (Functional safety and AI – TS 22440, Human-machine teaming ISO/IEC AWI TR 42109, Cybersecurity and AI - CEN/CLC JTC21 WG5), in robotics and safety of machinery. IoT and Digital Twin is covered on national level.)
  Automotive standards around ISO TC22 SC32 are covered as well on both levels: WG08 functional safety (ISO 26262 Ed3, ISO 21448 SotiF, WG 11 Cybersecurity engineering (partial as “ISO/SAE”), WG 12 SW Update, WG 13 from the beginning (Automated Driving Systems (ADS), already in TR 4804, now TS 5083).
- Infineon Technologies (IFAG, IFAT, IFD, IFI) are active in IEC TC56, JEDEC, IEC TC47 and standards like IEC 63492-1, 60747-xx, IEC TC109 IEC 60664 and other semiconductor standards, besides other standardization activities like in AEC.
- CSIC is active in several ISO/IEC JTC1 SC42 standards.
- SIGN is, besides its chairing position in IEC SC34A WG4, active also in SC34 B, C and D, and KDE 221.6.x on national level. For EMC standards, they are active in IEC TC77 and CISPR.
- UNIBO, besides its chairmanship, is active also in ARP 7374, 7375.

In total, there are more than 150 standards or standardization involvements indicated by partners, with focus on some specific areas (see Section 3.2, including well established and well-known generic and basic standards) and some with very specialized ones, e.g.,

IEC TC47: To prepare international standards for the design, manufacture, use and reuse of discrete semiconductor devices, integrated circuits, display devices, sensors, electronic component assemblies, interface requirements, and micro-electromechanical systems, using environmentally sound practices.

IEC 63492-1: Semiconductor devices - Isolation for semiconductor devices – Part 1: Failure mechanisms and measurement methods to evaluate solid insulation for semiconductor devices.

IEC 60747-xx Semiconductor standards: The IEC 60747 series of semiconductor standards covers discrete devices, integrated circuits, semiconductor sensors, microwave integrated circuits, and others as part of its 28 part series.

IEC TC109 (IEC 60664): To prepare International Standards on the principles of insulation coordination applicable to all low-voltage equipment (up to and including 1 000 V AC and 1 500V DC).

IEC TC34 Lighting: To prepare, review, and maintain international standards and related IEC deliverables regarding safety, performance, and compatibility specifications for lighting systems.

EN 62377-1: Safety requirements for power electronic converter systems and equipment.

ISO/IEC DTR 20226: Information technology — Artificial intelligence — Environmental sustainability aspects of AI system.

IEC 61851-1: Electric vehicle conductive charging system, Part 1: General requirements

IEC 60034-18-41: Rotating electrical machines - Part 18-41: Partial discharge free electrical insulation systems (Type I) used in rotating electrical machines fed from voltage converters - Qualification and quality control tests.

Because there were many partners that did not reply or claimed to have no standardization activities, awareness raising will be a major activity during the next months, trying to query the positions of those partners and to support analysis of the UC and CDTs (in the tables of the questionnaires often abridged to “CT” instead of CDT) with respect to provide a more complete picture of relevant standards, the approach indicated in Section 5.1 (Figure 10). This is the basis for final steps to consideration of (evolving and existing) standards during work in progress and identification of a few potential contributions to standards. Standardization is an ongoing process which takes longer than a research project like PowerizeD, and results that can be transferred to standardization work are to be expected towards the end of the project.

4 Standardization Activities and Established Contacts to Committees

4.1 PowerizeD and Reliability Standards: Revival of Austrian Mirror Group by the PowerizeD Standardization Team

Reliability is a key factor in application of semiconductors and hardware in critical systems. The long-established IEC TC 56 Committee develops and manages the standards around reliability and related topics as relevant for long-term deployed systems, like availability, maintainability and supportability. Therefore, the TC was renamed to “Dependability”, to demonstrate the overarching topics on system level.

