Alliance for IoT
and Edge Computing
Innovation

Webinar • 24 April 2024

Presentation of WG Standardisation reports

IoT and Edge Computing EU funded projects landscape Report R2

High Priority IoT Standardisation Gaps and Relevant SDOs R3

AIOTI

Opening and Welcome

Georgios Karagiannis, AIOTI WG Standardisation Chair (Huawei)

AIOTI

Agenda

AICTI

Agenda

15.00 **Opening and Welcome (10 min)**

Georgios Karagiannis, AIOTI WG Standardisation Co-Chair

15.10 **Presentation of the IoT and Edge Computing EU funded projects landscape Report R2 (20 min)**

Zbigniew Kopertowski (Orange), report editor

15.30 **Presentation of Report High Priority IoT Standardisation Gaps and Relevant SDOs R3 (20 min)**

Axel Rennoch (Fraunhofer), report editor

15.50 **Presentation of INSTAR Project (10 min)**

Damir Filipovic, AIOTI, INSTAR Project Participant

16.00 **Questions from the audience (15 min)**

Moderated by Georgios Karagiannis, AIOTI WG Standardisation Co-Chair

16.15 **Wrap up and end of Webinar**

Georgios Karagiannis, AIOTI WG Standardisation Co-Chair

About AIOTI
WG Standardisation

AIOTI

Leadership and Vision

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/standardisation/

Highlights

Relevant facts

95 member organisations

205 participants

Main achievements

Deliverables	Collaborations	Events
▪ IoT Landscape Reports ▪ High priority gaps Reports ▪ IoT relation and impact on (beyond) 5G Reports ▪ High Level Architecture and IoT Identifier Reports ▪ Semantic Interoperability Joint White Papers ▪ Ontology Landscape ▪ Guidance for the Integration of IoT and Edge in Data Spaces	▪ Cooperation with SDOs/Alliances to foster co-creation and interworking (MoUs and Liaisons) ▪ SNS Partnership ▪ Trans Continuum Initiative ▪ Stand.ICT - EU OS ▪ HLF on European Standardisation ▪ ICT MSP ▪ EGDC ▪ one6G	• AIOTI signature event • IoT Week – lead standards track • IoT and Edge computing workshops • Chariot project webinar • Navigating IoT Architectures and Standards Days Event • Edge Computing Forum • ETSI IoT Week • Policies to support Data Markets • EUCnC • IEEE IoT World Forum

AIOTI organisation

Horizontal WG

- Research & Innovation
  - Innovation Ecosystems
  - SCoDIHNet
  - Early Innovation Champions
- Standardisation
  - Semantic Interoperability
  - Landscape, Gaps, Comp Continuum, IoT and relation to 5G
  - High-Level Architectures
- Testbeds
  - DLT & Web3 Accelerator
- Policy
- ICT for CO2 reduction methodologies (ICM)

Vertical WG

- Agriculture
- Energy
- Health
- Manufacturing
- Mobility

Scope

Focus-Group / Task Force	Lead	Deliverable
IoT Landscape	Georgios Karagiannis (Huawei)	
IoT Landscape maintenance	Z. Kopertowski (Orange)	report published in February and December 2023
Gap Analysis and recommendations	A. Rennoch (Fraunhofer)	report published in April 2022 and in January 2024
IoT relation and impact on 5G	Georgios Karagiannis (Huawei)	report published in April and November 2023
Computing Continuum	Ronald Freund (Fraunhofer)	report published in April 2022
High Level Architecture for IoT, Edge Computing and Digital Twins	Antonio Kung (Trialog)	
IoT and Edge Computing Reference Architecture	Georgios Karagiannis (Huawei)	report published in December 2020
Guidance for the Integration of IoT and Edge in Data Spaces	Antonio Kung (Trialog)	report published in September 2022
Report on IoT and Edge computing architecture in context of Computing Continuum	Antonio Kung (Trialog)	work ongoing
Report on IoT and Edge computing architecture in context of Digital Twins	Antonio Kung (Trialog)	work ongoing
Semantic Interoperability	Martin Bauer (NEC Lab), Laura Daniele (TNO)	
Ontology Landscape Report		report published in December 2021
Ontology Landscape Online		published in March 2023

Priorities 2024 (I)

IoT & Edge Computing Landscape

- Cooperation with SDOs/Alliances to foster co-creation and interworking.
- New MSP DEI WG on standardisation in support of Digitising European Industry
- Maintain IoT and Edge Computing landscapes
- Recommendations and guidelines on solving protocol and interface gaps needed to support new IoT and Edge Computing features
- Provide Computing Continuum requirements (on IoT and edge computing) and (Optical Communication) enablers
- Provide guidelines on how IoT can become an enabler for 5G (and beyond 5G) and vice versa
- Provide guidelines on how IoT & Edge Computing standardisation can impact the Industry Digitization, and vice versa
- Provide guidelines on how IoT & Edge Computing standardisation can impact the UN SDGs and European Green Deal, and vice versa
- Explore and document the EU funded projects landscape focusing on IoT and Edge computing; (Implementation ion of this action is a report)

High Level Architecture (HLA)

- Recommendations of reference architectures, both for experimentation and deployments within IoT domains and cross - IoT domains
- Architecture and interfaces for IoT & Edge Computing Data (Services & Solutions) marketplaces; Guidelines for Data Access and Data Sharing; Guidelines of enhancement of data sharing in support of the Green Deal e.g. GreenData4all, Destination Earth (A European strategy for data - Common European Green Deal data spaces)
- Recommendation of an interoperable IoT Identifier space that transcends geographical limits
- Recommendations for a Digital Twin based IoT and Edge Computing reference architecture
- Recommendations for a Computing Continuum based IoT and Edge Computing reference architecture

Semantic Interoperability

- Identification of missing (semantic) interoperability standards and technologies within IoT domains and cross - IoT domains and recommendations for solving them. In addition topics related to the impact of edge computing on semantic Interoperability will be as well taken into account
- Promoting the availability, findability, use and development of Open Reference Vocabularies and Open Application Programming Interfaces to allow for flexible ad-hoc communication and interaction between different actors within IoT domains and cross - IoT domains
- Landscape of ontologies supporting users in their assessment of the quality and usability of ontologies.
- Investigate the impact of the Twin green and digital transformations on existing semantic interoperability models and ontologies

Presentation of the IoT and Edge Computing EU funded projects landscape Report

Zbigniew Kopertowski, Report Editor (Orange)

AIOTI

Goal and Content of the Report

- **Published on 15 December 2023**: "IoT and Edge Computing EU funded projects landscape, Release 2.0", Link to Report
- **Goal of report:**
  - Analysis of the completed and ongoing EU funded projects focusing on IoT and edge computing subjects for:
    - ✓ leverage on existing IoT and edge computing research and innovation challenges in Europe, as well as standardisation activities
    - ✓ provide input to IoT and edge computing standardisation gap analysis activities

- **Method of collecting information:**
  - ✓ Using template
  - ✓ Analysis of public deliverables of the projects
  - ✓ Inputs provided by AIOTI members coming

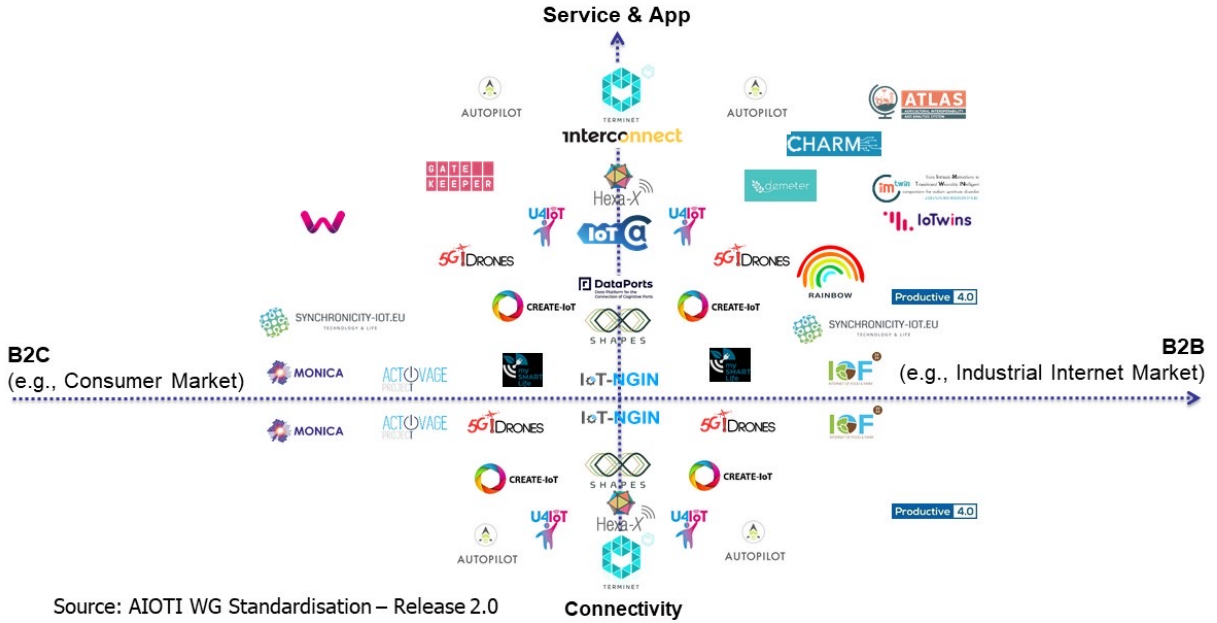
- **Table of contents:**

- **Summary of used template**
  - Title of the EU funded Project
  - URL/Reference
  - Abstract
  - Starting and (target) end time of project
  - IoT and/or EC **research challenges**
  - Expected/achieved activities on "**Dissemination and Impact on Standards**"

