

# StandICT.eu 2023

ICT STANDARDISATION OBSERVATORY AND SUPPORT FACILITY IN EUROPE

## **FOLLOWING THE FELLOWS**

IMPACT REPORT FROM  
FUNDED APPLICANTS TO  
THE STANDICT.EU 2023  
FELLOWSHIP PROGRAMME

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### **SEVENTH OPEN CALL**

*Editors:*

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## Disclaimer

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## About StandICT.eu

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The StandICT.eu 2023 Coordination and Support Action project has received funding from the European Union's Horizon 2020 - Research and Innovation programme – under grant agreement no. 951972. The project is coordinated by [Trust-IT Srl](#) (IT), supported by its partners from the [Dublin City University](#) (IE) and [AUSTRALO](#) (ES).

## Acknowledgements

Our consortium, formed by **Trust-IT as the coordinator, Dublin City University and AUSTRALO Marketing Lab**, is grateful to all experts of our StandICT.eu 2023 community for their competent work. This booklet is a tangible reflection of your continuous dedication in ICT Standardisation - Thank you!

StandICT.eu 2023 would also like to thank Thomas Reibe, StandICT.eu 2023 Project Officer & Senior Expert at DG Connect European Commission, and Emilio Davila-Gonzalez, Head of ICT Standardisation sector at DG Connect leading Unit F3-Blockchain & Innovation for their leadership and guidance. The External Advisory Group (EAG) provided invaluable support throughout the course of the project. Our appreciation for their effort and commitment goes to: Ray Walshe (EAG Chair), Stefan Hallensbellen, Brian McAuliffe, Lindsay Frost, Jens Gayko, Karl Grun, Enrico Scarrone, Nuria de Lama, Tom de Block, Martin Chapman, Fergal Finn, Ana Garcia Robles, Stefan Weisgerber, Jochen Friedrich, Antonio Conte, Omar Dhaher, Barbora Greplova, and Stefano Nativi. Finally, we would like to thank all our EUOS Technical Working Groups (European Observatory for ICT Standardisation) chairs and members for the investment in gathering expertise and producing outstanding landscape reports of the standardisation status across different ICT sectors. We warmly thank the TWG chairs guiding this work: Lindsay Frost, Ismael Arribas, Matthias Pocs, Dimosthenis Kyriazis, Jeroen Broekhuijsen, Antonio Kung, Claude Baudoin, Joel Myers, Arkopaul Sarkar, Georgios Karagiannis, Brian McAuliffe and Fiona Delaney.



## ■ Foreword

The European Green Deal & the New Industrial Strategy for Europe call for a strong **EU presence in international Standardisation development**. The recent significant shifts in the geopolitical environment call for increasing the intensity of the EU presence in international standardisation committees. Building up a strong and sustainable pool of European Standardisation competent professionals who are ready to engage in European and International Standardisation is crucial. With this we are pleased to contribute to this already engaged community through the

**“Following the Fellows” series Impact Reports**, now in its 7<sup>th</sup> edition, proving a tangible testimony of the impact generated by European ICT experts working in collaboration with international Standardisation Developing Organisations (SDOs), thanks to the financial support provided through the *StandICT.eu 2023 Fellowship Programme*, as paramount part of the broader mission of the StandICT.eu 2023 Coordination and Support Action, funded by the European Commission’s H2020 Framework Programme.

The main purpose of these regular publications is to display the work carried out by our fellows and illustrate the demonstrable outcomes that excellent research can make to both society and to the economy (SMEs or industry at large). Therefore, we attempt to substantiate how each effort on which the fellows are engaged provides a potential benefit to society and contributes to the achievement of specific, desired, societal outcomes as a result of the ICT Standardisation efforts.

Special thanks in putting together these regular publications go to our External Advisory Group who provide high-level input to fine-tune the topics covered by the Open Calls, as well as the dedicated work of our External Pool of Evaluators who scrupulously vet the numerous applications received in response to this call, to our Partners, Dublin City University and AUSTRALO Marketing Lab key to the monitoring activities, our project officers at the European Commission of DG Connect for their relentless support and, of course, to our fellows for the strenuous months of work behind each activity and reporting to help deliver the results herein.

### **Silvana Muscella**

StandICT.eu 2023 Project Coordinator  
& CEO, Trust-IT Srl



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# ■ Introduction

This report provides an immersion to outcomes of the StandICT.eu 2023 Open Call#7 from the perspective of fellows that were selected and funded under this call. Our team is delighted to showcase the seventh series of StandICT.eu 2023 success stories of the funded fellowships de-tailing the addressed standards and landscapes, how these will fill in the identified gaps as well as impact the related stakeholders and society. The results obtained by our fellows fully re-pond to many of the objectives set out in the EU Strategy on Standardisation. They mainly pri-oritise and address standardisation needs in strategic ICT areas, enhance European leadership in global standards, support innovation and, finally, improve the overall integrity of the European standardisation system.

Standards are at the core of the EU Single Market and global competitiveness and play a funda-mental (even if sometimes invisible) function in our daily life. They can ensure the interopera-bility of products and services, reduce costs, improve safety, and foster innovation.

At the same time, standards act as powerful drivers for innovation and growth by helping re-searchers bring their innovation to the market and spread technological advances, as standards make their results transparent and ensure high quality. One of the key purposes of StandICT.eu 2023 is to support the activity of European ICT experts to contribute to the modernisation and consolidation of the European standardisation system as well as to the valorisation of their re-search outputs, with a view to efficiently respond to the EU's ambitions towards the develop-ment of e-agriculture policies, strategies and plans. Standards enable ICT innovation and ICT standards to advance artificial intelligence, data and robotics, thematic areas that were the focus of the announcement of the 7<sup>th</sup> Open Call, and 18% of the funded fellowships in this round treated these topics.

The primary purpose of this document is to share the results attained through the work carried out by the funded experts, and to showcase the most relevant outcomes, creating awareness of the potential impact and repercussions of such impact on commerce, industry, governmental policies and strategies and the society.

This open call is the seventh one out of 9 StandICT.eu 2023 Open Calls. Each open call will have a dedicated impact report with the goal to timely share the key findings, contributions, and observations with StandICT.eu community, the European Commission, the Multi-Stakeholder Platform, the SDOs, and even beyond, with all interested actors of our ever-growing StandICT.eu 2023 community.

In this report, the Open Call #7 is presented with key takeaways and figures, then the fellow-ship outcomes are presented in the targeted technology areas, as defined in the Rolling Plan for ICT Standardisation 2023, addressed by the 43 funded Fellows:

- ▶ **Key Enablers and Security:** 22 fellowships: 5G and beyond (6 fellowships), Cybersecurity (7), AI (4), Big Data (1), Cross Domain Technologies (1), e-identification (1), industry 4.0 (1), Quantum (1).
- ▶ **Sustainable Growth:** 6 fellowships: Robotics and Autonomous Systems (2 fellowships), Smart cities and communities (2), Smart Grids and Smart Metering (1), Circular Economy (1), Building Trust (1).
- ▶ **Innovation for Digital Single Market:** 13 fellowships: Blockchain and DTL (3), FinTech and RegTech (2), Semantic Interoperability (2), Media (1), Digital Twins (1), Cross Domain Technology (1), Trusted Information (2), Privacy Protection (1).
- ▶ **Societal Challenges:** 1 fellowship: Learning and Education.



## Overview of the Open Call #7

The seventh StandICT.eu 2023 Open Call was launched on the 5<sup>th</sup> of May 2022 and closed on the 6<sup>th</sup> of July 2022. The StandICT.eu Open Calls target European ICT standardisation experts contributing to the international SDOs, work groups and/or technical committees at any of the priority topics, as taken from the Rolling Plan for ICT Standardisation.

This Open Call identified “*Artificial Intelligence, Data and Robotics*” as its leading theme: the development of open technical specifications and standards that aim to represent European values and ethics, strengthen the take-up, scalability cross-border and cross-sector interoperability of their technological solutions, as well as decreasing the costs of technical due diligence on the private and public procurers. The European Commission effort and investment on AI, Data and Robotics aims at using Industrial Data and responsible and trustworthy Industrial AI to open opportunities for Europe to strengthen its position. Europe can play the pacemaker role because particularly in Europe the required domain know-how is available, and it can rely on a powerful ecosystem of SMEs, big companies, research and technology institutes, and renowned experts. The Open Call was, however, completely open for applications tackling a broad range of ICT domains (as encompassed in the ICT Rolling Plan for Standardisation) and treated as equally valid.

## Fellowship Profiles

This seventh Open Call totalled 79 eligible applications received out of which 43 were selected for funding, with an overall 380,000 Euro granted.

Once more, this open call confirmed the excellent high quality of most of the submitted pro-posals, marking a noticeably high average quality score (the minimum threshold to access funding was 6,90 score in a 1 to 10 scoring scale). The funded applications provided an

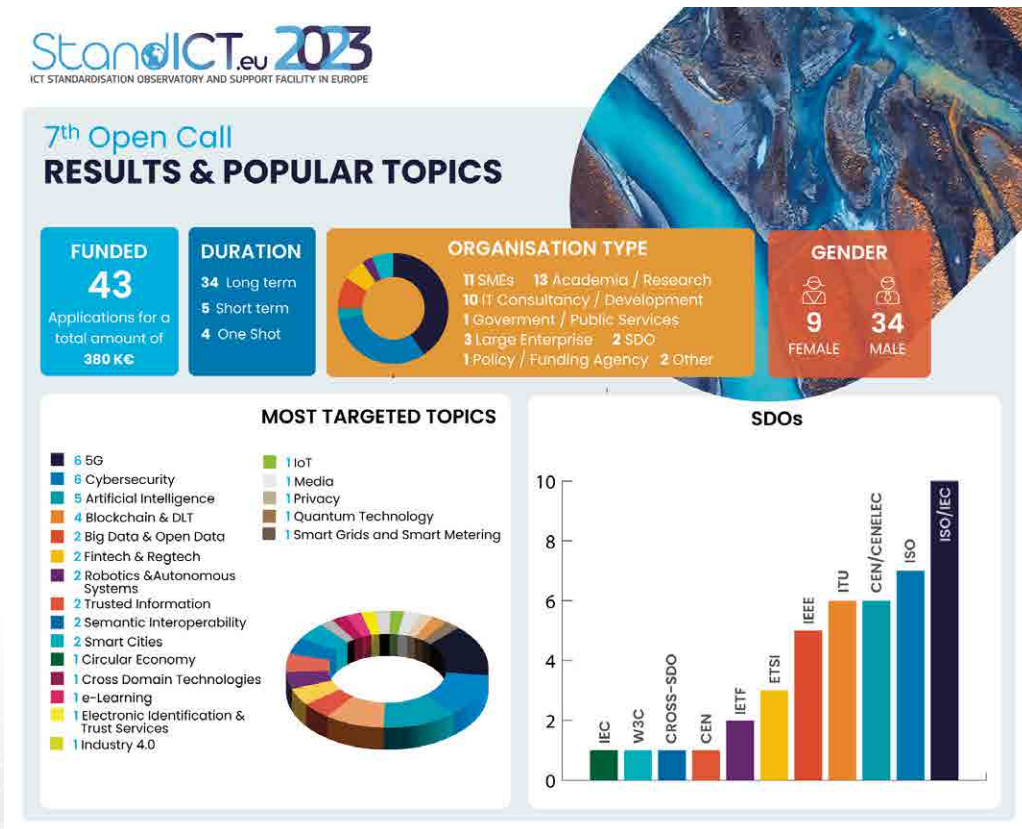


Figure 1 - StandICT.eu 2023 OC#7 Results snapshot

extensive geographical coverage with 17 different EU or associated countries represented with a satisfying balance across the key technologies, and with a wide spectrum of SDOs that will benefit of the competence and expertise of the applicants.

As outlined in Figure 1, major part of the submitted applications and granted fellows has chosen their focus in Key Enablers and Security, in trending areas as Cybersecurity, Artificial Intelligence, 5G and Blockchain. It is worth pointing out that 9 fellowships tackled the open call's focus topics of AI, Data and Robotics.

## Engaged SDOs, Organisations and European Projects

72% of the fellows' activity contribute to the activities of Committees or Working Groups operating in global SDOs, namely in ISO, IEC, ISO/IEC, ITU, IEEE, IETF, while the remainder works with European Standardisation Organisations (ESOs), namely in ETSI, CEN, CEN/CENELEC, and other groups/initiatives engaged in standardisation (notably NIST, OCG and EITCI). One of the most evident benefits that SDOs can take advantage of is the wide and solid know-how of the funded experts that can be instrumental to achieve a better understanding of standards (and their underlying design), trade-off and compromising during the development process, and the operating conditions and environments they are intended to serve. Moreover, SDOs can leverage the expertise of the fellows in view of building consensus within key areas of technology.

Finally, 24 European funded research projects (see Table 1) are strictly related to the engaged work in the OC#7 fellowships, with a focus on different horizontal and vertical technologies.

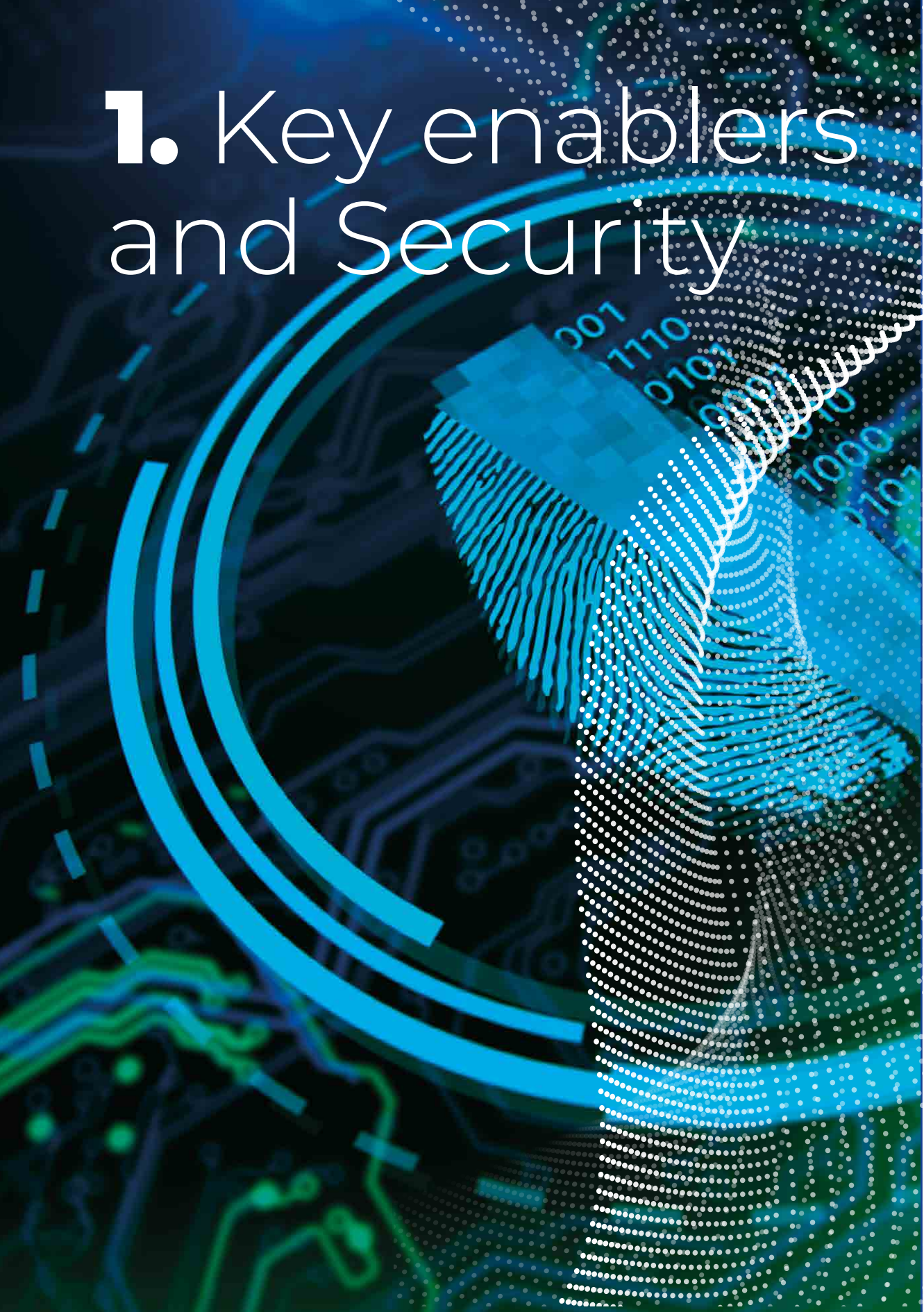
Table 1. Projects related to OC7 Fellowships

Project	Grant Programme	Thematic	Hyperlink	OC#7 Fellow
<b>NIOVE</b>	Horizon2020	Cybersecurity	<a href="https://cordis.europa.eu/project/id/833742">cordis.europa.eu/project/id/833742</a>	Antonio Jara
<b>i3Market</b>	H2020	Big Data	<a href="https://cordis.europa.eu/project/id/871754">cordis.europa.eu/project/id/871754</a>	
<b>Ideal Cities</b>	H2020	Smart Cities	<a href="https://cordis.europa.eu/project/id/778229/reporting">cordis.europa.eu/project/id/778229/reporting</a>	Marios Angelopoulos
<b>RIM</b>	NGI Pointer	Network infrastructure	<a href="http://www.ngi.eu/funded_solution/ngi-pointer-project-17/">www.ngi.eu/funded_solution/ngi-pointer-project-17/</a>	Marcelo Bagnulo
<b>ARETE</b>	H2020	Augmented learning	<a href="https://cordis.europa.eu/project/id/856533">cordis.europa.eu/project/id/856533</a>	Eleni Mangina
<b>MARVEL</b>	H2020	Smart Cities	<a href="https://cordis.europa.eu/project/id/957337">cordis.europa.eu/project/id/957337</a>	Theofanis Raptis
<b>MARSAL</b>	H2020	5G	<a href="http://www.marsalproject.eu">www.marsalproject.eu</a>	Adam Flizikowski
<b>TeamUp5G</b>	MSCA ITN	5G	<a href="http://teamup5g.webs.tsc.uc3m.es/">teamup5g.webs.tsc.uc3m.es/</a>	
<b>BRAINE</b>	ECSEL JU	5G	<a href="http://www.kdt-ju.europa.eu/projects/braine">www.kdt-ju.europa.eu/projects/braine</a>	

Project	Grant Programme	Thematic	Hyperlink	OC#7 Fellow
<b>STARLIGHT</b>	H2020	AI	<a href="https://cordis.europa.eu/project/id/101021797">cordis.europa.eu/project/id/101021797</a>	Vivian Bonde
<b>ACCRA</b>	H2020	Robotics	<a href="http://www.accra-project.org/">www.accra-project.org/</a>	Amelie Gyrard
<b>ActiVas</b>	FEDER	eHealth	<a href="https://en.caritascoimbra.pt/project/activas/">en.caritascoimbra.pt/project/activas/</a>	Joao Leitão Quintas
<b>ORACIA</b>	AAL	eHealth	<a href="http://www.aal-eu-rope.eu/projects/oracia/">www.aal-eu-rope.eu/projects/oracia/</a>	
<b>VITAL-5G</b>	H2020	5G	<a href="http://www.vital5g.eu/">www.vital5g.eu/</a>	Alexdanru Vulpe
<b>FOR-FREIGHT</b>	Horizon Europe	Cross-domain technologies	<a href="https://cordis.europa.eu/project/id/101069731">cordis.europa.eu/project/id/101069731</a>	
<b>InterConnect</b>	H2020	Smart Grid	<a href="http://interconnectproject.eu/">interconnectproject.eu/</a>	Antonio Kung , Olivier Genest
<b>GIFT</b>	H2020	Smart Grid	<a href="https://cordis.europa.eu/project/id/824410">cordis.europa.eu/project/id/824410</a>	Olivier Genest
<b>SENDER</b>	H2020	Smart Grid	<a href="https://cordis.europa.eu/project/id/957755">cordis.europa.eu/project/id/957755</a>	
<b>MAESHA</b>	H2020	Smart Grid	<a href="http://www.maesha.eu/">www.maesha.eu/</a>	
<b>ENERGICA</b>	H2020	Smart Grid	<a href="http://energica-h2020.eu">http://energica-h2020.eu</a>	
<b>ENERSHARE</b>	HEurope	Smart Grid	<a href="http://enershare.eu/about/">enershare.eu/about/</a>	
<b>IntNET</b>	HEurope	Smart Grid	<a href="https://cordis.europa.eu/project/id/101070086">cordis.europa.eu/project/id/101070086</a>	
<b>SCALE</b>	HEurope	Smart Grid	<a href="http://scale-horizon.eu/">scale-horizon.eu/</a>	

Now, we are delighted to share with you the insights from our granted fellows' work – and we truly hope that these results encourage you to follow even more closely all activities that the StandICT.eu 2023 initiative leads in the Fellowship Programme but also on the European Observatory for ICT Standards (EUOS, [www.standict.eu/euos](http://www.standict.eu/euos)) - via the Technical Working Groups (TWGs) delivering up-to-date landscape and gap analysis ([www.standict.eu/landscape-analysis-reports](http://www.standict.eu/landscape-analysis-reports)), Standards Academy (<https://www.standict.eu/index.php/euos-academy>) and policy recommendations to help shape together and reinforce the European and international ICT standardisation arena.

# 1. Key enablers and Security



# AI Standardization Roadmapping



**Patrick Bezombes**  
*Independent Expert*  
France

## Sector

Artificial Intelligence  
Long Term Fellowship Engaged SDOs, WGs and TCs



CEN-CENELEC/JTC 21/WG 1 Strategic Advisory Group  
ISO-IEC/SC 42/AG 3 AI standardisation road mapping

## Role

Convenor of the CEN-CENELEC JTC 21/WG 1 and convenor of the ISO-IEC/AG 3 (both groups covering AI standardisation road mapping)

## Addressed EU standardisation priorities and gaps

My fellowship tackles specific priorities for each work group; on the SC 42 side: Conformity assessment schemes and accreditation schemes have been discussed within AG 3 and presented to SC 42. A list of potential activities has been identified, with one project already being initiated within SC 42 regarding the “competencies of bodies providing auditing and certification of AI management systems”. Here, also AI environmental sustainability is in the focus. On the JTC 21 side, the priority is on new items in support of the AI Act, essentially related to AI trustworthiness characterisation and the AI risk catalogue.

## Concerned ICT standards and contribution to the related landscape

I have developed an SC 42 standardisation landscape framework that will also serve JTC 21. The landscape framework (categorisation matrix) has been approved by SC 42/AG 3 and presented at the October SC 42 plenary. After being approved, the framework has been filled with more than 150 standards from ISO-IEC SC 42, SC 27, CEN-CENELEC JTC 21, IEEE, SAE/ EUROCAE. The landscape will be updated regularly (the target is twice a year).

The AI standardisation landscape will be distributed to National bodies for review in early 2023. Based on this standardisation landscape, a work programme has been established by JTC 21/WG 1 to support the future standardisation request coming from the European Commission. Two critical projects have been identified on “AI trustworthiness characterisation” and “AI risk catalogue”.

In addition, in the framework of the TTC (Trade and Technology Council) between the US and the EU, I have been contributing to the AI standardisation roadmap that should pave the way for new standards. Furthermore, SC 42/AG 3 has initiated a work item on “AI environmental sustainability” and also initiated works within SC 42/WGs regarding “conformity assessment” and “accreditation schemes”. Impact (on European SMEs, related projects or in society)

## Impact (on European SMEs, related projects or in society)

### Impact on Society

Collaboration with IEEE (to fill the AI standardisation landscape) and with DKE to prepare a future standard supporting a European AI trustworthiness label. It is expected that, in the follow-up of the collaboration with IEEE, IEEE will actively contribute to the writing of a standard on “AI trustworthiness characterisation”. This standard aims at being a harmonised

standard in support of the AI Act. This way, my work supports AI trustworthiness characteristics such as robustness, human oversight, and transparency (all those are requirements from the AI Act)

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, I have contributed to the proposal to revise ISO/IEC 22989 (AI terminology and concept).

### Have the standardisation activities in your project led to specific deliverables?

Yes, I have contributed to a technical report on developing a new standard.

### What future efforts or activities are still necessary for your area of application?

I would recommend having additional EU experts to better support the EU position. As the standardisation request in support of the AI Act is expected for February 2023, additional EU experts are needed to ensure that EU specificities and interests will be taken into account.

### Online references related to the fellowship work

 [www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/](http://www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/)

 [www.iso.org/committee/6794475.html](http://www.iso.org/committee/6794475.html)

# Coordination of Belgian contributions towards drafting of harmonised ENs required by the AI Act



## **Francisco Medeiros-Filho**

*Independent expert, FM Tech Consult BV  
Belgium*

### Sector

Artificial Intelligence  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO/IEC JTC1/SC42 WG1 Foundational standards  
ISO/IEC JTC1/SC42 WG3 Trustworthiness  
CEN/CENELEC JTC21 WG1 Strategic Advisory Group

### Role

Vice Convenor JTC21 WG1 Strategic Advisory Group; Chair of Belgian AI Mirror Committee  
Head of the Belgian delegation to ISO/IEC JTC1/SC42 and CEN/CENELEC JTC21

## Addressed EU standardisation priorities and gaps

There is still a pressing need to continue the coordination and provide guidance to strengthen the Belgian influence on AI standardisation at European and international level. From a strategic point of view, it is also important to train and transfer knowledge to a younger generation of standardisation practitioners, especially in relation to the drafting of harmonised standards (hENs).

CEN/CENELEC JTC21 is under strong pressure to emulate the ISO/IEC JTC1/SC42 structure and adopt most SC42 standards. There is a knowledge gap to be bridged between AI standardisation at the international level (ISO/IEC) and at the European level. The challenge from a European perspective is to counteract the US and China's massive efforts in AI standardisation. In this context, I believe that JTC21 should act as a catalyst for greater European influence at ISO/IEC level.

## Concerned ICT standards and contribution to the related landscape

With this fellowship, I coordinate and guide the participation of the Belgian delegation, on behalf of the Belgian national standardisation body (NBN) at the European and international levels in relation to AI standardisation in the context of ISO/IEC JTC1/SC42 and CEN/CENELEC JTC21. Relevant standards are

- ▷ ISO/IEC 42001 (CD Stage) "Information technology - Artificial intelligence - Management system"
- ▷ ISO/IEC DIS 22989 "Information technology - Artificial intelligence - Artificial intelligence concepts and terminology"
- ▷ ISO/IEC DIS 23053 "Framework for AI Systems using Machine Learning"

Also, I continue my main involvement as Vice-Convenor of JTC21 Strategic Advisory Group (SAG).

## Impact (on European SMEs, related projects or in society)

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### Impact on SMEs

Compliance with harmonised European standards (hENs) are a means for providers of AI systems to demonstrate conformity with the requirements of the proposed European AI Act. The standardisation work by CEN/CENELEC JTC21 will have a direct impact on the industry, especially on SMEs. Standards will be 'mandated' (via formal standardisation requests) by the European Commission. The contribution of the Belgium delegation in JTC21 is fundamental for the development of such harmonised standards (hENs). This work started in January 2023 and will continue the end of 2024.

### Impact on Society

I have supported stronger involvement of civil society organizations (CSOs) and fundamental rights experts in the context of JTC21 and JTC21 WG1 as encouraged by the EC standardisation request.

Furthermore, Recital 61 of the proposed AI Regulation of 21 April 2021 states that "standardisation should play a key role to provide technical solutions to providers to ensure compliance with the AI Regulation. Compliance with harmonized standards should be a means for providers of AI systems to demonstrate conformity with the requirements of the AI Regulation". Therefore, the standardisation work being carried out by CEN/CENELEC JTC21 is bound to have a direct impact on the industry, especially on SMEs.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, it has contributed to the adoption by CEN/CENELEC of ISO/IEC 22989 "Information technology - Artificial intelligence concepts and terminology" and ISO/IEC 23053 "Framework for AI Systems using Machine Learning". Furthermore, launch of several 'parallel development' of standards in ISO/IEC SC42 and CEN/CLC JTC21.

## Have the standardisation activities in your project led to specific deliverables?

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No.

## What future efforts or activities are still necessary for your area of application?

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Harmonized European standards (hENs) need to be developed as the result of EC standardisation requests. These will be used by stakeholders to demonstrate compliance with the requirements of the forthcoming AI Act. Considering that negotiations on the AI Act at Council and European Parliament are expected to be concluded by the end of 2023, the relevant hENs must be finalized and approved by the end of 2024. Until then, standardisation actions must continue.

