



**Alliance for AI, IoT and Edge
Continuum Innovation**

Webinar • 28.10.2026

Presentation of StandICT.eu / AIOTI Report on IoT Standardisation Gaps Release 2

Opening and Welcome

Valentina Peniche, AIOTI Secretary General

Agenda

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16.00 Opening and Welcome

Valentina Peniche, AIOTI Secretary General

16.05 Introduction to Stand.ICT and AIOTI

Valentina Peniche, AIOTI Secretary General

Maria Giuffrida, Stand.ICT

16.15 Overview of IoT Standardisation Gaps Release 2 Report

Georgios Karagiannis, AIOTI WG Standardisation Co-Chair, main editor

16.25 IoT Standardisation Gaps Results and Analysis

Ines Robles, report contributor

16.45 Questions from the audience

Maria Giuffrida, Stand.ICT

17.00 Wrap up and end of Webinar

Valentina Peniche, AIOTI Secretary General

About AIOTI WG Standardisation

About WG Standardisation: Leadership, Vision, Highlights

Leadership:

Chair

Antonio Kung
Trialog



Co-Chair

Georgios Karagiannis
Huawei



Vision:

To be recognized as a major contributor to the worldwide interoperability, security, privacy and safety of IoT and Edge Computing systems and applications, and particularly for the development of the market in Europe

Deliverables:

<https://aioti.eu/resources-standardisation/>



Highlights:

89 member organisations

195 participants

Main Achievements:

Deliverables	Collaborations	Events
<ul style="list-style-type: none">IoT Landscape ReportsHigh priority gaps ReportsIoT relation and impact on (beyond) 5G ReportsHigh Level Architecture<ul style="list-style-type: none">HLAContinuum RAIntegration in data spacesSemantic interoperability<ul style="list-style-type: none">Ontology LandscapeEvolution of standardsGovernance standardisationManifestoComputing Continuum Report	<ul style="list-style-type: none">Cooperation with SDOs/Alliances to foster co-creation and interworking (MoUs and Liaisons)SNS Partnershipone6GStand.ICT - EU OS IoT and Edge, Digital twinsEGDCHLF on European StandardisationICT MSP	<ul style="list-style-type: none">AIOTI signature event 2023SC41 WorkshopStandardisation workshop on energy, mobility and buildingsETSI IoT WeekWebinars to promote reports (2 in 2024)AIOTI Days 2024AIOTI workshop on semantic interoperability and digital twinAIOTI Days 20252nd AIOTI workshop on semantic interoperability and digital twin

2026 Priorities

Standardisation	Stand. CT IoT Standardisation Gaps Release 2	Published
	AI, IoT and Edge Continuum relation and impact on 5G/6G – R6	Ongoing
	IoT landscape report V2	Ongoing
	High Level Architecture Report on patterns and IT asset management	Published
	Survey of standards on digital twin including new concerns (SoS, HMT)	Ongoing
	Landscape maintenance EU-funded projects Release 5.0	Ongoing
	Computing Continuum R4	Published
	High Level Architecture (HLA) Report, Release 8.0	Ongoing
	Semantic Interoperability and LLMs	Ongoing

StandICT.eu2029

ICT Standardisation Observatory and Support Facility in Europe

Introduction to StandICT.eu

Insights from the joint StandICT.eu–AIOTI report:

IoT Standardisation Gaps, Release 2

28 October 2026

Maria Giuffrida

Trust-IT Services, StandICT.eu 2029 Coordinator

m.giuffrida@trust-itservices.com

Driving EU leadership in ICT standardisation

A community of European experts who have contributed to **24 standards organisations**, acted across **290+ working groups and technical committees** and impacted **550+ contributions** to new and revised standards.

Current edition StandICT.eu 2029 Oct 2025 – Sep 2028 · €6M

2,400+

submitted applications

1,000+

funded applications

€8m+

distributed over 8 years

3,000+

ICT standards metadata records

20+

landscape reports

70+

trained applicants

4,000+ community members

Our objectives



Financial support

€4.2M for EU experts in SDOs; 6 open calls in 36 months



Landscape and gap analysis

TWGs producing state-of-the-art standards landscapes



Leadership in standards

Synergies with international SDOs



Capacity building

Tools and materials for ICT standardisation education



Community and engagement

Growing a community of 4,000+ experts and organisations

Our
consortium





EUOS

EU Observatory for ICT Standardisation

3,000+

ICT standards
metadata records

20+

landscape and gap
reports

24

SDOs featured

How the EUOS Observatory is populated

- **Fellows:** each standard lists the StandICT.eu fellows working on it, with role (e.g. convenor, chair), SDO and country
- **TWGs:** standards mapped in landscape and gap reports are uploaded and linked to their report
- **Additional sources:** links to SDO databases or external catalogues of ICT standards
- **Available info:** SDO, committee, abstract, latest version and ICT Rolling Plan topic

Landscape and gap analysis reports produced by StandICT.eu TWGs

AI, data and digital twins

- Artificial Intelligence
- Ontologies
- Trusted Information
- Digital Twins
- Digital Twins in Data Spaces
- Cloud for Data Policy (white paper)

Rolling Plan: Artificial Intelligence · Data economy · Data interoperability

IoT, edge and chips

- IoT landscape (V1, V2)
- **IoT gaps (R1, R2)**
- Edge Computing landscape
- **Edge gaps (R1, R2)**
- Semiconductors and chips

Rolling Plan: Internet of Things · Cloud and edge computing · Digitisation of European Industry

Smart cities and CitiVerse

- Smart Cities
- CitiVerse
- Climate-neutral smart cities (CEN TC 465)
- IoT and smart cities for health (ITU)

Rolling Plan: Smart and sustainable cities · Web 4.0 and virtual worlds · Digital health

Industry and products

- Digital Product Passport
- Robotics

Rolling Plan: Circular economy and sustainability · Robotics and autonomous systems

Each report's mapping contributes to chapters of the EU Rolling Plan for ICT Standardisation.

StandICT.eu 2029 TWGs

IoT

completed

Edge Computing

completed

Cyber Resilience

ongoing

EU–Japan CRA
and JC-STAR

ongoing, with
CYBERSTAND.eu

Digital Twin

ongoing

Virtual Worlds

ongoing

Reach of
TWG reports

33,000+

downloads across all reports

35,000+

views across all reports

Most downloaded

Digital Product Passport **7,500**
Artificial Intelligence **6,900**
Digital Twins **2,900**

StandICT.eu2029

ICT Standardisation Observatory and Support Facility in Europe

Thank you

Join the StandICT.eu community and our Technical Working Groups

Maria Giuffrida

Trust-IT Services, StandICT.eu 2029 coordinator
m.giuffrida@trust-itservices.com



Overview of IoT Standardisation Gaps Release 2 Report

Georgios Karagiannis

AIOTI WG Standardisation Co-Chair, main editor

IoT standardisation gaps

From identified IoT challenges to evidence-based standardisation priorities

What the report does

- Catalogues IoT research and standardisation challenges
- Maps challenges to relevant SDO and open-source work
- Highlights gaps needing research, harmonisation or new standards

40

IoT challenges

16

new immersive topics

2

coverage measures



Section 2 — the IoT challenges examined

24 established topics, plus 16 industrial immersive subchallenges introduced in §2.25.