IoT EU funded Completed Projects Landscape (1)

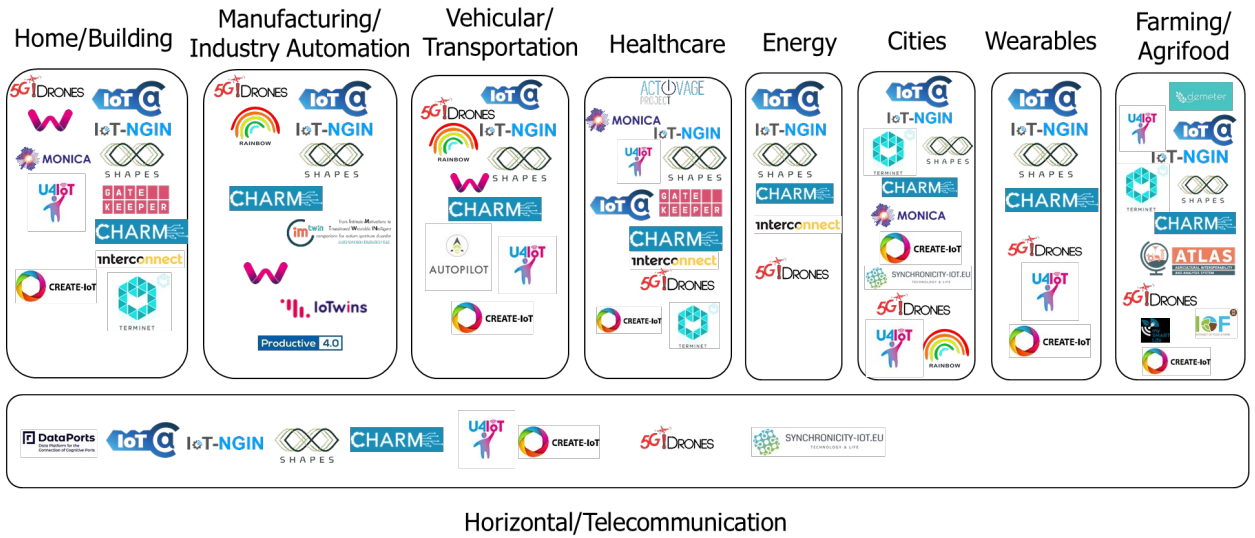
Technology and Marketing Dimensions
Vertical and Horizontal Domains

IoT EU funded Completed Projects Landscape (Technology and Marketing Dimensions)



Source: AIOTI WG Standardisation – Release 2.0

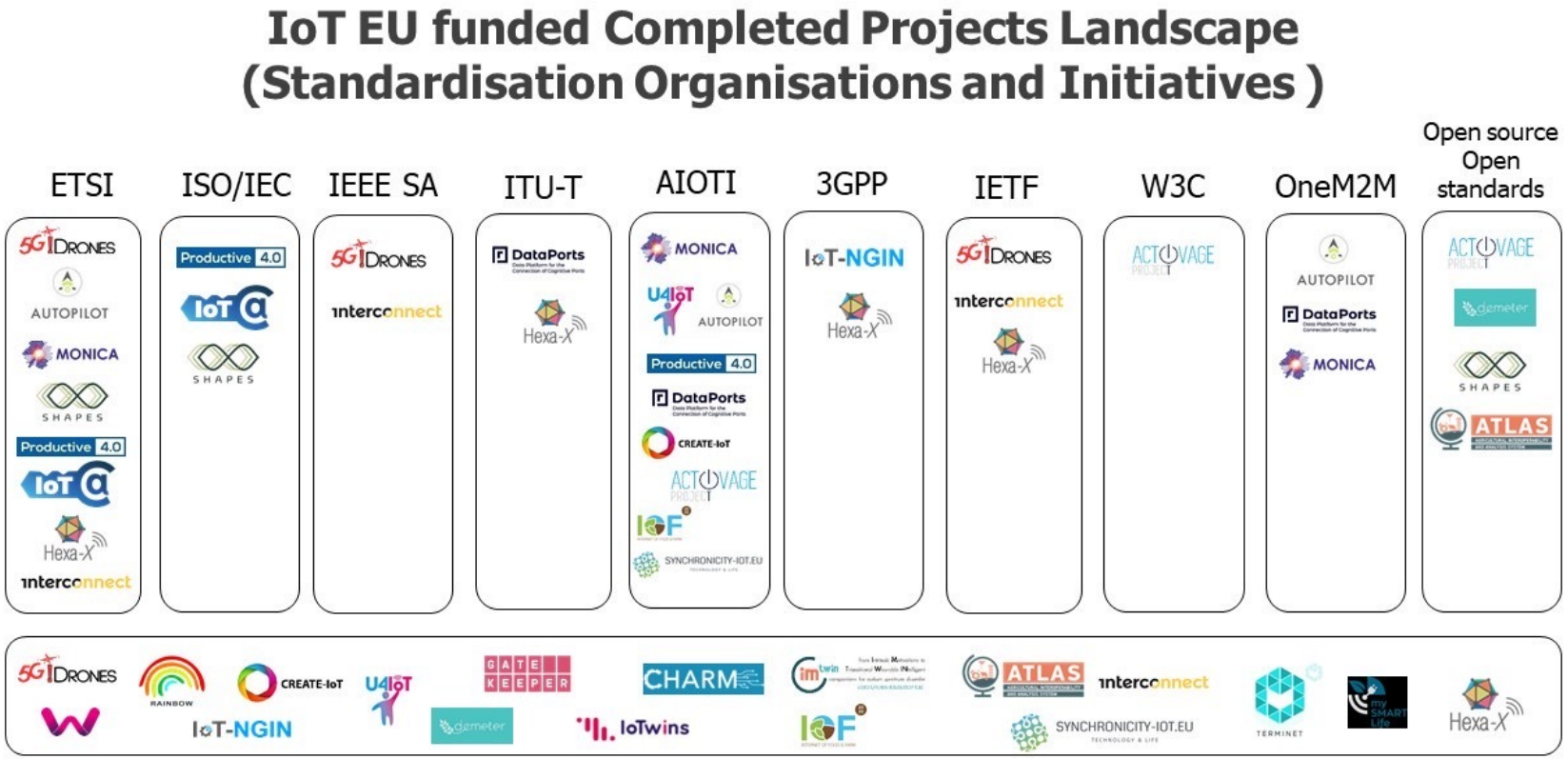
IoT EU funded Completed Projects Landscape (Vertical and Horizontal Domains)



Source: AIOTI WG Standardisation – Release 2.0

IoT EU funded Completed Projects Landscape (2)

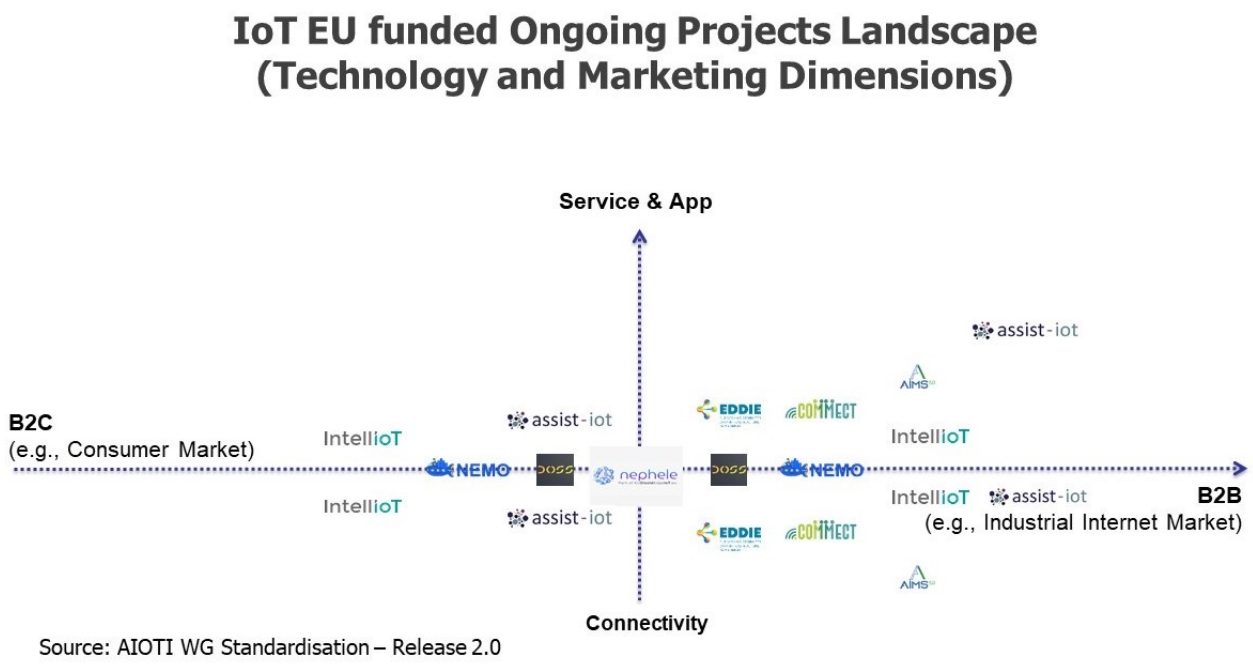
Standardisation Organisations and Initiatives projects' activities