## Online references related to the fellowship work

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 [www.iso.org/committee/6794475.html](http://www.iso.org/committee/6794475.html)

 [www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/](http://www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/)



# Project Editor ISO/IEC JTC 1 SC42 - Strategies for Mitigating Ethical and Societal Concerns



**Viveka Bonde**  
*Independent expert*  
Sweden

## Sector

Artificial Intelligence  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO/IEC JTC 1 SC 42 – Artificial Intelligence, all WGs, in particular WG 3 (Trustworthiness)  
CEN-CLC/JTC 21 – Artificial Intelligence  
National Body, Swedish Institute for Standards: Information Technology (TK 611)

## Role

Project Editor ISO/IEC JTC 1 SC42 WG3 - Strategies for mitigating ethical and societal concerns (NP)  
Project Editor TR 24368:2022 Artificial Intelligence – Overview of ethical and societal concerns  
Swedish Institute for Standards: Head of Technical Committee 611 (Information Technology)

## Addressed EU standardisation priorities and gaps

I aim to provide additional practices, guidance, and information, for identifying, analyzing, evaluating and treating ethical and societal risks of AI.

With this fellowship, the purpose is to help organizations to deal with ethical and societal risks when developing, producing, deploying, or using AI. This will help organizations to comply with new and emerging regulatory efforts to achieve trustworthy AI.

### Concerned ICT standards and contribution to the related landscape

This fellowship focuses on the following standards:

- ▶ ISO 26000 – Social responsibility
- ▶ ISO/IEC 22989:2022 – AI concepts and terminology
- ▶ ISO/IEC TR 24368:2022 – Overview of ethical and societal concerns
- ▶ ISO/IEC 31000 – Risk management - guidelines
- ▶ ISO/IEC DIS 42001 – AI - Management system [AIMS]
- ▶ ISO/IEC AWI 42005 – AI system impact assessment
- ▶ ISO/IEC 23894:2023 – AI - Guidance on risk management
- ▶ ISO/IEC 37000 – Governance of organizations - guidance
- ▶ ISO/IEC 38507:2022 – Governance implications of the use of artificial intelligence by organizations
- ▶ ISO Guide 82: 2019 – Guidelines for addressing sustainability in standards
- ▶ ISO/IEC/IEEE 24748-7000:2022 – Systems and software engineering – life cycle management – Part 7000: Standard model process for addressing ethical concerns – during system design

In addition, other relevant documents will be identified.

## Impact (on European SMEs, related projects or in society)

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### **Impact on SMEs**

The NP on 'Strategies for Mitigating Ethical and Societal Concerns' is suggested applicable to any organization, regardless of size, type, and nature. Notwithstanding, it is of particular importance to SMEs, with more limited resources, to have access to practices and guidelines when developing, providing or using systems, products, and services that utilize AI. For instance, this will be important in relation to the future European AI Act.

### **Impact on Society**

To address a broad range of risks affecting AI-subjects and the protection of fundamental rights. The aim is to provide practical, action-guiding methods and tools rather than general considerations, available for all AI-subjects and the society at large.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes. An international standard (IS) is proposed.

## Have the standardisation activities in your project led to specific deliverables?

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Yes. Prior to the current NP project, TR 24368:2022 was published in 2022, which emphasized the need for an inclusive, interdisciplinary, diverse, and cross-sectoral approach, in addressing ethical and societal concerns of AI.

In TR 24368:2022, it was further described that AI designers, developers, deployers and users can benefit from flexible input on ethical frameworks, AI principles, tools and methods for risk mitigation, evaluation of ethical factors, best practices for testing, impact assessment and ethics reviews.

## What future efforts or activities are still necessary for your area of application?

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In terms of ethical and societal risks and concerns of AI, to further explore the synergies between ISO ISO/IEC JTC 1 SC42 WG3 and CEN-CLC/JTC 21. It would be highly beneficial.

## Online references related to the fellowship work

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 [www.iso.org/committee/6794475.html](http://www.iso.org/committee/6794475.html)

# DTechMC – Phase III: Pilot test and Requirements for a Digital Technologies Management Container Std



## **Luis Moran Abad**

*ICT Senior Advisor, Independent Expert  
Spain*

### Sector

Fintech and Regtech  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO/IEC “ISO/IEC JTC 1 – Information Technology  
UNE CTN71 – Tecnología habilitadoras para la transformación digital  
SC40 – Subcommittee for ICT Governance and Management

## Role

Convener of the Spanish UNE CTN71/SC40 subcommittee for ICT Governance and Management

Moderator of the working group WG4 (UNE CTN71/SC40) “GT 4 Adopción e integración de sistemas de gestión, marcos y buenas prácticas”

## Addressed EU standardisation priorities and gaps

This fellowship tackles seven specific challenges with proposed results in each:

- ▶ Two separated worlds ISO and non-ISO management standards. Results: This fellowship address this gap.
- ▶ Select a scenario for a pilot experience that fits with the reduced schedule of the initiative. Results: Two pilot scenarios had been used: ICT Fintech for a governance model adoption and ICT University for RPA (Robotic Process Automation) projects organisation.
- ▶ The pilot experience shall validate de applicability of the results of the Phase II of this initiative. Results: The adoption-integration model defined in Phase II had been modified including the “engine to best-practices adoption” (BPAe), it is a specific variant of a Management System Standard (MSS) for Accredited Knowledge adoption.
- ▶ Understand the applicability of the adoption-integration model defined in this initiative Phase II Technical Specification, via a pilot experience. Results: The defined adoption-integration model or BPA engine showed its usability in the two pilot scenarios.
- ▶ Develop ways of easy understanding and use of this adoption-integration model defined. Results: In order to better understanding of the adoption-integration model it had been renamed to a “best-practices adoption engine”.
- ▶ Based on the Pilot experience, review and update the adoption-integration model defined. Results: The adoption-integration model defined in Phase II had been evolved, differencing between Program management and the launch of different Projects.
- ▶ Based on the results of Phase I (state-of-the-art in adoption), Phase II (work model proposed) and Phase III (Pilot experience), create a proposal of Requirements.

Results: A document for a Management System Standard requirements had been done aligned with ISO Annex SL. This is a proposal that will be submitted to a Spanish SDO.

## Concerned ICT standards and contribution to the related landscape

My fellowship is framed within the scope of the ISO / IEC JTC 1 Information Technology committee, it will provide companies with the ability to integrate business, technical and management standards, as well as existing knowledge on the market in the format of knowledge frameworks and best practices. My activity will allow Europe to produce a standard series whose mission is to integrate the main technical, business model and management trends. Therefore, digital disruption plays a key role, in providing an inclusive and elastic work structure.

Having a standard that allows this integration between business, technology, and management, reinforces ISO / IEC's position in promoting digitising technologies and economic transformation. This proposed standard is applicable to all types of businesses and technologies. It can be applied to specific areas within an ICT department, to business lines or to new businesses based on digitising technology.

In addition, these standard series define a new concept “engine to best-practices adoption” (BPAe), it is a specific variant of a Management System Standard (MSS) focussed on continuous ICT management improvement implementing marker consolidated best practices.

This “BPA engine” MSS could be used in FinTech companies, but also to help companies to transform into Digital and Green in ICT areas, and Business areas too.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

The industry or the Market has generated worldwide a multitude of accredited knowledge (best-practices), but SMEs are not able to take advantage of all this knowledge due to the difficulty involved in understanding it, and especially applying it. The newly defined best-practices adoption engine will help SMEs improve their management model to support their digitalisation and green transformation.

### Impact on Society

The overall objective is to create an international standard that facilitates the adoption of all types of best practices by ICT organisations, based on ISO/IEC management system standards. Whereas, the specific objective of this Phase-III is to validate the model for the adoption or implementation of standards and best practices by organisations, checking that the model should be simple and scalable. Thus, one of the first discoveries or Epiphanies of this Phase-III is the use of a template that guides managers to follow the model.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, this fellowship is strongly related to previous phases of this project (that were funded under the previous StandICT.eu 2023 open calls):

- ▶ Phase I (ID 02-279) state-of-the-art report: Spanish UNE 71401IN:2022 Technical Report Standard
- ▶ Phase II (ID 04-459) adoption model: Will propose a new Spanish UNE standard of Technical Specification

And, now, the current Phase III (ID 07-681) pilot experience and requirement management system standard proposal for a national standard: in this fellowship, I will propose a new Spanish UNE standard of Requirements for a best-practices continuous adoption management system.

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have drafted technical specifications.

## What future efforts or activities are still necessary for your area of application?

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I plan to continue the engaged work beyond this fellowship. The next and final Phase IV will address the proposal of a new international ISO/IEC standard under JTC 1/SC 40 "ICT Governance and Management". Next Phase IV was presented to StandICT.eu 2023 #9 Open Call.

## Online references related to the fellowship work

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 [www.iso.org/committee/45020.html](http://www.iso.org/committee/45020.html)

 [www.une.org/encuentra-tu-norma/comites-tecnicos-de-normalizacion/comite?c=CTN+71](http://www.une.org/encuentra-tu-norma/comites-tecnicos-de-normalizacion/comite?c=CTN+71)

# Development of the European Standard Guidelines on Sectoral Cybersecurity Assessment



**Elzbieta Andrukiewicz**

*Project Leader, National Institute of Telecommunications  
Poland*

## Sector

Cybersecurity  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



**CEN/CLC/JTC13 Cybersecurity and data protection WG3 Security and evaluation assessment**

## Role

My specific contribution regarding the project is to perform the editor works in CEN/CLC/JTC13 WG3. In parallel, I am convenor of the ISO/IEC JTC1/SC27 AG3 Advisory Group on Concepts and Terminology

## Addressed EU standardisation priorities and gaps

This fellowship focuses on the European Standard named “Guidelines on Sectoral Cybersecurity Assessment” that is under development. The objective is to provide a consistent methodology for assessing cybersecurity requirements based on the risk of the intended use of the object of evaluation/certification. Appropriate security objectives and security requirements that reflects levels of risk can be formulated and implemented. Further, a unified method of defining assurance requirements based on the concept of attack potential is provided.

## Concerned ICT standards and contribution to the related landscape

The objective of providing assurance in the cybersecurity certification scheme that is compliant with the Cybersecurity Akt (CSA) is to give confidence to the market that the object under certification fulfils security requirements. Further, the correctness and sufficiency of the implementation have been evaluated by a competent and impartial conformity assessment body, that is independent of vendors, service providers and risk owners.

A direct comparison between assurance levels offered by certification schemes is difficult or even impossible for two reasons:

- ▷ sectoral schemes (e.g., EU5G, EUCS) typically need to employ a variety of certification tools which specifically support the different types of ICT products, services or processes
- ▷ different evaluation methods apply different concepts of assurance.

With this work, achieving consistency of assurance offered by cybersecurity certification schemes allows re-using of certificates across applications and sectors. That will result in a limitation of efforts spent on certifications in terms of time and resources. A direct benefit from the standardisation efforts in this area could facilitate the implementation of various cybersecurity certification schemes under the CSA framework.

## Impact (on European SMEs, related projects or in society)

### Impact on Society

The CSA facilitates the use of certification as a powerful cybersecurity measure that can be implemented without additional burdens among Member States. Typically, in the past, the product or service had been certified, and then again, it was subject to a similar certification procedure if specific requirements regarding certification took place in each country. Once the European Cybersecurity Certification scheme enters effect (based on the relevant Implementing Act), all certificates, issued under such scheme, will be recognised by law in every Member State.

The landscape the CSA deals with encompasses schemes that are currently in operation e.g., SOG-IS MRA consists of several national cybersecurity certification schemes providing certificates in compliance with Common Criteria, or a set of schemes dedicated to the telecommunication market, and offered by the GSMA, and new potential candidate schemes for key industry verticals such as IoT, cloud, communications, payments, automotive, and more.

This fellowship project could facilitate coordinated and consistent implementations of different cybersecurity certification schemes that operate under the CSA framework. Specifically, it relates to a common understanding and implementation of the assurance requirements across different schemes based on a common reference model proposed in the standard. In that way cost- and time-effective implementations would be possible in the future. The societal impact measured by increasing confidence in the certification as a powerful cybersecurity tool would be real.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, it is expected to develop a European Standard.

### Have the standardisation activities in your project led to specific deliverables?

Yes, I am the editor of the resulting report, and my work consists of:

- ▶ gathering and ordering comments submitted by experts,
- ▶ preparing initial dispositions of comments ready for discussion at the editing meeting,
- ▶ conducting the editing meeting aimed at resolving all outstanding comments, possibly by consensus in the group,
- ▶ preparing the draft based on the agreed output from the editing meeting.

### What future efforts or activities are still necessary for your area of application?

This project shows a growing level of maturity. Thanks to this fellowship, my involvement in developing the standard measured by the number of contributions and a number of contributing individuals are significant, and it is expected to have contributions from experts to the next working draft.

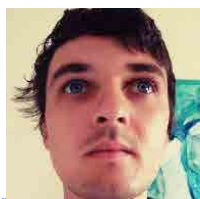
### Online references related to the fellowship work

<https://eucyberact.org/session/european-standardization-in-support-of-consistent-definition-of-cybersecurity-certification-schemes-b22c/>

[www.iso.org/committee/45306.html](http://www.iso.org/committee/45306.html)

[www.cencenelec.eu/areas-of-work/cenelec-sectors/digital-society-cenelec/cybersecurity-and-data-protection/](http://www.cencenelec.eu/areas-of-work/cenelec-sectors/digital-society-cenelec/cybersecurity-and-data-protection/)

# Cadzow Communications Request for Travel support for ETSI September Meetings



## **Alex Cadzow**

*Senior Cybersecurity and Human Factors Researcher, Cadzow Communications Consulting Ltd.*

*United Kingdom*

## Sector

Cybersecurity

One Shot Fellowship

## Engaged SDOs, WGs and TCs



ETSI TC Cyber Cybersecurity  
ETSI TC QSC Quantum-Safe Cryptography  
ETSI ISG SAI Securing Artificial Intelligence

## Role

The Secretary of ETSI ISG SAI

## Addressed EU standardisation priorities and gaps

The work items (WI) C3L are rapporteur each aim to address different gaps or development activity depending on their target area. The ISG SAI are 'Explicability and transparency of AI processing' WI intent is to extend from the published work of SAI to address the issues of design of AI platforms (data, algorithms, frameworks) that can give assurance of explicability and transparency of decisions. For WIs in Cyber' Identity Management and Discovery for IoT' describes a model of identity management applicable to IoT devices. It does not define or make recommendations about policies for users or devices with regards to in revealing identity information or accepting or rejecting discovery based on this information. The Cyber WI' Methods and Protocols for Security Part 1: TVRA' is an update to extend the text regarding the role of AI enabled Threat Agents to the analysis framework. Add text to reinforce that the 10 steps are not directly sequential and to modify/extend the metrics for analysis to better address application to environments such as RED analysis, CSA analysis, and AI analysis by the addition of material in annexes. Also, to remove some of the data models recommended as they are out of date. Along with ensuring collaboration in use cases with CEN-CLC/JTC13 and JTC21 as appropriate. The Cyber WI' Methods and Protocols for Security Part 2: Counter Measures' is an update of TS 102 165-2. It is required to keep abreast of threats and techniques related to security. With alignment to updated TVRA method and take due account of methods applied in emergent domains with removal of focus on deprecated domains. The Cyber WI' Optical Network and Device Security - Catalogue of requirements' defines a catalogue of security requirements to serve as a common technical baseline for optical networks devices and services. The CyberQSC WI' Migration to QSC for ITS' goal is to review and make recommendations on migration strategy for the ITS and C-ITS use cases.

## Concerned ICT standards and contribution to the related landscape

The main objective of this fellowship was to ensure Cadzow Communications (C3L) have travel support for ETSI September Meetings for working groups C3L participate in these are ISG SAI, Cyber QSC and Cyber groups. The reason the request for travel support was made is because while ETSI encourages its members to attend meetings in person it doesn't reimburse travel cost therefore this fellowship is to help cover these travel costs. At these



meetings the work items discussed and worked on with the aim for work items which are considered stable drafts to be moved ahead for publication by ETSI. The work items (WI) C3L are rapporteur for Cyber: Identity Management and Discovery for IoT; Methods and Protocols for Security Part 2: Counter Measures; Optical Network and Device Security - Catalogue of requirements; Methods and Protocols for Security Part 1: TVRA and the Cyber Roadmap. The work item C3L is rapporteur for in CyberQSC is Migration to Quantum Safe Cryptography (QSC) for Intelligent Transport Systems (ITS). The work items C3L are rapporteur for in ISG SAI are Explicability and transparency of AI processing and the ISG SAI Roadmap along with responsibility for the ISG SAI meeting agenda and minutes.

## Impact (on European SMEs, related projects or in society)

### Impact on Society

The new work item for an ETSI guide to address 'Technology enabled coercive control' with to start later this year and publish either late next year or early 2024 will help to provide guidance and advice on mitigating harm from social cybersecurity concerns.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, this fellowship contributes to the new work item for an ETSI guide to address 'Technology enabled coercive control'.

### Have the standardisation activities in your project led to specific deliverables?

Yes, I have contributed to technical specifications.

### What future efforts or activities are still necessary for your area of application?

These is a mixture of current work in progress, work in the publication phase and work which is in the early phase of getting started. One of work items CL3 lead are 'Optical Network and Device Security - Catalogue of requirements' is moving ahead for publication agreed at these meetings.

## Online references related to the fellowship work

 [www.etsi.org/technologies/quantum-safe-cryptography](http://www.etsi.org/technologies/quantum-safe-cryptography)

 [www.etsi.org/committee/cyber](http://www.etsi.org/committee/cyber)

 [www.etsi.org/technologies/securing-artificial-intelligence](http://www.etsi.org/technologies/securing-artificial-intelligence)

# Trusted Cyber Threat Intelligence-Sharing framework “Trusted CTI-Sharing” - P1 State of art



## **David Montero**

*Editor & Independent expert,  
Spain*

### Sector

Cybersecurity  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



UNE CTN320/SC4 Cybersecurity and personal data protection  
ISO/IEC JTC1/SC 27 Information security, cybersecurity and privacy  
protection  
/WG4 Security controls and services

## Role

Chairman of UNE CTN320/SC4, mirror subcommittee in Spain to ISO JTC1/SC27/WG4.

## Addressed EU standardisation priorities and gaps

My fellowship contributes to the development of the standard that is oriented towards the field of cybersecurity, specifically Cyber Threat Intelligence. From the point of view of the gap that currently exists in the related regulations, different working documents and very specific guidelines have been generated in Europe oriented towards the technical aspects of cyber threat intelligence, for example, the definition of the different intelligence sharing formats, but in no case, at a global level, has it been defined how this cyber threat intelligence should be shared and managed. This standard aims to address this current gap and improve interoperability in cyber threat intelligence (CTI) sharing between public and private companies; finally, it aims to provide better security alert management capabilities, using meta-alerts, alerts that summarise many threats and incidents in order to understand the overall threat landscape, provide better context awareness and improve existing cyber threat intelligence sharing capabilities through automation, while remaining GDPR compliant.

## Concerned ICT standards and contribution to the related landscape

I focus on the development of this standard based on a Threat Intelligence Sharing Management System, which will cover a very relevant regulatory niche that will have an impact on normalizing threat intelligence exchange communities and ecosystems.

## Impact (on European SMEs, related projects or in society)

### **Impact on SMEs**

Currently, the exchange of threat intelligence is focused on large companies, with a relevant growth of small and medium-sized companies in the intelligence sharing communities. For this reason, the new regulations intend to have an impact on this business segment.

### **Impact on Society**

The generation of a standard that supports a management system for the exchange will have a very important social impact on the global and local communities and ecosystems for the exchange of threat intelligence, normalizing the management and government of these communities.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, the first phase of the standardisation project that has just ended addresses the requirements, requirements and needs for the development of new regulations on the sharing of threat intelligence.

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have contributed to technical reports on development of a new standard and on common terminology.

## What future efforts or activities are still necessary for your area of application?

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The preliminary study based on the generation of the State of the Art in terms of threat intelligence exchange has shown gaps and unmet needs in the communities and ecosystems dedicated to intelligence exchange. The generation of regulations that cover these needs will make it possible to generate trust and massively facilitate the incorporation of entities into this type of community.

## Online references related to the fellowship work

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 [www.iso.org/committee/45306.html](http://www.iso.org/committee/45306.html)

# Key Management and Public-key infrastructure: Establishment and maintenance



## **Erik Andersen**

*Contributor and project editor, Andersen L-Service  
Denmark*

## Sector

Cybersecurity  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO/IEC ISO/IEC JTC 1/SC 27 WG 2 Cryptography and security mechanisms

## Role

Independent Expert, Andersen L-Service.

## Addressed EU standardisation priorities and gaps

The section on cryptographic algorithms describe how they are deployed for generating and verifying digital signatures, generation of symmetric keys for encryption. How different cryptographic algorithms relate to each other with respect to strength, performance and implementation effort are important when designing or acquiring ICT products. Today many of those aspects are described in many different special specifications. A single specification covering a large area with references to specific details specification is missing. The new standard is intended to fill that gap.

## Concerned ICT standards and contribution to the related landscape

My fellowship tackles to important standards: Rec. ITU-T X.509 | ISO/IEC 9594-8 (X.509) and Rec. ITU-T X.510 | ISO/IEC 9594-11 (X.510). I am the project editor both within ITU-T and ISO/IEC. X.509 is mostly concerned with system protection while X.510 is concerned with protection of the communication between systems.

The standard that is subject for the fellowship is suggested to be published as Rec. ITU-T X.508 | ISO/IEC 9594-12 with the title “Key management and public-key infrastructure establishment and maintenance”. It is intended to supplement the above-mentioned standards and together with them form a trilogy that will cover a wide range of security functions.

The standard under development has two major sections:

- ▶ One section gives a detailed descriptions of cryptographic algorithms and the mathematics behind.
- ▶ The other section gives guidance and best practices for establishing and maintaining a public-key infrastructure (PKI).

## Impact (on European SMEs, related projects or in society)

### **Impact on Society**

As digitisation increases within Europe, focus on cyber security becomes increasingly important. The new International Standard proposed here is intended to cover the gap between X.509 and X.510 and together with these two standards have an increased impact on cyber security.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, I am the project editor of two new standards mentioned here above.

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I am managing a technical report on a development of a new standard.

## What future efforts or activities are still necessary for your area of application?

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The generation of comments on the DIS must continue. After closing of ballot, the ballot resolution will take place. The documented will have to go through final editing to be ready for approval (consent) at the fall ITU-T Study Group 17 meeting.

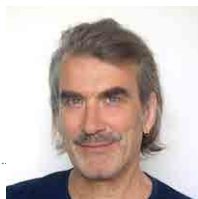
However, it would be useful if more people from the academic community would join. However, developers of standards are anonymous, so academic people prefer to write articles in recognised magazines, which can be referenced in their CV, helping their career. There is very little credit in standard participation, which is a meaningful problem while trying to get more EU experts engaged in standardisation.

## Online references related to the fellowship work

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 [www.iso.org/committee/45306.html](http://www.iso.org/committee/45306.html)

# Coordination of Background-Documents for the Security Evaluation of QKD Products



**Thomas Länger**  
*ID Quantique Europe GmbH*  
*Austria*

## Sector

Cybersecurity  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



CEN/CENELEC Focus Group Quantum Technologies (FGQT)

## Role

Editor of CEN-CENELEC Quantum Technologies Standardisation Roadmap

## Addressed EU standardisation priorities and gaps

With this fellowship, I focus on the Standardisation related to QKD security evaluation and certification, and especially on the practical application of the recently published standards in ETSI and ISO/IEC. It addresses a gap that was recently materialised, which is the evaluation and certification of an actual product requires “background documents” (BGDs), especially where cryptographic protocols and algorithms need to be specified, and in the specification of the quantum optical subsystem. These specification needs to reference widely accepted and recognised external documents, in the ideal case standards. My work contributes to identifying such missing standards and supporting that they are being established in a coordinated way. My thesis is that the CEN/CENELEC FGQT, and especially also its successor, the CEN/CENELEC JTC 22 QT, which has recently been agreed upon (and will be kicked off in March 2023) is a suitable place for such a coordination.

## Concerned ICT standards and contribution to the related landscape

This fellowship supports my work in the CEN/CENELEC Focus group for Quantum Technologies FGQT, where I am co-editor of its Quantum Technologies Standardisation Roadmap. I have been contributing significantly to the Quantum Communication (QKD) section, especially in the important field of QKD security certification standardisation. I was also heavily involved in the recent restructuring of the FGQT roadmap. I contribute the knowledge I have gained in my year-long work in QT standardisation, and the knowledge I am currently gaining through my occupation with QKD standardisation in other SDOs, as well as in my current job, where I am preparing the security certification of an actual QKD link for one of the biggest commercial producers of QKD equipment.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

My contribution in QKD certification supports the SME IdQuantique GmbH based in Vienna, Austria. Also, through my contributions to the FGQT QT Roadmap, I make this knowledge available to many European SMEs working on the development of QKD systems, which will need to be security certified for actual qualified deployment.

### Impact on Society

My work supports the emerging field of quantum technologies—a future key technology for European industries, and hence also with major impact on a future labour market and prosperity generation. Especially quantum communication and secure quantum communication will likely have a great impact in providing new services and securing digital communications of European administration and also of individual citizens.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, I am responsible for the “Quantum Communication/Quantum Key Distribution” part of the CEN/CENELEC FGQT roadmap, and especially also for standards for QKD security evaluation and certification. Here I am recommending already the establishment of several standards that will likely be necessary, and do not yet exist. I am particularly advocating a coordination between different standards developing organisations to avoid inefficiencies and double work.

### Have the standardisation activities in your project led to specific deliverables?

Yes, I have contributed to technical reports.

### What future efforts or activities are still necessary for your area of application?

The “Coordination of Background-Documents for the Security Evaluation of QKD Products” has only just been put on tracks, also with the support of this StandICT.eu 2023 grant. The activities to identify these documents have only begun recently, mainly in the CEN/CENELEC FGQT, as well as in the ETSI ISG-QKD, where I am also participating in an activity supporting that goal, led by the German Bundesamt für Sicherheit in der Informationstechnologie (BSI). I intend to continue the action in the newly founded CEN/CENELEC JTC 22, for which I am very well prepared, also thanks to the support of StandICT.eu 2023.

### Online references related to the fellowship work

[www.itu.int/en/ITU-T/Workshops-and-Seminars/2022/1108/Pages/programme.aspx](http://www.itu.int/en/ITU-T/Workshops-and-Seminars/2022/1108/Pages/programme.aspx)

[www.itu.int/en/ITU-T/Workshops-and-Seminars/2022/1108/Documents/ID%20Quantique%20-%20Thomas%20L%C3%A4nger%20-%20Florian%20Fr%C3%B6wis.pdf](http://www.itu.int/en/ITU-T/Workshops-and-Seminars/2022/1108/Documents/ID%20Quantique%20-%20Thomas%20L%C3%A4nger%20-%20Florian%20Fr%C3%B6wis.pdf)

<https://epjquantumtechnology.springeropen.com/articles/10.1140/epjqt/s40507-022-00150-1>

[www.etsi.org/events/2117-2023-02-9th-etsi-iqc-quantum-safe-cryptography-workshop#pane-2/](http://www.etsi.org/events/2117-2023-02-9th-etsi-iqc-quantum-safe-cryptography-workshop#pane-2/)

# Certification of biometric solutions for remote identification services



## **Raul Sanchez-Reillo**

*Promoter, contributor and editor, Universidad Carlos III de Madrid  
Spain*

### Sector

e-Identification  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



**CEN TC224 WG18 - Interoperability of biometric recorded data**

## Role

Co-convenor CEN TC224 WG20  
Convenor ISO/IEC JTC1/SC17 AG3  
Secretary ISO/IEC JTC1/SC17 WG11 and SC37 WG2

## Addressed EU standardisation priorities and gaps

To achieve a certification scheme, a set of standards and regulations is needed. eIDAS was defined within the EU years back, but unfortunately this has not been widely deployed, and the active solutions are not fully interoperable among each other. This has led to the EU to demand a revision of the whole eIDAS regulation, which is currently under progress (also known as eIDAS2). The work has not been finished yet, but one thing that is clear, is that one mean for authenticating the citizen will be the use of facial recognition using all kind of devices. This falls into the scope of my fellowship.

There have been previous works that could serve as the basis for this, but when coming to the world of biometrics, and in particular face recognition, some important gaps are detected:

- ▶ Current technical standards are typically generic, not going into the specific needs of a certain biometric modality.
- ▶ In international standards (i.e., ISO/IEC), the definition of passing criteria is really challenging, as the impact is worldwide and many local interests do not allow them to be defined.
- ▶ In ETSI TS 119 461, the biometric recognition is defined referring to generic standards, such as ISO/IEC 19795-1/2 and ISO/IEC 30107-3. But those standards do not define neither the specific tests, nor the passing criteria.
- ▶ Industry in the biometric sector is not used to certify their products, but only to carry self-assessments.
- ▶ There is the need to analyse, not only the recognition performance, but also the security and robustness against attacks.
- ▶ The few initiatives currently available for certifying these products, have been developed independently, without considering a potential interoperability.
- ▶ These gaps will be filled in after several years, but this proposed activity will establish the basis and initiating the development of the needed standards.