DATA & INTEROPERABILITY

- | | | | |
|-----|--------------|------|---------------------------|
| 2.1 | Data models | 2.17 | Harmonised identifiers |
| 2.2 | RESTful APIs | 2.18 | Semantic interoperability |

CONNECTIVITY & OPERATIONS

- | | | | |
|-----|-------------------------|------|-------------------|
| 2.3 | Real-time processing | 2.13 | Zero-touch setup |
| 2.4 | Connectivity cost | 2.16 | IoT over ICN |
| 2.5 | Intermittent resilience | 2.22 | Device management |
| 2.7 | Large-scale deployment | | |

SECURITY, TRUST & SOCIETY

- | | | | |
|------|--------------------------|------|--------------------------|
| 2.6 | Privacy and security | 2.12 | Governance/regulation |
| 2.9 | Security test/validation | 2.19 | Ethics & trustworthiness |
| 2.10 | Trustworthiness models | 2.21 | Device certification |
| 2.11 | IoT and ethics | | |

SERVICES, BUSINESS & GREEN

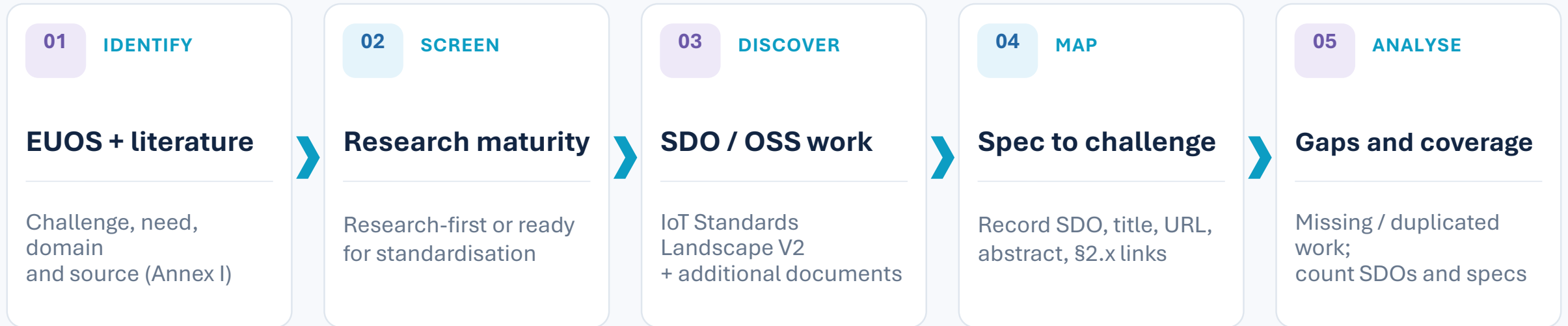
- | | | | |
|------|--------------------------|------|-------------------------|
| 2.8 | Sustainability/resources | 2.20 | Digital service markets |
| 2.14 | Usability of services | 2.23 | Simulation/emulation |
| 2.15 | AI-based service mgmt | 2.24 | Digital for Green |

§2.25

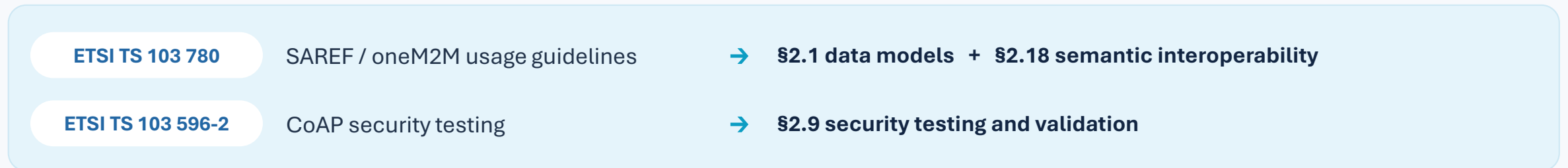
16 industrial immersive challenges — hardware, platforms, SDKs, UI, connectivity, interoperability, security, scalability, ethics and integration

How challenges are translated into standards-gap evidence

A traceable five-step method, connecting requirements in §2 to standards activity in §4 / Annex II.