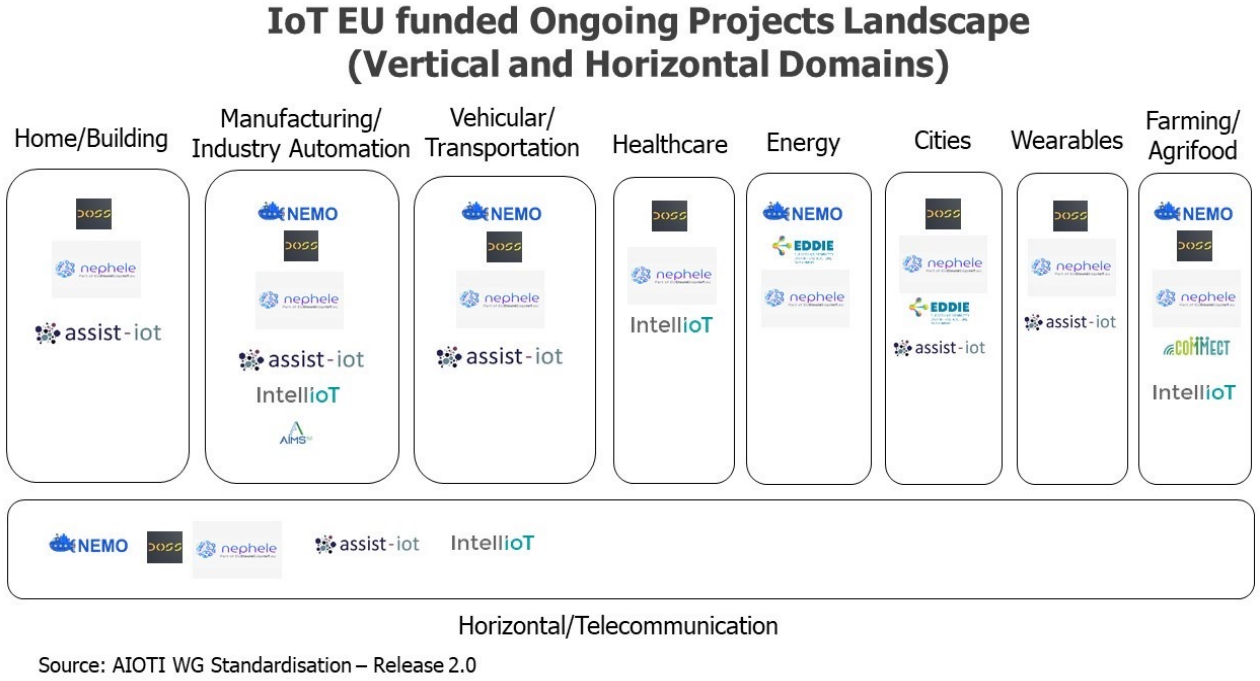
Source: AIOTI WG Standardisation – Release 2.0

IoT EU funded Ongoing Projects Landscape (1)

Technology and Marketing Dimensions
Vertical and Horizontal Domains



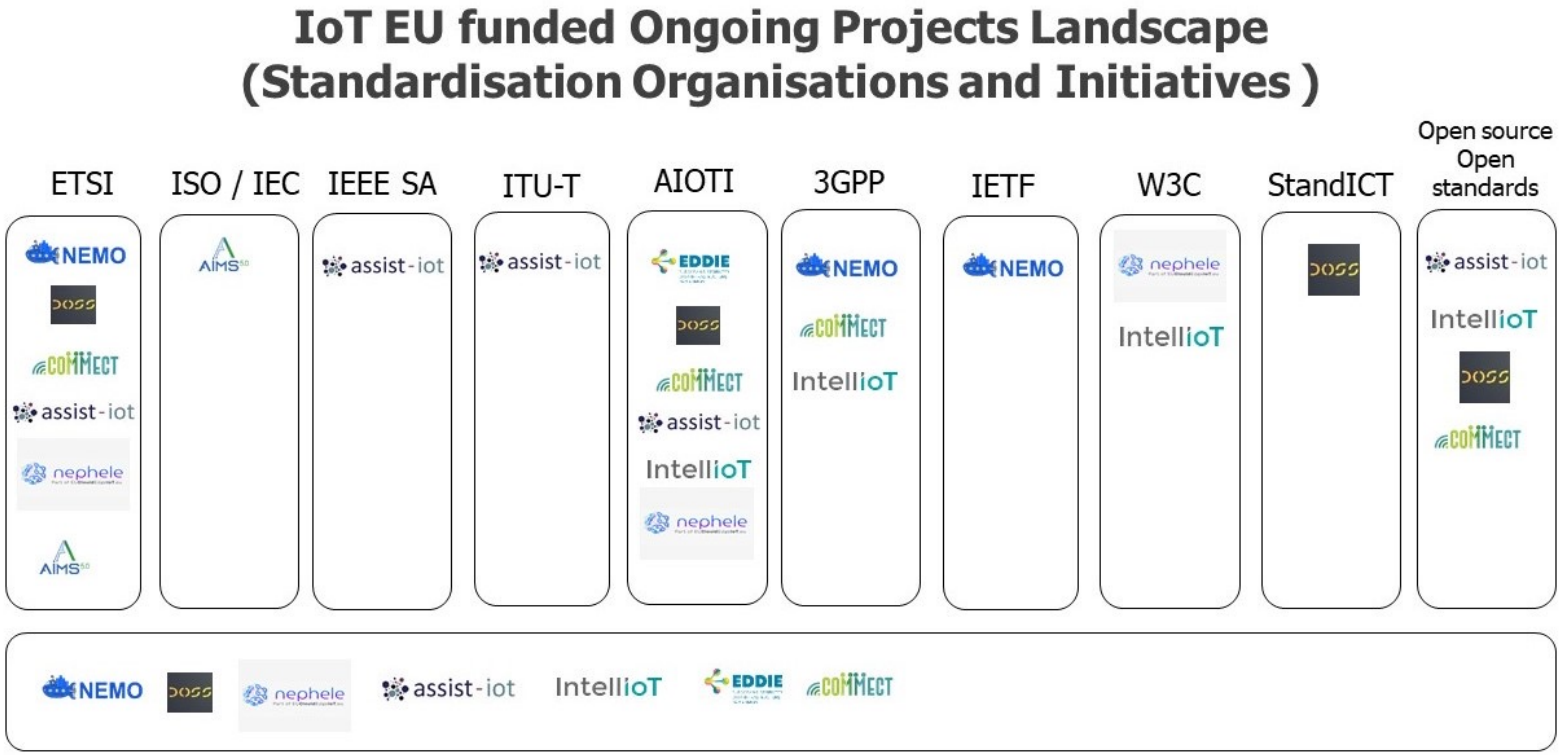
Source: AIOTI WG Standardisation – Release 2.0



Source: AIOTI WG Standardisation – Release 2.0

IoT EU funded Ongoing Projects Landscape (2)

Standardisation Organisations and Initiatives projects' activities



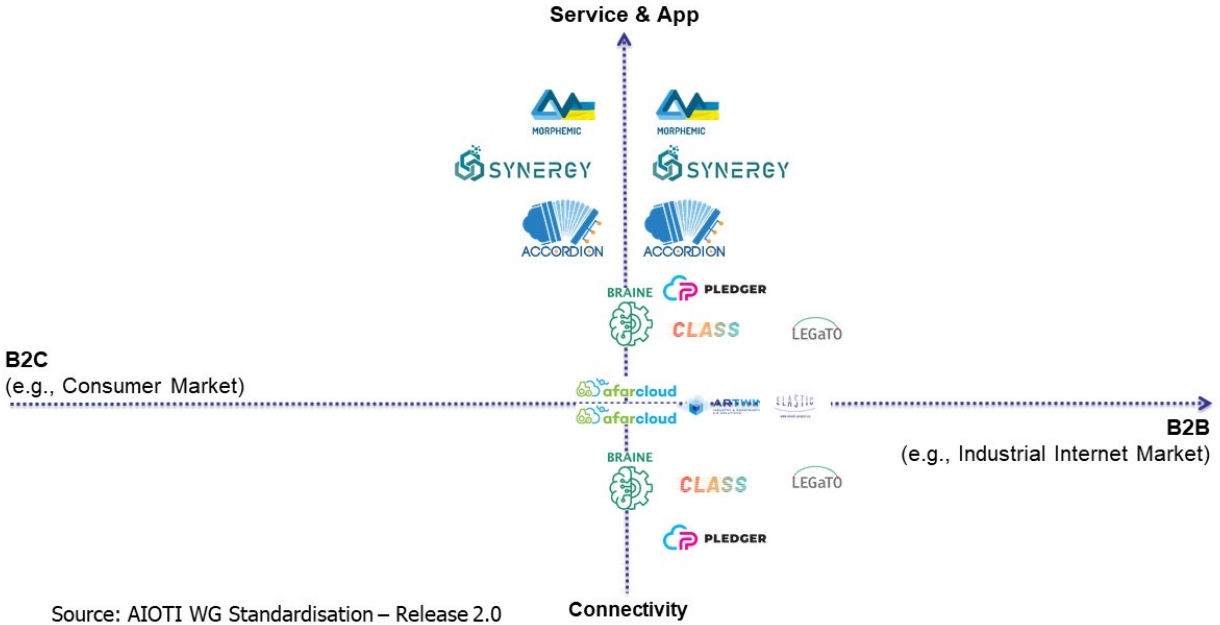
Others: BDVA, OneM2M, 5GPPP, 5G ACIA, 6G-IA, NGMN, NIST, CEN/CENELEC, ENISA, etc.