Dependability includes reliability, availability, maintainability, and supportability, as shown in Figure 6. It is fundamental for the performance of systems and services and impacts both all types of organizations and society in general. Particularly reliability is essential in the context of hardware and semiconductors and upwards to system level. Many targets of PowerizeD are covered by dependability standards, as shown in Figure 6 below, such as contributions to European goals of sustainability, resilience, circular economy, and public interest in trustworthiness of autonomous systems, and asset management in context of industrial supply chains.

The importance of dependability standards for the partners is well proven by the fact that in the “areas of interest” table of the questionnaire it received by far the highest score!

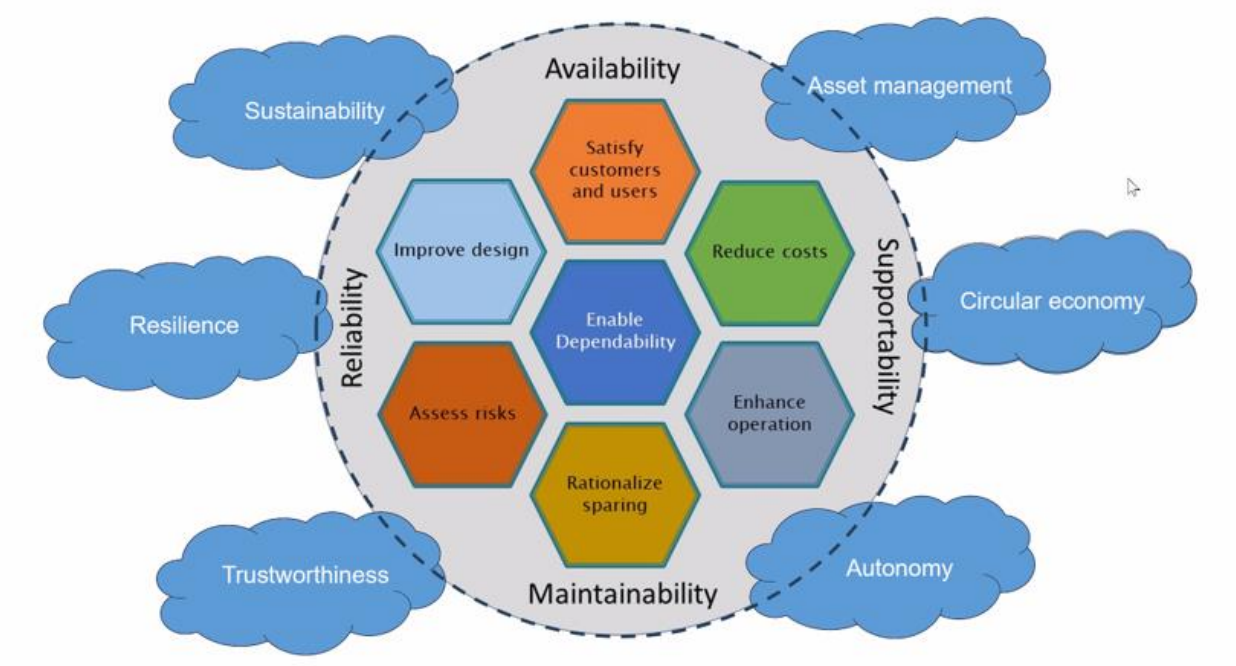


FIGURE 6: IEC TC56 DEPENDABILITY STANDARDIZATION (SOURCE: HTTPS://TC56.IEC.CH/)

The Austrian mirror group EG56 was endangered to be downgraded from P-member (Participating Member, who are voting members) to O-member (Observing member, who cannot vote) or even to be shut down after retirement of the long-term chairman. Representation on IEC level would have been just performed by ÖVE (Austrian Electrotechnical Association) at management level of the umbrella TK EG. The start of PowerizeD motivated the Austrian Team (Erwin Schoitsch and Horst

Lewitschnig) to revive and lead the national group to be able to actively perform the PowerizeD standardization task, in both directions: transfer of dependability standards information to work packages, Supply Chains (SCs) and CDTs (Use Cases and Cross-Domain Topics) and to facilitate to influence standardization where appropriate (transfer experiences and results to standardization groups).