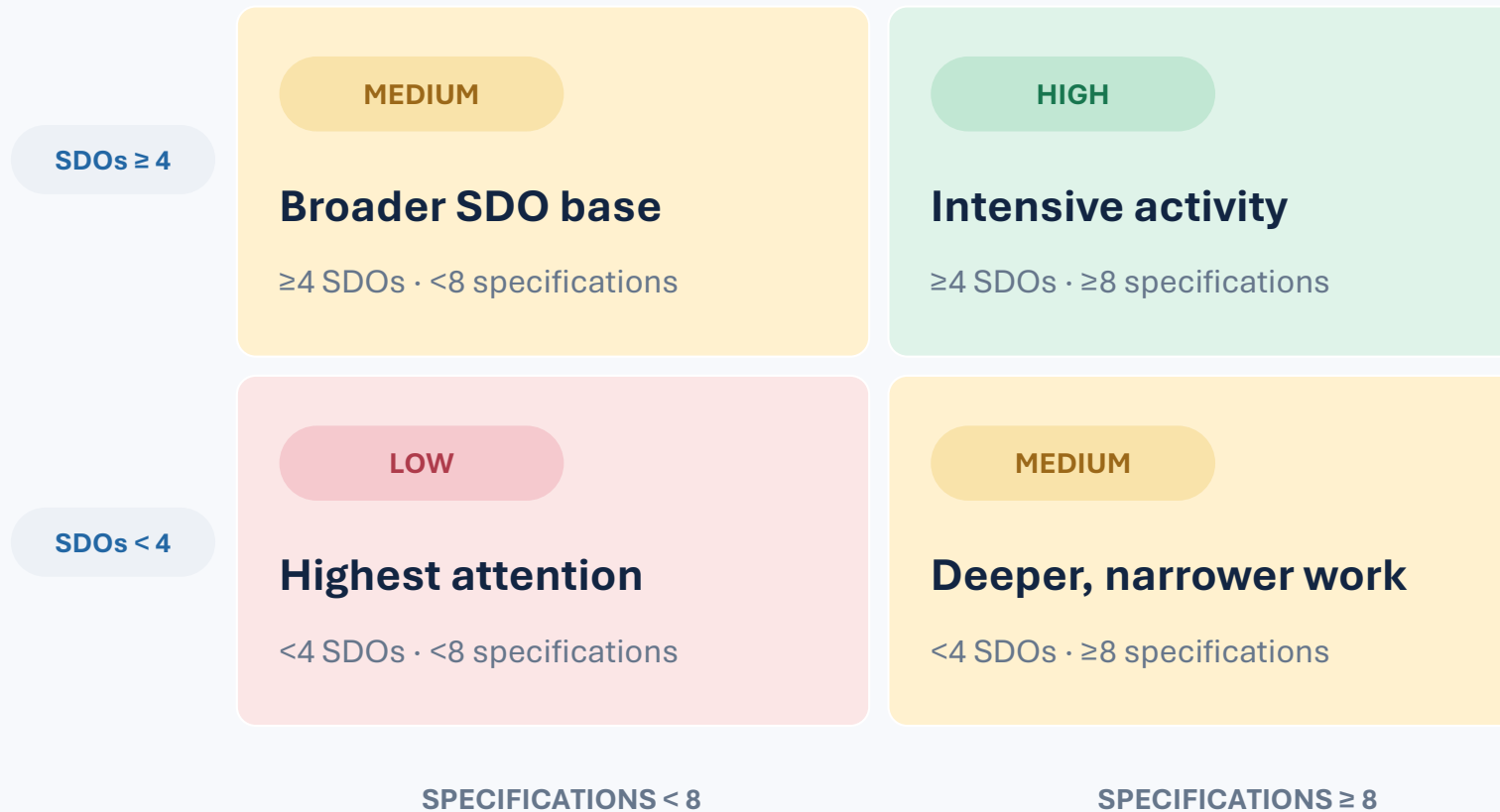


ONE CONCRETE EXAMPLE TRACE FROM ANNEX II



How gaps are prioritised: intensity of coverage

For each IoT challenge, count the distinct relevant SDOs and their mapped specifications.



How to interpret the matrix

- LOW coverage → larger standards-work need
- MEDIUM → targeted new work and coordination
- HIGH → many related activities; check overlap
- Research-first challenges are assessed separately

What the analysis concludes — and where to act

The report separates topics needing research from standards-ready gaps, then recommends focus by coverage.

9

RESEARCH FIRST

Research needed before drafting standards

§§2.15, 2.16, 2.20 + six immersive topics: UI, intelligent connectivity, blockchain/NFTs, platforms, integration, collaboration.

2

LOW COVERAGE

Report-highlighted highest standardisation-work needed

§2.11 IoT and Ethics; §2.19 Ethics and Trustworthiness.

10

MEDIUM COVERAGE

Further targeted work and coordination

§2.12 governance; §2.13 zero touch; 8 immersive topics covering hardware, platforms, SDKs, robustness, privacy, scalability, ethics and interdisciplinary work.

NEXT: UPDATE THE MAPPING · ALIGN SDOS · HARMONISE OVERLAP · DEVELOP MISSING STANDARDS

IoT Standardisation Gaps Results and Analysis

Ines Robles, Report Contributor

Outline

1 • WHY

Why do we need to analyse IoT standardisation gaps?
(Slides 3-4)

2 • HOW

How do we turn standards mapping into analytical insights?
(Slides 5-6)

3 • WHAT

What does the mapping evidence reveal?
(Slides 7-17)

4 • NEXT

What directions for further work emerge?
(Slides 18-19)

Why analyse IoT standardisation gaps?

01 WHAT CHALLENGES?

How has the IoT challenge landscape evolved?

02 WHAT STANDARDS ACTIVITY?

What existing standards activity is associated with the IoT challenges?

03 WHAT DOES THE DATA SHOW?

Where is mapped activity concentrated or limited?

04 WHAT NEXT?

What directions for research and collaboration emerge?

What counts as an IoT standardization Gap?

Missing capabilities and fragmented approaches may indicate gaps. Limited mapping evidence calls for further assessment.

01 MISSING CAPABILITY

No adequate specification or interoperability profile addresses an identified need.

02 FRAGMENTED APPROACHES

Different specifications or profiles may require alignment or harmonisation.

03 LIMITED MAPPING EVIDENCE

Few mapped specifications suggest a topic for review—not necessarily a confirmed gap.

From Standards Mapping to Actionable Insights

How we interpret Release 2 mapping evidence to identify patterns and inform priorities.

01

MAPPING DATA

40 IoT challenges mapped to specifications across 13 SDOs and initiatives.



02

QUANTIFY

Count specification mappings and SDO involvement for each challenge.



03

COMPARE

Examine concentrations, limited mappings and differences between challenge groups.



04

PRIORITISE

Identify topics for expert validation, harmonisation, research or standards work.

What does Release 2 cover?

A roadmap to the report six main sections



01

Goal and motivation

Why identifying standards gaps matters for interoperable IoT.

02

Possible IoT challenges

40 challenges, including 16 new industrial immersive technology topics.

03

Standardisation gaps

How gaps are defined, identified and prioritised.

04

Gap analysis and SDO work

How standards bodies and specifications address the challenges.

05

Analysis and recommendations

What the coverage analysis reveals and where action is needed.

06

Conclusion

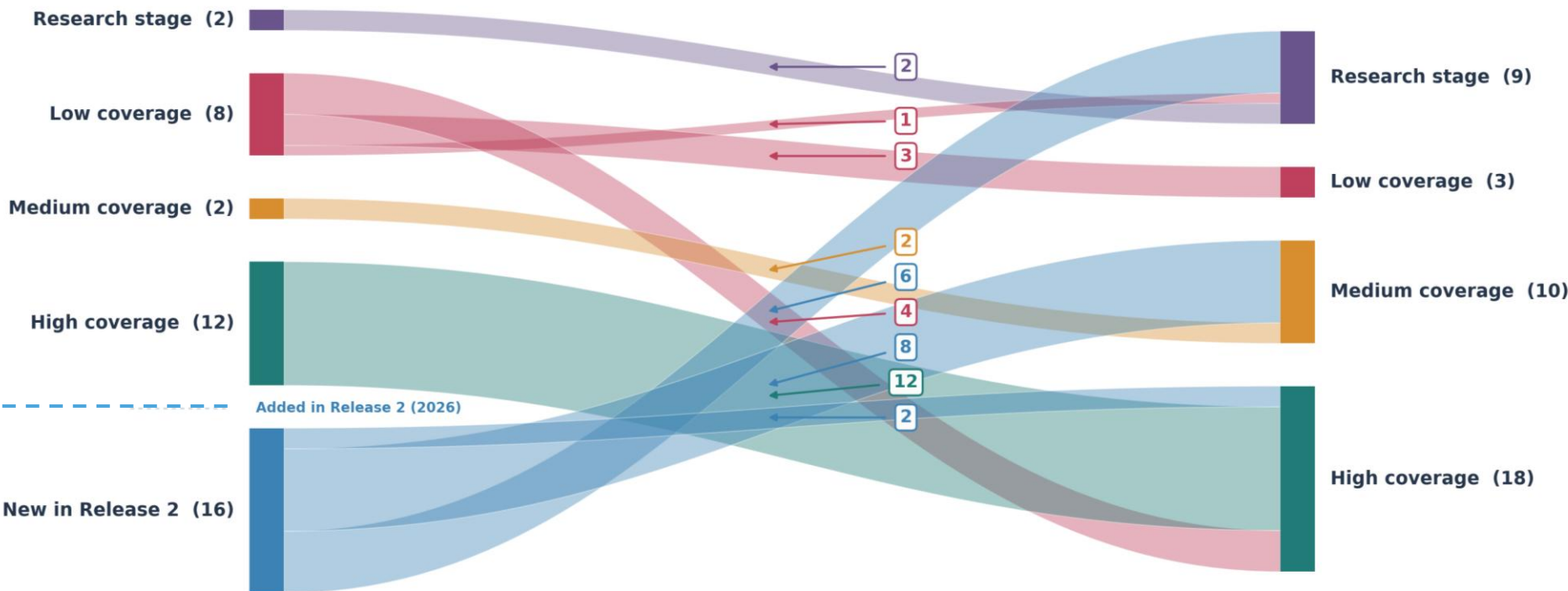
Key findings and the way forward for collaboration.