Source: AIOTI WG Standardisation – Release 2.0

EC EU funded Completed Projects Landscape (1)

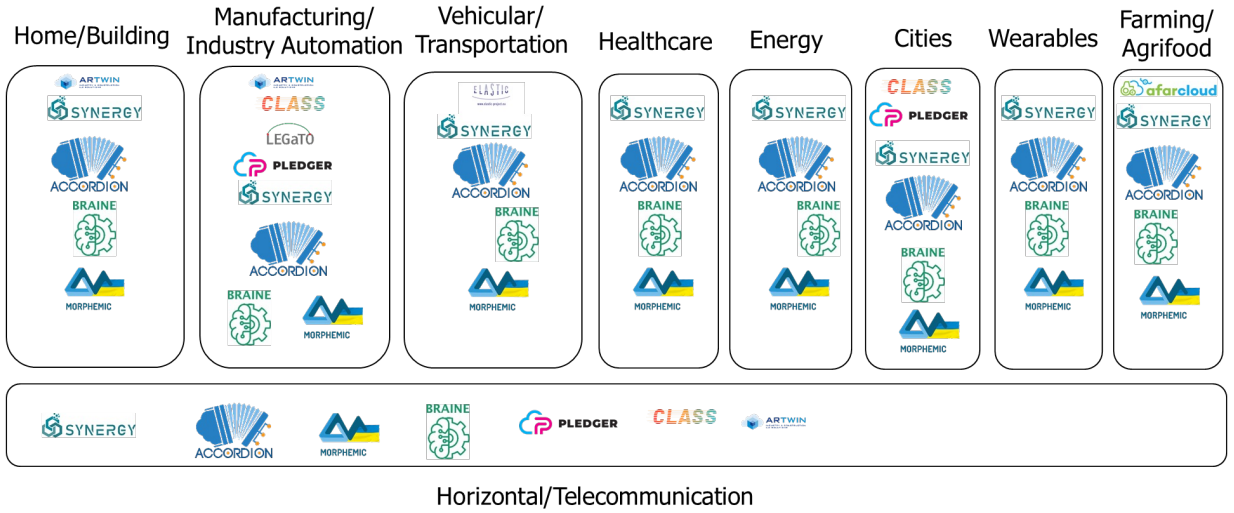
Technology and Marketing Dimensions
Vertical and Horizontal Domains

Edge Computing EU funded Completed Projects Landscape (Technology and Marketing Dimensions)



Source: AIOTI WG Standardisation – Release 2.0

Edge Computing EU funded Completed Projects Landscape (Vertical and Horizontal Domains)

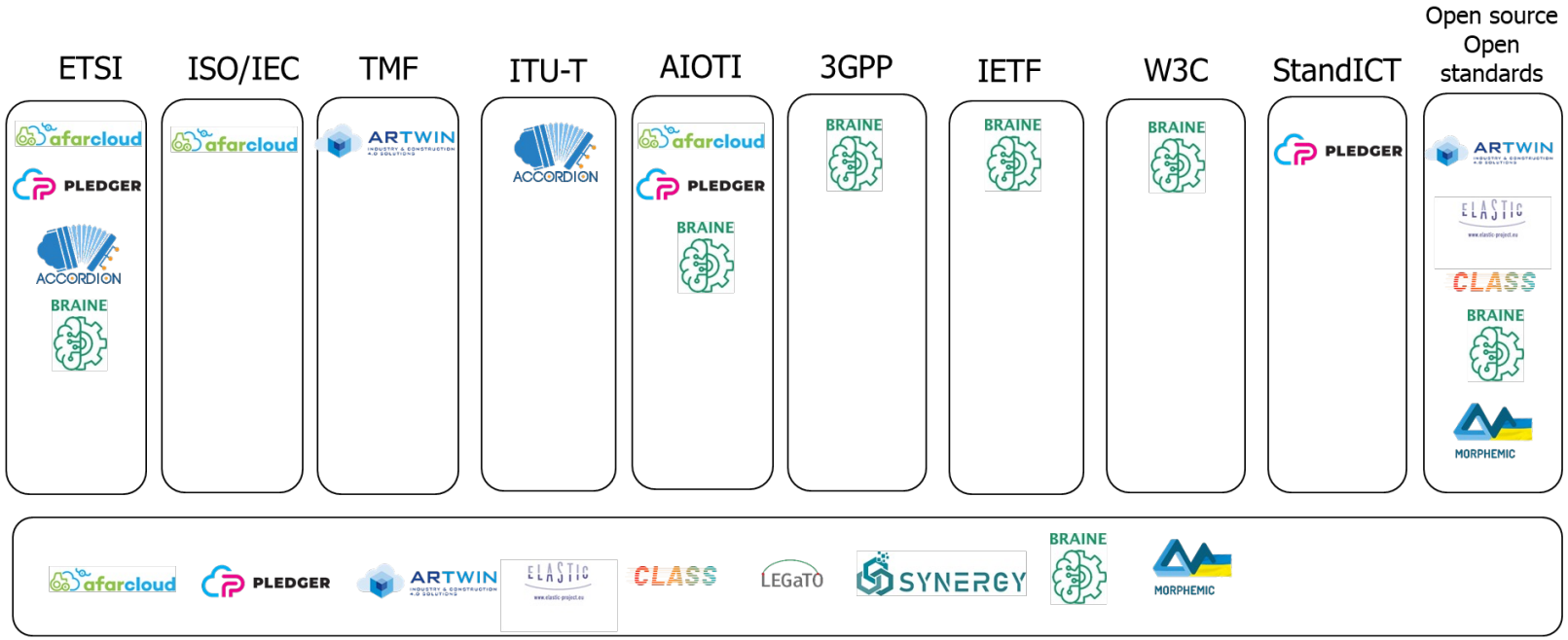


Source: AIOTI WG Standardisation – Release 2.0

EC EU funded Completed Projects Landscape (2)

Standardisation Organisations and Initiatives projects' activities

Edge Computing EU funded Completed Projects Landscape (Standardisation Organisations and Initiatives)



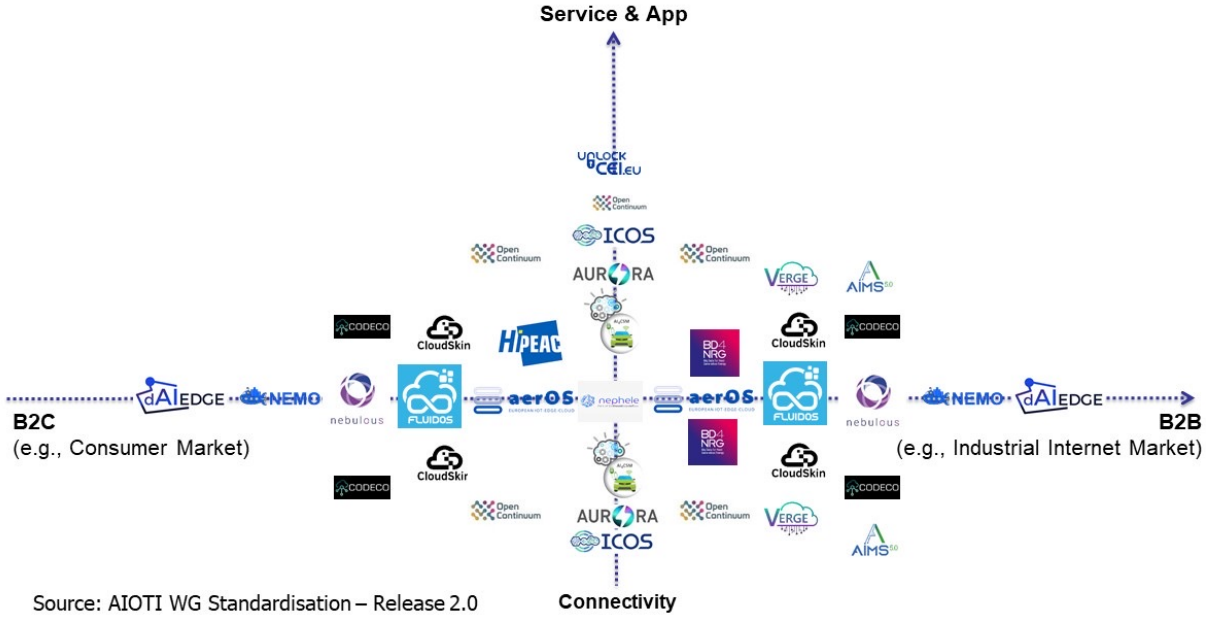
Others: BDVA, 5GPPP, 6G-IA, NIST, PICMG, etc.