## Concerned ICT standards and contribution to the related landscape

Standardisation activities, in several sectors, lack participating experts. One of the reasons is the lack of funding by companies and other organizations. Another problem that CEN TC224 WG18 *“Interoperability of biometric recorded data”* lacks applicable specifications, minimizing the diversity of interpretations. Several standards in WG18 have been defined in an abstract way, allowing different implementations. Such a variety does not help Administrations and service providers, in defining their own requirements, neither to select which products may be able to cover those requirements.

Therefore, after several years of progressing work items, it is time that WG18 start the definition of standards and technical specification, that will build clear requirements for both service providers and manufacturers. This will boost the activity in WG18 and will also increase awareness not only by Administrations, but also by industry and integrators, all around Europe.

This activity will not only add value to WG18, but also will provide valuable information to other SDOs, such as ETSI or ISO/IEC JTC1/SC37. And of course, this will be in line to the near future needs of the implementation of the revision of eIDAS (a.k.a. eIDAS2).

My fellowship work helps to improve the visibility of WG18 as well as the consideration of its work into practical products and services. More specifically, I have contributed to submitting the proposal to start several Preliminary Work Items, to define the Conformance Assessment of Biometric Solutions, that will lead to a future creation of a European Certification Scheme.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

I contribute in providing a solution in the field of electronic identification, as is based on the identification of users through biometric means. This activity will ease the development of new (or improved) solutions, that will be trustable by citizens and Administrations, reducing the cost in quality control, evaluation and even marketing, which will benefit greatly the budget of SMEs in Europe. Therefore, this standard will boost SME activity.

### Impact on Society

With the creation of the approved PWIs, those services used by the citizens that involve their authentication through biometric means, will be more secure, as there will be the basis for a certification scheme for such products. Therefore, security, integrity and trust will be increased in the user daily life.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

This proposal has achieved the main goal of activating 4 Preliminary Work Items, in the field of establishing the European Requirements for Biometric Products. All 4 have been approved, and 2 WDs have been generated for each of them.

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have drafted technical specifications.

## What future efforts or activities are still necessary for your area of application?

The work performed within this fellowship, i.e., the approval of 4 PWIs, shall be continued to finalized the WD texts, and prepare the activation of the NWIs in a near future (expected 1 year maximum for some of them). Once the NWIs are submitted and approved, the final texts will be generated.

## Online references related to the fellowship work

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 [https://standards.cencenelec.eu/dyn/www/f?p=205:22:0:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:6205,25&cs=1BEC25E62B2D3FAE470A24A21A7315A0B](https://standards.cencenelec.eu/dyn/www/f?p=205:22:0:::FSP_ORG_ID,FSP_LANG_ID:6205,25&cs=1BEC25E62B2D3FAE470A24A21A7315A0B)

 [https://standards.cencenelec.eu/dyn/www/f?p=205:22:0:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:793533,25&cs=19BB1E68ECC521335D1B3FC04E9353B9F](https://standards.cencenelec.eu/dyn/www/f?p=205:22:0:::FSP_ORG_ID,FSP_LANG_ID:793533,25&cs=19BB1E68ECC521335D1B3FC04E9353B9F)

# Further Evaluation of Lightweight Authenticated Encryption Algorithms for the Internet of Things



**Johann Groszschaedl**

*Software developer, University of Luxembourg  
Luxembourg*

## Sector

Cybersecurity  
Short-term fellowship

## Engaged SDOs, WGs and TCs



NIST the Cryptographic Technology group

## Role

Member

## Addressed EU standardisation priorities and gaps

The IoT can be seen as a large ecosystem populated by highly diverse and heterogeneous devices, which come in all shapes and sizes. Therefore, it is little surprising that there exist dozens of different microcontroller platforms, operating systems, and wireless communication standards for the IoT. Since there is no single dominating microcontroller platform, it is essential that a lightweight cryptographic algorithm achieves consistently good performance on a wide variety of 8, 16, and 32-bit architectures. To ensure a fair and consistent performance evaluation, the NIST LWC team developed a software benchmarking framework and collects benchmarking results of the candidate algorithms on microcontrollers. NIST's benchmarking framework was developed to support five different microcontroller architectures, namely 8-bit AVR ATmega, 32-bit ARM Cortex-M0, 32-bit ARM Cortex-M4, 32-bit PIC32, and 32-bit Tensilica Xtensa. However, NIST has over-emphasized 32-bit microcontrollers since four of the five platforms their benchmarking tool currently supports are 32-bit architectures. The only non-32-bit platform is 8-bit AVR, which means a 16-bit platform is completely lacking. Consequently, the efficiency of the ten finalists on a 16-bit microcontroller was unknown before the start of this project. Furthermore, it was also not clear how the finalist algorithms can be optimized for the MSP430 architecture. The main objective of my fellowship was to fill this gap in knowledge by:

- ▶ developing highly-optimized Assembler implementations of five of the ten NIST finalists and making them available under an open-source license,
- ▶ collecting detailed benchmarking results,
- ▶ summarizing the main results in a research paper and communicating them to the NIST. Concerned ICT standards and contribution to the related landscape

The U.S. National Institute of Standards and Technology (NIST) is currently undertaking a process to evaluate and standardize lightweight cryptographic algorithms that are suitable for use in constrained environments where the performance of existing cryptographic standards is not sufficient. Two kinds of lightweight cryptosystems are considered for standardisation, namely algorithms for Authenticated Encryption with Associated Data (AEAD) and hash functions. Like other NIST standardisation activities, the Lightweight Cryptography (LWC) project involves an open process for proposing candidates together with a thorough multi-round evaluation to select the preferred one(s). This evaluation is now in the final round, in which the 10 remaining candidates (out of a total of 57 submissions) are

rigorously scrutinized. The evaluation of the 10 finalists considers both security aspects and the efficiency of implementations in hardware and software.

My fellowship contributed to the assessment of the software performance of five of the 10 final-round candidates (namely Elephant, Grain-128AEAD, ISAP, PHOTON-Beetle, and Romulus) on the MSP430 family of 16-bit low-power microcontrollers. Such microcontrollers are used in a wide range of IoT devices, most notably miniature sensors, and actuators. During this fellowship, the most-performance-critical components of the five final-round candidates were implemented in MSP430 Assembly language and detailed benchmarking results were generated considering both the execution time and binary code size. The Assembler source codes, the benchmarking results, as well as a research paper summarizing the main results are available on GitHub and represent a valuable input for the NIST LWC team in their assessment of the software efficiency of the finalists.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

Cryptographic algorithms standardized by the NIST are relevant world-wide, not just in the U.S., since many other standards bodies (e.g., ISO) usually adopt NIST-approved algorithms (e.g., the AES). Even though the MSP430 architecture is owned by Texas Instruments, it was developed at the German subsidiary of Texas Instruments. Two major providers of tool-chains for MSP430, namely IAR and Rowley, have their headquarter in Europe. MSP430 microcontrollers are deployed in thousands of IoT devices of European companies in all segments of the Embedded/IoT industry, ranging from automotive appliances over industrial control systems to medical devices. Many of the companies that designed and/or manufactured these devices are SMEs; they will benefit from my contributions because it enables a better understanding of the efficiency of final-round candidates on the MSP430 platform. Furthermore, SMEs can also profit from the availability of the source code of the implementations.

### Impact on Society

The poor state of security in the IoT is a massive problem that constantly plagues individual users as well as organizations and enterprises. I have contributed to improve the security of the IoT since strong cryptography is the foundation upon which secure architectures, systems and protocols can be built. Cryptography is, of course, only one of several aspects that determine the real-world security of an architecture or protocol, but it is an essential one since without strong cryptography it would be next to impossible to build a secure system. However, to be suitable for deployment in IoT devices, a cryptographic algorithm does not only need to be secure, but it must also be efficient. Efficiency is particularly important for resource-constrained embedded/IoT devices (e.g., RFID tags, sensor nodes, or smart cards) that are extremely limited in terms of computational power, memory, and energy supply. The poor state of security in the IoT world is not only caused by ignorance and bad development practices, but also (in part) by the fact that cryptographic algorithms can have a significant negative impact on the execution time, RAM footprint, and energy consumption of an application running in an IoT device. Therefore, it is important that cryptographic algorithms considered for standardisation are carefully evaluated to have detailed information about their efficiency on many different platforms. Hence, I have contributed to a better understanding of the performance of the final-round candidates of the NIST lightweight crypto standardisation effort on 16-bit MSP430 microcontrollers.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, the benchmarking results obtained on basis of the highly-optimized Assembler implementations allow one to conclude that the final-round candidates ASCON, GIFT-COFB, Sparkle, and Xoodyak are the most efficient ones on 16-bit MSP430 microcontrollers. This conclusion has been sent by email to the NIST LWC team and was also announced on the official NIST mailing list for the LWC project (together with a link to the GitHub repository where the source codes and research paper can be found).

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have drafted technical reports on development of a new standard and on reference data.

## What future efforts or activities are still necessary for your area of application?

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During this fellowship, the performance-critical components of five of the 10 final-round candidate were implemented in MSP430 Assembly language. The implementation, benchmarking, and documentation took on average about 35 hours for each of the five algorithms, which is the reason why the project was limited to half of the final-round candidates. However, the other five final-round candidate (namely ASCON, GIFT-COFB, Sparkle, TinyJAMBU, and Xoodyak) were already implemented and evaluated by the predecessor project OC4-445 (4th open call). Consequently, all ten final-round candidates have been implemented and evaluated.

## Online references related to the fellowship work

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 <https://github.com/johngrolux/aead430>

 <https://csrc.nist.gov/Projects/lightweight-cryptography>

# Contribution to e-identification and privacy protection at CEN/CLC/JTC 13 & ISO/IEC JTC1/SC 27 WG5's



## **Christophe Stenuit**

*Standards Expert, Viewconcept.be  
Belgium*

### Sector

Cybersecurity  
Short-term fellowship Roles

## Engaged SDOs, WGs and TCs



CEN/CLC/JTC 13 WG5 on Data Protection, Privacy and Identity Management  
ISO/IEC JTC 1/SC 27 WG5 on Identity management and privacy technologies

### Role

CEO, Viewconcept.be.

## Addressed EU standardisation priorities and gaps

My fellowship aims of positively influence the European market and its infrastructures by benefiting from international contributions (e.g., ISO/IEC) in the controlling of civil security and the protecting of e-identity and e-privacy. My activity in this fellowship enhanced existing references and encouraged promoting the use of these references through adoption at the European market.

## Concerned ICT standards and contribution to the related landscape

The proposed standardisation activity intends to contribute to a better harmonisation of e-identity and privacy protection standardisation support in Europe. It contributed to ease the implementation of e-identity and e-privacy developments.

The scope of the proposed standardisation activity includes proposing/revising/amending/reviewing standards. Progress was made on the following ICT standards:

- ▷ ISO/IEC 24760-1 about identity management terminology and concepts
- ▷ ISO/IEC 24760-2 about identity management architecture
- ▷ ISO/IEC 24760-3 about identity management practices
- ▷ ISO/IEC 24760-4, about identity management and credentials, authenticators and authentication
- ▷ ISO/IEC 29146 about access management amendment
- ▷ ISO/IEC 29184 about online privacy notices and consent
- ▷ Adoption of the referred standards as prEN
- ▷ Other supporting activities were also carried out, e.g., contributions on supporting standardisation activities in relation to, as part of the ISO JTC1 SC27 WG5:
- ▷ AG5 on strategy
- ▷ Application of ISO 31000 for assessing identity-related risk

- ▷ Development of threats and possible mitigations to risks associated with identity management
- ▷ Development of Data Privacy threats and Controls
- ▷ Analysis of identification and authentication processes

And as part of the CEN/CLC/JTC 13/WG 5:

- ▷ Participation to Data Protection guidance for a single person acting as controller
- ▷ Cooperation Agreement between CEN-CENELEC and EDPB
- ▷ Supporting Establishment of a CEN CLC ETSI Coordination group on eIDAS
- ▷ Establishment of a Liaison Statement between ISO/IEC JTC 1/SC 27 WG 5 and to CEN-CENELEC JTC13

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

SME are better aware of risks and of controls required in IT and information protection. Recent EU GDPR, eIDA2 regulations and NIS directives developments impose a different view on IT risks, information security, data privacy protection and identity management controls, and by this a different awareness of the consequences that may fall improper compliance to good practices. Good standard references help confidence establishment and maturity improvement in matter yesterday far from SMEs' concerns.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, Part of the objectives of the fellowship project is to support revisions and amendments of existing work items, and another is to support the adoption and the publicity of these work items at EU market, and by this guaranteeing the sustainability of existing references in a changing world.

### Have the standardisation activities in your project led to specific deliverables?

I have contributed to several different technical reports providing common terminology, reference material, recommendations for new and revised standards.

### What future efforts or activities are still necessary for your area of application?

Most of developed standards are achieving maturity. Some work items are still at draft stage. Some other are nearly published or being published. This could take up to 18 or 24 months. This activity will continue over 2023, and achieve a publication during 2023 and 2024.

### Online references related to the fellowship work

[www.cencenelec.eu/areas-of-work/cenelec-sectors/digital-society-cenelec/cybersecurity-and-data-protection/](http://www.cencenelec.eu/areas-of-work/cenelec-sectors/digital-society-cenelec/cybersecurity-and-data-protection/)

[www.iso.org/committee/45306.html](http://www.iso.org/committee/45306.html)

## ■ Novel features of the near-real time RIC



**Adam Flizikowski**  
Product Manager, IS-Wireless  
Poland

### Sector

6G  
Long Term Fellowship

### Engaged SDOs, WGs and TCs



ORAN Alliance ATG WG1 Use-cases

### Role

Head of R&D at IS-Wireless.

### Addressed EU standardisation priorities and gaps

Present 5G mobile networks are an ongoing transition towards open and virtualized networks. O-RAN Alliance is working towards an ecosystem of innovative, multi-vendor, interoperable, and autonomous RAN, with reduced cost, improved performance, and greater agility. Several WGs are working on the improvement and deployment of O-RAN by introducing several open interfaces in the architectures, hardware designs, security aspects, management and orchestration features in the specifications. However, the existing O-RAN specifications do not cover cell-free paradigm, even though it is already proved that cell-free can bring essential improvements to the capacity of the network as well as can improve EMF radiation of the 5G networks. With my work group, we have identified these gaps in the O-RAN specifications. Our aim of my fellowship is to start filling these gaps by introducing novel technical solutions (i.e., CF mMIMO and AI/ML based life-cycle management) into the Technical Specifications of the related O-RAN WGs. Due to the huge data traffic, present 5G networks are facing capacity challenges and integration challenges in multi-stakeholder scenarios. This exponential traffic increase will challenge the current network designs (i.e., single-RAN cellular networks) and networks will need to become densified (a few-fold increase in number of base-stations per 10m<sup>2</sup>) together with its efficiency increased significantly. Thus, we need technical solutions to overcome these challenges. To address such challenges, we have already validated the practical solutions to implement novel paradigms into Open RAN based networks. Based on the identified performance results and potential of cell-free architecture, we will bring this knowledge to the O-RAN standards to build cell-free mMIMO solutions and AI/ML based life-cycle management for disaggregated RAN for 6G in an efficient way in terms of lowering the cost and integration efforts.

### Concerned ICT standards and contribution to the related landscape

Due to increased “Data tsunami” from the present mobile networks and predicted future networks, radio access networks (RAN) will face several challenges, e.g., high capacity, low latency, difficult integration among vendors, high cost of deployment, etc. In fellowship the aim is to contribute to the ICT standard (i.e., O-RAN Alliance) by bringing our novel solution such as Cell free massive MIMO (CF mMIMO) in the O-RAN architecture to enhance network capacity, and lowering the deployment cost and barriers regarding the integration effort. In addition, the focus is on the life-cycle management for disaggregated virtualized RAN with intelligent workload prediction. The proposed approaches will validate the possibilities of standardising the novel technical concepts enhancing the beyond 5G/6G network designs to



decrease the integration effort for the vendors compliant with O-RAN architecture and also extending O-RAN use cases. These steps will contribute to the landscape of ICT standards by bringing innovation to the digital market, maintaining sustainable growth, and ensuring key enablers for society. We are dealing with the standardisation of O-RAN Alliance which was formed in 2018 by five leading telecommunication companies with the aim of transforming radio access networks (RAN) towards open, intelligent, virtualized, and fully interoperable RAN.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

The inclusion of the concept of CF mMIMO and AI/ML based life cycle management into the O-RAN WGs will bring a great opportunity to exchange knowledge and expertise gathering on the specific points that can be transferred easily to the market. This could impact the business of European SMEs by strengthening the cooperation with large industries in the O-RAN community. Our contribution as a SME will ease the implementation of new efficient communication network elements and will allow a large dynamic range of advanced concepts (e.g., edge computing architecture, O-RAN concepts, and cell-free paradigm of O-RAN architecture). The new innovative technologies, techniques, and infrastructure investigated by IS-Wireless as a European SME will create new commercial opportunities and introduce a new line of products in the smart connectivity domain of 6G networks.

### Impact on Society

Cell-free massive MIMO (multiple-input, multiple-output) has the potential to bring about significant societal impacts in several areas. Cell-free massive MIMO, with its use of hundreds or thousands of antennas, can enhance wireless communication capacity and coverage. This can improve communication in remote areas, reduce congestion in urban areas, and make communication more reliable during natural disasters or other emergencies. The increased capacity and coverage provided by cell-free massive MIMO can enable the development of new services and applications, such as virtual and augmented reality, autonomous vehicles, and smart cities. This can create new economic opportunities and improve quality of life for individuals and communities. In addition, AI/ML (artificial intelligence/machine learning) based life cycle management can help operators optimize their network infrastructure, reduce energy consumption, and identify and resolve issues proactively. This can result in significant cost savings for operators, which could potentially be passed on to consumers. With the increased connectivity and data processing capabilities enabled by cell-free massive MIMO and AI/ML-based life cycle management, there are also potential privacy and security concerns. Ensuring that these technologies are deployed in a way that protects personal data and minimizes security risks will be crucial.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, these contributions, i.e., cell free massive MIMO and AI/ML-based is targeting to be directly involved for the development of new standards. We have started evaluating the approach with ORAN but will now continue towards 3GPP/ETSI.

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have drafted a dedicated presentation and a technical report.

## What future efforts or activities are still necessary for your area of application?

The Open Radio Access Network (O-RAN) alliance has been at the forefront of promoting interoperability and standardisation in the telecom industry. In recent years, there has been growing interest in the use of cell-free massive MIMO technology to improve wireless

communication. At this situation, we approached to include the CF massive MIMO for standardisation. However, O-RAN has decided not to include this topic in their standardisation efforts currently. Instead, O-RAN has suggested that the discussion on cell-free massive MIMO and AI/ML based life cycle management should first take place within the Third Generation Partnership Project (3GPP), which is a global collaboration between telecom standards organizations. This approach is aimed at ensuring that any standardisation efforts related to cell-free massive MIMO are well-informed and widely supported within the industry. O-RAN's recommendation to start the cell-free massive MIMO first with the 3GPP, does not diminish the potential importance of this technology in the future. Rather, it reflects a thoughtful and measured approach to standardisation that is based on careful consideration of the technology's potential benefits and challenges.

## Online references related to the fellowship work

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 [www.o-ran.org](http://www.o-ran.org)

# CEL6: Congestion control for Extreme Low delay in 6G networks



**Marcelo Bagnulo**

Associate Professor, Universidad Carlos III de Madrid  
Spain

Sector

6G

Long Term Fellowship

## Engaged SDOs, WGs and TCs



IETF - Internet Congestion Control RG (ICCRG)

## Role

Member

## Addressed EU standardisation priorities and gaps

As part of our previous work on the EU project NGI Pointer RIM, with my work group, we have identified an issue in the interaction between BBR and LEDBAT++ that prevent both CCAs to perform as expected when competing for the capacity of a bottleneck. Specifically, we have found that for base RTTs (i.e., the RTT when there is no queueing delay) lower than 60 ms, LEDBAT++ does not yield in front of BBR.

This shows that both LEDBAT++ and BBR fail to achieve their respective design goals in these conditions, as LEDBAT++ is supposed to be an LBE transport while BBR is supposed to be a best-effort transport. The conditions under which BBR and LEDBAT++ jointly fail to operate as expected (i.e., a base RTT smaller than 60 ms) are fairly common in the Internet. Since both BBR and LEDBAT++ are widely deployed, we have reasons to believe that the described behaviour is systematically occurring in the Internet today. This means that when both LEDBAT++ and BBR are being used in the same link, they fail to provide the expected benefits in terms of latency reduction. To deliver extremely low latencies, this issue must then be addressed.

The purpose of the CEL6 is to characterize the identified problem in the interaction between BBR and LEDBAT++ and propose a solution to the problem, that would result in LEDBAT++ effectively yielding when competing against BBR.

## Concerned ICT standards and contribution to the related landscape

One of the key research challenges that 6G will work on is Extreme Experience, which encompasses both extreme bitrates, and extremely low latencies.

To achieve that, we first realize the different types of traffic have different latency requirements. Short flows, interactive applications, real time streaming services require low latency. Long file transfers such as software updates and periodic backup do not. However, if both latency sensitive and latency insensitive traffic use the same CCA, they compete in equal grounds and the result is that latency insensitive traffic bloats the latency experienced by competing traffic sensitive traffic, even if these transfers could have been postponed until when latency sensitive traffic is completed.

To that end, currently, two novel CCAs are being specified in the Internet Congestion Control Research Group (ICCRG) of the IRTF (the research branch of the IETF), namely BBR and

LEDBAT++. Both CCAs are explicitly designed to reduce the latency. While BBR is targeting best effort traffic, LEDBAT++ implements a less-than-best-effort transport service. These two novel congestion control algorithms allow different types of traffic to have different priority in the network. Our contributions target to improve the interaction between these two congestion control algorithms that are currently being specified at ICCRG.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

My fellowship work corrected the abnormal interactions between two widely used congestion control algorithms, namely BBR and LEDBAT++. Specifically, the proposed solution modifies their behaviour so they can behave as expected when interacting, i.e., that LEDBAT++ yields against BBR. This benefits both content provider companies and content distribution companies. In case of SMEs, we expect that the former is much more common than the latter, since most CDNs are larger companies. But any SME present on the Internet would benefit from relying on BBR for the rendering of their content and would benefit from the results of this fellowship project.

### Impact on Society

The work on the CEL6 project also benefits end-users. End users rely on both BBR and LEDBAT++ on a day-to-day basis, as BBR is widely used across CDN, large content provider and streaming services. Similarly, LEDBAT(++) is widely used to update widely used software packages. When both LEDBAT++ and BBR are competing, the user experience will be poor, as LEDBAT++ fails to yield in front of BBR. For instance, if a user is watching a video and the operating system update starts, it is likely that the latter interferes with the former. The solution addresses these problems. Moreover, we have updated the rLEDBAT specification and open-source implementation to incorporate the proposed solution in rLEDBAT (i.e., the receiver driven version of LEDBAT++).

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Not directly, my work has provided as input for both the BBR and the LEDBAT++ specifications and authors of both specifications acknowledged the issue and are considering the proposed solutions.

## Have the standardisation activities in your project led to specific deliverables?

As part of the CEL6 project, we have produced a new Internet draft and updated an existent one. The new Internet draft is (see the online references below).

## What future efforts or activities are still necessary for your area of application?

LEDBAT++ and/or BBR specifications should be modified to address the identified problem and possibly adopt the solutions proposed as proposed in this work.

## Online references related to the fellowship work

 <https://datatracker.ietf.org/doc/draft-bagnulo-icrg-icrg-ledbat-bbr-interop/>

 <https://datatracker.ietf.org/doc/draft-irtf-icrg-rledbat/>

## ■ Hudobivnik-4 ITU SG13 Q1-2023



### **Alojz Hudobivnik**

*Expert in Standardisation, AH.TS Alojz Hudobivnik s.p.  
Slovenia*

### Sector

5G

Long Term Fellowship

## Engaged SDOs, WGs and TCs



ITU-T SG13 Future networks and emerging network technologies WPI  
ITU-T FG AN Focus Group on Autonomous Networks

## Role

ITU-T SG13 WPI vice-chairman, ITU-T SG13 Mentor

## Addressed EU standardisation priorities and gaps

This fellowship canters around the network aspects of IMT-2020 (5G) and beyond. My primary role is to contribute to studies on the requirements and capabilities of networks based on the service scenarios of IMT-2020 and beyond. This entails developing Recommendations for the framework and architecture design, incorporating critical network-related factors such as reliability, quality of service (QoS), and security. Additionally, I oversee topics on interworking with current networks, including IMT-Advanced, among others. The standardisation work extends to the integration of new technologies, insights, and requirements from various verticals. Thus, it is crucial that EU science, industry, and users are adequately represented and engaged in this process.

## Concerned ICT standards and contribution to the related landscape

As the ITU-T SG13 WPI vice-chairman, overseeing network aspects for “IMT-2020 (5G) and beyond,” I have significant responsibilities. These include management activities, attending live/virtual meetings in Geneva, active participation in decision-making processes, and guiding the work of Questions. This role presents a valuable opportunity to shape the content of outcomes such as freely available documents in ITU-T Serie-Y and new work item decisions. I prioritize aligning SG13’s plan, content, and standardisation objectives with EU objectives, with the ultimate aim of promoting EU solutions. Moreover, within FG AN, I help shape all aspects of “Autonomous Networks.”

## Impact (on European SMEs, related projects or in society)

### **Impact on SMEs**

Due to my recognized expertise and experience in ITU-T, I was appointed as an SG13 Mentor to assist newcomers.

I am committed to incorporating the specific requirements and needs of various verticals, such as healthcare and automotive, into the new areas of standardisation for 5G networks and beyond. By doing so, the benefits of these networks and services will be accessible to users faster and with greater ease. Through my management of ITU-T SG13 work, I offer a comprehensive perspective that contributes to better conclusions made by organizations such as EU MSP on ICT standardisation, CEPT COM-ITU, and CENELEC BT.

## Impact on Society

The European Commission's Multi-Stakeholder Platform (MSP) on ICT standardisation has suggested that supportive measures be taken to enhance the involvement of EU-based experts in international standardisation efforts, especially in new and innovative fields. Additionally, the platform recommends that standards organizations make information regarding ongoing and new development projects and work items readily accessible to the public. For standardisation activities pertaining to regulatory and policy matters, sufficient background information and assumptions should be provided. To ensure the seamless flow of information, personal presence during daily operations of Standard Development Organizations (SDOs) is crucial. In my capacity, I was able to meet these expectations when working within the ITU-T SG13's work area.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

I contribute to the following finalised standards:

- ▷ Y.3121 (Y.det-qos-reqts-lan) QoS requirements and framework for supporting deterministic communication services in local area network for IMT-2020
- ▷ Y.3120 (Y.IMT2020-fa-lg-lsn) Functional Architecture for latency guarantee in large scale networks including IMT-2020 and beyond
- ▷ Y.3183 (Y.ML-IMT2020-VNS) Framework for network slicing management assisted by machine learning leveraging QoE feedback from verticals
- ▷ Y.3119 (Y.IMT2020-DN-CCF) Future networks including IMT-2020: capability classification framework for dedicated networks
- ▷ Y.3159 (Y.IMT-2020-NSL-fra) Framework for classifying network slice level in future networks including IMT-2020
- ▷ Y.3325 (Y.IMT-2020-DL-AINW-fra) Framework for high-level AI-based management communicating with external management systems
- ▷ Y.3140\* (Y.SBN-TR) Service brokering network framework for Trusted Reality
- ▷ Y.3201 (Y.FMSC-frame) Fixed, mobile and satellite convergence – Framework for IMT-2020 networks and beyond
- ▷ Suppl 72 to ITU-T Y.3000-series (Y.sup.aisr) Artificial Intelligence Standardization Roadmap

Additionally, in my WG, we initiated work on long list of NWI as normal at the beginning of the new study period :

- ▷ New draft Recommendation ITU-T Y.det-qos-arch-lan "Functional architecture for QoS guarantee of deterministic communication services in local area network for IMT-2020 and beyond"
- ▷ New draft Recommendation ITU-T Y.det-qos-rf-intwk-lan "QoS requirements and framework of interworking capability supporting deterministic communication services in local area network for IMT-2020 and beyond"
- ▷ New draft Recommendation ITU-T Y.QKDN-qos-ml-fa: "Quantum key distribution networks: Functional architecture enhancement of machine learning based quality of service assurance"
- ▷ New draft Recommendation ITU-T Y.AN-Arch-fw "Architecture framework for Autonomous Networks"
- ▷ New draft Recommendation ITU-T Y.CCO-req "Requirements of orchestration supporting confidential computing for network slices in IMT-2020 networks and beyond"
- ▷ New draft Recommendation ITU-T Y.IMT 2020-DTNMO "Digital twin network - Management and Orchestration"
- ▷ Y.3073-amend "Draft amendment to ITU-T Y.3073 Framework for service chaining in information-centric networking"

- ▷ Draft new Recommendation ITU-T Y.FMSC-ns-req “Fixed, mobile and satellite convergence: Requirement of network sharing for IMT-2020 networks and beyond”
- ▷ Draft new Recommendation ITU-T Y.FMSC-DCN “Fixed, mobile and satellite convergence – Distributed core network for IMT-2020 networks and beyond”
- ▷ Draft new Recommendation ITU-T Y.FMSC-SS “Fixed, mobile and satellite convergence - Service scheduling for IMT-2020 networks and beyond”
- ▷ Draft new Recommendation ITU-T Y.FMSC-INCA “Fixed, mobile and satellite convergence – Integrated network control architecture framework for beyond IMT-2020”
- ▷ Draft new Recommendation ITU-T Y.FMSC-InNetFL “Requirements and Framework for In-Network Aggregated Federated Learning to Enable AI in Fixed, Mobile, and Satellite Convergence Networks”
- ▷ Draft new Recommendation ITU-T Y.FMSC-BM “Fixed, mobile and satellite convergence - Network enhancements of supporting broadcast and multicast for IMT-2020 networks and beyond”

## Have the standardisation activities in your project led to specific deliverables?

This period time was very intense for me personally, as I acted in many roles including the proposer of the C-112 initiative and the editor of the document Supplement 59 to ITU-T Y.3100-series “IMT-2020 standardization roadmap » which was successfully accomplished and published as revision 11/2022.