What Changed from Release 1 to Release 2?

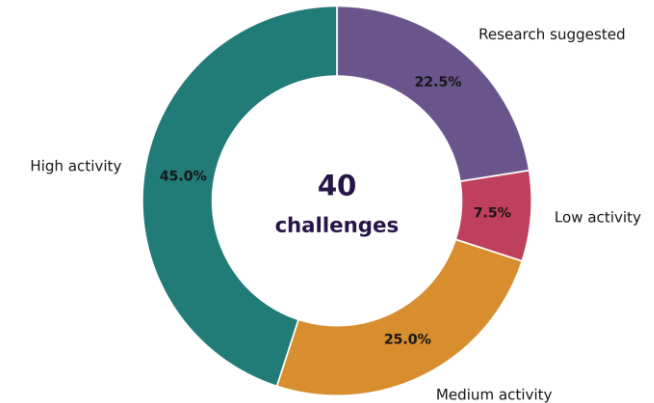
Evolution of IoT standardisation coverage

RELEASE 1 · 2024

RELEASE 2 · 2026



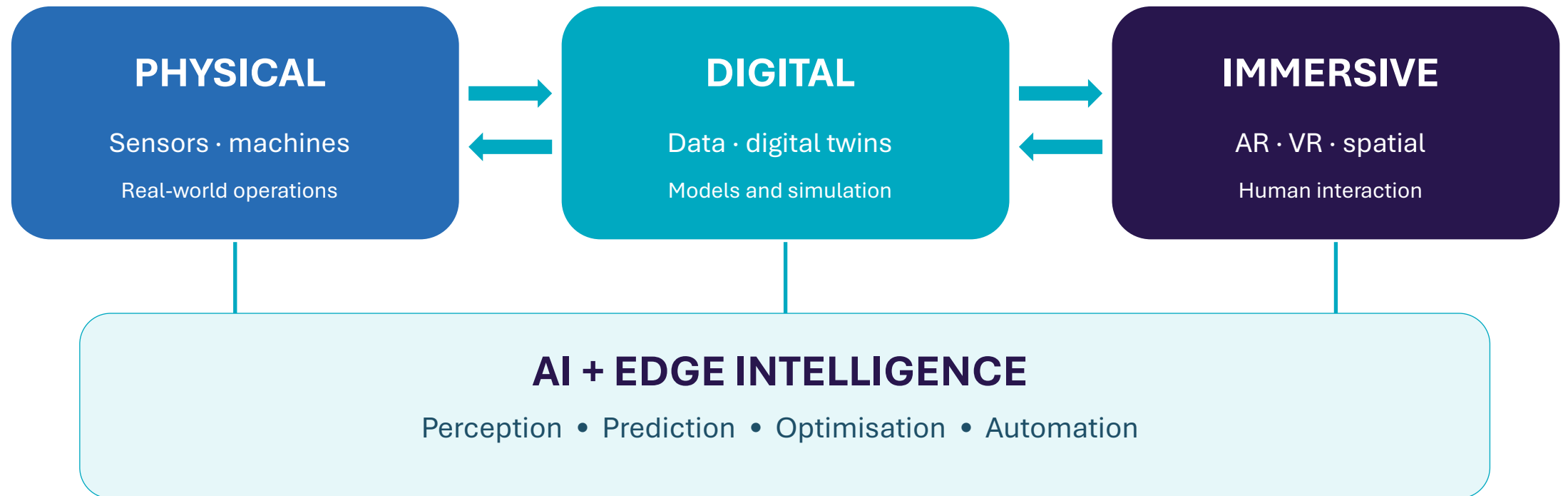
High (#SDOs (≥ 4) & #Specs (≥ 8)); Medium (#SDOs (≥ 4) & #Specs (< 8) OR #SDOs (< 4) & #Specs (≥ 8)); Low (#SDOs (< 4) & #Specs (< 8))



Coverage percentages

Connecting the physical, digital and virtual worlds through AI

Industrial real–digital–virtual continuum • Release 2 (2026)



AI enables intelligence and feedback across all three dimensions

IoT Challenges in the report

02

Possible IoT challenges

40 challenges, including 16 new industrial immersive technology topics.

An IoT challenge is a technical, operational or cross-cutting topic that needs to be addressed to enable the development, deployment, interoperability and effective use of IoT systems and services.

■ 2.1 Smooth interoperability between Data Models

Mapping of the described challenge into the class/group/category of challenges

▷ Data Models and Formats (Challenge 1)

Description of IoT challenge-research/standardisation requirement

- ▷ Currently, there is an unnecessary diversity in the data and interaction models of IoT devices across various industry standards development organizations (SDOs). This can cause problems for interoperability, as different systems and devices may use varying data models, resulting in difficulties communicating and exchanging data effectively. Additionally, this can lead to challenges in data management, analysis, and security, as data may need to be converted or transformed before it can be used or protected. The gap in data models can also limit the scalability and flexibility of the system, while increasing its complexity. Furthermore, this can cause inconsistencies in the quality of data, making it hard to effectively analyze and utilize. Moreover, a gap in data format refers to the lack of standardisation or consistency in the way that data is organized and represented.
- ▷ A gap in data model refers to a lack of standardisation or consistency in the way that data is structured and represented in the Internet of Things (IoT) ecosystem.

Source

🔗 <https://datatracker.ietf.org/wg/asdf/about/>

Application/Industry Domain

- 🔗 Applicable to all the use cases that require data modeling
- 🔗 Horizontal

The 40 IoT Challenges at a glance

From foundational IoT topics to new industrial immersive technologies

24 Original IoT challenges

Release 1 · 2024

24 challenges covering core IoT topics, from interoperability and connectivity to security, sustainability and governance.