Source: AIOTI WG Standardisation – Release 2.0

EC EU funded Ongoing Projects Landscape (1)

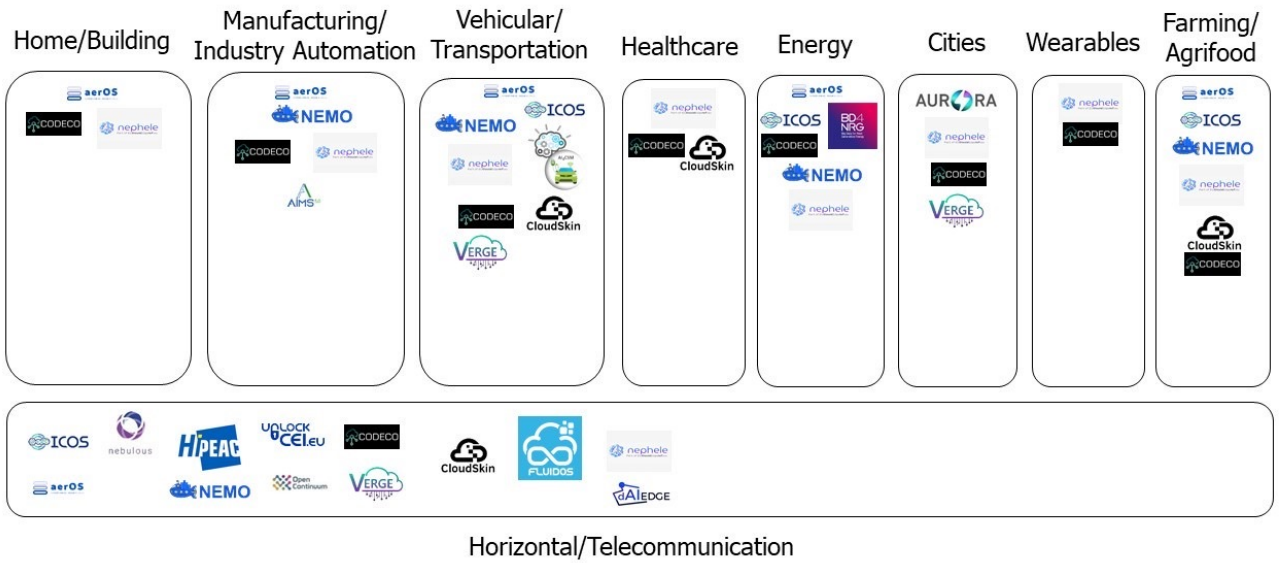
Technology and Marketing Dimensions
Vertical and Horizontal Domains

Edge Computing EU funded Ongoing Projects Landscape (Technology and Marketing Dimensions)



Source: AIOTI WG Standardisation – Release 2.0

Edge Computing EU funded Ongoing Projects Landscape (Vertical and Horizontal Domains)



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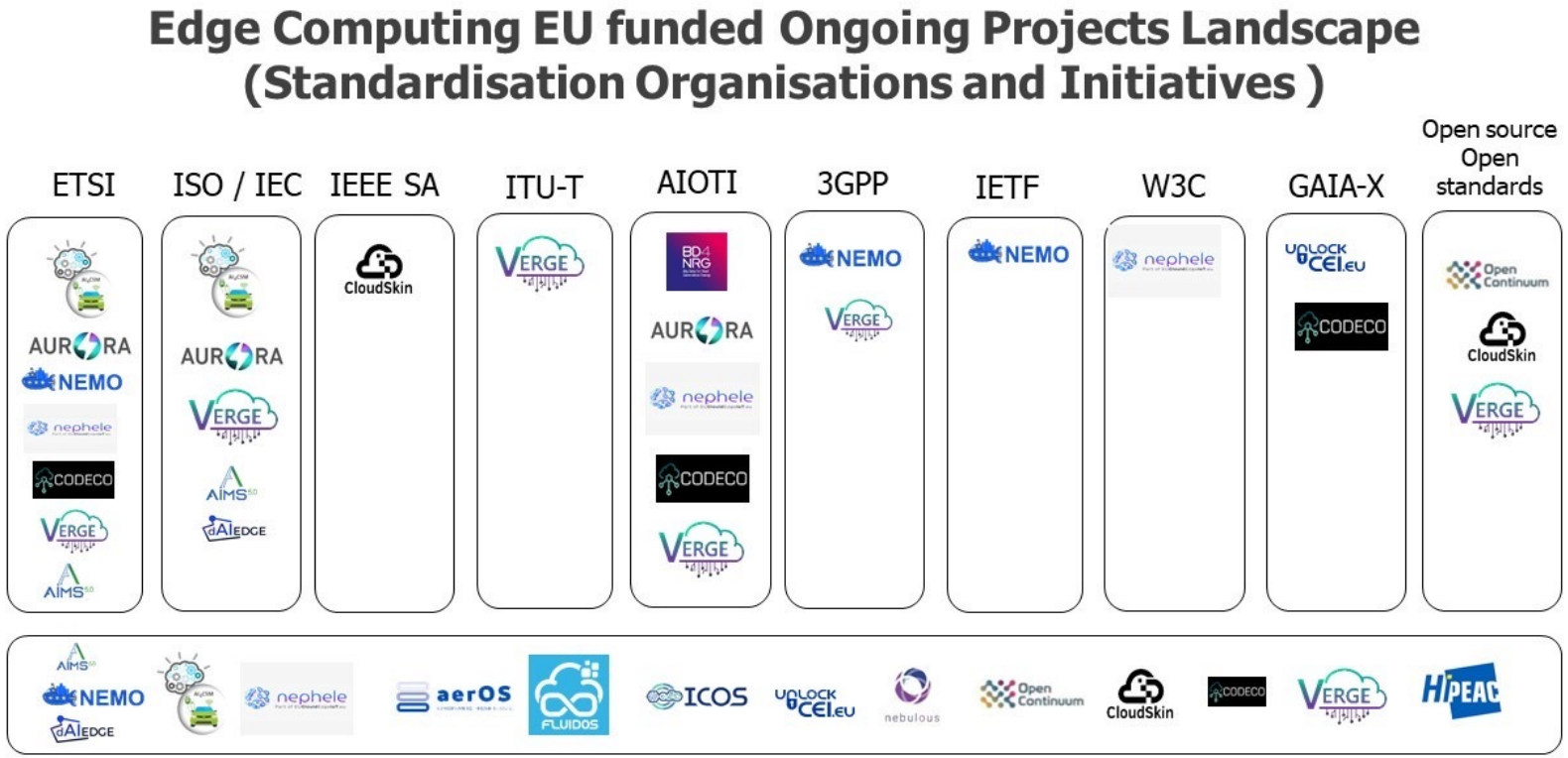
EC EU funded Ongoing Projects Landscape (2)

Standardisation Organisations and Initiatives projects' activities



Source: AIOTI WG Standardisation – Release 2.0

Summary

- **Goal of this presentation** is to promote the key results documented in the "IoT and Edge Computing EU funded projects landscape, Release 2"
- **61 projects included** (selected)
  - 34 IoT, 27 Edge Computing
  - 35 completed, 26 ongoing

- **IoT projects landscape**
  - **Challenges** in (most effort):
    - System architecture
    - Data security
    - Interoperability
    - Intelligence
  - **Standardization**
    - organizations and initiatives (most popular): ETSI, AIOTI, ISO/IEC, 3GPP, ITU-T, TMF, IEEE SA, IETF, BDVA
    - Activities:
      - Usage of standards
      - Contributions to technical reports
      - Use case specific

- **Edge Computing projects landscape**
  - **Challenges** in (most effort):
    - Platform architecture
    - Cloud-edge-IoT (CEI) computing continuum
    - AI support
    - Security
  - **Standardization**
    - organizations and initiatives (most popular): ETSI, AIOTI, StandICT, ISO/IEC, TMF, BDVA, 3GPP, ITU-T
    - Activities:
      - Usage of standards
      - Contributions to SDO
      - Contributions to technical reports

AIOTI

Next Steps and Discussion

- **Updated version of the report** "IoT and Edge Computing EU funded projects landscape, Release 3" is planned with:
  - New projects added
  - New technical challenges
  - Updated analysis of the standardisation activities

- **Questions to the audience**
  - Is this report useful for your community?
    - ✓ If yes, we can have one-to-one meetings to discuss details on topics interesting for your community
  - Are there any IoT and Edge Computing EU funded projects known to your community that need to be included in a subsequent Release?
    - ✓ If yes, we can have one-to-one meetings to discuss the way on how this input can be provided to AIOTI

- **Open Discussion**

Presentation of the Report High Priority IoT Standardisation Gaps and Relevant SDOs R3

Axel Rennoch, Report Editor (Fraunhofer)

AIOTI

IoT & Edge Computing Landscape Focus Group

WP 1: IoT & Edge Computing Landscape

- Cooperation with SDOs/Alliances to foster co-creation and interworking
- Maintain IoT and Edge Computing landscapes. (focus on edge computing landscape)
- **Recommendations and guidelines on solving protocol and interface gaps needed to support new IoT and Edge Computing features within IoT domains and cross-IoT domains.**

  Promote particularly the uptake of IoT & Edge Computing standards in public procurement to avoid lock-in
- Provide Computing Continuum requirements (on IoT and edge computing) and (Optical Communication) enablers
- Provide guidelines on how IoT can become an enabler for 5G (and beyond 5G) and vice versa. How IoT standards accommodate the use of these converged technologies, such as 5G, IoT/IIoT, Artificial Intelligence (AI), robotics, cloud and edge computing and as well automation, in vertical and cross-vertical applications
- Provide guidelines on how IoT & Edge Computing standardisation can impact the Industry Digitization, and vice versa
- Provide guidelines on how IoT & Edge Computing standardisation can impact the UN SDGs and European Green Deal, and vice versa

High Priority IoT and Edge Computing Standardisation Gaps and Relevant SDOs

High Priority IoT Standardisation Gaps and Relevant SDOs Release 2.0 January 2020:

https://aioti.eu/wp-content/uploads/2020/01/AIOTI-WG3-High-Priority-Gaps-v2.0-200128-Final.pdf

High Priority Edge Computing Standardisation Gaps and Relevant SDOs, April 2022:

https://aioti.eu/wp-content/uploads/2022/04/AIOTI-High-Priority-Edge-Computing-Gaps-Final.pdf

