

standICT.eu 2026

ICT Standardisation Observatory and Support Facility in Europe

FOLLOWING THE FELLOWS

IMPACT REPORT FROM
FUNDED APPLICANTS TO
THE STANDICT.EU 2026
FELLOWSHIP PROGRAMME

FIRST OPEN CALL

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Disclaimer

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About StandICT.eu

The project is coordinated by [Trust-IT Srl](#) (IT) acting as a technical coordinator, and [Dublin City University](#) (IE) acting as financial coordinator, supported by its partners [AUSTRALO](#) (ES), [European Digital SME Alliance](#) (BE), [Fraunhofer](#) (DE) and [Open Forum Europe](#) (BE).



Acknowledgements

Our consortium is grateful to all experts of our StandICT.eu 2026 community for their competent work. This booklet is a tangible reflection of your continuous dedication in ICT Standardisation - Thank you!

StandICT.eu 2026 would also like to thank EC representatives **Carlos Lopez Rodrigues, StandICT.eu 2026 Project Officer, Paul Killeen, Emilio Davila-Gonzalez, and Thomas Reibe** 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: **Harshvardhan Pandit (EAG Chair), Ana Garcia Robles, Antonio Kung, Betty XU, Diana Dus, Joel Myers, Karl Gruen, Lindsay Frost, Martin Chapman, Sandra Drechsler, Sebastian Hallensbelen, Silona Bonewald, Stephan Weisgerber.**

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.

■ 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 1st edition under the new StandICT.eu 2026 project, continuing the work of the precursor 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 2026 Fellowship Programme, as paramount part of the broader mission of the StandICT.eu 2026 Coordination and Support Action.

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 because of the ICT Standardisation efforts.

As we move forward, our commitment to bolstering the EU’s role in international standardisation remains strong. The “Following the Fellows” series is not only a testament to the achievements of our fellows but also serves as an inspiration and a call to action for future standardisation professionals. By highlighting the critical work of these individuals, we aim to underscore the importance of ICT standardisation in driving innovation, ensuring competitive advantages, and contributing to the sustainability and resilience of society and the economy at large.

We invite the standardisation community, policymakers, industry stakeholders, and all interested parties to engage with the insights and findings presented in these reports.

Silvana Muscella

StandICT.eu 2026 Project Coordinator
& CEO, Trust-IT Srl



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■ Introduction

This report marks the third edition of our funding programme, with **StandICT.eu 2026**, following StandICT.eu 2023 and StandICT.eu 2018. Since 2018, our programme funds European experts contributing actively to the work of international and European standardisation organisations and bodies. We have built an ever-growing and reactive network of standardisation enthusiasts who are creating ICT standards of tomorrow!

Now, our team is delighted to showcase the first series of StandICT.eu 2026 fellowship stories of the funded experts from the Open Call batch #1. You will discover how they addressed standards and landscapes, how these will fill in the identified gaps, as well as impact the related stakeholders and society. Moreover, the results obtained by our fellows fully respond to many of the objectives set out in the EU Strategy on Standardisation. They mainly prioritise 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 fundamental (even if sometimes invisible) function in our daily life. They can ensure the interoperability 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 researchers 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 2026 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 research outputs, with a view to efficiently respond to the EU's ambitions towards different thematic ICT areas, such as Metaverse and Digital Product Passport, which were the focus of the announcement of the 1st Open Call.

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 first one out of 9 StandICT.eu 2026 Open Calls. Each open call will have a dedicated impact report demonstrating 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 community.

In this funding batch, **in total 35 fellowships** were granted, tackling the five policy areas as defined in the ICT Rolling plan 2023 [1]:

- ▶ **Foundational drivers: 11 fellowships** focusing on cybersecurity (4 fellowships), e-Privacy (2) and network and information security (5).
- ▶ **Key enablers and security: 17 fellowships** focusing on Artificial Intelligence (9 fellowships), 5G/6G (2), big data (1), electronic identification (1), IoT (1), and Quantum technology (3).
- ▶ **Sustainable growth: 3 fellowships** focusing on Digital product passport (1), Robotics and autonomous systems (2), ICT Environmental impact (1), and Smart Cities (1).
- ▶ **Innovation for Digital Single Market: 3 fellowships** focusing on Metaverse.
- ▶ **Societal challenges: 1 fellowship** focusing on ethical artificial intelligence.

Overview of the Open Call #1

The first StandICT.eu 2026 Open Call¹ was launched on the 9th of May 2023 and closed on the 10th of July 2023. 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.

