Alliance for Internet of Things Innovation

AIOTI SIGNATURE EVENT

IoT and Edge computing : Societal Impact and Opportunities for the Green Digital Twin Transition

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Alliance for Internet of Things Innovation

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IoT and Edge computing standardisation Impact and Opportunities

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Panelist

- Celine Prins, AIOTI WG Urban Society Chair (IFL)
- Ricardo Vitorino, WG Urban Society Co-Chair (Ubiwhere)
- Erik Van Wijk, AIOTI WG Buildings Chair (DeWaardeFabriek)
- Rute Sofia, AIOTI Testbeds Co-Chair (fortiss)

Scope of the session

- Standardisation plays an important role in development and application of technologies in interoperable way.
- This presentation will show how standardisation and AIOTI activities in that area contributes to the topics covered by the three sessions (IoT and Crisis Preparedness, IoT improving Healthy Urban Lifestyle and Built Environment Powering the Future).

- Key Themes:
- Discussion between the panelists of the three session and the AIOTI Standardisation Group will show the challenges and opportunities of that IoT and Edge computing standardization has on Twin (Green and Digital) transition, supporting crisis preparedness, contributing to disease prevention and improving built environment.

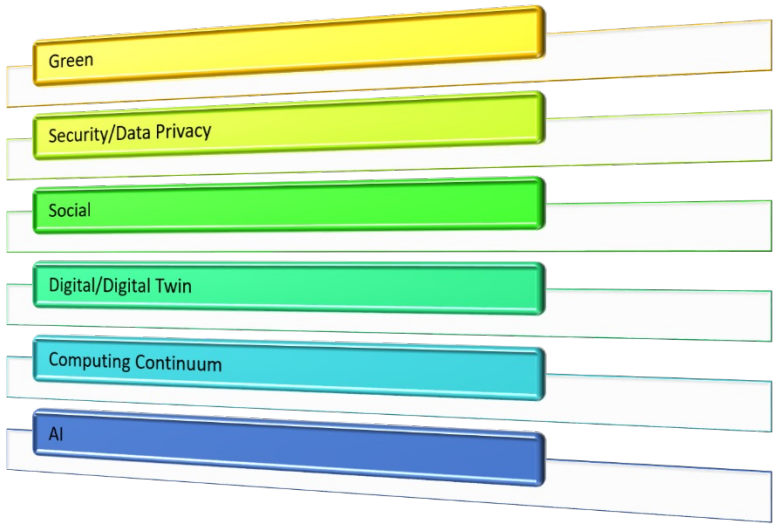
- Target results of the session
  - Provide recommendation to research projects, such as EU funded research projects, on solving open IoT and edge computing standardisation challenges
  - Support SDOs to define next steps in IoT and/or edge computing standardisation activities

IoT Standardisation Challenges ("IoT Gap Analysis and Recommendations" report)

= Well addressed and no gap anymore
= In the process of solving the gaps, in the right direction
= In the process of solving the gaps, but much work to be done
= Still an open gap

Nb	Short name	Nature of the standardisation gap	Domain
1	Applications to Span Multiple Ecosystems	APIs that decouple applications from the details of specific IoT ecosystems as a means to enable open markets of services (e.g., W3C –WoT, addresses well the standardisation gap for decoupling applications from the details of specific IoT ecosystems).	Service and applications
2	Safety	Safety standards (refer to safety standards of the relevant targeted domain, e.g., ISO 26262 or ISO 21448 for road vehicle) to be taken into account	Deployment
3	(Cyber-)Security	Risk Management Framework and Methodology.	Security / Privacy
4	Data management	Data rights management: ownership, storage, sharing, selling, liability, etc.	Security / Privacy
5	Harmonized identification	Harmonized reference for unique and secured naming mechanisms.	Applications Management
6	Semantic interoperability	Standards to interpret and process the sensor data in an identical manner across heterogeneous platforms. Need of a global and neutral data model.	Service and applications
7	Platform interoperability	Multiplicity and fragmentation of IoT HLAs, platforms and discovery mechanisms.	Integration / Interoperability / IoT Architecture
8	Connectivity interoperability	Competing communications and networking technologies.	Connectivity
9	Ethics and trustworthiness	Ethics. Transparency and choice for citizens.	Service and applications Security / Privacy Societal
10	Open Markets of Digital Services	Standards needed to enable open markets of services.	Business
11	Device certification	Certification mechanisms defining "classes of devices" and ensuring quality of the devices.	Device-sensor technology
12	Solution deployment and maintenance tools	Tools to enable ease of installation, configuration, maintenance, operation of devices, technologies, and platforms. Standardized methods to distribute software components to devices across a network	Deployment
13	Scalable device deployment	Unified model/tools for deployment and management of large-scale distributed networks of devices.	Deployment/ Device-sensor technology
14	Green technologies	Green technologies.	IoT Architecture / Societal
15	Usability	Easy accessibility and usage to a large non-technical public.	Applications Management

Edge Computing Standardisation Challenges ("Edge Computing Gap Analysis and Recommendations" report) - Categories of standardisation challenges