This included active participation in IEC TC56 international Plenary meetings and participation in the work of working groups. Participation was initiated in WG2 (Dependability Techniques), WG 3 (Management and systems), and WG 4 (Information systems).

WG2 covers:

- Reliability centred maintenance,
- Programmes for Reliability Growth,
- Fault tree analysis (FTA),
- Dependability of products containing reused parts – Requirements for functionality and tests,
- Methods for product accelerated testing,
- A global methodology for reliability data prediction of electronic components

WG 3 covers:

- management of dependability; (foundational standards)
- maintainability, supportability, and maintenance;
- technological risk assessment;
- systems engineering and human aspects.

WG 4 covers the important challenges of dependability of critical distributed systems and systems-of-systems:

- Dependability of information systems including open systems, Internet of Things (IoT), Systems of Systems (SoS).
- Dependability of IT security.

There are additional project groups in connection with the working groups, working on new topics. Projects of interest, particularly for RUL-based estimations relevant in PowerizeD, project teams like PT2.25 (Reliability data prediction) and PT 2.26 (Reliability – Reference failure rates at reference conditions) are working on these topics. PT 3.27 (Dependability management – Application guide – Availability) is of general interest in extending the existing, established basic standards of TC56 on Dependability management.

4.2 PowerizeD Standardization Team at International IEC TC56 (Dependability) Plenary Meeting in Vienna, December 2-6, 2024

The Plenary meeting of IEC TC56 (Dependability) (Figure 8) took place in Vienna from December 2-6, 2024. It was hosted by ÖVE (Austrian Electrotechnical Association) and supported by the Austrian Mirror Committee EG56, led by Erwin Schoitsch (AIT Austrian Institute of Technology) and Horst Lewitschnig (Infineon Austria), both also the leaders of the PowerizeD Standardization Task. We had the opportunity to present the Standardization Synergies Roll-up Poster (Figure 7) and give a short overview on the importance of standardization in ECSEL and Chip-JU industry-driven projects, funded

by the EC (Horizon Europe, Joint Undertakings ECSEL JU and Chips-JU) and national funding Authorities of the partners in the Plenary and during the seminar.