Due to their current strategic importance at the EU level, applications focusing on the topics of Metaverse and Digital Product Passport were highly encouraged. However, this open call was 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 first Open Call totalled 105 applications received out of which 35 were selected for funding, with an overall 321,000 Euro granted. Once more, this open call confirmed the excellent quality of most of the submitted proposals, marking a noticeably high average quality score (the average score of submitted applications was 7,74 and that of funded applications was 8,9 in a 1 to 10 scoring scale). The funded applications provided an extensive geographical coverage with 16 different EU or associated countries (with most representants from Belgium). Moreover, 17% of the funded experts were female.

The retained fellowships 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

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1st Open Call APPLICATIONS FUNDED

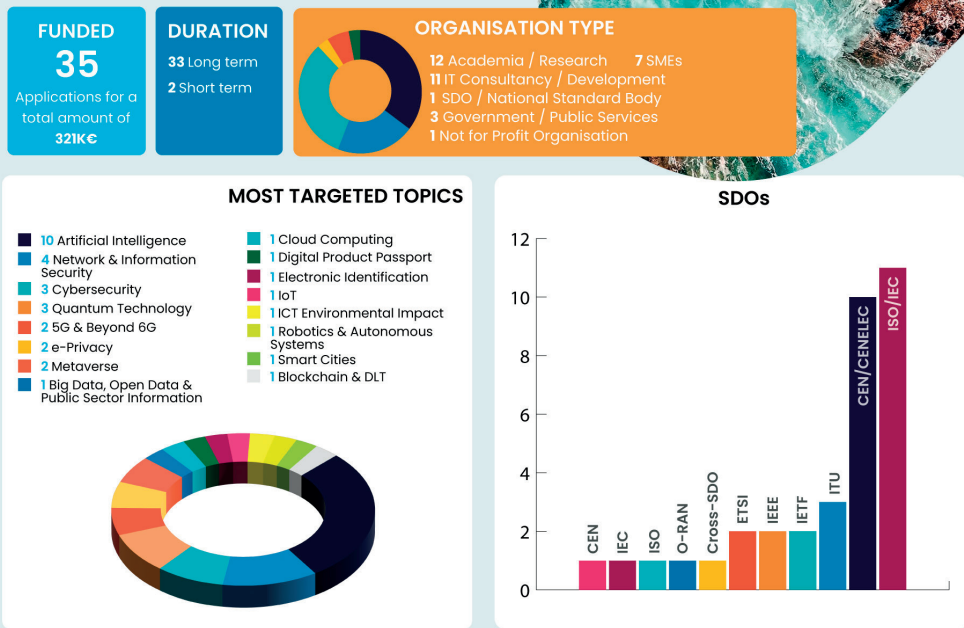


Figure 1 - Overview of the #1 Open Call key results and insights

¹ <https://www.standict.eu/standicteu-2026-1st-open-call>

applicants. As outlined in Figure 1, major part of the granted fellows has chosen their focus across a varied range of horizontal and vertical ICT areas; the most popular areas in this batch include artificial intelligence, cybersecurity, quantum technologies as well as network and information security. This funding batch is marked by a great variety of vertical ICT areas covered by the fellowships, including metaverse and digital product passport that were the targeted areas of the announced call.

Engaged SDOs, Organisations and European Projects

30% of the fellows are new to the StandICT.eu programme, and the remainder are returning fellows who have already benefited from a funded StandICT.eu fellowship or fellowships in the previous programme (under StandICT.eu 2023). Engaged SDOs, Organisations and European Projects

62% 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 another group engaged in standardisation (namely, O-RAN). Finally, 9 European funded and innovation research projects (see Table 1) are related to the engaged work in the OC#1 fellowships, with a focus on different horizontal and vertical technologies

Table 1 – EU Projects related to OC#1 Fellowships

Project	ICT Area	Funding Programme	Related StandICT.eu Fellow
NGI eSSIF-labs	Self-Sovereign Identities (SSI)	Horizon2020	Jan Lindquist
ONTOCHAIN	Next Generation Internet	Horizon2020	
TRUSTCHAIN	Virtual identity management	HorizonEurope	
MEDIIVERSE	Media	Horizon2020	Pilar Orero
GreenSCENT	e-learning	Horizon2020	
Adra-e	AI, Data and Robotics	HorizonEurope	Paulo Gonçalves
VITAL-5G	5G	Horizon2020	Alexandru Vulpe
FOR-FREIGHT	Intelligent Transport Systems	HorizonEurope	
EvOran (NGISargasso)	Next Generation Internet	HorizonEurope	Jordi Mongay Batalla

Now, we are delighted to share with you the insights from our granted fellows' work – and we truly hope that these results encourage you get involved in our StandICT.eu community and joining our Fellowship Programme under our forthcoming Open Calls, the European Observatory for ICT Standards (EUOS) - via the Technical Working Groups (TWGs) delivering up-to-date landscape and gap analysis , and finally Standards Academy training future experts in ICT Standardisation.