2.1  Smooth interoperability between data models	2.2  Assurance a RESTFUL data exchange APIs	2.3  Need for real-time or near real-time processing and decision-making	2.4  Connectivity cost	2.5  Resilience to intermittent services	2.6  Assurance privacy and security
2.7  Deployment and management of large-scale distributed network of devices	2.8  Sustainability, energy consumption, rare minerals and raw materials provisioning	2.9  Developing standards for IoT security testing and validation	2.10  Developing and implementing trustworthiness for IoT systems	2.11  IoT and ethics	2.12  IoT governance and regulation
2.13  Zero touch configuration	2.14  Usability of data and services provided by IoT devices and platform	2.15  User-level service management of IoT network by utilizing AI	2.16  IoT over ICN	2.17  Harmonized identification	2.18  Semantic interoperability
2.19  Ethics and trustworthiness	2.20  Open markets of digital services	2.21  Certification of devices classes	2.22  Device management	2.23  Simulation and emulation environments	2.24  Digital for green

16 New industrial immersive technology challenges

Release 2 · 2026

16 new challenges addressing the convergence of the physical, digital and virtual worlds through industrial immersive technologies.

2.25.1  Advanced HW and edge IoT devices	2.25.2  New SW and CAD platforms	2.25.3  Programming languages, libraries, and SW development kits (SDKs)	2.25.4  User interface (UI)
2.25.5  Intelligent connectivity	2.25.6  Blockchain and NFTs	2.25.7  Edge IoT immersive platforms	2.25.8  High-quality, robust, reliable, and affordable immersive technologies
2.25.9  Integration of immersive technology	2.25.10  Interoperability and standardisation	2.25.11  Data privacy and security	2.25.12  Scalability
2.25.13  Complexity in deployment and management	2.25.14  Ethical and societal implications	2.25.15  Interdisciplinary integration	2.25.16  Collaboration across the technology spectrum

Standards Coverage Density

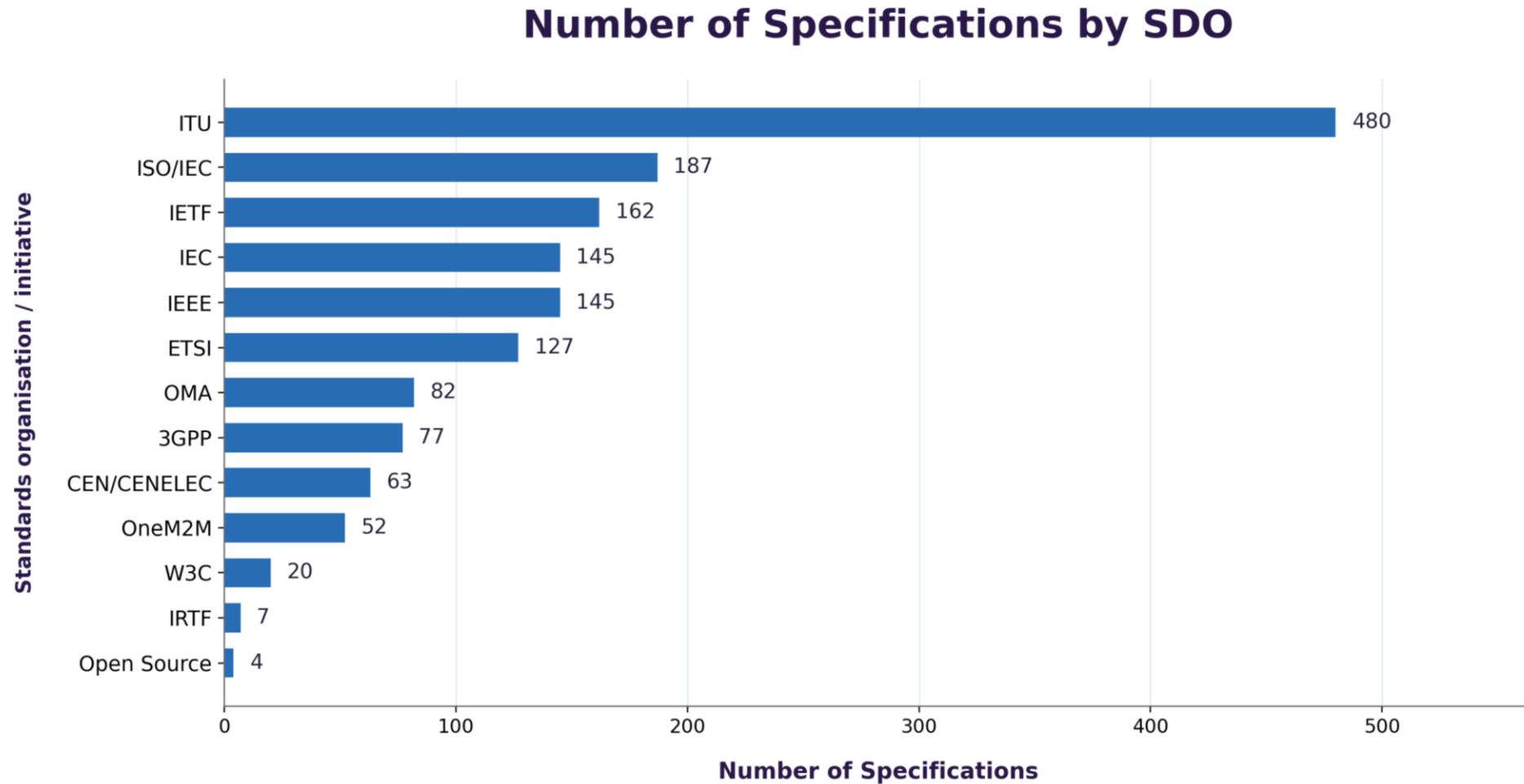
Standards Coverage by Organisation



Standards coverage across 40 IoT standardisation challenges and 13 standards-development organisations (SDOs) and initiatives. Cell colours represent the number of specifications mapped to each challenge–organisation pair, using a logarithmic colour scale to accommodate differences in mapping frequency.