## What future efforts or activities are still necessary for your area of application?

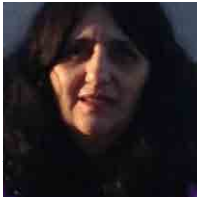
Participating in global standardisation can be a costly endeavour, especially in the field of telecommunications where uniform global standards are necessary for globalization. To achieve European initiatives, contributions, and goals, it is essential to have delegates and experts present in global Standard Development Organizations (SDOs) such as the ITU-T. However, despite the significance of the work carried out in SG13, there is a noticeable lack of European experts in attendance, typically accounting for less than 7 out of 200 delegates.

## Online references related to the fellowship work

 [www.itu.int/en/ITU-T/studygroups/2022-2024/13/Pages/default.aspx](http://www.itu.int/en/ITU-T/studygroups/2022-2024/13/Pages/default.aspx)

 [www.itu.int/en/ITU-T/focusgroups/an/Pages/default.aspx](http://www.itu.int/en/ITU-T/focusgroups/an/Pages/default.aspx)

# Spread IoT standardisation through ETSI IoT week event as PC vice chair



## **Michelle Wetterwald**

*Senior standardisation expert, NETELLANY  
France*

### Sector

Cross Domain Technologies  
One Shot Fellowship

## Engaged SDOs, WGs and TCs



ETSI TC SmartM2M

## Role

Team leader of the Specialist Task Force 601 operating under the steering of the ETSI TC SmartM2M committee.

## Addressed EU standardisation priorities and gaps

My fellowship within TC SmartM2M provides specifications for M2M services and applications, focusing on aspects of the Internet of Things (IoT) and Smart Cities. Its work also includes converting the oneM2M specifications into European standards. TC SmartM2M is very active in the standardisation of the SAREF ontology in multiple vertical domains and on service and application-level standards complementing the oneM2M activities.

The yearly ETSI IoT week allows to disseminate and exchange on the IoT standardisation work completed over the past year. It includes workshop presentations, live panels, and poster sessions on a selected set of topics to increase the standardisation footprint in a fragmented and often proprietary ecosystem. The 2022 event focused on the IoT contribution to “Pursuing Digital and Green Transformation”.

AIOI and ETSI TR 103 376 have identified the usability of the data and services that the IoT devices and platforms deliver is a crucial issue that was identified as a standardisation gap. Indeed, standards on ICT usability exist, but they are mainly based on the user experience or the accessibility of ICT products and equipment. An ETSI standardisation project covered this gap and delivered two standards: TR 103 778 and TS 103 779. Its results were shared with the oneM2M RDM WG, for their Work Item “System Enhancements to Support AI capabilities”.

## Concerned ICT standards and contribution to the related landscape

The ETSI IoT week is one of the primary yearly events on IoT standardisation. Its achievement lies in the promotion of standardisation work in various horizontal aspects and vertical contexts, including oneM2M and the SAREF ontology, which is the flagship activity at TC SmartM2M. The objective of the 2022 edition was to emphasise the impact of standards on Green and Digital Transformation, providing access to the ICT industry, SMEs, verticals and academia to the relevant IoT standardisation. This year’s event covered topics such as IoT and sustainability, E-health and well-being, Digital Twins, IoT and AI, IoT and security, and semantic interoperability, which are essential topics in the current standardisation landscape.

Leveraging the different discussions, the IoT community was updated with the latest developments and informed on new initiatives and directions of the standardisation work. The event will thus impact the consolidation of the IoT standardisation ecosystem.



My presentation was the dissemination of two ETSI standards: TR 103 778 “Use cases for cross-domain data usability of IoT devices”, and TS 103 779 “Requirements and Guidelines for cross-domain data usability of IoT devices”. The lack of data usability in IoT has been identified as a high-priority standardisation gap by an AIOTI study published in 01 2020. Filling this gap gives the capacity to increase trust in services depending on IoT data, including when related to AI decisions. Furthermore, these two standards will constitute a market enabler for the IoT ecosystem by removing a blocking factor. At the ETSI IoT week, addressing a broader audience to explain and discuss the content of the requirements included in the recently published standard allowed the IoT stakeholders to make the best use of these requirements in their products and increase the quality and reliability of their results. I received several questions during and after the presentation from attendees discovering this work.

## Impact (on European SMEs, related projects or in society)

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### Impact on SMEs

The IoT domain is a very varied ecosystem where SMEs can contribute to developing and commercialising software for IoT platforms and services. Therefore, the event gathered all types of speakers and attendees: large companies, academia, users' associations (e.g., for smart cities), but also many SMEs who were present to find new opportunities and consolidate their technical knowledge on new directions and new standards.

### Impact on Society

This event allowed sharing knowledge on standardisation work in many domains, which all have a societal impact: digital transformation, self-energy consumption, energy management, IoT and edge computing for green change, technologies to support eHealth, IoT security weaknesses and related initiatives, smart cities, IoT based railway diagnostic, interoperability as key for local authorities to master data sovereignty and IoT carbon footprint, operator device management, IoT data usability.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, OneM2M is currently re-using the work done in TR 103 778 and TS 103 779 for their TR-0068 on AI enablement.

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have contributed to a technical report.

## What future efforts or activities are still necessary for your area of application?

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This One-Shot fellowship covered my participation and vice-chairing of the event, which is terminated now. It also covered the dissemination of two standards to a broader audience during the event. This work will continue at oneM2M, but another member of the former STF team will take care of this.

## Online references related to the fellowship work

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 [www.etsi.org/committee/1414-smartm2m](http://www.etsi.org/committee/1414-smartm2m)

# Request for funding for IETF IoT standardisation work



**Maria Ines Robles**

*IETF Working Group Chair, Tampere University  
Finland*

## Sector

Industry 4.0  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



IETF ROLL Working Group  
IETF IoT-Directorate  
IETF Routing-Directorate  
IETF Gen-Area Review Team

## Role

Chair of IETF ROLL Working Group and co-chair of the IETF IoT Directorate

## Addressed EU standardisation priorities and gaps

One of the challenges in industrial plants in Europe is to ensure seamless connectivity and interoperability throughout ever increasing number of wirelessly connected devices. One of the protocols developed to address these challenges is RPL(RFC6550), the IoT-routing protocol, with features such as self-healing capabilities. The aim of ROLL is to improve the routing in constrained environments, considering energy saving and unstable operational circumstances. This broadens the range of use cases where IoT can be applied to business needs of the European smart industry and societal applications such as smart cities. The technical work addresses the following gaps: Supporting Asymmetric Links in Low Power Networks; RPL Capabilities; Root initiated routing state in RPL; Controlling Secure Network Enrolment; Operation Mode extension; Common Ancestor Objective Function and Parent Set DAG Metric Container Extension; Fast border router crash detection.

Also, the IoT directorate establishes communication and dissemination reach across organisations not fully aware of the IoT work at IETF.

## Concerned ICT standards and contribution to the related landscape

The IETF (Internet Engineering Task Force) develops Internet protocols used worldwide, I am co-chairing ROLL (Routing Over Low-power and Lossy Networks) IETF working group (WG) that develops protocols for routing related to Internet of Things used in use cases such as Smart Grid, Industry 4.0, smart home, smart health and smart cities. The WG focus on routing issues, improving the protocols already developed (RPL, MPL, routing security, etc). The project helps to achieve the milestones and objectives by the WG.

Additionally, I am co-chairing the IETF IoT Directorate, an advisory group of experts that coordinates the IETF IoT working groups increasing visibility to e.g., external SDOs. This fellowship helps to collaborate with other SDOs on the IETF work on IoT, to disseminate the work and to support the overall coordination of the protocol groups at large.

Also, my activity as a reviewer in the Routing Directorate and reviewer in the Gen-Area Review Team help to improve the quality of the IETF standards.

## Impact (on European SMEs, related projects or in society)

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### **Impact on SMEs**

The IETF RPL is an approved open international standard with various implementations available as open source, evaluated through extensive simulations, and is in continuous testing. RPL deployments meet all the capabilities required by European SMEs to grow sustainably. Thus, the continuous improvement that is taking place in ROLL is essential to guarantee the adaptation of new use cases covered in Europe, allowing inherent interoperability and security required in SMEs.

### **Impact on Society**

The IETF IoT Routing protocols broaden the range of use cases where the Internet of Things can be applied to the needs of European societal applications such as smart cities, smart industry, smart grid, smart workforce and smart health to address the challenges to ensure seamless connectivity, security, safety and interoperability throughout ever-increasing number of wirelessly connected IoT devices that are improving and streamlining our lives.

Thus, The IETF ROLL working group continues working in routing issues for constrained (IoT) environments which are constantly adapted to the needs of the Internet users that are currently being under served due to remote locations, hard to reach areas with limited infrastructure or harsh environment use cases.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes; The chairing of ROLL (Routing Over Low Power and Lossy Networks) at the IETF led to the development of the following standard work: Supporting Asymmetric Links in Low Power Networks: AODV-RPL (Document in progress proposed as Standard Track); Root initiated routing state in RPL (Document in progress proposed as Standard Track); Controlling Secure Network Enrolment in RPL networks (Document in progress proposed as Standard Track); Mode of Operation extension (Document in progress proposed as Standard Track); Common Ancestor Objective Function and Parent Set DAG Metric Container Extension (Document in progress proposed as Standard Track).

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have contributed to technical reports.

## What future efforts or activities are still necessary for your area of application?

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I continue the co-chairing work on the IETF ROLL working group. The work in ROLL is based on milestones such as Mode of Operation extension and Projected routing. It is also envisioned future work such as the development of RPLv2, YANG models for AODV-RPL protocol, DIS-modification, and the evaluation of semantic for routing.

Also, I continue the co-chairing work in the IoT Directorate and coordination within IETF IoT groups increasing the IETF IoT standards visibility to external SDOs, alliances, and other organizations. IoT is a very rapidly growing area of technology and connects with number of other emerging technologies.

Finally, I continue the work in the routing directorate and gen-area review team with the goal of improving the quality of the routing standards of the Internet, and evaluate standard work submitted to publication covering all the IETF areas.

## Online references related to the fellowship work

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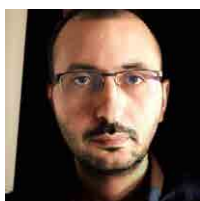
 <https://datatracker.ietf.org/wg/roll/about/>

 <https://datatracker.ietf.org/group/iotdir/about/>

 <https://datatracker.ietf.org/group/rtgdir/about/>

 <https://datatracker.ietf.org/group/genart/about/>

# Contribution to ITS standardisation and 6G-IA Trials WG



## **Alexandru Vulpe**

*Researcher, University Politehnica of Bucharest  
Romania*

### Sector

5G

Long Term Fellowship

### Engaged SDOs, WGs and TCs



IEEE P1609 Dedicated Short Range Communication WG  
IEEE P1950 – Standard for Communications Architectural Functional Framework for Smart Cities  
6G-IA Trials WG and 6G-IA Vision and Societal Challenges WGs

### Role

Member

### Addressed EU standardisation priorities and gaps

My fellowship addresses gaps, priorities or challenges that lie in the realm of the convergence of 5G/6G and AI for enabling applications such as smart cities, autonomous navigation, industrial automation as well as cost reduction and optimization. There is low digitalization and low penetration of cutting-edge technologies in the Transportation and Logistics sector. Also, most of the existing standards on e.g., for functional safety, (e.g., ISO 26262 or IEC 61508), are not compatible with typical AI methods, such as machine learning and are not up to date to include the recent advances in technology development, neither the 5G perspective, nor the AI.

### Concerned ICT standards and contribution to the related landscape

The lack of standardisation in the T&L sector leads to increased costs and lack of efficiency due to either lack of innovative technologies or the deployment of different solutions from different providers leading to lack of interoperability. While there exist standards on Intelligent Transportation Systems such as IEEE or ETSI, they are still under development and are not in line with the latest results and achievements from EU projects or other initiatives. My fellowship contributes to IEEE P1609 and P1950.1, the ETSI Technical Committee (TC) Intelligent Transport Systems (ITS), ISO and IEC standards related to ITS. My plan is to set the stage for the standardisation of the API for the management of network slices on the interface between the VITAL-5G platform and the network slice management system deployed at the smart port trial site in Galati.

### Impact (on European SMEs, related projects or in society)

#### **Impact on SMEs**

My fellowship impacts European vertical industry actors and SMEs, addressing key challenges in the sea/river port and warehouse operations domains as well as logistics road operators (transport of cargo between logistics hubs), multimodal transport as any technology to be applied by SMEs should be highly reliable, accessible, low cost and based on open standards.

## Impact on Society

The work has different aspects of societal impacts; Key Values are values important to people and society that may be directly addressed or indirectly impacted by future network technology, and to specifically be considered for 6G. Therefore, a societal value-driven approach to technology development building on the concept of KVIs has been supported by my work.

As most of my contribution lies in the realm of smart cities and smart ports, there is implicit societal impact. Smart cities have social implications in the connecting of citizens, end-user privacy, raising citizen awareness, cost efficiency, economic growth, and quality of life.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, this fellowship has enabled me to be directly involved in a series of ongoing initiatives and standard development. More specifically, I was able to contribute directly to draft editing of the P1950.1 standard revision as well as P1609 standard (although the process is more complicated there, as only members with a certain degree of seniority are allowed to access documents). As a member of a ballot group (which I am for IEEE P802.15.3, P3079.3 and P2418) I can directly comment and provide suggestions of the standard text. The balloting period has not ended yet for these standards and my contribution is pending. Finally, via contributing to 6G-IA's position on ITU-R preliminary draft new Recommendation ITU-R M. [IMT.VISION 2030 AND BEYOND] I am indirectly contributing to the new 6G standard the effects of which will be seen in years to come.

### Have the standardisation activities in your project led to specific deliverables?

Yes, I have drafted technical specifications and related technical reports.

### What future efforts or activities are still necessary for your area of application?

As my contributions have been both in EU (6G-IA) and US-based (IEEE) entities, I can say that the EU position is being largely ignored or non-existent in the IEEE Standards. Many participating actors are not from the EU, and the plethora of research projects that are being run within the HORIZON and other research framework did not seem to have a voice in the respective Working Groups where I have participated. Therefore, I strongly recommend to support additional EU experts with strong experience and knowledge that can represent the EU position in the domains of my application.

### Online references related to the fellowship work

 <https://standards.ieee.org/ieee/1609.2/10258/>

# Phase-2: Guide on Dev & Maintenance of MultiSDO Standards-Driven 5G Open Networking Platforms (ONPs)



## **Ranganai Chaparadza**

*Senior ICT Consultant and Standardization Expert, Capgemini Germany*

### Sector

5G

Long Term Fellowship

## Engaged SDOs, WGs and TCs



ITU T SG11 Focus Group FG-TBFxG; WG1, WG2, and WG3  
ETSI TC INT AFI WG on Autonomic Management and Control (AMC) Intelligence for Self-Managed Fixed & Mobile Integrated Networks (AFI),  
IEEE INGR Future Networks Initiative (FNI) Standardization Building Blocks (SBB) Roadmap WG,  
IEEE INGR Future Networks Initiative (FNI) Systems Optimization WG,  
IEEE INGR Future Networks Initiative (FNI) Testbeds WG  
TMForum Multi SDO Initiative

## Role

Chair of ITU-T TBFxG Focus Group and Vice-Chair of ETSI TC INT AF WG

## Addressed EU standardisation priorities and gaps

This fellowship addresses the following:

The Gap being addressed is that of providing Guide/Framework for “Development and Maintenance of Multi SDO/Fora “Standards Driven” Open Networking Platforms (ONPs) for Standards Driven Innovation, Multi-SDO Standards Harmonization, and Validation of Pre-Deployment Technology Use Cases in 5G & Beyond” that helps Industry to Develop and Maintain Multi-SDO Standards Validation Facilities in form of ONPs. The variety of Testbeds that can be built as ONPs and get federated means bringing various SDOs/Fora and Open Source and Open Hardware Projects closer together in Standards Validation, Harmonization and Standards-Driven Innovation, thanks to ONPs and the Emerging Joint ITU-T & ETSI Testbeds Federations Reference Model and its APIs.

The priority and challenge being addressed by this work is that the industry (SDOs/Fora, 5G Network Operators, Enterprises) are in dire need of Open Networking Testbeds for use in Validation of the Fusion of Multi-SDO/Fora Standards, Harmonization, and Trials through Industry-Grade Proving Grounds Testbeds. Unfortunately, most of the Open Testbeds available (e.g., for 5G) are mainly suitable for Research purposes only and are not built based on Standards and for Standards Validations based on SDOs/Fora Standards-Driven requirements as drivers for Building the Testbeds. Standards-Driven Open Networking Platforms (ONPs) implemented in form of Components that for a Testbed (consisting of Network Infrastructure Layer and Management and Control Layer Components) that can be federated with other ONP Testbeds are what the industry is calling for. An ONP is meant to be a “Neutral Environment” that is meant to be an Open Platform that enables to Test certain targeted Standards Fusions and Use Cases from the SDOs/Fora that provide Inputs for the

fusion of Standards selected for fusion and validations at a particular time; built upon Open Source/Hardware mainly.

## Concerned ICT standards and contribution to the related landscape

My fellowship contributes to Standards for Testbeds Federations for 5G and Beyond that are to be built upon the recently developed ITU-T & ETSI Joint Reference Model and its associated APIs for Testbeds Federations (produced by ITU-T SG11 and ETSI TC INT)—ITU-T Recommendation Q.4068 . My work introduces the Concept of Open Networking Platforms (ONPs). An ONP(s) is to be considered as a Playground (Proving Ground) for trying out New Technology Pre-Deployment Real Use Cases for 5G (particularly), based on Industry Harmonized and Cross-SDO/Fora fusion of standards (to implement Cross-SDO Industry Harmonization of Multi-SDO/Fora Standards), and for Validation of the Interworking of Multi-SDO Standards deployed to interwork in certain environments and scenarios. The building of ONPs need to be driven by Multi-SDO/Fora Standards Fusion and the Testbeds Federation Reference Model and APIs being jointly specified by ITU-T SG11 and ETSI TC INT.

Also, I contribute to what should be considered as Enablers for supporting Validation and Acceleration of Time-to-Market of Emerging Standards that are being derived from the growing trend in the industry on E2E Network Disaggregation and Network “Software’rization” in the Network Infrastructure Layer and in Management and Control Software Layer (as being advanced by various SDOs and Standards oriented Fora, such as O-RAN, TIP, ETSI, BBF, TMForum, ITU-T, IEEE, 3GPP, etc.). The Enablers required are “Open” Testbed-oriented Platforms (ONPs) built on Standards and for Standards Validations.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

The targeted Framework is bound to offer the following value to SMEs and ISVs (Independent Software Vendors). It is now being standardized under ITU-T Focus Group FG-TBFXG, and it shall serve as a guiding blueprint for promoting the idea of Developing and Maintaining ONPs (Open Networking Platforms) for 5G & Beyond by SDOs/Fora and other Stakeholders. Enable SMEs to enhance their business models by leveraging the ONPs ecosystem or by contributing to the development of the ONPs ecosystem that enables them to innovate, develop and test products and bring them to market much faster—thanks to ONPs; SMEs and ISVs business models/products based on the targeted Framework, huge potential for some SMEs and ISVs to tap into becoming Integrators of Testbeds and offer “Testbed-as-Service” Business Model. ONPs can benefit even small operators and SMEs that do not have capital to invest in Testbeds facilities for standards-based products Innovations and Testing.

### Impact on Society

The Work has fostered the Collaboration of the ITU-T TBFXG Focus Group with ETSI TC INT, IEEE and NGMN, TMForum, through Liaisons. My expertise was instrumental in establishing the Collaborations through Liaisons.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, Deliverables 3.3 and 3.5 of the WG3 of the ITU-T TBFXG Focus Group are the New Standards/Technical Reports being developed, thanks to the fellowship project.

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have drafted a technical report on recommendations for new / revised standards.



## What future efforts or activities are still necessary for your area of application?

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The work is almost complete but needs more effort to complete the ITU-T TBFxG Focus Group Deliverables.

## Online references related to the fellowship work

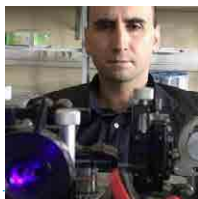
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 [www.itu.int/en/ITU-T/focusgroups/tbfxg/Pages/default.aspx](http://www.itu.int/en/ITU-T/focusgroups/tbfxg/Pages/default.aspx)

 [www.itu.int/rec/T-REC-Q.4068-202108-P](http://www.itu.int/rec/T-REC-Q.4068-202108-P)

 [https://intwiki.etsi.org/index.php?title=Accepted\\_PoC\\_proposals](https://intwiki.etsi.org/index.php?title=Accepted_PoC_proposals)

# QRNG International Technical Standardisation Advancement



## **Jacak Witold**

*University Professor at WUST - Poland, European IT Certification Institute  
Belgium*

### Status

Quantum Technologies  
Long-Term Fellowship

## Engaged SDOs, WGs and TCs



EITCI Quantum Standards Group (QSG) QRNG Workgroup

### Role

Coordinator of the EITCI Quantum Standards Group

## Addressed EU standardisation priorities and gaps

The current action advances previous contributions to quantum cryptography standardisation in terms of its key enabling technology, i.e., quantum random numbers generation. Continued effort in QRNG standards including approaches based on non-entanglement and entanglement schemes, with technical referencing of implementation techniques is expected to support uptake of the QRNG technology which is of an enabling importance for the future of cryptography and communication, especially in view of recent quantum supremacy breakthroughs (see *online references*) conditioning the future quantum internet's operability.

While the QKD technical standards are developed for several years and are now mature enough to provide device independent security (e.g., in efforts of the ETSI QKD-ISG Industry Specification Group), there are currently limited technical reference standards scopes for quantum randomness, despite the QRNG being a key enabler for QKD. The only two international QRNG standardisation initiatives both from 2019 include ID Quantique's coordination of the efforts towards a dedicated WG establishment on the forum of the ITU-T, and the QRNG QSG workgroup hosted by EITCI.

New concepts and technical developments in quantum randomness generation and testing throughout the recent years will facilitate drafting of extended QRNG in-depth technical reference standards, beyond the scope of the currently limited QRNG standards inventory, compiling inputs from international SDOs' relevant WGs and domain experts, aiming at further consolidation of a high expertise level required for successfully supporting international efforts in quantum technology standardisation.

## Concerned ICT standards and contribution to the related landscape

My fellowship supports standardisation efforts in quantum information processing and communication (QIPC) technologies for facilitating their uptake as roadmapped in the EU Quantum Flagship program (€1b funding in 10 years timescale). It aims to advance international work on standardisation of both non-entanglement and entanglement-based quantum random numbers generation, simultaneously supporting Europe's position on international SDOs/SSOs forum and leveraging on EU's far-reaching quantum infrastructure projects.

These efforts are complementary with international standardisation actions. In Europe ETSI has established in 2008 the Industry Specification Group working on QKD, ETSI QKD-ISG (as outcome of SECOQC), and on an international level quantum standards efforts take place in cybersecurity and networks WGs, mainly under JTC 1 of ISO/IEC. The CEN and CENELEC has recently established the Focus Group on Quantum Technologies (FGQT) and signed agreements with ISO and IEC through which common European and international standards are developed in parallel without duplication, emphasising European role in initiating several international quantum standards. Quantum standardisation is developed also in QISS of IEEE (P1913, P7130, P7131 WGs), ITU-T and ISA and NIST in the US. In 2018 the European QF Programme launched the Quantum Internet Alliance joining 12 research groups from 8 EU countries along with 20+ companies, workings towards breakthrough in quantum repeater technology enabling inter-metropolitan exchange of entanglement that conditions practical quantum internet.

## Impact (on European SMEs, related projects or in society)

### **Impact on SMEs**

With progress in quantum computation increasing investments are allocated at quantum technologies, especially in QIPC. Programs such as the Quantum Flagship in Europe have counterparts globally allocating billions of euros and dollars in R&D. SMEs play a crucial role in development of innovation and with QT it is no exception. Standards for basic quantum infrastructures such as quantum information encryption in future quantum networks can support innovation in quantum technology and accelerate its uptake by European SMEs. This is already happening among multiple start-ups in Europe, with a lot of their founders and/or key engineers engaging in the standardisation effort of the action (the cooperation is developing rapidly).

### **Impact on Society**

True (quantum) randomness has significant applications not only in quantum domains. Classical cryptography, as well as in mathematical modelling and many other fields widely rely on random numbers with various levels of required entropy (random binary sequences usually need to be certified in statistical testing of randomness levels). Hence industry-specification consensus efforts towards a truly (quantum) random number generation standards are expected in various novel techniques to employ quantum mechanics phenomena to generate non-deterministic random binary strings. These efforts follow already mature standards in QKD as well as the currently under development standards in quantum computing.

The societal impact of the action is in supporting Europe's leading role in quantum technologies. Quantum engineering is expected to revolutionize industry on an unprecedented scale, surpassing technological revolutions witnessed so far. It is important for Europe and its citizens to be at the forefront of these developments as they will define economic and hence societal position of the EU in the future.

European leaders understand potential of quantum technologies and allocate adequate means to support developments in this domain with programs such as Quantum Flagship or European Quantum Communication Infrastructure. Important enabler for these efforts is standardisation of emerging quantum technologies, with quantum cryptography as an early application, enabled and conditioned by the quantum random numbers generators (QRNG) to provide information-theoretic security level of communication.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

The work mainly contributes to the QRNG Workgroup of the Quantum Standards Group (QSG) hosted by the European IT Certification Institute to support EU-initiated international standards in quantum technologies. The EITCI QSG, that I coordinate, joins ca. 300 relevant domain experts.

Although the main contribution is with the European Information Technologies Certification Institute, distribution of the RFCs to relevant WGs of international SDOs/SSOs dealing with quantum communication standards also includes in particular the CEN/CENELEC Focus Group on Quantum Technologies (FGQT), as well as ETSI QKD-ISG, ITU-T SG13 (Future Networks) and SG17 (Security), IEEE (and IEEE ISTO with formal quantum Project Authorization Requests), IETF, IEC TC 57, IEC TC 292, IEC TC 65/WG10, ISO/IEC JTC 1/SC 27, ANSI/ASC and NIST.

The project directly contributed to development of 2 technical reference standards in protocols and implementations for quantum random numbers generators (QRNG), i.e., RS-EITCI-QSG-QRNG-PROTOCOLS-STD and RS-EITCI-QSG-QRNG-IMPLEMENTATION-STD.