High Priority IoT Standardisation Gaps and Relevant SDOs – Goals of the Report

Publication of High Priority IoT Standardisation Gaps and Relevant SDOs, Release 3.0 report:

- https://aioti.eu/wp-content/uploads/2024/01/AIOTI-High-Priority-IoT-Gaps-R3-Final.pdf

Goal of report:

- This report presents an approach for the *definition and identification of key IoT standardisation gaps* in several initiatives

(1) Method of collecting information on IoT challenges:

- Using pre-defined template to collect IoT challenges
- Input provided discussed and approved by AIOTI members

(2) Method of identifying IoT Standardisation gaps to be covered by SDOs:

- Identify which of found IoT challenges can be considered IoT Standardisation challenges
- Investigate how many SDOs and SDO specifications are covering/working out each IoT Standardisation challenge
- Analyse and recommend which IoT Standardisation challenge is to be seen as a gap and should be covered by SDOs

Preparations

Selection of IoT computing challenges

1. Identification of European IoT research projects: 14 EU projects
   - Collection of related project research challenges
   - Using a Challenge description template
2. IoT challenges identified from AIOTI members, literature studies (e.g. by AIOTI and ETSI reports)
   - AIOTI "High Priority IoT Standardisation Gaps and Relevant SDOs Release 2.0"
   - ETSI STF 505 document ETSI TR 103.375
3. IoT challenges collected from AIOTI SRIA
   - Strategic Research and Innovation Agenda (https://aioti.eu/aioti-sria-advancing-next-generation-iot-and-edge-computing-research-and-innovation/)

Identification of relevant SDOs and related specifications/reports

1. Use of StandICT excel sheets
2. Updated with recent specifications/reports

Template used for IoT research/standardisation requirement

- **Title of IoT research/standardisation requirement**
- **Description of IoT research/standardisation requirement**
  - Motivation
  - Description
  - Type of requirement
    - Functional (real-time communication, scalable communication, etc.)
    - non-functional (performance, flexibility, security, etc.)
- **Application/Industry domain:**
  - Horizontal, Health, Mobility, Energy, Buildings, Agriculture, Manufacturing, Urban Society, etc.

Samples of IoT challenges (from 37 challenges)

1. **Group (from EU projects): 14 challenges**
   - IoT-based data analysis to **improve farming** *(project DEMETER)*
   - **Security By Design** IoT Development and Certificate Framework with Front-end Access Control *(project IOTAC)*
   - Smart and **Healthy Ageing** through People Engaging in Supportive Systems *(project SHAPES)*
2. **Group (from AIOTI members and literature): 8 challenges**
   - **Semantic interoperability** of IoT data spaces
     (from AIOTI report "Guidance for the Integration of IoT and Edge Computing in Data Spaces")
   - **ICT for CO2 Reduction Methodologies**
     (from AIOTI report „IoT and Edge Computing Carbon Footprint Measurement Methodology")
3. **Group (from AIOTI SRIA): 15 challenges**
   - **Energy-Efficient** Intelligent IoT and Edge Computing Systems
   - IoT Digital Twins, **Modelling and Simulation** Environments
   - Internet of Things **Senses** (senses of sight, hearing, taste, smell, and touch)

Selection of SDOs and SSOs

Standards Developing Organisations (**SDOs**),
Standards Setting Organisations (**SSOs**)
like Industrial Consortia and Open-Source Software (**OSS**) initiatives

- Based on:
  - The AIOTI "IoT LSP Standard Framework Concepts R3" report and
  - the EUOS "Landscape of Internet of Things (IoT) Standards" report

- Key SDOs:
  - ETSI, 3GPP, oneM2M,
  - CEN/CENELEC,
  - IEC, ISO/IEC JTC1, ITU-T,
  - W3C, IETF, IEEE

Details: identification of standardization gaps

1. Check **for each SDO** all specifications addressing the IoT challenge, e.g.
   - ETSI: check 88 specifications wrt. 37 challenges
   - ITU-T: check 65 specifications wrt. 37 challenges
   - ISO/IEC: check 79 specifications wrt. 37 challenges
   - …

	Contributor	REF_ID_init	Source	Source_R	Title_Full	Title_Merged	Abstract/Scope	Published	Webpage_URL
2	Michelle W	750	ETSI	ETSI	Smart M2M; Smart Escalators IoT Syste	ETSI TS 103 849 Smart M2M; Smart Es	The scope of this standard	Under development	Not available yet
3	Marco, Georgios, ITU-T S	59	ITU-T	ITU-T	Sustainable and intelligent building ser	ITU-T L.1370 (11/2018) Sustainable and	This recommendation sets	2018-11	https://handle.itu.int/11.1002/
4	Maria Ines Robles	302	IETF	RFC7	Applicability Statement: The Use of the	IETF RFC7733 Applicability Statement:	The purpose of this docun	2016-02	https://datatracker.ietf.org/do
5	Michelle W	201	ETSI	ETSI	SmartM2M; IoT LSP use cases and stan	ETSI TR 103 376 SmartM2M; IoT LSP us	The scope of this documer	2016-10	http://www.etsi.org/deliver/et
6	Maria Ines Robles	259	IETF	draft	RAW use-cases	IETF draft-ietf-raw-use-cases RAW use-c	This document presents w	2022-02	https://datatracker.ietf.org/do
7	Maria Ines Robles	333	IETF	RFC 8	Deterministic Networking Use Cases	IETF RFC 8578 Deterministic Networkin	This document presents u	2019-01	https://datatracker.ietf.org/do
8	I0T-EDGE-0096 Noleen C	630	ISO/IEC	ISO/I	Information technology - Internet of th	ISO/IEC TR 22417:2017 Information tec	ISO/IEC TR 22417:2017(E)	2017-11	https://www.iso.org/standard/
9	I0T-EDGE-0046	137	oneM2M	TR-0(	oneM2M - Use Case collection	oneM2M TR-0001-V2.4.1 oneM2M - U	The present document inc	2016-08	https://www.onem2m.org/ima
10	George Suciu	233	5GAA		Tele-operated Driving Use Cases, Systen	5GAA Tele-operated Driving Use Cases,	The evolution of driving au	2021-12	https://5gaa.org/news/tele-op
11	Maria Ines Robles	273	IETF	RFC5	Building Automation Routing Requirem	IETF RFC5867 Building Automation Rou	The Routing Over Low-Pov	2010-06	https://datatracker.ietf.org/do
12	Ray Walshe	781	HL7 International	HL7 V	HL7 Version 2 Messaging Standard	HL7 International HL7 V2.9 HL7 Versior	Communications/Network	2019-12	http://www.hl7.org/implemen
13	Maria Ines Robles	272	IETF	RFC5	Home Automation Routing Requiremer	IETF RFC5826 Home Automation Routi	This document presents re	2010-04	https://datatracker.ietf.org/do
14	George Suciu	462	3GPP	3GPF	Study on Narrow-Band Internet of Thin	3GPP TR 36.763 V17.0.0 Study on Nar	The objectives for this doc	2021-06	https://portal.3gpp.org/deskto
15	George Suciu	551	3GPP	3GPF	Study on Narrow-Band Internet of Thin	3GPP TR 36.763 V17.0.0 Study on Nar	The objectives for this doc	2021-06	https://www.3gpp.org/news-e
16	George Suciu	550	3GPP	3GPF	Evolved Universal Terrestrial Radio Acc	3GPP TR 36.802 V13.0.0 Evolved Unive	The present document sur	2016-06	https://www.3gpp.org/ftp/Spe
17	George Suciu	3	5G PPP	5G P	5G Trials for Cooperative, Connected ar	5G PPP 5G PPP H2020 ICT-18-2018 5G	The white paper focuses o	2020-10	https://5g-ppp.eu/wp-content/
18	Georgios, AIOTI	4	AIOTI		Identifiers in Internet of Things (IoT)	AIOTI Identifiers in Internet of Things (I	Identification is a major to	2018-02	https://aioti.eu/wp-content/up
19	Noleen Campbell	73	bioTope	bioTo	Prototype of Platform Integration using	bioTope D3.5 Prototype of Platform Int	This document is a part of	2017-06	https://st11.ning.com/topolog
20	Noleen Campbell	87	bioTope	bioTo	Information Source Publication and Cor	bioTope D3.6 V2.0 Information Source	The main objective of this	2018-01	https://storage.ning.com/topo
21	Noleen Campbell	72	bioTope	bioTo	Service Composition Framework	bioTope D5.2 V1.0 Service Composition	This document discusses t	2017-01	https://st11.ning.com/topolog
22	Noleen Campbell	88	bioTope	bioTo	Service Composition Framework	bioTope D5.5 V2.0 Service Composition	This document presents a	2017-12	https://storage.ning.com/topo
23	Noleen Campbell	485	CEN	EN 1	Communication systems for meters - P	CEN EN 13757-3:2018 Communication	This draft European Stand	2018-10	https://standards.cencenelec.e
24	Noleen Campbell	482	CEN	EN 1	Communication systems for meters - P	CEN EN 13757-4:2019 Communication	This European Standard sp	2019-11	https://standards.cencenelec.e
25	Noleen Campbell	480	CEN	EN 1	Communication systems for meters - P	CEN EN 13757-6:2015 Communication	This European Standard sp	2016-06	https://standards.cencenelec.e
26	Noleen Campbell	486	CEN	EN 1	Communication systems for meters - P	CEN EN 13757-7:2018 Communication	This draft European Stand	2018-10	https://standards.cencenelec.e
27	Noleen Campbell	481	CEN	EN 1	Heat meters - Part 3: Data exchange an	CEN EN 1434-3:2015 Heat meters - Par	This European Standard sp	2016-06	https://standards.cencenelec.e
28	Noleen Campbell	478	CEN	EN 1	Communication systems for meters - W	CEN EN 16836-2:2016 Communication	This European Standard sp	2017-05	https://standards.cencenelec.e
29	Noleen Campbell	479	CEN	EN 1	Communication systems for meters - W	CEN EN 16836-3:2016 Communication	This European Standard sp	2017-05	https://standards.cencenelec.e
30	Noleen Campbell	78	CEN	CEN/	Communication system for meters - Ac	CEN/TR 17167:2018 Communication sy	This Technical Report cont	2018-04	https://standards.cencenelec.e