SDO/Initiative (Abbreviation)	SDO/Initiative Full Name
IEC	International Electrotechnical Commission
ETSI	European Telecommunications Standards Institute
3GPP	3rd Generation Partnership Project
ISO	International Organization for Standardization
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
IEEE	Institute of Electrical and Electronics Engineers
ITU	International Telecommunication Union
W3C	World Wide Web Consortium
IETF	Internet Engineering Task Force
IRTF	Internet Research Task Force
oneM2M	one Machine to Machine
OMA	Open Mobile Alliance
Open Source	Such as RIOT OS (Real-time Internet of Things OS)

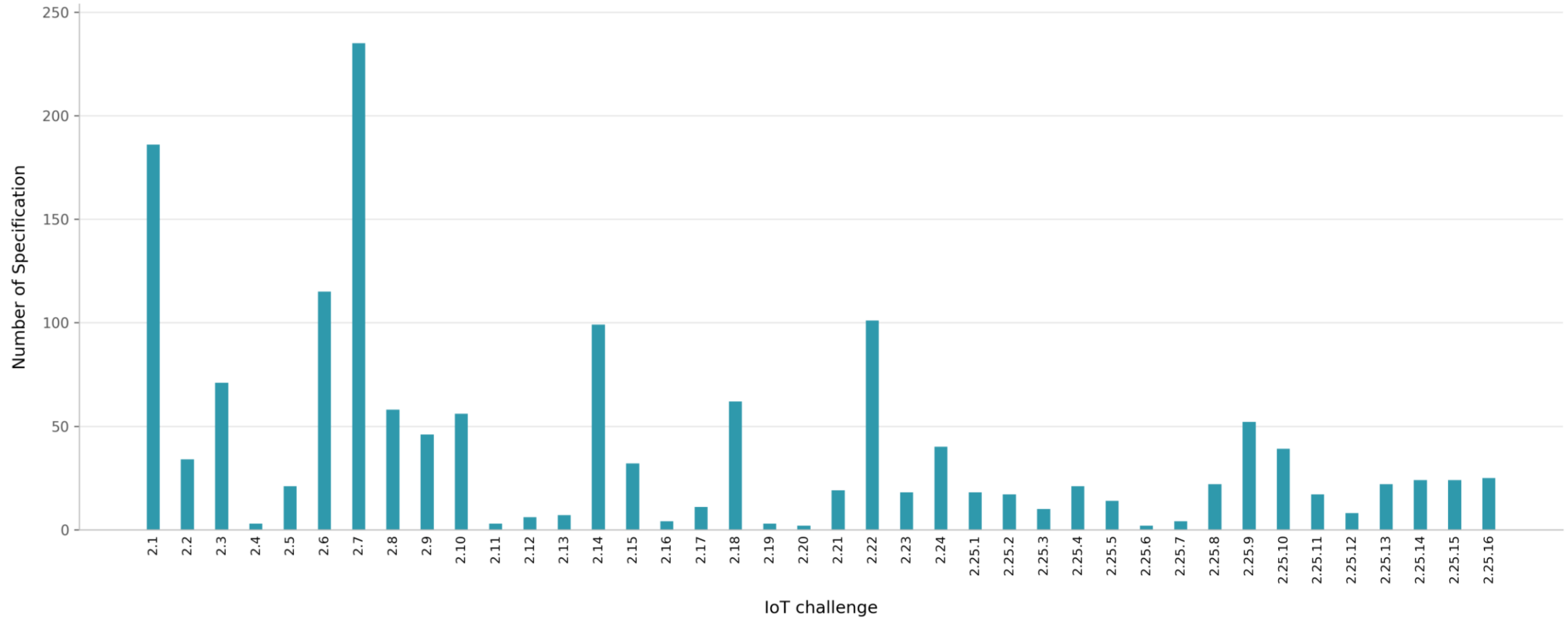
Which organizations have the most mappings?



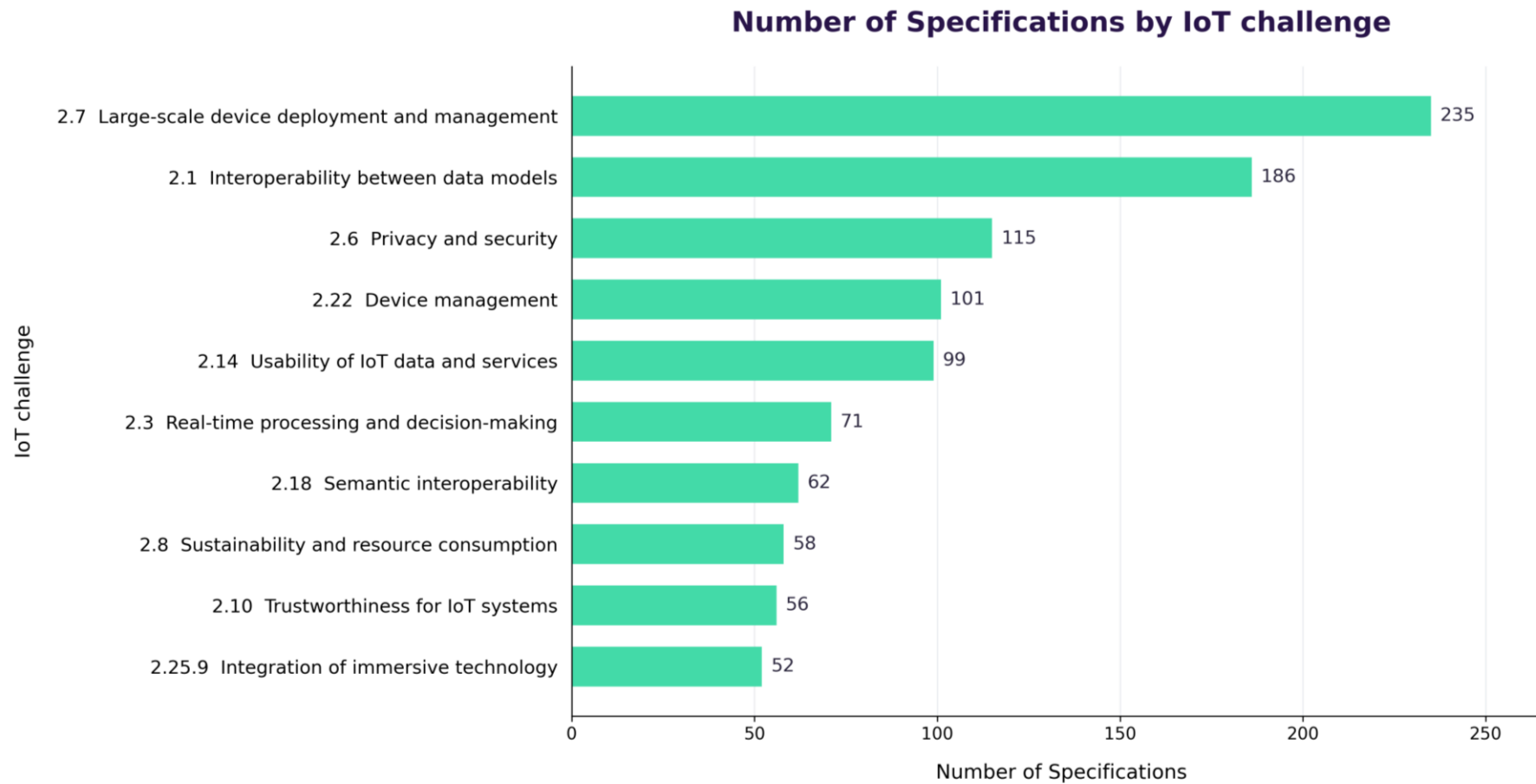
IoT Standardisation Coverage Across 40 Challenges