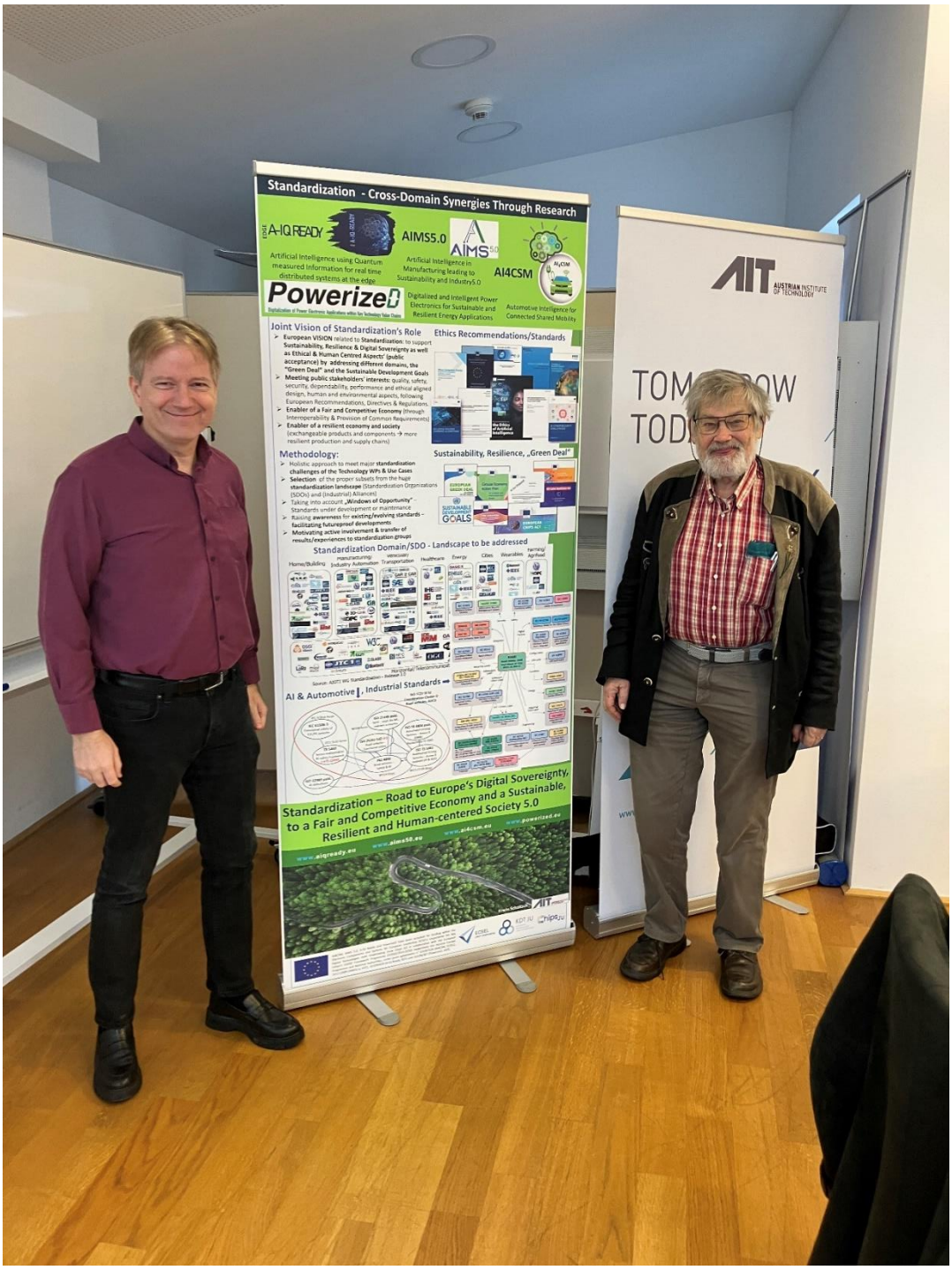


FIGURE 7: POWERIZED STANDARDIZATION TEAM, ERWIN SCHOITSCH AND HORST LEWITSCHNIG, AT THE ROLL-UP POSTER

FIGURE 8: FULL PLENARY OF IEC TC56 IN VIENNA, ALSO INCLUDING A SEMINAR AND MANY MEMBERS ONLINE.

4.3 JEDEC Standardization

BME and IFAG are members of JEDEC JC15 and will work together to provide inputs for the revision of the JEDEC JESD51-14 thermal testing standard with a focus on extending the scope of the standard from TO **(Transistor Outlines)** type packages to packages of high-power semiconductor devices. They will provide this to the JEDEC JC15 committee on thermal characterization of semiconductor packages. BME will also prepare proposals for extending the series of JEDEC's thermal modelling guidelines (JESD 15-x series). They have a few items in mind that could be revised in this standard related to e.g., IGBTs (insulated-gate bipolar transistors). **The integration into the standardization activities was clarified by** moving subtask 2.4.3.3 (VSE, BME, PTB) to 4.1.3 standardization because it fits better to Task 4.1.3.

4.4 Standardization Support (examples)

Some examples are e.g., the CT on "Federated Learning", where AI and Machine Learning are covered in detail already by published or developing standards, but particularities of "Federated Learning" are not covered at the moment.