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Details: identification of standardization gaps

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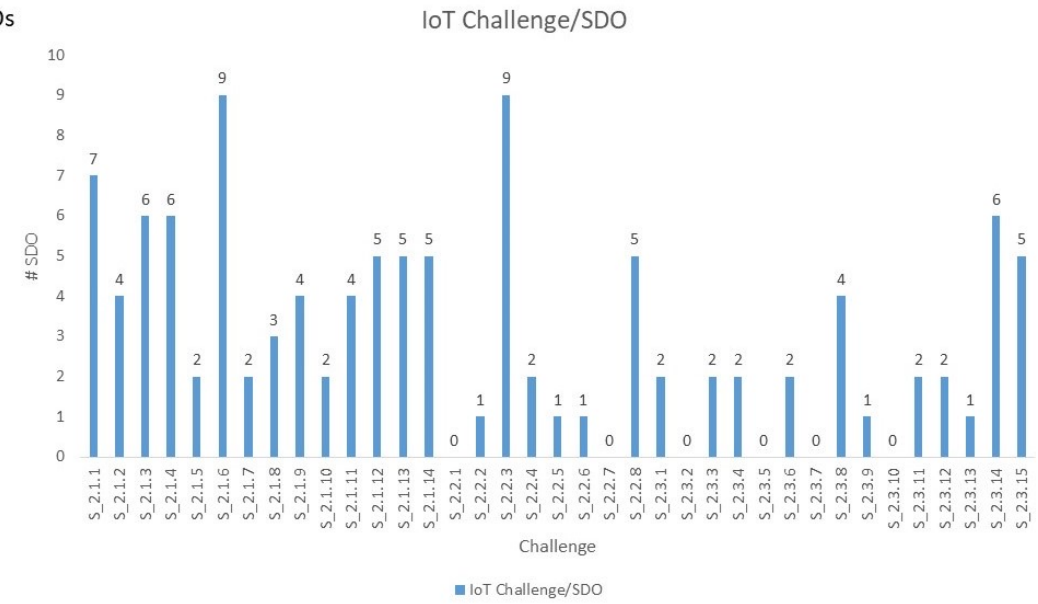
   - …

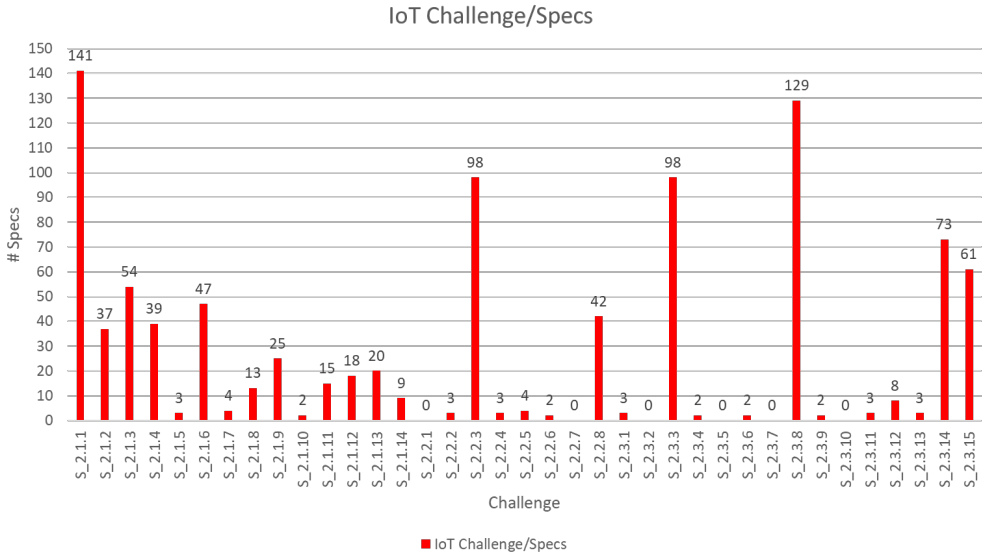
2. Check **for all 37 challenges**
   - *Number of SDO* addressing the IoT challenges (with minimum of one specification)
   - *Number of* SDO *specifications/reports* addressing the IoT challenges

Number of SDOs and specifications covering / working out an AIOTI IoT identified challenge

Number of SDOs working on an IoT challenge



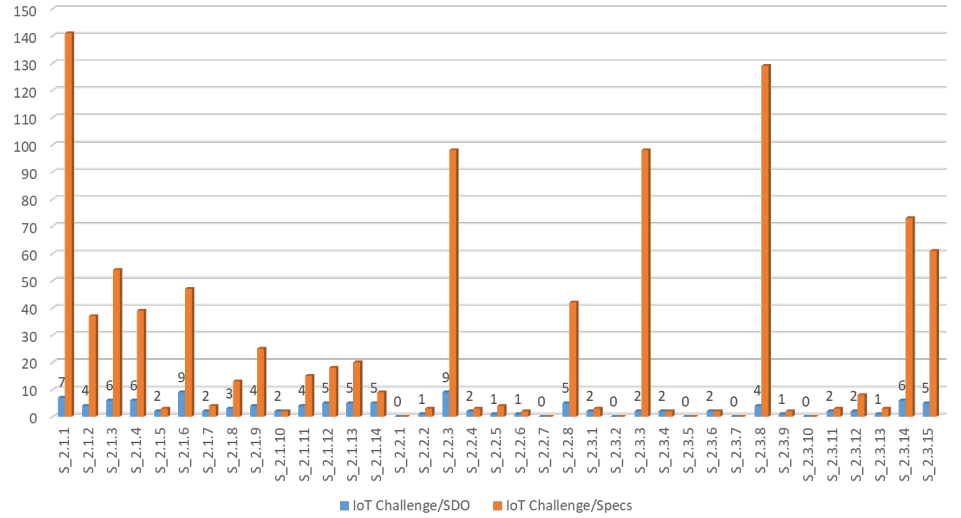
Number of specifications working on an IoT challenge



Depending on the level of the intensity that an IoT standardisation challenge is covered/worked out by an SDO, **<u>three categories can be distinguished</u>:**

- <u>GREEN:</u> **High** intensively covered standardisation gap in SDOs (high #SDOs >= 4 AND high #specs >= 8)
- <u>YELLOW:</u> **Medium** intensively covered standardisation gap in SDOs (high #SDOs >= 4 AND low #specs < 8) **OR** low #SDOs < 4 AND high #specs >= 8)
- <u>RED:</u> **Low** intensively covered standardisation gap in SDOs (low #SDOs < 4 AND low #specs < 8)

Number of SDOs and Specs working on an IoT challenge



15 IoT challenges covered/worked out by SDOs (green)

#chall	Description	IEC	ETSI	3GPP	ISO/IEC	CEN/CENELEC	IEEE	ITU	W3C	IETF	OneM2M	#SDO	#Specs
2.1.1	Challenges reported in DataPorts: A Data Platform for the Cognitive Ports of the Future	41	2		31	37	1		5	24		7	141
2.1.2	Challenges reported in DEMETER: IoT-based data analysis to improve farming				31			1	4		1	4	37
2.1.3	Challenges reported in IoTAC: Security By Design IoT Development and Certificate Framework with Front-end Access Control	10	5		8	3			1	27		6	54
2.1.4	Challenges reported in IoT-NGIN: Next Generation IoT as part of Next Generation Internet				3		1	3	1	25	6	6	39
2.1.5	Challenges reported in SHAPES: Smart and Healthy Ageing through People Engaging in Supportive Systems							1			2	2	3
2.1.6	Challenges reported in ASSIST-IoT: Architecture for Scalable, Self-*, human-centric, Intelligent, Secure, and Tactile next generation IoT	9	5		3	1	1	2	4	21	1	9	47
2.1.7	Challenges reported in IM-TWIN: from Intrinsic Motivations to Transitional Wearable INtelligent companions for autism spectrum disorder				3			1				2	4
2.1.8	Challenges reported in GATEKEEPER: Smart Living Homes – Whole Interventions Demonstrator For People At Health And Social Risks		1					10			2	3	13
2.1.9	Challenges reported in CHARM: Challenging environments tolerant Smart systems for IoT and AI					22	1	1			1	4	25
2.1.10	Challenges reported in ATLAS: Agricultural Interoperability and Analysis System							1			1	2	2
2.1.11	Challenges reported in TERMINET: nexT gEneRation sMart INterconnectEd ioT		5		3	6					1	4	15
2.1.12	Challenges reported in Hexa-X: A flagship for B5G/6G vision and intelligent fabric of technology enablers connecting human,			3			4		2	4	5	5	18
2.1.13	Challenges reported in InterConnect: Interoperable Solutions Connecting Smart Homes, Buildings and Grids		3		1		3		4		9	5	20
2.1.14	Challenges reported in IntellIoT: Intelligent, distributed, human-centered and trustworthy IoT environments		1		2	1		4			1	5	9
2.2.1	Green machine learning for the IoT											0	0
2.2.2	Software Containers at the Edge		3									1	3
2.2.3	Semantic interoperability of IoT data spaces	41	2		8	20	1	1	2	15	8	9	98
2.2.4	Digital Twins – overall		1		2							2	3
2.2.5	Heterogeneous vocabularies and ontologies in Digital Twins				4							1	4
2.2.6	Quality of metadata in Digital Twins				2							1	2
2.2.7	IoT Swarms											0	0
2.2.8	Digital for Green	1			2	5		8		26		5	42
2.3.1	IoT and Edge Computing Granularity		1								2	2	3
2.3.2	IoT Edge and X-Continuum Paradigm											0	0
2.3.3	Intelligent Connectivity	11								87		2	98
2.3.4	Energy-Efficient Intelligent IoT and Edge Computing Systems							1			1	2	2
2.3.5	Heterogeneous Cognitive Edge IoT Mesh											0	0
2.3.6	IoT Digital Twins, Modelling and Simulation Environments		1		1							2	2
2.3.7	Internet of Things Senses											0	0
2.3.8	Decentralised and Distributed edge IoT Systems	20		3		7				99		4	129
2.3.9	Federated Learning, Artificial Intelligence technologies and learning for edge IoT Systems										2	1	2
2.3.10	Operating Systems and Orchestration Concepts for edge IoT Systems											0	0
2.3.11	Dynamic Programming Tools and Environments for Decentralised and Distributed IoT Systems							1	2			2	3
2.3.12	Heterogeneous Edge IoT Systems Integration		1								7	2	3
2.3.13	Edge IoT sectorial and Cross-Sectorial Open Platforms										3	1	3
2.3.14	IoT Verification, Validation and Testing (VV&T) Methods	17	11			2		16		25	2	6	73
2.3.15	IoT Trustworthiness and Edge Computing Systems Dependability	13	11		3					26	8	5	61