## Have the standardisation activities in your project led to specific deliverables?

The main contributions involved QRNG technical reference standards drafted as RFC documents: 1) QRNG protocols (definitions, key theoretical concepts and use cases for QRNGs) and 2) QRNG implementation (technical specification of processes, devices, and operative parameters for QRNGs). The QRNG protocol RFC further advances formalization of details regarding definitions, key theoretical concepts and use cases for non-entanglement and entanglement-based quantum randomness generators. True (quantum) randomness has significant applications not only in quantum domains. Classical cryptography, as well as mathematical modelling and many other fields rely on random numbers with various levels of required entropy (random binary sequences usually need to be certified in statistical testing of randomness levels).

Hence industry-specification consensus efforts towards a truly (quantum) random number generation standards in both non-entanglement and entanglement-based approaches are expected to support various novel techniques in employing quantum mechanics phenomena to generating non-deterministic random bits. These efforts follow already mature standards in QKD as well as the currently under-development standards in quantum computing. Additional result of the action's implementation was increasing scale of the collaboration upon the EITCI Quantum Standards Group (organizing multiple group meetings and webinars), as well as distribution of the RFC drafts to relevant experts and WGs of international SDOs working on quantum communication standards, inviting them to cooperation with EITCI QRNG-QSG, expanding work of the EITCI Quantum Standards Group (to over 300 quantum domain and cybersecurity experts), reiteration of the comments, corrections and extending contributions within the RFC documents, publication and dissemination of the resulting Reference Standards documents aimed at increasing prospects of QRNG devices wide industrial uptake and stimulating further development of related international quantum randomness standards.

The activities of the action stem from cooperation in many projects. Predominantly however, the cooperation concerns the SeQre International Quantum Cryptography Commercialization Platform. Results of the undertaken QRNG standardisation efforts also support further technical oriented academic research in this domain, with currently defended QRNG related PhD thesis under a supervision of the action's coordinator.

## What future efforts or activities are still necessary for your area of application?

Only few years ago the European Commission launched EuroQCI, a large-scale program implemented by all EU member states, targeted at building quantum terrestrial & satellite network acting as an infrastructure for quantum systems developed in the EU's Quantum Flagship program and prospectively for anticipated quantum computers. In 2019/2020 two important breakthroughs have been reported by Google (USA) and USTC (China) with the so-called quantum supremacy of quantum processors (Sycamore implemented on superconducting Josephson junctions and Jiuzhang built on entangled photons), able to solve problems beyond the reach of classical computational power.

The advent of quantum computers pronounces the need to further develop quantum standards and especially so in the quantum cryptography domain enabled by the QRNG. The QRNG standardisation efforts need to be further pursued to mature on a similar level as are the standards for the QKD to jointly provide quantum security for the future of communication.

## Online references related to the fellowship work

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 <https://eitci.org/technology-certification/qsg/eqrng>

 <https://www.nature.com/articles/s41598-019-56706-2>

 <https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2019132679>

 <https://www.cenelec.eu/areas-of-work/cen-cenelec-topics/quantum-technologies>

 <https://secre.net/commercialization>

# Definition of KPIs Specific to Testbeds Federations



## **Muslim Elkotob**

*Principal Solutions Architect and Standardization Expert,  
Vodafone  
Germany*

### Sector

5G  
One Shot Fellowship

## Engaged SDOs, WGs and TCs



ETSI TC INT Core Network and Interoperability Testing  
ETSI AFI Autonomic Future Internet  
ITU-T FG-TBFXG  
IEEE INGR Security,  
IEEE INGR SBB (Standardization Building Blocks),  
IEEE INGR SysOpt (System Optimization)  
IEEE INGR Testbeds  
ITU Focus Group FG-TBFXG Testbeds Federations

## Role

Chairman of ETSI AFI  
Vice Chairman ETSI TC INT  
Vice Chairman ITU Focus Group FG-TBFXG Testbeds Federations and Chairman of WG1

## Addressed EU standardisation priorities and gaps

The main gap addressed by this work is the need in the industry of a standardized reference model with a comprehensive set of KPIs with detailed guidelines on what KPIs play what role in capturing Federated Testbeds behaviour. Another important gap is the scattered set of measurement instruments for Federated Testbeds and Testbeds Federations in addition to the lack of many needed KPIs; the lack of interconnecting the KPIs, determining their weights, impacts and significance in reflecting certain behaviours of Federation in ecosystems is part of this gap.

The priority concerns to align on roadmaps among SDOs and key stakeholders in a harmonised and collaborative way is central to this work. In general, all various stakeholders can then help contribute to capturing requirements to be fulfilled by the Testbeds Federations APIs to the platform of the SDOs. This work offers an opportunity to foster such developments. Also, another priority is to build the foundation for an understandable, clear, easy-to-follow and port model that captures ecosystem behaviour with Federated Testbeds.

The key challenge in this project work is capturing a wide range of examples and cases across all relevant dimensions such as verticals, technologies, use-cases, business scenarios, and others.

## Concerned ICT standards and contribution to the related landscape

After successfully co-establishing the ITU Focus Group FG-TBFXG Testbeds Federations for IMT-2020 and beyond (Dec 2021) and setting up an ETSI Work Item to back the TR Standards Document DTR/INT-00181 (TR 103 763) this fellowship has helped me to progress immensely on those two fronts.

At the 3rd regular meeting of the FG, my core contributions were concentrated in one WG3 deliverable on KPIs and one on Advanced Use Case Modelling for Testbeds Federations.

Relevant activities on the ICT Standards landscape that I have driven to a successful state and partially still driving include (within ETSI):

- ▶ ETSI Technical Report (TR) 103 763 based on the new Work Item DTR/INT-00181. The TR Standard provides a Description of Test Requirements and Approach for E2E Federated Testbeds with an Example Use Case of Testing Federated Autonomic Management and Control (AMC) operations.
- ▶ I have been driving a Use Case to leverage the concept of Federated Testbeds, on E2E AI-powered Autonomic Security Management & Control Across Multi-Domain 5G Networks (Ref. Nr. DTR/INT-00900)

Moreover, ITU Recommendation Q.4068, which I produced together with partners, has served as a supporting standard to the Focus Group and its activities of pre-standardisation.

## Impact (on European SMEs, related projects or in society)

### **Impact on SMEs**

KPIs designed and classified to match and qualify Federated Testbeds and Testbeds Federations allow for better qualification and standardisation of the bar needed for any stakeholder (including SMEs) to join a Federation ecosystem. Thus, this work and its subsequent stages after the early ITU-T draft on KPIs will better enable SMEs to take part in Federations value chains and ecosystems and monetize on their assets and contribute with their software, services, and algorithms.

### **Impact on Society**

The work in this fellowship project on KPIs for Testbeds Federations and Federated Testbeds impacts society in the following way:

- ▶ Increasing inclusion and collaboration among stakeholders of all types, especially SMEs and ISVs (Independent Service Vendors) by allowing them to take part in the standardized service-architecture for Testbeds Federations and Testbed as a Service powered and framed using the well designed and structured KPIs explained in this TS Draft deliverable document. Previously, an SME (e.g., ISV) had an ambiguous situation and a higher hurdle/bar to join a Federations ecosystem or value chain.
- ▶ The work done bridges the gap and shortens the distance between stakeholders of various types if they have assets (services, infrastructure, software, etc.) to share via Federation. Today, the technical (IT, Telco) pillar is a key to societal development and evolution; this work allows for more interactions and matching stakeholders to enable more value-added services and monetization that is crucial especially to smaller players (SMEs, etc)

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

I don't know.

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have drafted a technical report on a development of a new standards as well as technical specifications.

## What future efforts or activities are still necessary for your area of application?

The performed work is an essential step the area of KPIs for Federated Testbeds and Testbeds Federations. The results are put into Deliverable Document D3.4 of WG3 in the ITU-T Focus Group on Testbeds Federations; the document is a draft for the to-become Technical Specification (ITU-Documents) which will be a mature pre-standard (in 4-6 months from

now) and then it will be put on the table of ITU SG11 (the parent group of the ITU Focus Group for standardizing technical achievements in final ITU-T formal standards.

### Online references related to the fellowship work

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 [https://portal.etsi.org/webapp/WorkProgram/Report\\_WorkItem.asp?WKL\\_ID=59577](https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKL_ID=59577)

 [https://portal.etsi.org/webapp/WorkProgram/Report\\_WorkItem.asp?WKL\\_ID=63106](https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKL_ID=63106)

 [www.itu.int/rec/T-REC-Q.4068-202108-P](http://www.itu.int/rec/T-REC-Q.4068-202108-P)

 <https://www.itu.int/en/ITU-T/focusgroups/tbfxg>



# Advance Design-for-Test standards for complex electronics systems



**Michele Portolan**

Senior Associate Professor at Grenoble-INP  
France

## Sector

Cross-domain Technologies  
Long-Term Fellowship (under Open Call#6)

## Engaged SDOs, WGs and TCs



IEEE P1687.1 WG Standard for Access and Control of Instrumentation  
Embedded within a Semiconductor Device  
IEEE 1687 RE-Affirmation Working Group

## Role

Secretary of the IEEE 1687 RE-Affirmation Working Group and a Core Member of the IEEE P1687.1 WG

## Addressed EU standardisation priorities and gaps

The WGs that I am working with are led by the major companies in the Electronics Design field: founders such as Intel, Renesas and AMD, and Electronic Design Automation (EDA) software providers such as Synopsys, Siemens and Cadence. Their focus is on short-term applications of the standard to their problems. As an independent academic actor, I was able to steer the discussions and targets toward medium-to-long-term issues. The main priority is to obtain Standards that will profit the wider community in the long run, not only the companies pushing their interests in the WG. Furthermore, the main challenge in such an environment for an academic actor is legitimacy: in order to be taken seriously, it is paramount to prove both a high engagement level, and to be able to provide practical Examples and Proof-of-Concept to support our proposals and point of view.

## Concerned ICT standards and contribution to the related landscape

Thanks to this fellowship, I have been able to make an active contribution to two ongoing IEEE Working Groups: the IEEE P1687.1, which aims to extend the traditional domain of Electronics Testing, and the Renewal WG for the seminal IEEE 1687-2014 standard, which has been widely regarded as a “paradigm shift”.

With this fellowship, I was able to provide a continuous participation to the weekly meetings for both IEEE 1687 and IEEE P1687.1. In particular, the fellowship allowed me to participate to the in-person meeting during the 2022 International Test Conference in Anaheim, CA, USA. This continuous effort allowed me to be elected Secretary of the IEEE 1687 Renewal working group. This official position as Officer gives me a high visibility and an important international recognition.

On the other side, the fellowship allowed me also to focus on the development of Proof-Of-Concept software and demonstrators. This was especially important for the P1687.1 WG: thanks to my demonstrations, I have been able to obtain a prominent position in the discussion and to get several of my propositions accepted.

## Impact (on European SMEs, related projects or in society)

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### Impact on SMEs

Europe has a thriving ecosystem of SME companies working in the different fields of Microelectronics. With my effort in pushing the standards, I am contributing to be as open as possible and to support new usages will help them adopt these new approaches and potentially open up new market niches.

### Impact on Society

This fellowship tackles the deep tech, so it is difficult to evaluate immediate societal impacts. However, there are two long terms impacts:

- ▷ Standard bodies such as IEEE which are mainly driven by the USA. Thanks to this fellowship I was able to strengthen the European contribution to these new standards, and the resulting Dissemination will be a step forward in the effort to European sovereignty in Microelectronics.
- ▷ In general, the aim of Testing is to optimize the production cycles of Electronics Devices and therefore reduce waste, reducing the Environmental impact of the industry.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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No.

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have contributed to technical specifications, and technical reports on development of a new standard, recommendations for new / revised standards and other reference materials.

## What future efforts or activities are still necessary for your area of application?

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At this moment in time, I am one of the few Europeans to participate to these meetings, and the only Academic. The chances of successful knowledge transfer to European companies and universities would be higher with more participants.

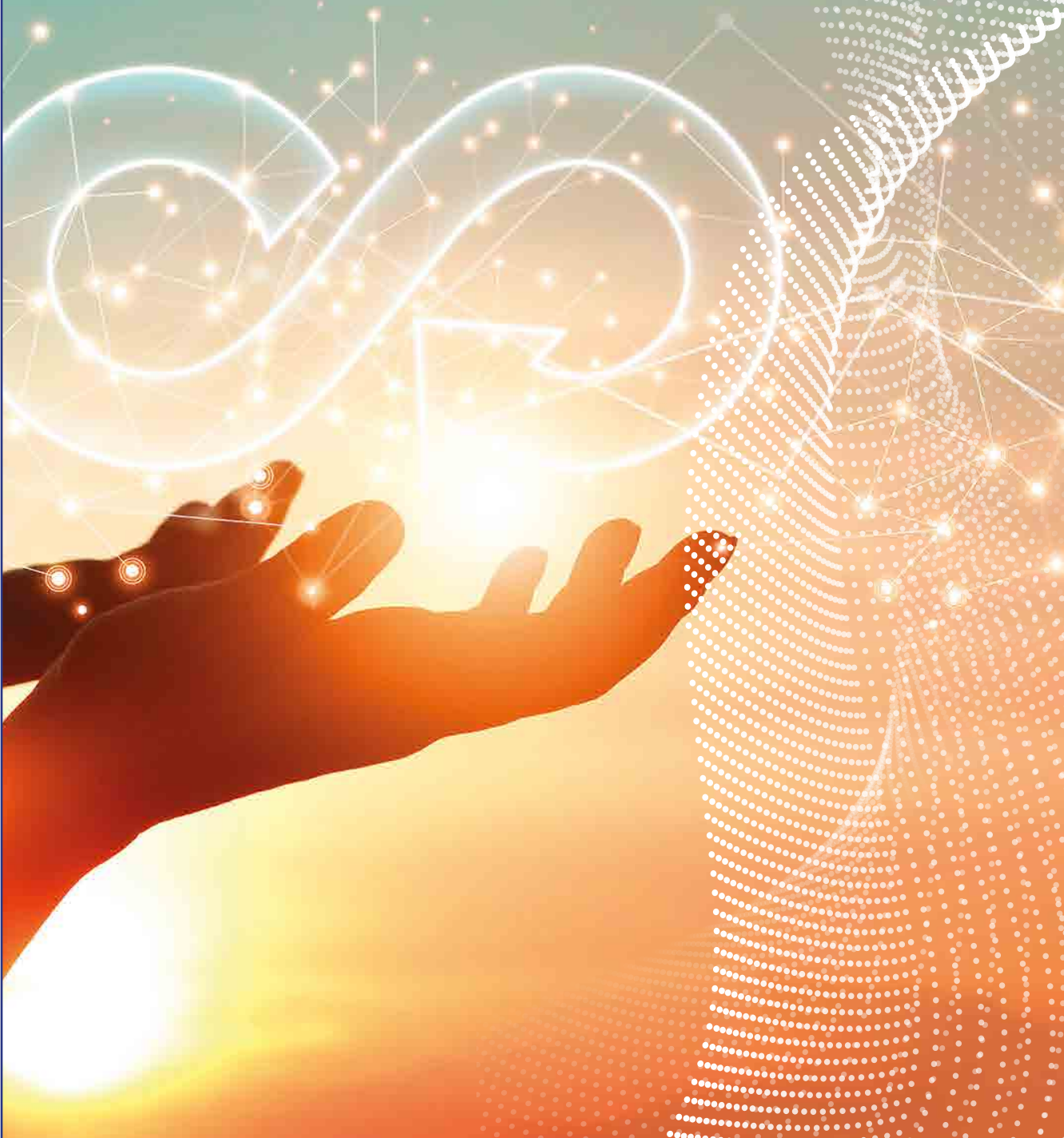
## Online references related to the fellowship work

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 <https://standards.ieee.org/ieee/1687/10896/>

 [www.researchgate.net/publication/366610844\\_IEEE\\_P1687L\\_Extending\\_the\\_Network\\_Boundaries\\_for\\_Test](http://www.researchgate.net/publication/366610844_IEEE_P1687L_Extending_the_Network_Boundaries_for_Test)

# 2. Sustainable Growth



## ■ Promoting adoption of IEEE 1872.2



### **João Manuel Leitão Quintas**

*Principal Researcher, Instituto Pedro Nunes  
Portugal*

#### Sector

Robotics and Autonomous Systems  
Long-term fellowship

### Engaged SDOs, WGs and TCs



IEEE SA P1872.2 Autonomous Robotics (AuR) Ontology Working Group

#### Role

IEEE EPPC on ICT Chairing Editor on the policy statement for AI

### Addressed EU standardisation priorities and gaps

Knowledge models constitute the basic component of knowledge-based approaches in fields such as artificial intelligence (AI) and robotics. Until recently, there was a tendency to develop knowledge models that represent the knowledge in a way most suitable for performing a given task. The need for cooperation among different stakeholders motivated the development of knowledge models that represent a common view of reality. Due to this, in the last years, there has been an increasing adoption of ontologies since they are built for meeting these requirements. In this fellowship, challenges to be addressed include:

- ▷ semantic heterogeneity of information in decision-making systems, - combining static encyclopaedic knowledge,
- ▷ common-sense knowledge,
- ▷ task descriptions,
- ▷ environment models,
- ▷ object information and information about observed actions,
- ▷ using knowledge in perception and actuation including human-robot interaction, grasping and manipulation of objects, navigation, etc.

### Concerned ICT standards and contribution to the related landscape

My fellowship supports the additional commitment and the effective contribution to the development and promoting adoption, of the IEEE P1872.2 standard, which is a logical extension to the CORA ontology by defining additional ontologies appropriate for Autonomous Robotics (AuR).

This project allows a more effective participation from my side, and I bring knowledge and perspective from the European RTD ecosystem related to robotics and automation but also with the application domain of ICT for Health and Active and Assisted Living. This fellowship is expected to influence the preparation of a technology-oriented standard by sharing concerns and requirements that may be relevant for future adoption of the standard in concrete solutions targeting these sectors.

Also, during this fellowship, a new project for a standard was submitted to IEEE and approved, which paves the way for part of the AuR WG continuing working toward IEEE P1872.2 extending the active standard IEEE 1872.2.

## Impact (on European SMEs, related projects or in society)

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### Impact on SMEs

SMEs related to robotics and/or developing artificial agents with a certain degree of autonomy can be impacted by this contribution, as the standard being developed aims to bring added value for integration and interoperability in solutions based on robotic and autonomous systems.

### Impact on Society

This work is supporting the societal impact related to demographic change challenges. Solutions that may adhere to the standard should result in more interoperable, intelligent, sustainable, and cost-effective technologies.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, I am directly involved in the proposal and approval to the new IEEE P1872.3, which will extend IEEE 1872.2 with specific sub-domain ontologies. While IEEE 1872.2-2021 can be considered still a top-level ontology, which is useful to describe system architectures, the case for IEEE P1872.3 will consider standardisation for ontology reasoning on multiple robots.

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have drafted technical reports on recommendations for new or revised standards.

## What future efforts or activities are still necessary for your area of application?

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The landscape for standardisation in Robotics account for near 100 applicable standards. However, many are coming from other areas not specifically from autonomous and robotic (AuR) systems. Additionally, the overall standardisation in terms of knowledge representations for AuR are not sufficiently addressed, hence the motivation and need to continue creating new standardisation projects (e.g., IEEE P1872.3). Moreover, in spite of the existing active standards we can still observe a lack of adoption. Possibly because some AuR applications did not become yet mainstream, but this may be changing within the next 5 to 10 years, as other related fields evolve and societal challenges pressing demand for new technology-based solutions to be developed. Hence, it is my opinion that the state of maturity for the topic I am addressing is still in preliminary stage and requires a continuation of action.

## Online references related to the fellowship work

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 <https://ieeexplore.ieee.org/document/9774339>

 [www.credential.net/7b63465c-13b7-4a15-a991-43ea3715ed0c](http://www.credential.net/7b63465c-13b7-4a15-a991-43ea3715ed0c)

 <https://github.com/joaquintas/aurora>

# Standards for Robotics and Autonomous Systems: Tasks, Semantic Maps, HRI, Multiple Robots



## **Paulo Jorge Sequeira Gonçalves**

*Professor, IDMEC, Instituto Politécnico de Castelo Branco  
Portugal*

### Sector

Robotics and Autonomous Systems  
Long-term fellowship

## Engaged SDOs, WGs and TCs



IEEE WG 1872.1 - Robot Task Representation  
IEEE WG 3140 - Semantic Map for Autonomous Robots Working Group  
IEEE WG 3107: Human-Robot Interaction Terminology  
IEEE WG 1872.3 - Ontology for reasoning on multiple autonomous robots"

## Role

Chair of IEEE WG 1872.3

Member of IEEE WG 1872.1, 3140, 3107

## Addressed EU standardisation priorities and gaps

Several actions of this fellowship contribute to fill the gaps in ICT standards related to robotics, and pursue the challenges defined in the IEEE 1872.1/1872.3 / 3140 / 3107 project standards:

- ▷ Provide a foundational basis for the definition of the tasks that each agent must perform, and all relevant concepts to perform the task. Standardize this knowledge on an ontological framework is the focus, using OWL-S, IEEE 1872.2 and IEEE 1872 ontologies within a consensus ontology for tasks (1872.1).
- ▷ Propose a systematic way of representing knowledge and a common set of terms and definitions, ranging from the ICT, robotics, and autonomous systems domains to operate in partial known or unknown environments, using semantic maps (IEEE 3140).
- ▷ Extend the baseline ontology defined in IEEE 1872.2-2021 (autonomous robots) to address reasoning on multiple robots (IEEE 1872.3).
- ▷ Propose an unambiguous knowledge transfer among humans, robots, and other artificial agents/systems, and obtain semantic interoperability between ICT autonomous systems, e.g., physical agents and software agents within HRI (IEEE 3107).

## Concerned ICT standards and contribution to the related landscape

My fellowship is related to the development of four standards:

- ▷ IEEE P1872.1 - Robot Task Representation;
- ▷ IEEE P1872.3 "Standard for Ontology Reasoning on Multiple Robots"
- ▷ IEEE WG 3140 - Semantic Map for Autonomous Robots Working Group;
- ▷ IEEE WG 3107: Human-Robot Interaction Terminology;

In addition, I have contributed to the EUOS ICT standards landscape in the robotics, autonomous systems, specific domains.

My work is also related to IEEE standards, that are defined using ontologies for task representation for robotics systems, multiple robots and semantic mapping, e.g., that include basic definitions on tasks, actions, resources, communication, behaviour, semantic mapping, etc. And, I aim to represent the agreed concepts, within the community and working group, for human and robot interaction.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

My contribution is related to robotics, HRI, and knowledge representation, based on ontologies. An increasing number of state-of-the-art Robotics and autonomous systems use AI based systems to reasoning, mainly because of the increasing complexity of such systems. Nowadays, knowledge representation for robotics is being regulated worldwide, to which EU SMEs must also comply. As such, knowledge representation for robotics standards will have a huge impact on future robotic and autonomous systems developed by companies.

### Impact on Society

The impact of formal knowledge representation for robotic and autonomous systems will lead to a better understating on the Ai based reasoning of such systems by the Society at large, i.e., common people. As such will enhance the acceptability of those systems.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, I am involved in the start of a new working group, the IEEE 1872.3 “Standard for Ontology Reasoning on Multiple Robots”.

## Have the standardisation activities in your project led to specific deliverables?

The project led to deliverables, namely ontologies for the several WG’s referenced above. Those will be published with the Standards. The IEEE P1872.1 is in its final steps to present a Robot Task Ontology.

## What future efforts or activities are still necessary for your area of application?

The envisioned needs relate to develop application guides to roboticists for a proper applicability of the standards, and standards related to reasoning and its explainability within AI, Data and Robotics.

## Online references related to the fellowship work

<https://standards.ieee.org/ieee/1872.1/6993/>

<https://standards.ieee.org/ieee/1872.3/11037/>

<https://standards.ieee.org/ieee/3140/10851/>

<https://standards.ieee.org/ieee/3107/10709/>

<https://ieeexplore.ieee.org/document/9891749>

# Bridging the gap between EU R&I ecosystem and worldwide standardisation on Smart Energy



**Olivier Genest**  
Director, Trialog  
France

## Sector

Smart Grids and Smart Metering  
Long-term fellowship

## Engaged SDOs, WGs and TCs



IEC SyC Smart Energy JWG3 IEC Smart Energy Roadmap linked to ISO/IEC JTC 1/SC 41  
IEC SyC Smart Energy CAG7 CAG Chairman's Advisory Group  
ISO/IEC JTC1/SC41 "Internet of Things and Digital Twin AG6

## Role

Co-Convenor of IEC SyC Smart Energy JWG3

## Addressed EU standardisation priorities and gaps

This fellowship contributes to the following actions/priorities of the rolling plan for ICT standardisation (2022):

Public sector information, open data, and big data

- ▶ Action 2: Promote standardisation.
- ▶ Action 3: Support of standardisation activities at [...] H2020 R&D&I activities level. We bridge the gap between the EU R&I ecosystem and IEC standardisation.
- ▶ Action 4: Bring the European data community together.

Internet of Things

- ▶ Action 2: Continue ongoing work in semantic standards.
- ▶ Action 3: Provide standards that can be used for compliance for IoT products, systems, applications and processes
- ▶ Action 5: Promote the development and foster the adoption of the international Reference Architecture for IoT developed in ISO/IEC JTC 1/SC 41
- ▶ Action 7: Further outreach to verticals, focusing on the Energy vertical
- ▶ Action 8: Define the technical common ground of the Common European Data Spaces. BRIDGE and IntNET EU research projects, related to this fellowship, will foster the cooperation between the 5 Energy Data Spaces projects.

Smart grids and smart metering

- ▶ Action 1: Reflection of SGTf results.
- ▶ Action 3: Incorporation of SAREF into the full demand-side flexibility chain; SAREF is considered in the BRIDGE project, related to this fellowship, and in IEC TS 63417 project.
- ▶ Action 5: Collaboration with H2020 INTERCONNECT project.
- ▶ Action 6: Collaboration with HE projects on Energy Dataspace. The BRIDGE and IntNET projects are supporting the Energy Dataspace projects



Electric vehicles (EVs)

- ▶ Action 7: Development of the needed standards to support Alternative Fuels (incl. EVs); IEC TS 63460 will support the grid integration of EV charging infrastructure

From IEC SyC Smart Energy perspective, the following challenges are tackled:

- ▶ Integration of new challenges such as virtualisation, digital twin, software-defined systems or named networks into the smart energy roadmap (IEC 63097)
- ▶ Alignment of the e-mobility and grid perspectives to enable EV-based grid support functions mapping of existing standards & standardisation gaps (IEC 63460)

## Concerned ICT standards and contribution to the related landscape

The IEC System Committee Smart Energy deals with systems level standardisation, coordination, and guidance in the areas of Smart Grid and Smart Energy. The JWG3 “Smart Energy Roadmap” is a joint Working Group between the IEC SyC Smart Energy and the ISO/IEC JTC1/SC41 which focuses on Internet of Things and Digital Twin. This purpose of this JWG is to map the existing standards with the relevant systems architectures, identify the standardisation gaps and recommend the development of new standards by TCs. With its systemic approach, the JWG also supports the introduction of IoT and Digital Twin concepts into the smart energy domain and co-ordinate their integration into Smart Energy standardisation.

Two main standards are currently under development/revision within the JWG3:

- ▶ IEC TR 63097 Smart Energy Roadmap: the on-going work aims to update this standard (dated 2017) to update the mapping and gap analysis, include novel technology trends such as virtualisation or digital twin, and identify new required standardisation efforts for smart energy.
- ▶ IEC TS 63460 Architecture and use-cases for EVs to provide grid support functions: the purpose of this new standard is to define a common end-to-end architecture for EVs as DER/DESS, consistently with on-going activities from TCs such as TC69/120/57/..., and then to specify grid support functions to map them to existing standards and to identify standardisation gaps.

As being co-Convenor of this JWG3, I am leading the work on IEC TR 63097 update and following the work on IEC TS 63460. I have also been appointed by France as expert to contribute to IEC TS 63460 project. In addition, I am making sure that the EU R&I results/experience from BRIDGE, ETIP SNET, OPEN-DEI and IntNET are considered at worldwide standardisation level, and I am disseminating the relevant on-going standardisation activities to the three abovementioned initiatives.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

The impact on European SMEs is twofold. Firstly, my company (Trialog) is a European SME, which is impacted by my contribution. In particular, my activities in IEC SyC Smart Energy and ISO/IEC JTC1/SC41 allow to be aware of on-going standards development in the field of IoT and Smart Energy, which is crucial for a company providing consulting and expertise on innovation. Furthermore, My activities in the EU R&I ecosystem allow to share experience based on our R&I projects and to learn from the experience of other projects and actors.