Other issues concern dependability/reliability standards, one very specific example question was raised on which standard(s) apply today and tomorrow for harmonic currents in a practicable usable form. EN 61000-3-12 is rather old – this could be answered insofar as exactly this standard is now coming under maintenance in IEC TC56, progress will be reported to the interested partner.

Standards for RUL-based estimations are now handled and updated in IEC TC56 (see report above).

An internal support was initiated in investigating and facilitating contacts between partners on Wafer-test data exchange, standardized formats, etc., and on the upcoming EU Product Passport (vs. ISO TC 184, SC 4, Industrial data).

4.5 Synergies in Standardization Work with other ECSEL/Chips JU projects

Since many aspects to be considered and handled in PowerizeD are partially shared with related ECSEL/Chips JU project where key partners of PowerizeD are also involved (e.g., AIT as task leader in PowerizeD, AI4CSM, AIMS5.0 and A-IQ Ready; Infineon AG, Infineon Dresden and Infineon Austria, OTH, MBAG, VIF, BME, HUA, and others in two or more of them, just to name a few), there are some synergy effects as demonstrated in the Roll-Up (Poster) which was already presented at several project meetings, Conferences, Workshops and standardization meetings (see, e.g., Section 4.2, and Figure 9).

FIGURE 9: PRESENTATION OF STANDARDIZATION SYNERGIES THROUGH RESEARCH AT CONFERENCES AND WORKSHOPS

Examples have been (besides project-internal workshops of the referenced projects):

- **Society 5.0 – Sustainable Technology Trends and Society** presentation on ““Society 5.0 – Sustainability as a Key Challenge for Society and Technology – Technology driven, but human-centred”, Vienna, Jan. 30, 2024.
- **MESS24,** Vienna, June 6-7, 2024
- **SAFECOMP 2024 (DECSoS WS),** Florence, Sept. 17-20, 2024
- **ARROWHEAD fPVN/AIMS5.0,** Joint Workshop in Budapest, Hungary, November 12-14th, 2024

4.6 Establishing links to other standardization organizations

Besides this specific activity in IEC TC56, the involvement in the established areas and committees in ISO, IEC and ISO/IEC JTC1 of functional safety, cybersecurity, smart manufacturing, digital twin, IoT, Artificial Intelligence, Automated vehicles and robotics, EMC, Lighting, and semiconductor standardization as indicated in the evaluation (JEDEC, IEC TC47, AEC and ECPE) is ongoing and includes more than 20 committees and working groups. This was presented partially at the first review and the recent Steering Committee meeting in Bilbao in November 2024.

5 Conclusion

5.1 Next Steps

The next step is to query the replies to the questionnaire and complete on a “per CDT/UC/WP” level the identification and association of relevant standards to support partners to consider evolving standards and collect potential contributions to the standardization landscape within the next few months (Figure 10).