Release 2 (2026)

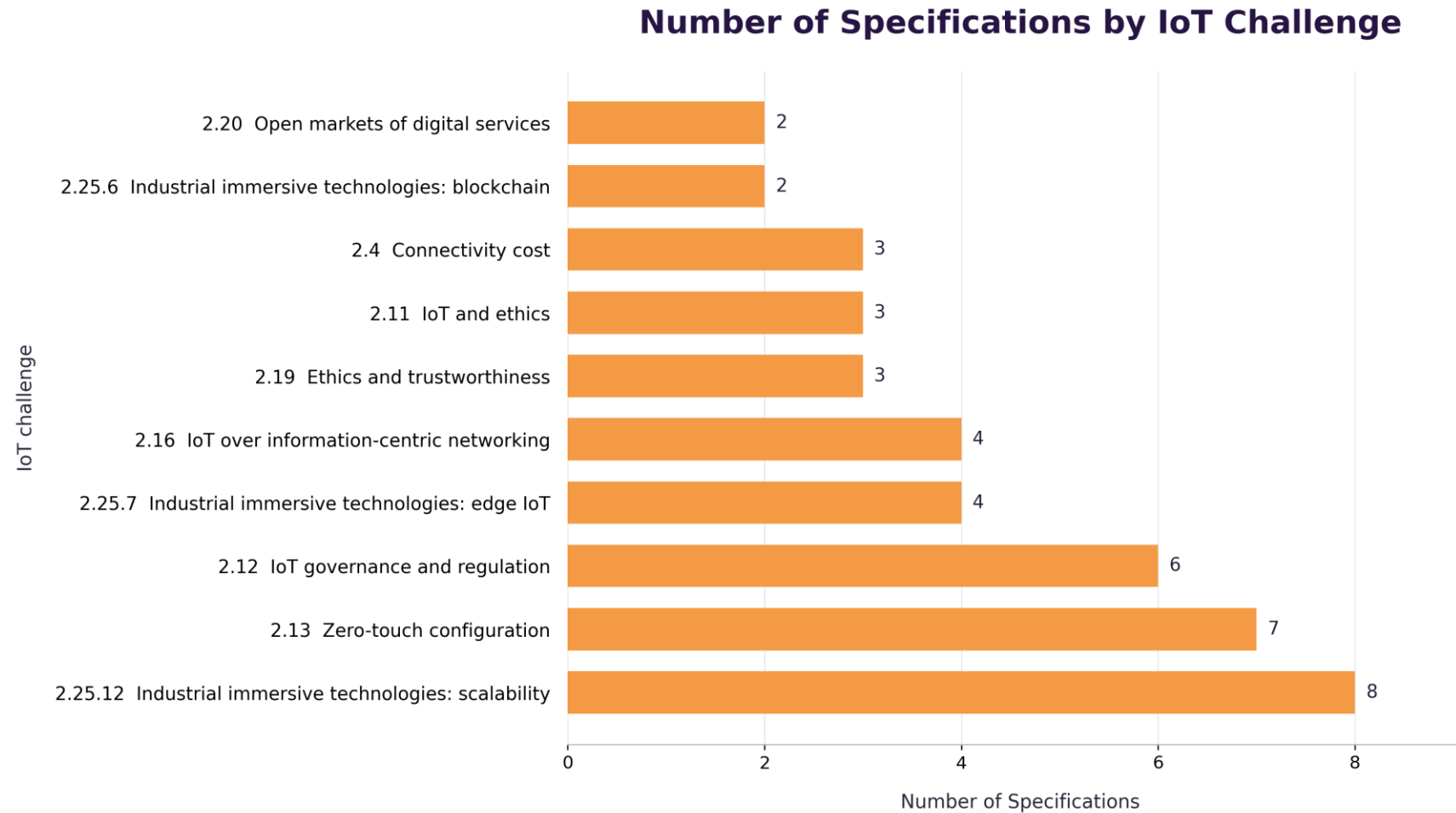
Number of Specifications by IoT Challenge



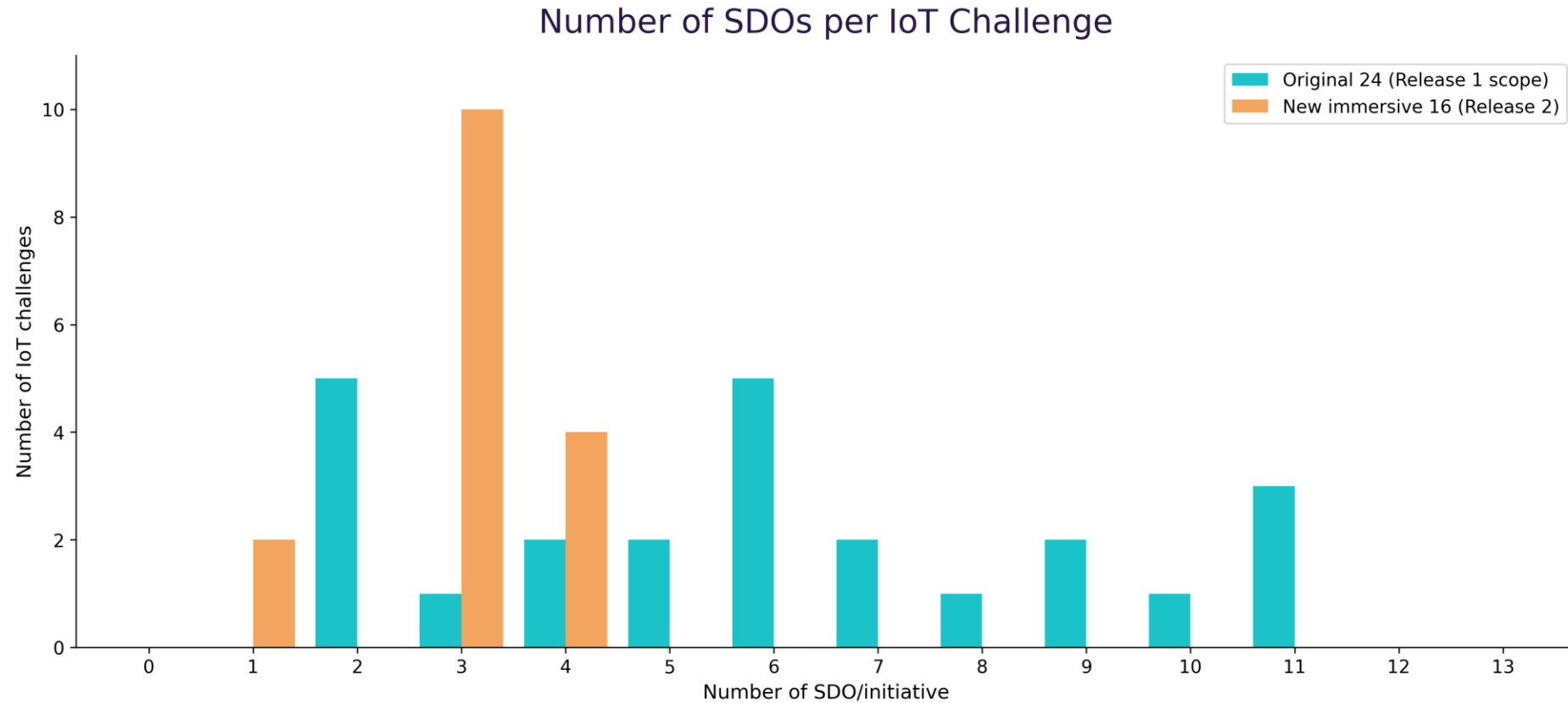
Which IoT challenges attract the most mapped standards activity?