Secondly, the European SMEs from the smart energy sector, in particular those involved in EU R&I projects, are impacted by my contribution on two aspects:

- ▶ Worldwide standards are better aligned with the EU R&I ecosystem, making it easier for Europeans SMEs to make business at worldwide level (less specific development).
- ▶ The EU R&I ecosystem, including SMEs, is better aware of the standards, so its players can develop solutions which are already aligned to worldwide practices.

### Impact on Society

With this fellowship, my work supports the development of smart energy grids, allowing to integrate a high share of renewable energy sources and to support new usages such as transports electrification (e-mobility). Smart energy grids also enable a more efficient operation of the energy systems (i.e., less energy losses) and foster an active commitment of grid users (i.e., consumers or prosumers) towards the energy transition.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, my activities aim to Update IEC 63097 Smart Energy roadmap and to develop IEC 63460 Architecture and use-cases for EVs to provide grid support functions.

### Have the standardisation activities in your project led to specific deliverables?

No.

### What future efforts or activities are still necessary for your area of application?

The cross-fertilization between EU R&I ecosystem and worldwide standardisation on Smart Energy needs to be pursued. The BRIDGE project has launched in 2021 an action on “BRIDGE contribution to standardisation”: the continuation of my work will allow to support the newly-created BRIDGE Standards User Group, both by pushing EU R&I results to standardisation and by ensuring that EU R&I is aware of worldwide standardisation activities and results.

The update of IEC 63097: the work is on-going, based on a methodology and supporting tools defined to enable iterative writing, validation and publication of the updated content. A first batch has already been completed and published. This work should be continued.

The development of IEC 63460: the work has started in September 2022 and discussions are on-going to align the EU approach together with the US and JP perspectives. Further work is planned to lead to the CD.

### Online references related to the fellowship work

 [www.iec.ch/dyn/www/f?p=103:187:728165683742574:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:11825,25#4](http://www.iec.ch/dyn/www/f?p=103:187:728165683742574:::FSP_ORG_ID,FSP_LANG_ID:11825,25#4)

# Standards for data spaces and trustworthy AI integrating IoT and digital twins



**Antonio Kung**

CEO, Trialog

France

## Sector

Building Trust

Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO/IEC JTC1/SC 27 Information security, cybersecurity and privacy protection

ISO/IEC PC317 Consumer protection: privacy by design for consumer goods and services

ISO/IEC JTC1/AG8 Meta Reference Architecture and Reference Architecture for Systems Integration

ISO/IEC JTC1/WG13 Trustworthiness

ISO/IEC JTC1/SC41 Internet of things and digital twin AG25, AhG30, AG31

JTC1/SC42 Artificial intelligence Liaison with ISO/IEC JTC1/AG8, WG13

## Role

Convenor of JTC1/SC41/AG25, AhG30, AG31

## Addressed EU standardisation priorities and gaps

My fellowship is based on the gap that there are no standards concerning data spaces focusing on architecture and interoperability aspects. This is a barrier for industry, for SMEs. Also, there is no guidance on guide the creation of interoperability standards on the IoT-edge-cloud continuum. This is a barrier for IoT-edge-cloud pilots when they wish to promote their work to standardisation and create an impact. Therefore, there is a need to provide guidance on how to ensure trustworthiness in artificial intelligence. This is a barrier for industry on how they will comply with the AI act.

## Concerned ICT standards and contribution to the related landscape

With this fellowship, I lead the completion and the creation of standards related to European projects, continuing the work that was already initiated. The aim is to complete two standards:

- ▷ ISO 31700-2 privacy by design for consumer goods and services – use case (task 1) in ISO/IEC PC317
- ▷ ISO/IEC 27563 security and privacy in AI use cases (task 2) in ISO/IEC JTC 1/SC 27

I will also pursue the work in relation to four preliminary work items:

- ▷ ISO/IEC PW1 “IoT Behavioural and policy interoperability” (task 3) in ISO/IEC JTC 1/SC 41
- ▷ ISO/IEC PW1 “Guidance on IoT and digital twin use cases” (task 4) in ISO/IEC JTC 1/SC 41
- ▷ ISO/IEC PW1 5896 Cybersecurity assurance of complex system (task 5) in ISO/IEC JTC 1/SC 27
- ▷ ISO/IEC PW1 6089 Guidelines for privacy protection in AI systems (task 6) in ISO/IEC JTC 1/SC 27

I contribute to prepare the submission of two standards:

- ▷ ISO/IEC PWI 27568 “Security and privacy of digital twins” (new task 8) in ISO/IEC JTC 1/SC 27
- ▷ ISO/IEC 27091 “Cybersecurity and privacy protection – artificial intelligence – privacy protection” (extension of task 6)

These standards contribute to the ICT standards landscape in privacy, AI, cybersecurity, data spaces and digital twins. They leverage results from European research in t Contributing to a family of data space standards: Three position papers prepared by AIOTI, BDVA, and the OpenDei support actions on data spaces.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

The proposed standards on architecture and interoperability will enable SMEs to easier access to knowledge, as they are available through the standards. They will be able to provide services related to the use of these standards, such as training and consulting. They will also have the possibility to participate in the supply chain of data, as the standards will provide a clear open ecosystem. A typical example is the participation to a common marketplace. Finally, the SME will be able to meet assurance and testing requirements that are clearly stated and demonstrate that they supply components at the right level of quality.

### Impact on Society

The societal impact is threefold. By focusing on assurance aspects, the standards will pave the way to a practice of data sharing that is trustworthy in a context where there are many stakeholders in the ecosystem. By integrating at the architecture level all the trustworthiness properties (e.g., safety, security, resilience, privacy, reliability, ethics, explainability, unbiased) and at the process level all the needed features (e.g., continual improvement, x-by-design, conformity assessment), it will create a sustainable approach by defining principles on data spaces and providing standards related to the operationalisation of the principles, standards will promote the FAIR principles.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, my contribution impacts several PWIs as listed above.

## Have the standardisation activities in your project led to specific deliverables?

Yes, a technical report on a development of a new standard.

## What future efforts or activities are still necessary for your area of application?

In collaboration with AIOTI and BDVA, a series of initiative has led to the creation of SC41/AG31. A similar move will be made in SC42. This is paving the way to future data space standards.

## Online references related to the fellowship work

[www.iso.org/committee/45306.html](http://www.iso.org/committee/45306.html)

[www.iso.org/committee/6935430.html](http://www.iso.org/committee/6935430.html)

[www.iso.org/committee/45020.html](http://www.iso.org/committee/45020.html)

[www.iec.ch/dyn/www/f?p=103:14:302927768918844:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:28900,25](http://www.iec.ch/dyn/www/f?p=103:14:302927768918844:::FSP_ORG_ID,FSP_LANG_ID:28900,25)

<https://aioti.eu/guidance-for-the-integration-of-iot-and-edge-computing-in-data-spaces/>

<https://european-big-data-value-forum.eu/wp-content/uploads/2022/10/Data-sharing-spaces-and-interoperability-position-paper-AKung.pdf>

[www.opendei.eu/case-studies/reference-architectures-and-interoperability-in-digital-platforms/](http://www.opendei.eu/case-studies/reference-architectures-and-interoperability-in-digital-platforms/)

# CrowdWireless+: Enriching Crowd Wireless Energy Sharing with Battery Ageing Mitigation



## **Theofanis Raptis**

*ITU-T Work Item Lead Editor, Consiglio Nazionale delle Ricerche  
Italy*

### Sector

Smart Cities and communities  
Long Term Fellowship

### Engaged SDOs, WGs and TCs



ITU-T SG20: Internet of things and smart cities and communities, Q5:  
Study of emerging digital technologies, terminology and definitions

### Role

Member

### Addressed EU standardisation priorities and gaps

The aim of the analysis within ITU is to identify existing gaps and market needs in the area of P2P crowd charging systems. Special focus has been given to smart city vertical areas, as well as technological enablers such as battery ageing mitigation, social information management, standardized prototyping.

### Concerned ICT standards and contribution to the related landscape

The funding is supporting the development of the ongoing work item YSTR.P2P-CC in SG20 of ITU-T. A P2P crowd charging system is a distributed system comprising ICT infrastructure provided by the public (e.g., smartphones). The distributed resources of a P2P crowd charging system operate in a collaborative manner driven to perform energy sharing tasks by using their built-in power transfer modules. This work item is conducting a review of and provide an analysis of the current state of P2P crowd charging systems in terms of currently available technological solutions, ongoing research, and recent and ongoing standardisation activities in this area.

### Impact (on European SMEs, related projects or in society)

#### **Impact on Society**

Use of technologies based on wireless energy sharing are extending to more and more applications yielding a fast-growing market in the consumer electronics sector. Society and industry should overcome obstacles for stakeholders to fully take advantage of this technological opportunity: The current wired (and non-P2P wireless)-based development model that makes charging applications highly centralised and inflexible generate inconvenience to users. The P2P wireless energy sharing vision that universally accessible standards can have the same positive effects on society as wired energy sharing standards and has identified P2P wireless energy sharing interactions as an area where standards can foster the development of innovative approaches, promote use of P2P applications and contribute to the solution of existing social energy sharing challenges.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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The current standards in P2P wireless energy sharing are in very early stage. The lifetime of the ITU-T YSTR.P2P-CC work item spans until Q4/2023. Given that the work item's appreciation is high from the point of view of different industrial and academic stakeholders, it is highly probable that it will result in at least the publication of an ITU Technical Report. The work conducted during this fellowship has raised awareness of the enormous potential of the concepts under development and the engaged ITU working group editorial team is aligned and continues working in crowd wireless energy sharing and battery ageing mitigation.

## Have the standardisation activities in your project led to specific deliverables?

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ITU Technical Report of YSTR.P2P-CC. Version 3-2-2023.

## What future efforts or activities are still necessary for your area of application?

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Further research on the social-centric aspects of the market needs.

## Online references related to the fellowship work

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 [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17940](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17940)

# Leading the development of ITU standards for IoT applications in smart cities and communities



## **Marios Angelopoulos**

*Associate Professor, Bournemouth University  
United Kingdom*

### Sector

Smart Cities and communities  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



**ITU-T Study Group 20 Internet of things (IoT) and smart cities and communities (SC&C)**

### Role

Co-Rapporteur of Question 5 “Study of emerging digital technologies, terminology and definitions” in ITU-T Study Group 20 “Internet of Things, smart cities and communities”

Liaison co-Rapporteur of Study Group 20 to the Standardization Committee for Vocabulary (SCV)

## Addressed EU standardisation priorities and gaps

My work in ITU addresses the priorities of the call pertaining to smart cities and communities/ technologies and services for smart and efficient energy use, and citizen centric digital public services and EMC radiation. The work is highly relevant to the European Commission’s strategy for Europe as the development of standards provisioning the use of crowdsourcing methodologies is aligned with one of the nine initiatives mentioned in a recent report by the European Commission DG Communications Networks, Content & Technology to lead the way is ‘empowering cities and communities across Europe’ through ‘better public services for citizens, better use of resources and less impact on the environment’. Furthermore, crowdsourcing methods enable the re-purposing of privately own digital assets (such as smartphones) and therefore in line with sustainability and the transition to a Circular Economy as described in the Green Deal.

## Concerned ICT standards and contribution to the related landscape

This fellowship supports my engagement and contribution to the International Standardisation Union (ITU), one of the most prominent and impactful SDOs in the area of ICT with a global outreach to policy makers, Industry and Academia. In particular, the fellowship supports me in my role as Co-Rapporteur of Question 5 “Study of emerging digital technologies, terminology and definitions” in ITU-T Study Group 20 “Internet of Things, smart cities and communities” and as Liaison co-Rapporteur of Study Group 20 to the Standardization Committee for Vocabulary (SCV). Currently SG20/Q5 has five active work items covering areas such as blockchain terms and definitions for IoT, digital transformation, and smart oceans. Furthermore, I also lead the editorship of a work item for ITU Technical Report YSTR.P2P-CC “Current state of P2P crowd charging platforms and corresponding market needs”.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

According to Allied Market Research, the Wireless Power Transfer market is projected to be

worth USD 35 Billion by 2030 at a 27 CAGR. The development of international standards will help provide SMEs, policy makers and regulators with common references thus helping overcome market barriers such as technology fragmentation, thus promoting market growth.

### **Impact on Society**

In the context of this fellowship, I co-lead the editorship of a work item on P2P crowd-charging; a paradigm of crowdsourced systems where privately owned digital assets (such as smartphones) are re-purposed, therefore contributing to sustainability and the transition to a Circular Economy as described in the Green Deal. Furthermore, the new work item will identify and outline corresponding market needs with the aim of underpinning the establishment of a normative ITU-T Recommendation. This activity will therefore support growth in the corresponding market opening commercialisation pathways, while at the same time promoting EU initiatives and strategic objectives on sustainability, better public services for citizens, better use of resources and less impact on the environment.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, this fellowship has been successful in supporting work on the work item ITU-T YSTR.P2P-CC as well as supporting my presence and involvement in the Focus Group on AI for Natural Disaster Management (FG-AI4NDM).

### Have the standardisation activities in your project led to specific deliverables?

Yes, I have contributed to a technical report on reference material.

### What future efforts or activities are still necessary for your area of application?

The typical timescale for work items to be concluded in ITU is around two years (from the establishment of a work item until the publication of its outcome). This fellowship has been successful in establishing a new work item in an area that is highly relevant to the European strategic agenda. As such, continual support of this activity is suggested in order to allow for its successful fruition.

### Online references related to the fellowship work

[www.itu.int/net4/ITU-T/lists/loqr.aspx?Group=20&Period=17](http://www.itu.int/net4/ITU-T/lists/loqr.aspx?Group=20&Period=17)

[www.itu.int/ITU-T/workprog/wp\\_search.aspx?sg=20&q=5](http://www.itu.int/ITU-T/workprog/wp_search.aspx?sg=20&q=5)

[www.itu.int/en/ITU-T/focusgroups/ai4ndm/Pages/default.aspx](http://www.itu.int/en/ITU-T/focusgroups/ai4ndm/Pages/default.aspx)



# Sanitisation and secure data deletion of the information media in end-of-use ICT devices



**Leandro Navarro**

*Professor, Universitat Politècnica de Catalunya  
Spain*

## Sector

Circular Economy  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ETSI EE Environmental Engineering  
ITU-T Q7/SG5 Environment, climate change and circular economy



## Role

Chair (co-rapporteur Q7/SG5, member of ETSI EE)

## Addressed EU standardisation priorities and gaps

The scope of the work is linked to the effort towards more sustainable ICT products and more circular processes. The gap is in the development of methods for the secure deletion of data in information media at end-of-use and end-of-life of ICT devices. The main challenge is the standardisation of ways to ensure 'secure data deletion', the effective erasure of all traces of existing data from data storage devices.

## Concerned ICT standards and contribution to the related landscape

This fellowship supports my role as editor and co-rapporteur to develop a standard about good practices for the sanitisation or secure deletion of information media in end-of-life ICT devices. The work items in ITU-T are called L.GPSIM and L.ME\_DD, the last connected to ETSI EE for a technically aligned standard.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

Good, trusted, secure data deletion is one of the main deterrents to the secondary use of ICT devices. Developing harmonised ways as standards to delete information media in these devices can help scale up the second-hand market for ICT and reduce the risks of information leakage. Many SMEs, in Europe and globally, need these standards to enable and scale up their businesses in this direction. In addition, the L.ME\_DD/ETSI work supports and complements an EU regulation with requirements for the industry to provide ways for users to exercise their right to delete information media for users safely.

### Impact on Society

Furthermore, the second-hand market enables digital inclusion, creating a supply of lower-cost devices that can reach more people, create jobs in repairing and refurbishing these devices, and help society reduce its environmental impact.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, two recommendations/standards are in an advanced draft format, one for L.GPSIM and another for L.ME\_DD work items.

## Have the standardisation activities in your project led to specific deliverables?

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Yes, there are drafts of both baseline documents for the corresponding draft standards.

## What future efforts or activities are still necessary for your area of application?

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Verification and discussion of the completeness and precision of the content of both drafts, merging any potential contribution, getting comments from the EC (ETSI side), reaching consensus among the work item participants, and going through the approval process until publication.

## Online references related to the fellowship work

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 [www.itu.int/en/ITU-T/studygroups/2017-2020/05/Pages/default.aspx](http://www.itu.int/en/ITU-T/studygroups/2017-2020/05/Pages/default.aspx)

# 3. Innovation for Digital Single Market



# KOALA: Knowledge-driven Data Quality assessment for trustable AI in IoT and Robotics



## **Antonio Jara**

*Head of Research and Development, HOPU  
Spain*

### Sector

Smart Cities  
Long Term Fellowship

### Engaged SDOs, WGs and TCs



IEEE P2510  
OMA LwM2M  
OGC SensorThings  
TMForum “Smart data models”

### Role

Chair, IEEE P2510 (Quality of Sensor Data); Member in OMA LwM2M.

### Addressed EU standardisation priorities and gaps

The aim of my fellowship is to enable cross-vertical standards, since, current standards are working on specific verticals such as IoT, robotics, drones, and connected cars / C-ITS, among others. I aim at endorsing the cooperation between ETSI and IEEE to make data quality comply with standards and interfaces (e.g. ETSI NGSI-LD...). Finally, I also work on Data Quality validation and data curation capabilities and standards, that can be integrated with Data exchange standards as ETSI NGSI-LD (FIWARE) and the emerging data marketplaces, and data spaces as GAIA-X

### Concerned ICT standards and contribution to the related landscape

The main objective of this fellowship is to develop a reliable solution to verify that data coming from multiple sources are reliable, trustable and quantified data quality based on the IEEE P2510 “Standard for Establishing Quality of Data Sensor Parameters in the Internet of Things Environment”. This project will provide guidelines published in IEEE about how to carry out contextual analysis to assess data quality through Knowledge-based approaches such as machine learning, contextualisation and integration with data spaces.

The cooperation of standards such as IEEE PAR 2510 standard for data quality with the new needs of the integration and compliance with data spaces, and the capacity to integrate data quality validation over datasets (CEN/TS 17660) are key contributions to the ICT Digital Single Market contributions, which are integrating FIWARE, Data Spaces and with this contribution Data Quality.

FIWARE Foundation (as a member of the board of directors) to synergise with Data Spaces and Data Business alliance to enable this integration. The implementation of these data quality assessment has been introduced into FIWARE smart data models and FIWARE metadata as the first step for its adoption; a real example has been implemented for air quality sensors, as well as a validation and implementation with CEN/TS 17660 has been contributed.

## Impact (on European SMEs, related projects or in society)

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### Impact on SMEs

This work is key contributions as part of the innovation and differentiation of the SME Libelium, where I play the role of Chief Scientific Officer. Therefore, it has a total and direct impact over SMEs in terms of providing knowledge, differentiation capabilities and innovation.

### Impact on Society

The main application for validating these results is air quality and pollution data quality assessment, which has a direct connection over urban health and the investments to enhance quality of life, reduce the impact of climate change and raise equality among all the citizens. In details, this societal impact is defined properly as part of the World Health Organization initiative OneHealth and the KPIs, Health Impact Assessments where air quality is correlated with health impact in indicators as DALYs.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, I have contributed to dissemination of the standard IEEE P2510 “Standard for Establishing Quality of Data Sensor Parameters in the Internet of Things Environment”.

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have drafted technical reports on the development of a new standards and on reference data.

## What future efforts or activities are still necessary for your area of application?

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There is a very good momentum to consolidate the results into more guidelines and more documents, cooperation with SDOs as CEN/TS, GAIA-X and FIWARE. Thereby, its continuation will scale-up the impact of this relevant and well-accepted innovation.

Therefore, the goal of a continuation must be focused on extending it, leveraging cooperations with other SDOs that promote adoption and raise awareness based on guidelines, examples and more implementations in other use-cases, beyond the air quality one used as a reference of this work.

## Online references related to the fellowship work

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 <https://omaspecworks.org/what-is-oma-specworks/iot/lightweight-m2m-lwm2m/>

 <https://standards.ieee.org/wp-content/uploads/import/governance/nescom/nescom-12072021rec.pdf>

 <https://ieee-sensors.org/standards-activity/>

# ■ ISCC – International Standard Content Code



## **Titusz Pan**

*Expert and Developer, ISCC Foundation  
Germany*

### Sector

Trusted Information  
Long Term Fellowship

### Engaged SDOs, WGs and TCs



ISO/TC 46/SC 9 - WG 18 - NP 24138 International Standard Content Code

### Role

Member

### Addressed EU standardisation priorities and gaps

While ISO/TC 46/SC 9, Information and Documentation, Identification and Description, has established a variety of specific identifier standards, a content-dependent identifier for digital assets in all content formats has not yet been agreed.

Digital content is dynamic, always in motion, and acted upon globally by a variety of entities with different interests and requirements. Digital content continuously re-encodes, resizes, and re-compresses, changing its data as it travels through a complex network of actors and systems. These circumstances require a special design for a universal identifier that is capable of matching transcoded or otherwise transformed content.

### Concerned ICT standards and contribution to the related landscape

ISO/TC 46 is a technical committee responsible for developing and maintaining standards related to information and communication technology (ICT). The subcommittee “Information and description” (SC9) has established specific identifier standards like the ISBN, ISRC, and others targeting individual sectors. My fellowship has supported the work on the upcoming ISCC standard, which is the first universal identifier and fingerprint for text, image, audio, and video-based digital media assets.

### Impact (on European SMEs, related projects or in society)

#### **Impact on SMEs**

Advanced content identification technologies are mostly proprietary systems used by large technology corporations to improve their efficiency in managing, matching, and monetizing digital content. The ISCC is the first standard that enables SMEs across different sectors of the media landscape to use content identification technologies. The ISCC standard will be published with an open-source reference implementation that SMEs can use to generate interoperable ISCC-CODEs for their digital assets without requiring a third-party service. The use cases for ISCC-CODEs cover many applications, such as timestamping, content indexing, matching, plagiarism detection, and fake media detection.

#### **Impact on Society**

The ISCC is a foundational standard that supports the development of applications that tackle the challenges of fake media and copyright infringement.

The ISCC positively impacts the fake media problem by providing a way to identify and track the source and ownership of digital content. It can help to reduce the spread of fake news and misinformation by allowing fact-checkers and others to trace the origins of a given piece of content more easily and determine its credibility.

The ISCC can also reduce instances of copyright infringement and plagiarism by providing a way to identify the source and ownership of digital content. The ISCC benefits creators and rights holders by allowing them to protect and monetize their works. It can also help consumers and users by ensuring they have access to original content that they can adequately attribute to its creators.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, in addition to the work on ISO/CD 24138, I developed an accompanying W3C DID method specification.

### Have the standardisation activities in your project led to specific deliverables?

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Yes, to technical specifications.

### What future efforts or activities are still necessary for your area of application?

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ISO/CD 24138 needs to go through the last stages (DIS & FDIS) to become a published ISO standard.

### Online references related to the fellowship work

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 [www.iso.org/standard/77899.html](http://www.iso.org/standard/77899.html)

 <https://core.iscc.codes/>

 <https://sdk.iscc.codes/>

 <https://ieps.iscc.codes/>

 <https://iscc.io/>

# Development of OGC Points of Interest (POI) Data Model and Standard, and POI Standards WG leadership



## **Christine Perey**

*Expert, PEREY Research & Consulting  
Switzerland*

### Sector

Cross Domain Technologies  
Long Term Fellowship

## Engaged SDOs, WGs and TCs

**Open Geospatial Consortium Points of Interest Standard Working Group**

### Role

Contributor/editor of draft Points of Interest Data Model and Standard, and Co-chair of OGC POI SWG

## Addressed EU standardisation priorities and gaps

With this fellowship, I focus on the lack of a POI standard that hampers use of POI data in many domains, including but not limited to industrial and enterprise users. For example, when robots or people in professional roles, such as builders, technicians on service and repair assignment, they must use diverse sources of information including private and public maps. The lack of POI standards has an impact when citizens move between geographically-defined spaces (e.g., borders) such as within Shengen zone in Europe. If the POI provider is not international, users must change POI client applications to match the local POI data publisher's format.

A Europe-centric POI data model and encoding format standard (or a widely adopted open-source project) does not exist. However, several regional and national POI data publishers (governments of Belgium and Denmark, AfriGIS, Australian Mapping Agency), engineers from Google Maps and large end users of POI have joined the OGC POI SWG and are now working together.

In the past six months, the Overture Maps Foundation, a new project of the Linux Foundation, has emerged and may have POI interoperability in its scope. The POI SWG is actively seeking to liaise with the Overture Steering Committee and other groups who seek POI interoperability to determine how well the draft POI Conceptual Model fits their needs.

In addition, there is need for a developer or users' guide for the POI Conceptual Model Standard. Since the beginning of December 2022, the POI SWG is working actively on a guide for those who may need to aggregate or publish POI using the OGC POI Standard.

## Concerned ICT standards and contribution to the related landscape

The ICT standard on which this grant is contributing is called OGC Points of Interest Encoding Standard v 1.0. I continue to lead a team of 10 highly committed OGC members with diverse skills and interests. The SWG meets weekly for one hour and uses GitHub to revise and continue the editing of a new POI standard. A standard architect with model-based approach continues to improve the first draft for the first POI logical model. The model has expanded



to be very consistent with pre-existing standards (OGC and ISO, and by the end of 202, two milestones were achieved:

- ▷ Completion of first draft UML Conceptual Model for POI
- ▷ Completion of draft JSON Schema for the POI Conceptual Model

## Impact (on European SMEs, related projects or in society)

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### Impact on SMEs

By meeting requirements of many stakeholders across multiple domains, in Europe and around the world, and providing a single, domain-neutral POI data model and set of data encodings, this activity will reduce data and industry fragmentation. When successfully published by a world-renown standards development organization with tight cooperation with European standards groups such as TC211, an open POI data format will enable existing local and regional POI data providers who adopt the standard to expand their business opportunities to many new domains. Also, it will support creation of new business opportunities for citizens, users, and publishers in Europe and beyond.

### Impact on Society

The impacts of having a widely adopted standard for encoding points of interest will be high in many industries, reducing barriers to data portability and interoperability of solutions and services for society and industry.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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I don't know.

## Have the standardisation activities in your project led to specific deliverables?

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I have drafted technical specifications.

## What future efforts or activities are still necessary for your area of application?

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In general, there are no other standards on the topic of points of interest. All publishers and services that deliver POI must have their own data models. Since the original proposal was submitted for support, the POI specification has been expanded and a draft is published on GitHub.

We have created/opened and managed over 30 issues. Since it has not been submitted to the OGC Architecture Board and the members of OGC have yet to ratify the specification, the web site has not been launched and supporting materials have not been publicly released.

The work on this standard is in progress and there is good momentum, however, it is unfinished and requires additional support and leadership.

## Online references related to the fellowship work

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 <https://github.com/opengeospatial/POI>

 [www.ogc.org/](http://www.ogc.org/)

## Decentralised Media Rights Ecosystem



**Panos Kudumakis**

Consultant

United Kingdom

### Sector

Blockchain and DTL

Long Term Fellowship

### Engaged SDOs, WGs and TCs



ISO/IEC “ISO/IEC JTC1/SC29/WG03 MPEG Systems subgroup on Smart Contracts for Media

### Role

Chair of ISO/IEC JTC1/SC29/WG03 MPEG Systems subgroup on ‘Smart Contracts for Media’ & Head of UK Delegation of ISO/IEC JTC1/SC29 (MPEG & JPEG)

### Addressed EU standardisation priorities and gaps

Copyright legislation has continuously evolved so that fair, timely and transparent revenues are returned to artists and rights holders, e.g., US Music Modernisation Act and EU Digital Single Market Copyright Directive. Meanwhile, several key artists and media companies have turned their hopes for resolving these issues to blockchain, e.g., Open Music initiative by Berklee ICE in US and Mycelia by Imogen Heap in UK.

Furthermore, in line with EC Rolling Plan for ICT Standardisation (2022), Action 7 ‘to allow the flow of smart contracts between different DLTs’, pp 143, the aim of this fellowship project is twofold:

Firstly, I work on the finalisation of ISO/IEC 21000-23 Smart Contracts for Media: This standard will greatly assist the media stakeholders in achieving effective interoperability for the exchange of verified contractual data between different DLTs. Such a process in turn will increase trust among the stakeholders for sharing high-value data (e.g., music rights) in the ecosystem. Another important feature of this standard is that it offers the possibility to bind, the clauses of a smart contract with their corresponding ones of the narrative contract. In this way, each party signing an ISO/IEC 21000-23 conforming smart contract will be able to know exactly what its clauses express.

Secondly, I contribute to initiate ISO/IEC 23000-23 Decentralised Media Rights Application Format: A standards-based fair and sustainable trade of music and media ecosystem is envisaged based on widely deployed MPEG technologies (e.g., audio-visual codecs, file formats, and streaming protocols), including emerging MPEG IPR ontologies that can be executed as smart contracts on DLT environments, thanks to ISO/IEC 21000-23. Such a decentralised media rights ecosystem can drive a shift of power in the music and media value chain (e.g., from the intermediaries to artists and rights holders).