Challenges presented in detail in	Green	Security/ Data Privacy	Social	Digital/Digital Twin	Computing Continuum	AI
Section 2.1		intelligent approaches			interoperability, orchestration	
Section 2.2	energy costs balance	distributed security			federation, cross-platform	network optimization
Section 2.3		users trust, fault tolerance	agile pricing		systems' collaboration	
Section 2.4	energy /CO_2 footprint	solutions evaluation		massive IoT applications		green AI
Section 2.5	energy /CO_2 footprint	solutions evaluation				
Section 2.6	environmental impact score	GDPR compliance	ESG monitoring	metrics collection		performance acceleration
Section 2.7						explainable AI, common sense
Section 2.8		confidentiality, non-repudiation		digital twins, physics realism		explainable AI, interpretability
Section 2.9		digital attestations		digital twins, data spaces		federated learning
Section 2.10				new solutions certification		
Section 2.11					MEC, connectivity	
Section 2.12					MEC hosts, interoperability	
Section 2.13		access, share, store, threats	human-centric		microservices, scaling, planes	distributed AI, fed. learning
Section 2.14	environmental meta-model		societal context, buy-sell	model coherency	interoperability, internet space	
Section 2.15.1					interoperability, ecosystems	
Section 2.15.2					coexistence rules	
Section 2.15.3				devices/systems certification		
Section 2.15.4		trustworthiness, dependability		non-functional properties		
Section 2.15.5				digital service transformation		
Section 2.15.6		security/privacy models			interoperability, coexistence	
Section 2.15.7						cognitive digital services
Section 2.15.8			socio-economic impact	service discovery	end-to-end interoperability	
Section 2.15.9		service security, security models				
Section 2.15.10		services authentication	micropayments			
Section 2.15.11	policy descriptions		policy descriptions			
Section 2.15.12				novel models/ languages		
Section 2.15.13				distributed devices	reorganization, reassignment	
Section 2.15.14					responsive connectivity	AI on the edge
Section 2.15.15					X-continuum paradigm	
Section 2.15.16					granularity, interoperability	
Section 2.15.17					swarm systems	intelligence clustering
Section 2.15.18				distribution, decentralisation		cognition
Section 2.15.19						fed. learning, AI for edge
Section 2.15.20				virtualisation, automation		
Section 2.15.21					systems integration	AI-based edge applications
Section 2.15.22		federated AAA[9]		digital twin, IoT certification	infrastructures merging	
Section 2.15.23					interoperability, merging	
Section 2.15.24		distributed/ ledger security		digital twin		distributed AI

Edge Computing standardisation gaps

Section	Standards	Section	Standards	Section	Standards	Section	Standards
2.1	26	2.11	30	2.15.7	1	2.15.17	0
2.2	41	2.12	15	2.15.8	3	2.15.18	5
2.3	12	2.13	9	2.15.9	2	2.15.19	1
2.4	1	2.14	3	2.15.10	7	2.15.20	3
2.5	1	2.15.1	7	2.15.11	1	2.15.21	2
2.6	2	2.15.2	6	2.15.12	0	2.15.22	4
2.7	1	2.15.3	6	2.15.13	0	2.15.23	4
2.8	7	2.15.4	6	2.15.14	14	2.15.24	6
2.9	1	2.15.5	4	2.15.15	2	2.15.25	2
2.10	6	2.15.6	4	2.15.16	3		

= **Less priority gap, more standardisation work ongoing**

= **High priority gap, some standardisation work ongoing**

= **Considerably high priority gap**

- Considerable (high priority) standardisation gaps related to AIOTI identified edge computing challenges of (red color):
  - Digital Twins (and Green Deal) (Sections 2.4, 2.5, 2.9); → Sessions 1, 2, 3
  - ICT/IoT and policies description and languages supporting the Environmental, Social and Governance (ESG) monitoring (Sections 2.6, 2.15.11, 2.15.12); → Sessions 1, 3
  - Federated Learning and AI (Sections 2.7, 2.15.7, 2.15.19); → Sessions 1, 2, 3
  - Devices and IoT swarm systems management (Sections 2.15.13, 2.15.17). → Sessions 1, 2, 3
- Activities could be initiated for creation of standardization specifications covering challenges of (brown color):
  - IoT and edge computing coexistence/integration/interoperability and continuum across several sectors and platforms (Sections 2.14, 2.15.6, 2.15.5, 2.15.6, 2.15.15, 2.15.16, 2.15.20, 2.15.21, 2.15.22, 2.15.23); → Sessions 1, 2, 3
  - Services discovery and authentication – in the context of multiple edges (Sections 2.15.8, 2.15.9). → Session 1

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Questions for discussion

1. Which are the key IoT and Edge computing Standardisation challenges and opportunities on Twin (Green and Digital) transition imposed by: A) IoT and Crisis Preparedness, B) IoT improving Healthy Urban Living, C) Built Environment Powering the Future?

2. What are activities done by SDO/Alliance/OSS initiatives to solve the IoT and Edge computing Standardisation challenges on Twin (Green and Digital) transition?

3. What you see as next step on supporting the IoT and Edge computing Standardisation challenges on Twin (Green and Digital) transition in (1) SDOs and (2) research projects, such as European projects? What is the role of testbeds here?

4. What you see as next step on implementing the IoT and Edge computing Standardisation opportunities on Twin (Green and Digital) transition? What is the role of testbeds here?

5. Any other standardisation challenge/opportunity that you would like to address or that came out from your sessions

Thank you for listening

Any questions?

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

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