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Recommendations (red and yellow)

Four IoT challenges need **more research before being standardised**:

- 2.2.1 *Green machine learning* for the IoT
- 2.2.7 *IoT Swarms*
- 2.3.2 IoT Edge and X-*Continuum* Paradigm
- 2.3.5 Heterogeneous Cognitive Edge IoT *Mesh*

Two IoT challenges marked as **medium intensively covered** (require lower level of standardisation work):

- 2.1.8 Challenges reported in GATEKEEPER: *Smart Living Homes* – Whole Interventions Demonstrator For People At Health And Social Risks
- 2.3.3 Intelligent *Connectivity*

16 (!) IoT challenges low intensively covered (require highest level of standardisation work):

- 2.1.5 Smart and *Healthy Ageing* through People Engaging in Supportive Systems
- 2.1.7 From Intrinsic Motivations to Transitional Wearable INtelligent *Companions for autism* spectrum disorder
- 2.1.10 *Agricultural Interoperability* and Analysis System
- 2.2.2 *Software Containers* at the Edge
- 2.2.4 *Digital Twins* – overall
- 2.2.5 Heterogeneous *vocabularies* and *ontologies* in Digital Twins
- 2.2.6 Quality of *metadata* in Digital Twins
- 2.3.1 IoT and Edge Computing *Granularity*
- 2.3.4 *Energy-Efficient* Intelligent IoT and Edge Computing Systems
- 2.3.6 IoT Digital Twins, Modelling and Simulation *Environments*
- 2.3.7 Internet of Things *Senses*
- 2.3.9 Federated *Learning*, Artificial Intelligence technologies and learning for edge IoT Systems
- 2.3.10 Operating Systems and *Orchestration Concepts* for edge IoT Systems
- 2.3.11 Dynamic *Programming Tools* and Environments for Decentralised and Distributed IoT Systems
- 2.3.12 Heterogeneous Edge IoT Systems *Integration*
- 2.3.13 Edge IoT sectorial and Cross-Sectorial *Open Platforms*

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Next Steps

- **Goal of this presentation** is to promote the key results documented in the "High Priority IoT Standardisation Gaps and Relevant SDOs, R3"

- **Questions to the audience:**
  - Is this report useful for your community?
  - Are there any SDO/Alliance/OSS initiatives working on IoT known to your community that need to be included in a subsequent Release?

- **Next meeting (joint meeting AIOTI & Stand.ICT/EUOS):** 3rd May 2024
  - Update of Edge and IoT "gaps" reports

- **Open Discussion**

Presentation of INSTAR Project

Damir Filipovic, AIOTI, INSTAR Project Participant

AIOTI

Supporting the implementation of the Digital Partnerships and the EU-US TTC through international common ICT Standards

Geographical scope

7

USA JAP
CAN ROK
SGP AUS
TWN

Technological scope

Key actions

- Common vision & roadmap with like-minded partners to promote ICT standards in the target foundational technologies internationally
- Effective stakeholder engagement across existing and new communities
- Studies and analyses on ICT standardisation in key HE technologies
- Monitoring effective implementation of trade agreements

Consortium

- **BluSpecs (coordinator)**, Fraunhofer, Fortiss, AIOTI, Trialog, TU Delft, Trust-IT, COMMpla, NCSRD, AIT

Start: January 2024	**Duration:** 30 months
Budget: €1,500,000	Learn more here.

Scope of the Task Forces

TF1 – AI
- Secure, trustworthy and ethical development and use of AI systems (ML algorithms, neural networks, analytics, autonomous systems)
- AI Act, ETSI's Operational Coordination Group on AI (OCG AI)

TF2 – Cybersec-eID
- Cybersecurity & electronic identification in industries like healthcare, manufacturing, financial services, energy, automotive
- European Cyber Resilience Act (CRA)

TF3 – Data
- Data quality, syntactic, semantic and pragmatic characteristics of data (ISO 8000-1)
- Standards impact on policy & regulation, investment & innovation, cross-industry scenarios

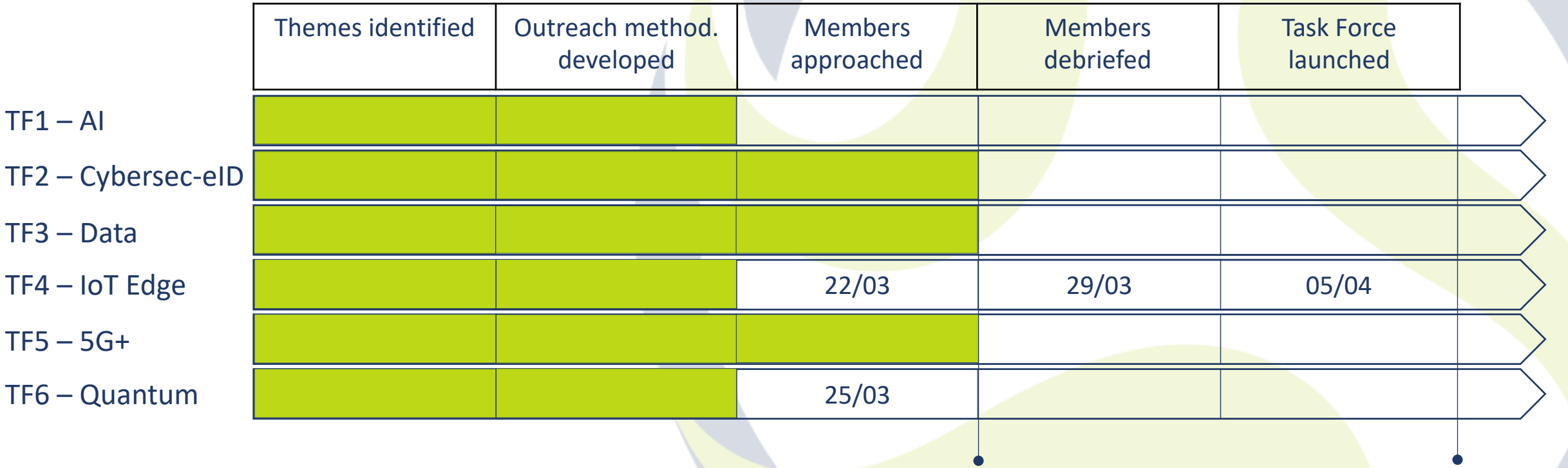
TF4 – IoT Edge
- Cloud, Edge (near vs. far edge), IoT in smart manufacturing, precision agriculture, mobility, energy grids, smart cities, healthcare etc.

TF5 – 5G+
- Convergence of communications, sensing, sustainable services & AI
- Human-centric, cognitive network of networks system

TF6 – Quantum
- Quantum computing, communication, sensing and cryptography, as well as post-quantum cryptography techniques
- Specific focus on technologies that can be integrated into European infrastructure and interoperability aspects

Relevant standards our TFs will address are listed in our High-Level Standardisation Framework (to be shared upon request).

Task Forces


Themes identified
Outreach method. developed
Members approached
Members debriefed
Task Force launched
TF1 – AI
TF2 – Cybersec-eID
TF3 – Data
TF4 – IoT Edge
TF5 – 5G+
TF6 – Quantum
22/03
29/03
05/04
25/03
Deadline for official invites: 25/03
All kick-off calls scheduled: 30/04

Questions from the Audience

Moderated by:
Georgios Karagiannis, AIOTI WG Standardisation Co-Chair

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Wrap up and end of the Workshop

Georgios Karagiannis, AIOTI WG Standardisation Co-Chair

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Thank you for listening

Any questions?

You can find us at @AIOTI_EU or email sg@aioti.eu

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