While the former has finally been published, the latter is rather challenging due to lengthy time process and fierce competition.

### Concerned ICT standards and contribution to the related landscape

There is a growing belief that blockchain technologies constitute a revolutionary innovation in how we transfer value electronically. In that vein, blockchain may be a suitable complement to ontologies to achieve Tim Berners-Lee’s vision of the Semantic Web. Therefore, if this

complementarity is to be achieved blockchain and ontologies must co-evolve.

In the last few years, ISO/IEC JTC1/SC29/WG03 MPEG Systems Working Group has developed several standardized ontologies catering to the needs of the music and media industry with respect to codification of Intellectual Property Rights (IPR) information toward the fair trade of music and media. MPEG IPR ontologies can be used by music and media value chain stakeholders to share and exchange, in an interoperable way, all metadata and contractual information connected to creative works, leading to transparent payment of royalties. However, the challenge that naturally arises is how MPEG IPR ontologies can be converted to smart contracts that can be executed on existing DLT environments, thus enriching DLT environments with inference and reasoning capabilities inherently associated with ontologies.

Thus, an MPEG Systems subgroup has been established on 'Smart Contracts for Media' with the aim to develop the means (e.g., application programming interfaces) for converting MPEG IPR ontologies (ISO/IEC 21000-19 Media Value Chain Ontology, 21000-19/AMD1 Audio Value Chain Ontology, 21000-20 Contract Expression Language and 21000-21 Media Contract Ontology) to smart contracts that can be executed on existing DLT environments. The resulting standard, ISO/IEC 21000-23 Smart Contracts for Media, which has finally been published on 17 Nov. 2022, is envisaged to close the interoperability gap toward a semantic music and media blockchain. As such, it has the potential to unlock both the Semantic Web and in turn the creative economy and open the way forward for other industry domains.

## Impact (on European SMEs, related projects or in society)

### **Impact on SMEs**

EU Digital Single Market Copyright Directive aim to facilitate a fairer marketplace for rights holders and remuneration of authors and performers. Effective IP rights management in the digital environment is key to support the competitiveness of creative industries. More broadly, most of the internet traffic is around creative content, so that creative industries are key to generating economic value for all the stakeholders involved in the creative value chain. Thus, creative SMEs need to be empowered to make better decisions and deploy more advanced solutions based on insights gleaned from data. To that end, MPEG IPR ontologies based smart contracts - thanks to ISO/IEC 21000-23 Smart Contracts for Media which its publication was the focus of this fellowship - supported by rich semantic copyright models can be handy when data-based decisions need to be derived by evidence and logic, leading to new business models that can be efficiently deployed on decentralised digital media platforms.

### **Impact on Society**

Inference and reasoning capabilities normally associated with ontology use cannot naturally be done in a blockchain environment. Bridging this gap has the potential to unlock the semantic web and in turn the creative economy. The latter is not only one of the most rapidly growing sectors of the world economy, but also a highly transformative one in terms of income-generation, job creation, export earnings, quality of life and social cohesion. Recent studies have shown that the creative sector is contributing 4.4 % to the EU GDP, while providing quality jobs to 8.3 million people across EU27.

However, the creative economy sector is highly mobile, representing both a risk and an opportunity. With the right investment, policy, regulatory and immigration regime, the EU could leap the rewards as leader in this field. Get it wrong and swathes of this highly internationalised workforce will relocate to Canada and US whose governments are working hard to create attractive conditions for growth.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes. Towards enabling a fairer marketplace for rights holders and remuneration of authors and performers, this fellowship enables me to finalise the development of ISO/IEC 21000-23 Smart Contracts for Media which has been published as International Standard (IS) on 17 Nov. 2022, and to initiate work on a new standard ISO/IEC 23000-23 Decentralised Media Rights Application Format which is at registration stage.

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have drafted technical specifications.

## What future efforts or activities are still necessary for your area of application?

The standards in this field are mature. However, continuation of actions is suggested.

Publication of the International Standard (IS), the ISO/IEC 21000-23 Smart Contracts for Media, took place on 17 Nov. 2022. Meanwhile, a white paper on 'MPEG Smart Contracts for Media' has also been published at the 138th MPEG meeting.

ISO/IEC 23000-23 Decentralised Media Rights Application Format work has been initiated with respect to the following mandate. Study and solicit contributions (e.g., technologies and APIs) for ISO/IEC 23000-23 Decentralised Media Rights Application Format in the areas: 1) Smart contracts and DLTs, 2) Rights and metadata management, 3) Content and creator IDs, and 4) File formats and streaming protocols. At the 140th MPEG meeting, revised Technologies under Consideration (TuC) for ISO/IEC 23000-23 Decentralised Media Rights Application Format document have been published including motivation, scope, use cases, architecture, and technologies. At the 141st MPEG meeting, it is envisaged to further identify and describe APIs and workflows needed for the interaction of the technologies involved towards a Working Draft (WD).

## Online references related to the fellowship work

📄 Resources for ISO/IEC 21000-23:2022 Smart Contracts for Media: [www.iso.org/standard/82527.html](http://www.iso.org/standard/82527.html)

📄 Reference Software: <https://tinyurl.com/mrdfzs9t>

📄 Demonstration (incl. videos): <https://tinyurl.com/476dnrfj>

📄 White paper (incl. slides): <https://tinyurl.com/2ne769wn>

📄 Short article: <https://tinyurl.com/57tmxcd4>

📄 Join MPEG Systems Smart Contracts for Media Subgroup: <https://tinyurl.com/2bbukxfs>

📄 Resources for ISO/IEC 23000-23 Decentralised Media Rights Application Format

📄 TuC for ISO/IEC 23000-23: <https://tinyurl.com/yc6snmtx>

📄 Join MPEG Systems Smart Contracts for Media Subgroup: <https://tinyurl.com/2bbukxfs>

# Developing Security Standards Roadmap for Blockchain and Distributed Ledger Technologies



## **Paul Ferris**

*Technical Expert, European Distributed Computing Association  
United Kingdom*

## Sector

Blockchain and DTL

Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO/TC307

ISO/TC307/AG1 Strategic Business Plan RAG

CEN/CLC/JTC 19 Blockchain and DTL WG 1 Decentralised identity management

BSI/DLT1

## Role

Nominated for Convener of ISO/TC307/AG1 Strategic Business Plan RAG – Ballot result, April'23

## Addressed EU standardisation priorities and gaps

My fellowship aims to identify gaps, priorities and challenges within the area of Blockchain and Distributed Ledger Technologies, in the broad area of security. The work on security is intended as a contribution for developing a generalised approach that can be employed for other subject areas, such as privacy, identity, supply chain, finance, and governance, etc.

## Concerned ICT standards and contribution to the related landscape

My initial consultative document was published as an N-document by ISO/TC307 - Blockchain and distributed ledger technologies, where work began especially in TC307/JWG04 - Security, Privacy and Identity for Blockchain and DLT and the work received enthusiastic support from the Working Group participants. Over thirty expert members have already provided their contributions prior to a formal call for contributions to all JWG 4 experts which the meeting decided was the next steps. On completion of the 1st working draft (June 2022) the resulting paper is to be submitted as a standing document for development and review by the TC307/AG1 Strategic Business Plan RAG. The document is aimed at contributing to new and developing TC307 standards by providing input into discussions and progress monitoring of the committee through TC307/AG1. Its output is intended to provide input in, for example, Use Cases TR3242 (Nov'22) ongoing. The aim is to provide data and expert opinion to help set priorities, highlight dependencies and allow the drawing up of planning timelines, resource plans, etc. within ISO/TC307.

## Impact (on European SMEs, related projects or in society)

### **Impact on SMEs**

Positive security effects are often quoted as justification for the use of DLT/blockchain systems but without quantifying or fully justified reasons. It may be the case that positive security impacts are only available where diverse organisations are aiming to share the same

system. Alternatively, it may be that such systems would be more secure if they applied more traditional or alternative approaches to achieve similar ends. There is a confusing range of possibilities that SMEs are unlikely to be equipped to assess without a set of dependant standards to guide them. The criteria for making such decisions needs examination, and the approach comparative measurement needs standards to be effective. This work has involved reaching out to SME's and European Associations to gather their input and innovative approaches to the technology and solutions. This extensive input is being included in the contribution document being developed for submission to ISO/TC307 through appropriate channels. Initial results were shared at the November plenary with ISO/TC307.

### **Impact on Society**

All work within ISO is classified against the UN's Sustainable Development Goals, which fall into three categories; economic, social and environmental. An enabler to many of the goals is security of people and systems. Making effective progress in the area of security, that maintains individual's privacy and ability to contribute to society, is a real contribution and impacts society at all levels.

As this work broadens beyond 'security' to other important enablers to good systems; identity, governance, privacy; the societal impact will grow.

### **Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?**

Past work in this area has done just that, and the continuing work is likely to have similar or larger effect. The ISO/TC307/AG1 work will be more focused as a result and will provide more input into the Technical Committee.

### **Have the standardisation activities in your project led to specific deliverables?**

Not to deliverables, but thanks to this work, I have been nominated as convener of ISO/TC307/AG1 Strategy Business Plan RAG.

### **What future efforts or activities are still necessary for your area of application?**

The review of the ISO/TC307 Strategic Business Plan is an ongoing activity and will provide input into the TC307 planning going forward.

### **Online references related to the fellowship work**

[www.iso.org/committee/6266604.html](http://www.iso.org/committee/6266604.html)

<https://www.cencenelec.eu/areas-of-work/cen-sectors/digital-society-cen/emerging-technologies/>

# Develop European and International technical reports in DLT/blockchain



## **Caroline Thomas**

*ISO WG Convenor and Technical Expert, ISO  
United Kingdom*

### Sector

Trusted Information

## Engaged SDOs, WGs and TCs



ISO TC307 Blockchain and distributed ledger technologies WG6 Use Cases  
ISO TC 307 AG3 - Digital Currencies  
ISO TC68 Finance – AG5 Digital Currencies  
ISO TC68 Finance - Strategic Committee

### Role

ISO/TC307 WG6 Convenor

### Addressed EU standardisation priorities and gaps

Use cases are relevant to ICT standards development as they provide technical experts with insights into in this emerging DLT technology to address gaps, priorities and challenges. Through this fellowship, I have been Convenor leading three ISO Technical Reports in DLT/Blockchain. I also participated in research to fill the gaps of three priority market sectors that are increasingly applying DLT/Blockchain technologies. These are Digital Currencies, NFTs and Smart Energy within ISO/TC 307.

The key challenge I address is knowledge-sharing and co-ordination across the varying perspectives from different Technical Committees who aim to create standards across different domains and markets.

The most activity to date has been on Digital Currencies; then NFTs where a new Working Group has just been formed; and Smart Energy where a new Ad Hoc Group on DLT and Carbon Markets was created in November 2022, with its first meeting in January 2023.

The opportunity for strategic EU and international standards development is to learn and spot the gaps on how new technologies are being applied in different ways across countries and business sectors. For example:

- ▶ market-led demand applications such as new business applications that apply DLT to address gaps in Carbon Markets in China, Europe, the UN and multiple SDOs)
- ▶ emerging new DLT models for financial services such as digital currencies, and their different stakeholders across cryptocurrencies, to stable coins, and Central Bank digital currencies (CBDCs)
- ▶ transferable technical applications across market sectors (e.g., compare Non-fungible tokens (NFTs) across the Gaming, Art, Fashion and real-estate etc)

These emerging technologies have significant European activity and perspectives in international applications of DLT/Blockchain.

## Concerned ICT standards and contribution to the related landscape

This fellowship contributes to the ICT Standards landscape in Blockchain and distributed ledger technologies (DLT). In my role as Liaison between ISO/TC 307 and TC68 Financial Services and TC322 Sustainable Finance, I apply my financial and technical experience to the related landscape for standards development in digital currencies and DLT in carbon markets.

As Convenor, I lead the work of the experts across three Technical Reports in ISO/TC 307, which have all progressed through different ISO stages:

- ▷ ISO/TR 3242:2022 – Blockchain and distributed ledger technologies: Use Cases Summary, published in 2022.
- ▷ ISO/PRF 6039- Blockchain and distributed ledger technologies -Identifiers of subjects and objects for the design of blockchain systems
- ▷ ISO/WD2 TR6277-Blockchain and distributed ledger technologies –Data flow model for blockchain and DLT use cases

The use cases concept provides examples of 'state of the art' technology applications that are necessary to inform and drive contemporary standards development in DLT/blockchain. They contribute to the StandICT.eu 2023 theme of 'standards being a bridge between research, innovation and the market, and as a means of capturing and disseminating knowledge'.

I am also a regular contributor to other EU and international SDOs, by liaising and presenting to encourage knowledge sharing to enable consistent standards development in rapidly emerging technologies.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

As Convenor of ISO TC307/WG6, we have impacted European SMEs in 2 ways:

- ▷ SMEs have demonstrated their DLT technology to the ISO community to develop use cases in their pioneering tech, based in a consistent ISO format.
- ▷ SME members gained practical experience in developing standards, where some have become reviewers or contribute to new standards. Examples of European SMEs in TRs include energy markets in Ireland and Spain, Italian finance, agriculture in Ireland.

### Impact on Society

Blockchain and DLT technologies can impact society by providing decentralised services that enable trust and transparency such as provenance in food supply chains, carbon markets and finance.

All work within ISO/TC 307 are categorized against specific the relevant UN Sustainable Development Goals.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, during this period, there are recommendations and proposals for standards in digital currencies, decentralised identifiers and NFTS.

## Have the standardisation activities in your project led to specific deliverables?

Yes, during this period, the three Technical Reports have led to specific deliverables by progressing through ISO stages, where TR3242 :2022 Use Cases was published in October 2022 , the TR6039 has progressed to a PRF Report and the TR6277 Data Flows project has just closed a WG Ballot.



## What future efforts or activities are still necessary for your area of application?

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I intend to continue to provide Convenor and Liaison support to see the current research, proposals and draft Technical Reports progress through to a published standard. The next milestone is contributing to discussion papers and proposals being prepared for the next Plenary in June 2023.

## Online references related to the fellowship work

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 [www.iso.org/committee/6266604.html](http://www.iso.org/committee/6266604.html)

 [www.iso.org/committee/49650.html](http://www.iso.org/committee/49650.html)

# Further Contribution to Identity Management Standards at ISO/TC307 and CEN-CENELEC/JTC-19



## **Jerome Pons**

*Founder & CEO and Blockchain Standardisation Manager,  
Music won't stop  
France*

### Sector

Blockchain and DTL  
Short-term fellowship

### Engaged SDOs, WGs and TCs



ISO/TC307 Blockchain and distributed ledger technologies/WG1  
Foundations

ISO/TC307/JWG4 Security, privacy and identity for Blockchain and DLT  
CEN-CENELEC/JTC19/WG1 Blockchain and Distributed Ledger  
Technologies

### Role

Member

### Addressed EU standardisation priorities and gaps

The focused gap of this fellowship concerns unharmonised terms within national, European and international levels, meaning that different terms refer to the same concept (e.g., “attestation” and “certificate”, “custodian” and “guardian”, “principal” and “subject”). Also, the acronym ID is interchangeably used for “identifier” or “identity” and many standards refer to “decentralized identity” within their title whereas they do not define this term within their terminology or vocabulary sections.

My priorities in this fellowship are the French translations of ISO 22739:2020 (EN, AFNOR), harmonisation of decentralised identifier and identity terms at ISO/TC307/WG1, ISO/TC307/JWG4, ISO/TC307/WG6 and CEN-CENELEC/JTC19/WG1;

The faced challenge concerns the difficulties retrieving some English terms (e.g., Alastria ID) ; some standardisation works are not enough shared between working groups (e.g., ISO/TC307/WG1 does not access UNE 71307-1:2020 and CEN-CENELEC/JTC19/WG1 works and CEN-CENELEC/JTC19/WG1 does not access ISO/TC307 works) so that sharing through joint meeting or liaisons is highly recommended.

### Concerned ICT standards and contribution to the related landscape

This fellowship addresses several target standards are ISO/DIS 22739 led by ISO/TC307/WG1, ISO/WD 7603 led by ISO/TC307/JWG4, ISO CD/TR 6039 led by ISO/TC307/WG6, CEN-CLC TS “Decentralised Identity Management Model” led by CEN-CENELEC/JTC19/WG1 and French translations of ISO 22739:2020 in EN ISO 22739:2022 and AFNOR EN ISO 22739.

I have also drafted two national level white papers (e.g., the French Ministry of Interior white paper on blockchain and identity (BCID), the Universities of Aston and Cardiff paper “Your Identity is Yours”).

I contributed to two EU project-related works on the EBSI “Glossary”, eSSIF-Lab “Glossary”.

In addition, my fellowship targets several other international standards: ISO 22739:2020, ISO/TR 23249:2022, ISO/IEC 24760-1:2019, ISO/IEC 24760-2:2015, ITU-T X.1252 and X.1403, NIST paper "Emerging Blockchain Identity Management Systems", W3C DID, W3C VC, Sovrin "Glossary V3", INATBA "Glossary", GSMA "Identity Glossary").

The resulting benchmark was published on December 7th 2022 on ResearchGate to feed harmonisation works led by ISO/TC307/WG1, JWG4 and WG6 as well as CEN-CENELEC/JTC19/WG1.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

As European SMEs are subject to stronger regulation (e.g., eIDAS, GDPR, Copyright), harmonising terms in worldwide standards is key. Blockchain and decentralised ledger technology (DLT) terms were harmonised in the French translations of ISO 22739:2020 (EN, AFNOR) (e.g., hard fork, prune, soft fork). Additionally, I proposed a benchmark of decentralised identifier and identity terms for harmonising blockchain and distributed ledger technology and identification standards that was published on ResearchGate and is publicly accessible. All European SMEs will take advantage of such harmonisation.

### Impact on Society

ISO/TC307 technical committee contributes with 15 standards to the following Sustainable Development Goals (SDGs) defined by the United Nations: 1 No Poverty, 4 Quality Education, 9 Industry, Innovation and Infrastructure, 10 Reduced Inequalities, 11 Sustainable Cities and Communities, 12 Responsible Consumption and Production, 13 Climate Action and 16 Peace, Justice and Strong Institutions.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, this has led to a revision of a standards already under development (i.e., ISO CD 22739 revision, ISO AWI 7603, EN ISO 22739:2022, AFNOR EN 22739).

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have contributed to a technical report on a common terminology.

## What future efforts or activities are still necessary for your area of application?

The harmonisation of decentralised identifier and identity terms should be pursued and consolidated at CEN-CENELEC/JTC19/WG1 to fully integrate European stronger regulation (e.g., eIDAS2 revision and associated identity wallet), thus giving European SMEs a competitive advantage (quality of standard and regulation) thus reinforcing the European sovereignty on blockchain (including self-sovereign identity and EBSI infrastructure).

## Online references related to the fellowship work

[www.iso.org/committee/6266604.html](http://www.iso.org/committee/6266604.html)

[www.cencenelec.eu/areas-of-work/cen-sectors/digital-society-cen/emerging-technologies](http://www.cencenelec.eu/areas-of-work/cen-sectors/digital-society-cen/emerging-technologies)

# Fintech in Sustainable Financial Products and Services



## **Shakira Bedoya**

*Senior Risk Officer - Product Risk and Governance, Danske Bank  
Danish Standard foundation  
Denmark*

## Sector

Fintech and Regtech  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO/TC68 Financial services AG2 Standards Advisory Group  
ISO/TC68 AG4 Sustainable finance Advisory Group  
ISO/TC68 TAG 1 Fintech Technical Advisory Group  
ISO/TC207 Environmental management /SC4 Environmental performance evaluation /WG7  
ISO/TC322 Sustainable finance AG  
ISO/TC322/AHG2 Future standards development  
ISO/TC322/TAG1 Sustainable FinTech  
ISO/TC322/WG1 Sustainable finance framework

## Role

Member

## Addressed EU standardisation priorities and gaps

My fellowship focuses on the lack of adequate integration of ICT Standards into Financial Products and services. The priority is to establish a common European Approach towards technological innovation in the value chain of financial products and services. The challenge is the lack of alignment between ICT Standards and other regulatory/soft law requirements such as ESG taxonomies.

## Concerned ICT standards and contribution to the related landscape

My objective is to develop standards to promote the use of new technologies for sustainable financial products and services. FinTech is recognized as a great enabler of sustainable products in areas such as: Financial inclusion, lower costs of delivery, access to capital markets, selection of investors and improvement of risk management. (PWC 2021). By participating in the work of Danish Standards (DS) my objective is to foster standardisation by participating in three committees: ISO/TC 68 (Financial Services), ISO/TC 322 (Sustainable Finance) and previously ISO/TC 207/ SC4/WG7 (Green debt instruments). My fellowship addresses several specific standards:

- ▷ Revision of the ISO 24165 (Digital Token Identifier) to assess if the standard should cover nonfungible tokens (NFT's) in alignment with ISO 4217 (currency codes).
- ▷ ISO 22739 (Blockchain and distributed ledger technologies)
- ▷ ISO/NP 24165 Digital Token Identifier- registration, assignment and structure.
- ▷ ISO/AWI TS 32211 (Principles and guidelines for development and implementation of sustainable finance products and services)

- ▷ ISO/PRF 14100 (Guidance on environmental criteria for projects, assets and activities to support the development of green finance)

## Impact (on European SMEs, related projects or in society)

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### Impact on Society

As the European Banking Authority has demonstrated, the use of FinTech in the provision of financial products and services is extremely important for credit institutions, investment firms, payment, and electronic money institutions. My participation in standardisation work aided the inclusion of FinTech from the perspective of sustainable finance looking at improving areas such as 1. Making financial products available to vulnerable customers and excluded populations (for example in emerging markets); 2. Lowering the costs of access to products and services; 3. Increasing accessibility to capital markets, 4. Better monitoring of risk management and 5. Producing adequate and reliable data to ensure products offered to customers and investors are in fact sustainable therefore avoiding green-washing.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, I contributed to the dissemination of the ISO 32210:2022 - Sustainable finance.

### Have the standardisation activities in your project led to specific deliverables?

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Yes, I have drafted technical specifications and technical reports on recommendations for new standards and on reference data.

### What future efforts or activities are still necessary for your area of application?

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Sustainable Fintech is an area that desperately needs EU experts. In the view of the implementation of the EU Green deal in financial services, we need more people who can help catalyse climate transition into concrete deliverables, for example through a sustainable approach to financial products and services for consumers.

### Online references related to the fellowship work

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 [www.iso.org/committee/49650.html](http://www.iso.org/committee/49650.html)

 <https://committee.iso.org/home/tc322>

 [www.iso.org/committee/54808.html](http://www.iso.org/committee/54808.html)

# Danish participation in the ISO/IEC JTC 1/SC 32 WG 3 Database languages (SQL and GQL)



**Thomas Frisendal**  
Expert, TF Informatik  
Denmark

## Sector

Semantic Interoperability  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO IEC/JTC1/ SC32/WG3 Database languages

## Role

Member

## Addressed EU standardisation priorities and gaps

Since graph database technology is a key for meaningful and explainable machine learning and AI, it is evident that these standards will have positive impact on applications in our societies. Key aspects of using graph technology and query language are very important. The SQL universe is technical, but graph database concepts have a lower learning curve and thus are accepted more rapidly by users of ICT solutions and by SMEs. I will be contributing discussion papers and change proposals for temporality and recordkeeping in GQL 1.x, and in general for making GQL easy to work with for business users in the SME area.

## Concerned ICT standards and contribution to the related landscape

In this fellowship, I contribute to developing an ISO/IEC standard, ISO/IEC CD 39075 Information Technology — Database Language. My focus is on ISO 39075, GQL (Graph Query Language).

## Impact on Society

The standards work takes place within the ISO/IEC JTC 1/SC 32 framework, and the committee WG 3, which does the work, is dominated by the US, and some strong presence from Asia etc. A lot of the inputs to the committee originates from large DBMS vendors and their large customers. I am more concerned with the requirements from small to medium size companies, which are important in Europe. There are only 7 EU member countries actively participating in ISO/IEC JTC 1/SC 32 WG 3 and together we (the EU) only have around 10 percent of the total of appointed national expert members of the WG 3. To the best of my knowledge, I am one of 4 EU-based committee members, who are independent of vendor interests. Moreover, this standard will make it easier for non-technical business users to adopt the new standards.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, I contribute to the development of two standards as mentioned here above.

## Have the standardisation activities in your project led to specific deliverables?

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No.

## What future efforts or activities are still necessary for your area of application?

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The SQL PGQ standard is now a Draft International Standard, whereas the GQL standard will go into the DIS stage in the second half of 2023. However, it is becoming more and more clear that these database standards are dominated by the large resources of ANSI/INCITS, and also by Chinese and Korean groups. The European Union should have a stronger presence in this standardisation work.

## Online references related to the fellowship work

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 [www.iso.org/committee/45342.html](http://www.iso.org/committee/45342.html)

# JPEG Pleno Point Cloud Coding - Deep Learning based coding of Point Clouds



## **Antonio Pinheiro**

*Academic, U.B.I. - Universidade da Beira Interior; Instituto de Telecomunicações, Portugal*

### Sector

Media  
Long Term Fellowship

### Engaged SDOs, WGs and TCs



ISO/IEC JTC 1/ SC 29/ WG 1 JPEG  
ITU SG16 Multimedia



### Role

Member

### Addressed EU standardisation priorities and gaps

The scope of the JPEG Pleno Point Cloud activity is the creation of a learning-based coding standard for point clouds and associated attributes, offering a single-stream, compact compressed domain representation, supporting advanced flexible data access functionalities. This standard targets both interactive human visualization, with competitive compression efficiency compared to state-of-the-art point cloud coding solutions in common use, and effective performance for 3D processing and machine-related computer vision tasks, and has the goal of supporting a royalty-free baseline. This standard is envisioned to provide several unique benefits, including a single efficient point cloud representation for both humans and machines. The intent is to provide humans with the ability to visualize and interact with the point cloud geometry and attributes while providing machines the ability to perform 3D processing and computer vision tasks in the decompressed/reconstructed domain, notably by enforcing error constraints, and in the compressed domain (latent after entropy decoding), notably by enabling lower complexity and higher accuracy through the use of compressed domain features extracted from the original instead of the lossy decoded point cloud.

To support the scope above, this fellowship will advance through a series of stages:

- ▶ Stage 1: A learning-based coding standard addressing human visualization and decompressed/reconstructed domain 3D processing and computer vision task;
- ▶ Stage 2: A learning-based coding standard additionally supporting compressed domain 3D processing such as visual enhancement and super-resolution and;
- ▶ Stage 3: A learning-based coding standard additionally supporting compressed domain computer vision tasks such as classification, recognition and segmentation. I contribute to the collaborative process starting in the 96th meeting will allow JPEG to use its recent research on the performance of deep learning-based solutions (recently two papers have been proposed). Moreover, my research group is actively pursuing research on the classification and processing of point clouds, in particular using the latent representation generated by typical point cloud codecs.



## Concerned ICT standards and contribution to the related landscape

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With this fellowship, I contribute to two standards:

- ▶ ISO/IEC 21794 Information technology — Plenoptic image coding system (JPEG Pleno);
- ▶ ISO/IEC 21794 – 6 Information technology — Plenoptic image coding system (JPEG Pleno) — Part 6: Learning-based point cloud coding

## Impact (on European SMEs, related projects or in society)

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### Impact on Society

The impact on the European societies can be major, and we can establish the following:

- ▶ Knowledge for development in an emerging technology and their based standards that can be used by the European industry;
- ▶ Support for open standards;
- ▶ Support for standards that support models of automation in industry and other applications.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, I have contributed to the preparation of the Committee Draft (CD) for ISO/IEC 21794 – 6 Information technology — Plenoptic image coding system (JPEG Pleno) — Part 6: Learning-based point cloud coding.

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have worked on the following deliverables:

- ▶ Evaluation of the responses of the call for proposals (joint work lead by UBI and presented by UBI) - wg1n100251-096-REQ-Report on the JPEG Pleno PCC Call for Proposals Results
- ▶ Definition and testing of the initial verification model software VmUC
  - ▶ wg1m98110-PCQ-JPEG Pleno Point Cloud Report on Codec Stability
  - ▶ wg1m98111-PCQ-JPEG Pleno Point Cloud Report on Metric Performance from CfP\_1

## What future efforts or activities are still necessary for your area of application?

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Standardisation process is ongoing. And this new series of standards based on deep learning codecs has been attracting many participants from non-European countries. At this stage is very important to keep as many European players in these activities as this kind of technologies have a very high probability of being the future and replacing the traditional ones. Hence, it is very important to Europe to be present with as many players as possible.