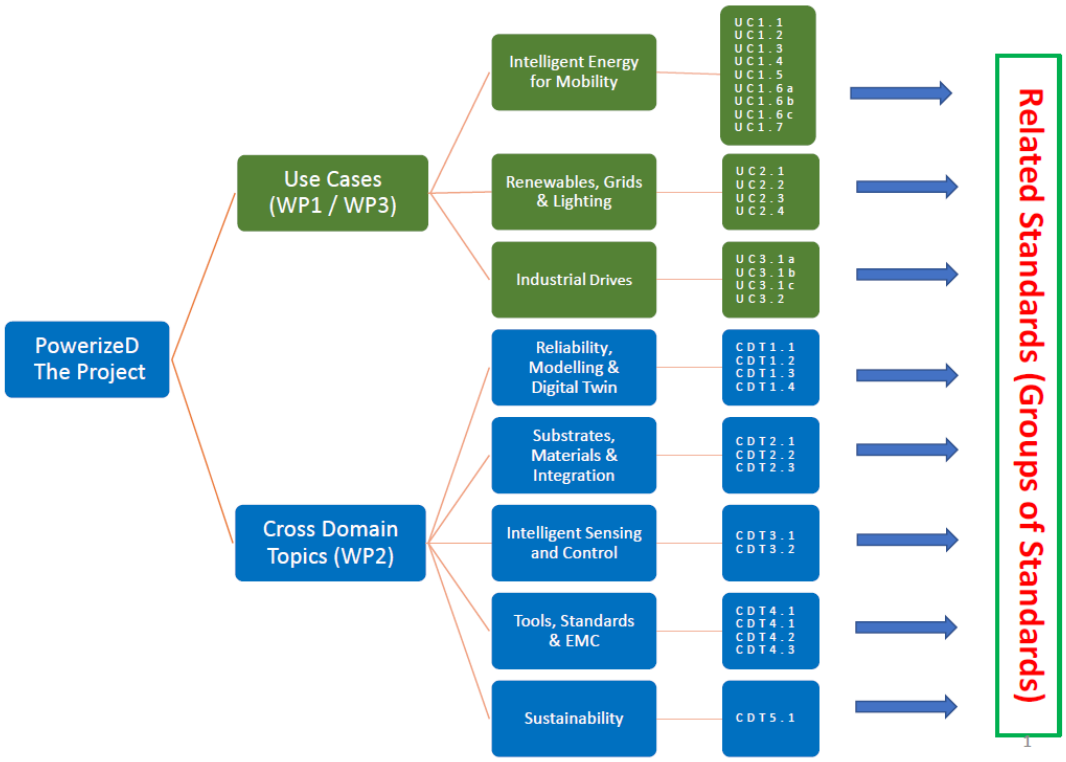


FIGURE 10: IDENTIFICATION AND ASSOCIATION OF RELEVANT STANDARDS TO USE CASES AND CDTS

A further investigation is under way to identify some gaps in declared areas of interest and declared standardization involvement of partners with the help of the PowerizeD Standardization Team.

5.2 Alignment with other WPs:

The standardization subtask 2.4.3.3 (VSE, BME, PTB) was moved to 4.1.3 standardization because it was isolated there and fits better to Task 4.1.3.

BME and IFAG are members of **JEDEC JC15** and will work together to provide inputs for the revision of the JEDEC JESD51-14 thermal testing standard with a focus on extending the scope of the standard from TO type packages to packages of high-power semiconductor devices. They will provide this to the JEDEC JC15 committee on thermal characterization of semiconductor packages. BME will also prepare proposals for extending the series of JEDEC’s thermal modelling guidelines (JESD 15-x series). They have a few items in mind that could be revised in this standard related to e.g., IGBTs.

6 References

Links validated 2025-01-12.

AIOTI – Alliance for AI, IoT and Edge Continuum Innovation – https://aioti.eu

AIOTI Standardization WG - WG Standardisation Deliverables – AIOTI

ISO Standards https://www.iso.org (International Standards Organization)

IEC standards https://www.iec.ch (International Electrotechnical Commission)

ISO/IEC JTC1 About - JTC 1 (ISO/IEC Joint Technical Committee 1)

Schoitsch, E. (2020). "Towards a Resilient Society – Technology 5.0, Risks and Ethics", IDIMT 2020, Digitalized Economy, Society and Information Management, Proceedings, Trauner Verlag, Linz, Austria, Schriftenreihe Informatik 49, (ISBN 978-3-99062-958-1), p. 403-412.

UNESCO (2021, Nov. 23). Recommendation on the Ethics of Artificial Intelligence, https://unesdoc.unesco.org/ark:/48223/pf0000381137?3=null&queryId=c5dd8ced-9647-452b-b4d6-92723006496c

United Nations, Transforming our World - The 2030 Agenda for Sustainable Development (2015), https://sustainabledevelopment.un.org/post2015/transformingourworld

Von der Leyen, U. (2019). "A Union that strives for more – My agenda for Europe".
https://www.europarl.europa.eu/resources/library/media/20190716RES57231/20190716RES57231.pdf

7 Annex 1: Standardization Involvement Questionnaire (Template)

Partner XXXX Involvement in Standardization & AI (Intelligence) issues

Please fill in XXXX and add this acronym to the filename replacing XXXX.