Which IoT Challenges Have the Fewest Mapped Specifications?

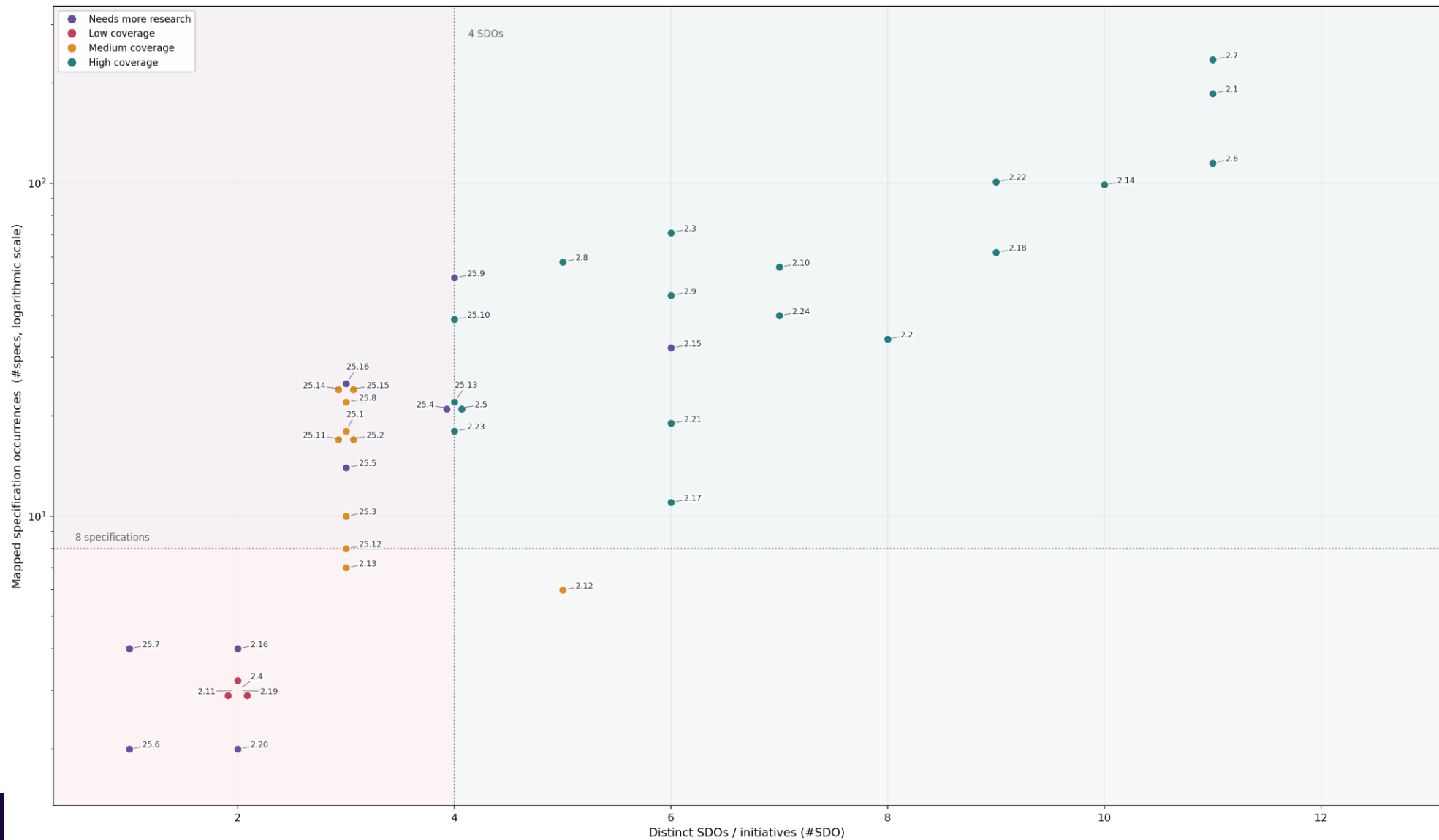


SDO Coverage: Original vs. New IoT Challenges



Standards Coverage Across IoT Challenges

Release 2 (2026): Standards Coverage — SDO Participation vs. Specifications



What directions for further work emerge from the findings?

Report findings and possible follow-up directions for continued discussion.

01

Further research

Explore the challenges identified as needing further research before standardization.

02

Standardisation attention

Consider the low-coverage and medium-coverage challenges highlighted in the report.

03

Coordination opportunities

Explore where related specifications or overlapping scopes could benefit from dialogue.

04

Ongoing assessment

Consider future mapping updates and implementation evidence to reassess potential gaps.

Report findings: 01–02 | Possible follow-up directions informed by the analysis: 03–04

What can we conclude?

SYNTHESIS • ANSWER THE FOUR QUESTIONS

01 WHAT CHALLENGES?

The landscape expands from **24 to 40 challenges**, introducing 16 industrial immersive technology challenges.

02 WHAT STANDARDS ACTIVITY?

Existing specifications are mapped **across 40 challenges and 13 SDOs/initiatives**, revealing a broad standardization landscape.

03 WHAT DOES THE DATA SHOW?

Mapped activity is unevenly distributed: some challenges have extensive coverage, while others show limited mapping evidence.

04 WHAT NEXT?

The report highlights areas requiring further research and standardisation attention, while providing a basis for continued collaboration, coordination and assessment of potential gaps.

ICT Rolling Plan 2027

The report was accepted for inclusion in the IoT Chapter 3.1.4 (Section C2) of the ICT Rolling Plan 2027.

- Recognition of the report's contribution to European IoT standardisation activities.
- Supports the development of interoperable, secure, and innovative IoT ecosystems in Europe.



Questions from the Audience

- Moderator: Maria Giuffrida, Stand.ICT

Wrap up and end of the Webinar

Valentina Peniche, AIOTI Secretary General



Thank you for listening

Any questions?

You can email us at sg@aioti.eu