## Online references related to the fellowship work

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 [www.iso.org/committee/45316.html](http://www.iso.org/committee/45316.html)

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# IoT Semantic Interoperability Specialization to Preventive Health, Well-Being and AI



**Amelie Gyrrar**

*Principal Research and Innovation Consultant, Trialog  
France*

## Sector

Semantic Interoperability  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO SC41 IoT and Digital Twin  
ISO SC 42 AI, ISO TC215 Health Informatics

## Role

Member and Contributor

## Addressed EU standardisation priorities and gaps

With this fellowship, I contribute to the standardisation of IoT Interoperability by ensuring integration of SAREF and other European contributions into ISO/IEC 21823-3 IoT semantic interoperability (as co-editor). Also, I contribute to the standardisation of AI architecture by ensuring integration of European contributions on AI and interoperability (e.g., BDVA, IDSA, AIOTI, and H2020 projects such as IoT large-scale projects) into ISO/IEC JTC1/SC42 AI 5392 Knowledge Engineering Reference Architecture (as a contributor).

## Concerned ICT standards and contribution to the related landscape

The objective of my fellowship is to include European contributions on semantic interoperability ISO standards such as ISO SC41 IoT and Digital Twin and ISO SC42 AI, with a focus on health and well-being use cases. With this work, I leverage European contributions carried out in European initiatives (AIOTI Health WG, AIOTI Urban Living WG and AIOTI WG Standard - IoT semantic Interoperability Group, BDVA), ETSI SmartM2M SAREF (SAREF-Core, SAREF4EHAW for eHealth /Ageing-well and SARE4WEAR for wearables), OneM2M, and H2020 projects (e.g., IoT large-scale projects such as ACTIVAGE, ACCRA, etc.).

## Impact (on European SMEs, related projects or in society)

The following impacts are identified at a general level:

The IoT addresses many societal challenges including climate change, resource and energy efficiency and ageing.

In the emerging IoT economy, voluntary global standards can accelerate adoption, drive competition, and enable cost-effective introduction of new technologies.

Standardisation facilitates the interoperability, compatibility, reliability, security, and efficiency of operations on a global scale among different technical solutions, stimulating industry innovation and providing greater clarity to technology evolution.

Interoperability between IoT networks operated by different companies along the value chain opens up opportunities to address EU Policy objectives, e.g., greater resource efficiency for a more circular economy, sustainable and responsible supply chains through transparency and traceability, and others.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

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Yes, I have contributed to two published standards:

JTC1-SC41/167/CDV - ISO/IEC 21823-3:2021 Internet of things (IoT) — Interoperability for IoT systems — Part 3: Semantic interoperability

Std 1872.2-2021 Autonomous Robotics (AuR) Ontology

Also, I have contributed one standard under publication, to ISO/IEC 5392 Knowledge Engineering Reference Architecture (KERA).

## Have the standardisation activities in your project led to specific deliverables?

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Yes, I have drafted technical reports for the concerned standards.

## What future efforts or activities are still necessary for your area of application?

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I continue my engagement in the standards under development (e.g., ISO/IEC CD 5392 Knowledge Engineering Reference Architecture (KERA), OKER, JTC 1/SC41 New Work Item on Internet of Things (IoT) - IoT for Stress Management, good-health & Well-being (SC41 N2153)). Also, I will follow up of IEEE Global artificial Intelligence Systems (AIS) well-being initiative – IEEE 7010 - as well as IEEE P1872.3 Standard for Ontology Reasoning for Multiple Autonomous Robots.

## Online references related to the fellowship work

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 [www.iso.org/standard/83752.html](http://www.iso.org/standard/83752.html)

 <https://standards.ieee.org/ieee/1872.2/7094/>

 [www.iso.org/standard/81228.html](http://www.iso.org/standard/81228.html)

 [www.iso.org/standard/83752.html](http://www.iso.org/standard/83752.html)

 <https://standards.ieee.org/ieee/1872.2/7094/>

 <https://standards.ieee.org/industry-connections/ais-well-being/>

# “Uncertainty Quantification in Machine Learning” in National and International AI Standardisation



**Lukas Höhdorf**  
Data Scientist, IABG mbH  
Germany

## Sector

Artificial Intelligence  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO/IEC “ISO/IEC JTC 1/SC 42 Artificial intelligence  
ISO/IEC 22989 Information technology — Artificial intelligence —  
Artificial intelligence concepts and terminology  
ISO/IEC CD 42001.2 Information Technology — Artificial intelligence —  
Management system  
CEN-CENELEC JTC 21 Artificial Intelligence  
EUROCAE WG-114 Artificial Intelligence / SAE G-34 Artificial  
Intelligence in Aviation  
AIR6987 (WIP) Artificial Intelligence in Aeronautical Systems:  
Taxonomy  
NA 043-01-42 GA DIN/DKE Gemeinschaftsarbeitsausschuss Künstliche  
Intelligenz  
NA 043-01-42-01 AK KI-Qualität und Prüfverfahren

## Role

Vice-chair of NA 043-01-42 GA DIN/DKE, Consortium leader of DIN SPEC 92005 “Uncertainty quantification in machine learning”, and regular expert in other groups.

## Addressed EU standardisation priorities and gaps

The identified gap addressed by this fellowship is the lack of considerations of uncertainties in AI standardisation, in particular for machine learning systems. To fill this gap, the DIN SPEC 92005 “Uncertainty quantification in machine learning” (see online references) has been initiated and the main priority is to contribute to the development of the DIN SPEC 92005.

A challenge for this work is related to organisational difficulties regarding the liaison between the European EUROCAE WG-114 Artificial Intelligence in Aviation and ISO/IEC JTC 1/SC 42 Artificial intelligence. Currently, a sharing of documents under development between the related committees is not possible. During the plenary meeting of EUROCAE WG-114 in December 2022, I gave a presentation about this liaison and motivated discussions to solve these organisational challenges.

## Concerned ICT standards and contribution to the related landscape

Without the contributions related to this fellowship, the consideration and quantification of uncertainties in machine learning would be underrepresented in existing AI standardisation projects. I support the ongoing development of the DIN SPEC 92005 “Uncertainty quantification in machine learning” and will evaluate ways how to best integrate this topic in current or future AI standardisation projects.

Furthermore, I had the chance to continue strengthening the liaison between the European EUROCAE WG-114 Artificial Intelligence in Aviation specific for aviation and the “universal” (i.e., not specific for a certain domain) ISO/IEC JTC 1/SC 42 Artificial intelligence as Liaison Representative on the SC 42 side. During the EUROCAE WG-114 plenary meeting, I gave a presentation about the above-mentioned liaison and make the WG-114 committee aware of the current developments of SC 42. As part of my activity in WG-114, I mainly deal with the standard EUROCAE ED-xxx / SAE AS 6983 “Process Standard for Development and Certification/Approval of Aeronautical Safety-Related Products Implementing AI”.

Also, in relation with this fellowship, I attended CEN/CENELEC JTC 21 Artificial Intelligence plenary meeting between organised in January in Brussels, Belgium. I was among the four members of the face-to-face delegation of the German national body. The plenary meeting was prepared in several meetings of the German national body DIN/DKE NA 043-01-42 GA, which I am vice-chairing.

## Impact (on European SMEs, related projects or in society)

### Impact on Society

My fellowship supports ongoing AI standardisation activities and in particular fosters the consideration and quantification of uncertainties in machine learning.

### Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, I contribute directly to the DIN SPEC 92005 “Uncertainty quantification in machine learning” and considers related next steps beyond the DIN SPEC level towards a national, European or international standard.

### Have the standardisation activities in your project led to specific deliverables?

The main deliverable of this fellowship is the DIN SPEC 92005 “Uncertainty quantification in machine learning”. Expected publication of this DIN SPEC is in September 2023.

### What future efforts or activities are still necessary for your area of application?

Now, I focus on completing the development of the DIN SPEC 92005 “Uncertainty quantification in machine learning” and consider potential next steps beyond the DIN SPEC level.

### Online references related to the fellowship work

 [www.din.de/en/innovation-and-research/din-spec-en/business-plans/wdc-beuth:din21:360097552?destinationLanguage=&sourceLanguage=](https://www.din.de/en/innovation-and-research/din-spec-en/business-plans/wdc-beuth:din21:360097552?destinationLanguage=&sourceLanguage=)

# Data Governance and Stakeholder Reference Model for Telco Data Sharing in Trusted AI



## **Muslim Elkotob**

*Principal Solutions Architect and Standardization Expert,  
Vodafone  
Germany*

### Sector

Big Data  
Short-term fellowship

## Engaged SDOs, WGs and TCs



ETSI TC INT Core Network and Interoperability Testing  
ETSI AFI Autonomic Future Internet  
ITU-TU  
IEEE INGR  
TM Forum

## Role

Chairman of ETSI AFI  
Vice Chairman ETSI TC INT  
Vice Chairman ITU Focus Group FG-TBFxG Testbeds Federations and Chairman of WG1

## Addressed EU standardisation priorities and gaps

This fellowship addresses the following gaps:

- ▶ Lack of standardized models for stakeholders (especially CSPs) for collaborating on data-driven services and leveraging their potential; primarily Trusted AI Models.
- ▶ The high threshold and large distance between setting up a classical PoC (like 5G PoC) and a PoC for Telco Data Sharing where new more dynamic and more complex ecosystems emerge and new interactions are to be tested and verified and there are more complex and dynamic structures to be handled (primarily on the data dimension) than the classical connectivity and network performance issues covered in a typical (e.g., 5G or Beyond 5G) PoC.

The tackled priorities concern:

- ▶ To set up the foundation for new ecosystems for Telco Data Sharing and Data Driven Services. This includes preparing the ETSI AFI PoC with internal ETSI support instruments and important stakeholders to be ready for more complex test setups with the data dimension. Whereas ETSI AFI PoCs so far have been 5G and Beyond focused, primarily testing connectivity, performance and specific architectural features, Telco Data Sharing PoCs which are now being prepared, need to address more complex ecosystems with more stakeholders as ISVs (Independent Software Vendors), SMEs, Software Algorithm providers (e.g., for AI, ML, Analytics),
- ▶ Leveraging on the data dimension and enabling data driven services, and enabling smaller players (ISVs and SMEs) to take part in new ecosystems and leverage AI using their algorithms and software to enable trusted AI

- ▷ The focused challenges are:
- ▷ Bringing new players (especially ISVs, SMEs) and those specialized in AI into the new ecosystems that are evolving and enabling data driven services and data sharing.
- ▷ Providing a dynamic productive/experimental environment for developing new ecosystems, interacting among new types of stakeholders, and running PoCs for driving forward the use cases with data sharing, and especially Trusted AI.

### **Concerned ICT standards and contribution to the related landscape**

With this fellowship I established a Telco Data Sharing as a paradigm initially hosted in TM Forum via the Catalysts Telco Data Sharing I and Telco Data Sharing that I Championed for Vodafone. This allowed to find the concept of Telco Data Space with a blueprint architecture, new ecosystems that evolve to support this paradigm, and new use cases, especially on Trusted AI.

I have also contributed to introducing and promoting the Telco Data Sharing concept and providing a foundation for several activities that build on this work, including:

- Using the ETSI INT PoC as an instrument to host and drive forward Telco Data Sharing concepts in new emerging ecosystems based on Gaia-X, IDSA, and other standards.
- ETSI INT #53 Meeting contribution for placing Gaia-X and Telco Data Sharing concepts and raising the claim for requirements for features, potential projects and characteristics of resulting activities such as PoCs in collaboration with or hosted in ETSI.
- Discussing at the ETSI INT #53 Meeting the synergies with activities in other SDOs that leverage the Telco Data Sharing concept and its governance and stakeholder/ecosystem models in activities and use-cases as Testbeds (or Assets) Federations, Multi ISV scenarios, SME collaboration for Data Sharing.

## Impact (on European SMEs, related projects or in society)

### **Impact on SMEs**

My project supports the evolution of new ecosystems and value chains around data driven services and data sharing; those ecosystems are more diversified and open and not dominated around the central element of a CSP (Communication Service Provider) with a single vendor and integrator. Ecosystems for data sharing open the space in an inclusive manner for smaller players, especially of the ISV (Independent Software Vendors) type in addition to other SMEs that are specialized in software algorithms (e.g., in AI, ML, and other relevant areas).

### **Impact on Society**

The work in this fellowship project impacts society by increasing inclusion and collaboration among stakeholders of all types, especially SMEs and ISVs (Independent Service Vendors) by allowing them to take part in the standardized service-architecture for Data Sharing and Telco Data Space usage. Previously, an SME (e.g., ISV) had an ambiguous situation and a higher hurdle/bar to join a Data Sharing ecosystem or value chain. Furthermore, the work done bridges the gap and shortens the distance between stakeholders of various types as long as they have data assets to share. Today, the technical (IT, Telco) pillar is a key to societal development and evolution; this work allows for more interactions and matching stakeholders to enable more valuable services and monetization that is crucial especially to smaller players (SMEs, etc).

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

No.

## Have the standardisation activities in your project led to specific deliverables?

No.

## What future efforts or activities are still necessary for your area of application?

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The performed work is an essential step the area of Telco Data Sharing and Trusted AI Use Case. The results are a successfully completed and award-winning Catalyst in TM Forum, a built foundation for the successor Catalyst as encouraged by TM Forum Management, a new impulse in ETSI with Management backing for setting a new level PoC series for Data Sharing and New Ecosystem Testing, and several presentations, contribution reports and collaborations established to keep this work going. All this foundation should be leveraged on by carrying on this work.

## Online references related to the fellowship work

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 <https://www.youtube.com/watch?v=Tv-BQxiHRil>

 [https://intwiki.etsi.org/index.php?title=Accepted\\_PoC\\_proposals](https://intwiki.etsi.org/index.php?title=Accepted_PoC_proposals)

 <https://myaccount.tmforum.org/networks/21-0-223/index.html>



# Consent records and privacy principles in Distributed Ledger Technology and EU digital wallet



## **Jan Lindquist**

*Privacy Manager (CIPM), SSI and DLT Specialist, Linaltec AB Sweden*

### Sector

Privacy Protection  
Long Term Fellowship

## Engaged SDOs, WGs and TCs



ISO SC27 Information security, cybersecurity and privacy protection /  
WG5 Identity management and privacy technologies  
CEN/JTC 13 Cybersecurity and data protection  
CEN/TC 224 Personal identification and related personal devices with  
secure elements, systems, operations and privacy in a multi sectorial  
environment  
CEN/JTC 19 Blockchain and Distributed Ledger Technologies

## Role

In ISO SC27/WG5 co-editor ISO 27560

## Addressed EU standardisation priorities and gaps

My fellowship will result in two specific deliveries:

Delivery 1: ISO/IEC TS 27560 - Major milestone was reached at ISO SC27 WG5 meeting end of September 2022 it was agreed to go for final DTS ballot vote for ISO 27560. This felt like a major accomplishment to reach this stage considering late comments were accepted as input. Goal once final ballot goes through is to publish the standard by summer 2023. Final ballot review is set for WG5 meeting in April in Redmond, US.

Delivery 2: Article "Introducing privacy receipts into DLT and eIDAS" - The article has been accepted for publication and will be published in next issue 2 of the Journal of ICT standardisation (see the online reference).

## Concerned ICT standards and contribution to the related landscape

I am in the unique position to be working across 3 different CEN committee's: privacy (CEN-CLC/JTC-13), blockchain (CEN/JTC 19) and digital identity (CEN/TC 224). This unique view gives an opportunity to raise privacy questions across the groups. This privacy insight may have a big influence in the development of eIDAS and EU's wallet framework. A new project proposal surrounding privacy requirements on eIDAS and wallet is being discussed informally across the groups. Intention of the project is to help address the GDPR gap. For example, communicating privacy related information like purpose and type of processing when sharing personal data like digital id or attested attributes. The article which now has been accepted and is awaiting publication will increase awareness of the GDPR privacy gap.

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

The work will help SME's by making it easier to describe processing of personal data that is machine readable (ISO 27560) allowing individuals using the services from the SME to objectively reject or accept sharing of personal data with an SME. The work will also help with the EU's data sharing strategy by limiting how personal data is shared to only what is needed to provide a service by SME. Additionally, data brokers or intermediaries as promoted by Data Governance Act will have a clear traceability of how data is shared with 3<sup>rd</sup> parties (SME's).

### Impact on Society

The publication of ISO 27560 will have a big impact to promote creating a digital receipt with details of use of personal data. Additional details will allow to review any risks associated with using personal data and to easily withdrawal or terminate a service. The clear communication of risks can also help address of transparency with service using AI to profile or rate individuals. The privacy receipt would be able to include references to the risks as part of a data protection impact assesment (DPIA). Risks could be listing biases in a rating algorithm.

Once EU adopts a digital wallet that contains identity information you can also be able to collect the consents. The consent details make it possible to easily exercise privacy rights or contact data privacy authority. Eventually privacy preferences can automate the rejection or give warnings of details that are sensitive.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

Yes, there is discussion of a privacy related standard associated with eIDAS and wallets. The project is under discussion. The work from ISO 27560 may become key mechanism to transfer metadata associated with eIDAS and attested attributes.

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have completed the updates to the technical specification in compliance with ISO style guide in preparation for final DTS ballot.

## What future efforts or activities are still necessary for your area of application?

The adoption of ISO 27560 once published needs promotion for industry adoption. Plan is to continue to present at conferences the standard, also initiated projects in consent and digital receipts will be pursued after ISO 27560.

## Online references related to the fellowship work

[www.iso.org/committee/45306.html](http://www.iso.org/committee/45306.html)

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<https://journals.riverpublishers.com/index.php/JICTS/issue/archive>

# 4. Societal Challenges

The background features a dark silhouette of a person with arms outstretched, set against a vibrant, multi-colored digital landscape. The scene is filled with glowing icons such as a smartphone, a Wi-Fi symbol, a laptop, a globe, and a person icon. A network of glowing blue and white lines crisscrosses the image, creating a sense of connectivity and data flow. The overall aesthetic is high-tech and futuristic, with a color palette dominated by blues, purples, and oranges.

# ■ XR Educational Content Ethics Metadata



## **Eleni Mangina**

*Professor in Computer Science and H2020 ARETE Project Coordinator, University College Dublin Ireland*

### Sector

Learning and Education  
Long Term Fellowship

### Engaged SDOs, WGs and TCs



IEEE P2881 Working Group (Standard for Learning Metadata)  
IEEE Computer Society/Learning Technology (C/LT)  
IEEE P1589 Working Group on 'Augmented Reality Learning Experience Models'  
IEEE Experience API (xAPI) Working Group  
IEEE Global Initiative on Ethics of Extended Reality (XR)  
CEN/TC 353 ICT For Learning, education and training  
ETSI ISG ARF Industry Specification Group Augmented Reality Framework

### Role

Co-chair of the CEN CWA on XR for Learning and Performance Augmentation

### Addressed EU standardisation priorities and gaps

XR is increasingly used in education and training to support learning, practice, or even guide performance. Standards, however, are scarce, incomplete, with existing work scattered across standardisation bodies and committees. For example, existing relevant standards work is not necessarily conducted under the auspices of IEEE Computer Learning Technology Standards Committee (C/LTSC) but can also be found in hardware-oriented, industry-focused, or human-computer interaction sponsorship. Moreover, several existing standards applicable to learning technologies at large focus on web and mobile apps and thus fall short of considering specificities of the new XR medium, delivery and interaction devices, and related management and usage protocols. Within this fellowship, I contribute towards the ethical concepts of the 3D learning objects' schemas used for education and training. This activity can set standards for metadata to inform educational managers, intermediaries, and regulators (such as, departments of education on member state level, educational infrastructure providers, school systems) so they can systematically identify appropriate enhancing actions and ensure ethically approved XR learning resources for the provision of XR education anytime anywhere. Setting of targets for education and training services and augmented infrastructure implies the ability to:

1. Measure the current learning object metadata.
2. Define a process to set the target for implementation of ethically approved XR educational platforms.
3. Define specific targets based on impact assessment within specific educational subjects.

Furthermore, I have participated to IEEE Planet Positive 2030 Metrics Committee with a vision to identify the Technology metrics of XR ethical aligned technology for educational and societal awareness for a sustainable planet for the IEEE report (P2030).

## Concerned ICT standards and contribution to the related landscape

I am the coordinator of the H2020 ARETE project which has created 3D/AR data infrastructures for educational purposes using compliant standards to preserve applicability, reproducibility, interoperability, accessibility and sustainability.

This fellowship has contributed towards to my workload time in the CEN CWA on XR for Learning Performance Augmentation which is currently open for public review. The CEN/CENELEC Workshop on “eXtended Reality (XR) for Learning and Performance Augmentation” kick off took place on the 9th of September 2022 and a number of meetings took place since then. This fellowship has also contributed towards EM’s workload on the active participation in existing standards’ WGs and the application of new standards.

I have been actively involved in the investigation, exploitation and support of several standards related to Information and Communication Technologies (ICT) with a vision of the utilization of standards related to AR/VR/MR/XR technologies and the implementation of such technologies in educational settings.

The standards participated within this work are:

- ▶ IEEE P2048 IEEE VR/AR Working Group
- ▶ IEEE P1228 – Standard for Software Safety
- ▶ IEEE P2881 Standard for Learning Metadata Working Group
- ▶ IEEE 1589-2020 – IEEE Standard for Augmented Reality Learning Experience Model
- ▶ P2048: Standard for Metaverse: Terminology, Definitions, and Taxonomy
- ▶ IEEE P7016™ – Standard for Ethically Aligned Design and Operation of Metaverse Systems.
- ▶ The submission of the PAR P7016.1 for new Standards for Ethically Aligned Educational Metadata in Extended Reality (XR) & Metaverse

## Impact (on European SMEs, related projects or in society)

### Impact on SMEs

CEN-CWA on “eXtended Reality (XR) for Learning and Performance Augmentation”: The CWA is intended to be used by:

- ▶ Educational providers to establish targets for XR learning content services provided and boost resilience of the XR learning and performance augmentation infrastructure, ensuring that there is a complete and systematic way of setting up a service for teaching and learning anytime anywhere with 3D experiences.
- ▶ Educational managers, intermediaries, and regulators to systematically identify appropriate enhancing actions and ensure effective allocation of digital learning resources for the provision of education anytime anywhere.
- ▶ Investors to properly allocate resources to 3D content infrastructure.

IEEE (P7016.1) will help support XR educational designers and developers and policy makers to adapt their processes to prioritize ethically aligned design of their XR products, services or systems.

### Impact on Society

The main societal impact from this work is to make research results work for the society. According to the ECORYS report (2021) on XR, the European XR industry has evolved and the following improvements could be made to further strengthen this leading position:

- ▶ Using XR as a response to COVID-19 to mitigate its impacts.
- ▶ Ensuring education and training corresponds to the industry’s increasing needs.
- ▶ Nourishing the XR ecosystem through organisations such as digital innovation hubs.
- ▶ Raising awareness around XR and its potential for Europe.
- ▶ Creating funding, financing, and investment opportunities.

Some of the strengths of this work include:

- ▷ Set standards for the maturing XR industry with strong ethically aligned software and content creation.
- ▷ Europe's leading role in XR demand with upwards trends.
- ▷ Apply in global standards GDPR framework on data privacy and a leading position setting global standards for regulating the digital economy.

## Has your project directly involved or led to a specific recommendation or proposal for developing new or revised standards?

The CEN CWA elaborates a recommendation for a holistic register of standards (including application profiles of existing standards where appropriate) that can serve to establish interoperability in support of XR learning and performance augmentation. The overarching goal for each of three use cases –authoring, exchange, and delivery– is the creation of memorable experiences. Providing 3D digital objects and the required connected interactivity for learning and performance augmentation, however, is a complex matter by itself. This CWA seeks to address the complexity for learning and performance augmentation and remedy the situation, easing access for education and training specialists to emerging XR technologies. IEEE PAR submission (P7016.1) establishes the definition of the ethical metadata of learning objects within eXtended Reality (XR) and Metaverse, when used within educational applications.

## Have the standardisation activities in your project led to specific deliverables?

Yes, I have contributed to drafting a technical report on development of a new standard.

## What future efforts or activities are still necessary for your area of application?

The submission of the PAR P7016.1 for new Standards for Ethically Aligned Educational Metadata in Extended Reality (XR) & Metaverse took place in December 2022 and is under review.

P7016.1 has been approved by SSIT/SC. C/LT was listed on the PAR and SSIT/SC approved it. C/LT approved to be a co-standards committee on the PAR in January 2023. P7016.1 still needs SSIT/SC to approve CTS/MS as a co-standards committee and CTS/MS will need to approve as well. All these actions will be finalised by end of April 2024.

IEEE P2030 Metrics Committee Chapter] Strong Sustainability by Design, Chapter 2 (Metrics/ Indicators) Section 8: Issue 8: Technology Toolkits Enabling Paradigm Shifts. This report is under progress and will be finalised and published by May 2023.

## Online references related to the fellowship work

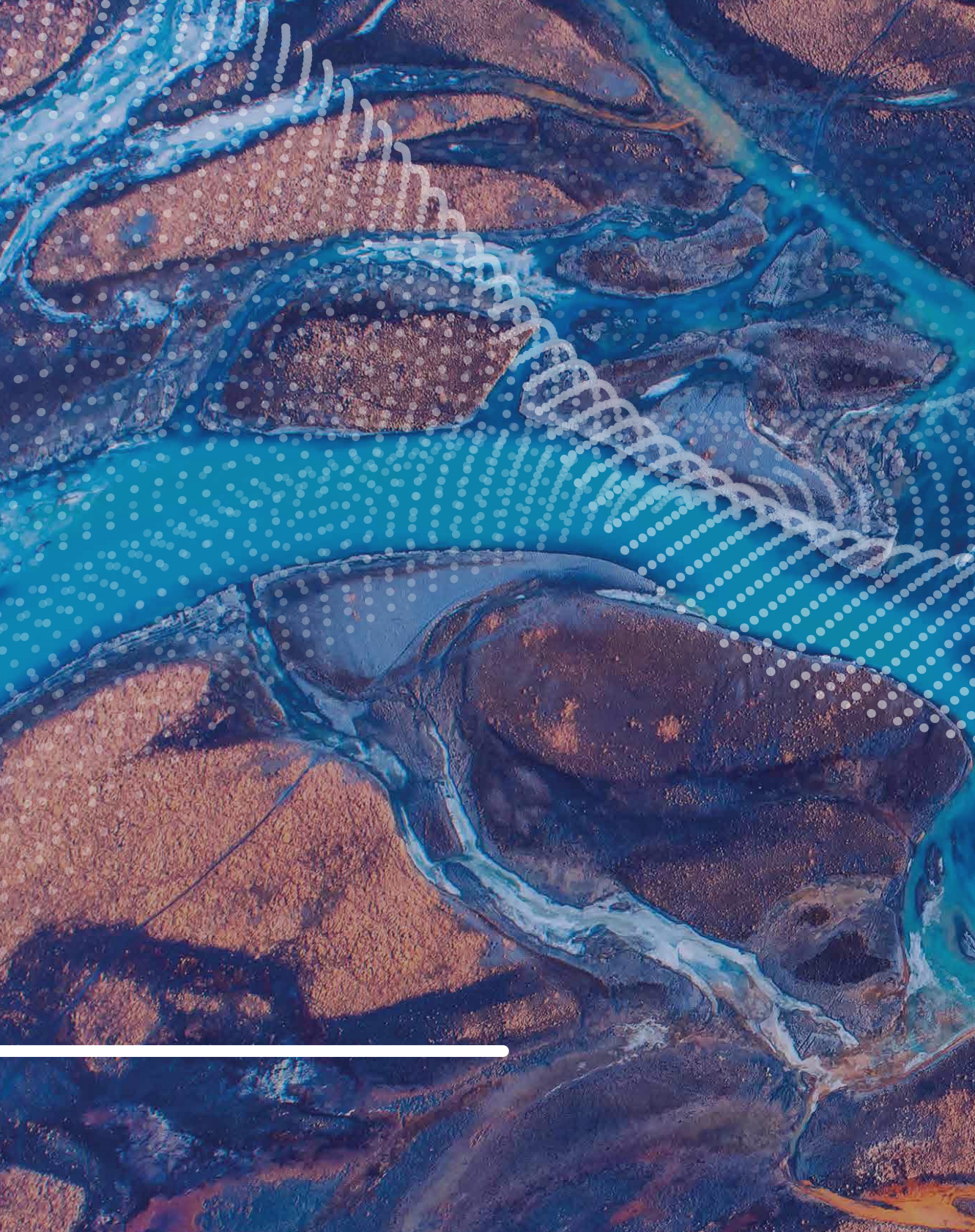
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