Please fill in as soon as possible, latest until January 10, 2024, to allow evaluation in time before the review.

Partner XXXX – < Full affiliation name>

Standardization Contact: <name, email> (one name required for each partner)

1. **Part 1:**
   a) **Comment in free text where in your work in PowerizeD AI/Intelligence plays a role, and which one (tools, product development, final product, …)**

   b) **List of areas addressed by standards – your interests, relevance in your CDT#, UC#, WP x.y.z (Table 1):**

Areas addressed	**Interest (Y/N, key standard (s)?)**	**CDT#, UC#, WP x.y.z or comment**
Functional Safety, Cybersecurity		
Dependability/Reliability		
Mobility: Automotive, Railways		
Machinery Safety		
Artificial Intelligence		
Digital Twin		
JEDEC Standards		
AEC (Automotive Electronics Council)		
ECPE (European Center for Power Electronics)		
EMC Standards		
<please add any other area you think may be relevant, in the following lines>		

2. Standards Involvement Assessment (Table 2)

General Remarks:

Note: "Involvement" does not address only you as person, but also your department or site (colleagues you may have contact to).

"PwD staff Y(es)" means personal involvement of persons working in PowerizeD (PwD), "N(o)" means "Partner XXX involved, but not PwD persons themselves"

SDO = Standardization Organization, TC Technical Committee, SC Subcommittee, WG Working Group, TF Task Force, etc. (use appropriate abbreviation depending on SDO or Alliance rules).

Roles of partners: I (interested), U (using), M (monitoring), A (active in Std. group), C (chairing a group)

Relevance: Please include your **UCs, CTs, WPs (Tasks)** where these standards are relevant.

Examples (marked yellow, NOT exhaustive) are from AIT involvement – please delete in your submission!

SDO	TC/WG	Stan-dard(s)	Title of Standard	Role	PwD staff	Comments on involvement	Relevant for UC#/ CDT#/WP x.y.z
IEC	SC 65A	IEC 61508	IEC 61508 Functional safety of E/E/PE systems, maintenance teams	A	Y	Regular contributions, IEC 61508-3 and IEC 61508-1 and 2;	CDT 1.x, 3.1, 3.2, 4.3, 4.4; UC 1.1, 1.7; WP 4.1.3:
IEC	TC65	IEC 62443 series	IEC 62443 Security of Industrial Process Measurement and Control – network and system security	A, U	N	Active via other AIT staff, AD staff: User with respect to Safety & Cybersecurity topics in other IEC Standards; Roadmap and Horizontality TF	CDT 1.3; UC 1.1, 1.6b, c, 1.7; WP 4.1.3
ISO	TC22 SC32 WG 8	ISO 26262	Road vehicles - Functional safety	A	Y	Regular contributions, initiator of ISO 26262:2018 cyber-security task force	UC 1.2, 1.7; WP 4.1.3
ISO	ISO/SAE JWG1	ISO 21434	Road vehicles – Cybersecurity engineering	A, U	Y	Active from the very beginning in several "Part Groups", in Ed3 in several TR, TS, PAS	CDT 1.3; UC 1.7; WP 4.1.3;
IEC	TC56	Several stds.	Dependability, Reliability, Maintainability, Supportability	C	Y	Convenor of the PAS from AIT - AI4CSM staff	CDT1.1, 2.1, 2.2, 2.3; UC 1, 2, 3, 5, 7; WP 4.1.3
ISO/ IEC JTC1	SC 42	Several AI Stds.	Artificial Intelligence – WG 3 "Trustworthiness"	A, U	Y/N	Plus several other AIT staff members, includes ethics, oversight and governance	CDT 1.4, 3.1a, 3.1b; WP 4.1.3

8 List of figures

9 List of Tables

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