Together we shape and reinforce the European and international ICT standardisation arena!

1.

Foundational Drivers



Second edition of Rec. ITU-T X.510 | ISO/IEC 9594-11



Erik Andersen

*Independent expert, Andersen's L-Service
Denmark*

Sector

Cybersecurity

Engaged SDOs, WGs and TCs



Collaborative work between:
ITU-T Study Group 17 Security &
ISO/IEC JTC 1/SC 6 Telecommunications and information exchange
between systems

Role

Contributor and project editor

Addressed EU standardisation priorities and gaps

One of the more difficult issues is the migration of cryptographic algorithms. Until now it has not been done in any significant scale as it involves many different partners. The cryptographic algorithms 15 years ago are still in use today although better algorithms are available. However, with the expected development of quantum computing, migration becomes a necessity. There are several activities in progress to develop quantum safe algorithms, while how to migrate is an unfilled gap. Only a big-bang migration where everybody in country or may in the whole of Europe switches at the same time. That is unrealistic.

With this fellowship, I am contributing to the development of the Rec. ITU-T X.510 | ISO/IEC 9594-11 (in the following referred to as ITU-T X.510) is intended to fill that migration gap by specifying procedures and tools for an orderly migration involving many diverse parties.

Concerned ICT Standards and contribution to the related landscape

In addition to the migration capabilities discussion in section 2.1, ITU-T X.510 describe many cryptographic algorithms in way that that eases the development of secure protocol by devising a way to avoid "hard-coding" in communication protocol specifications where cryptographic algorithms can be plucked-in as needed.

ITU-T X.510 specifies a communication protocol that wraps other protocols and thereby provides protection for those wrapped communication protocols.

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

Impact on Society

X.509 has a major impact on how we design secure systems as it is the framework for public-key infrastructure (PKI). It is expected to be an important specification for cryptographic algorithm migration which is essential in the light of future developments of quantum computers. The cryptographic pluck-in capabilities are also important as that will allow different areas to have their own choice of cryptographic algorithms.

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

Yes, the project has resulted in a second edition of Rec. ITU-T X.510 | ISO/IEC 9594-11.

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

Yes, I have drafted a technical report on recommendations for a revised standard. Both of my WGs contribute in developing new standards and revising obsolete ones in the field of cybersecurity.

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

ITU-T X.510 specifies a communication protocol that allows an entity to subscribe on the status of public-key certificates. This protocol should be extended to also subscription of status of attribute certificates. It should also be generalised in other ways allowing directory access to information. This protocol should also be extended to provide access to a directory holding information related to public-key infrastructure (PKI). This could be the subject for a new fellowship in the StandICT.eu2026 Programme.

Online references related to the fellowship work

 www.iso.org/committee/45072.html

 www.itu.int/en/ITU-T/studygroups/2022-2024/17/Pages/default.aspx

 www.itu.int/md/T22-SG17-230829-TD-PLN-1288/en

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



Christophe Stenuit

*Expert in ICT standardisation, Viewconcept.be
Belgium*

Sector

Cybersecurity

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

Editor and expert member

Addressed EU standardisation priorities and gaps

With this fellowship, I am to 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 contributions 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

In the framework of this fellowship, I have contributed to a better harmonisation of e-identity and privacy protection standardisation support in Europe. This project also contributed to ease the implementation of e-identity and e-privacy developments. The scope of this 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
- ▷ Integration of the referred standards with their amendments
- ▷ 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
- ▶ Development of threats associated with digital authentication and possible controls.
- ▶ Development of an entity authentication assurance framework (ISO/IEC 29015 rework)
- ▶ Analysis of identification and authentication processes

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

- ▶ Contribution to a CEN CLC ETSI Coordination group on eIDAS
- ▶ Contribution to the establishment of a Liaison Statement of ISO/IEC JTC 1/SC 27 WG 5 to CEN-CENELEC JTC13.

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

Impact on SMEs

SMEs are better aware of risks and of controls required in IT and information protection. Recent EU GDPR, eIDAS2 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 down improper compliance to good practices. Good standard references help establish confidence and improve maturity related to SMEs' concerns.

Impact on Society

This work impacts the society from three different perspectives:

Firstly, it fosters secure societies - protecting freedom and security of Europe and its citizens: Supporting standards on e-identity and e-privacy information management ensures identity information lifecycle, identification, bound proofed identity information and authentication of citizen and societies are in place before authorised accesses to services is provided without compromising their privacy.

Secondly, it builds better cybersecurity, network, and identity information security: Standards on reference architectures around e-identity and e-privacy management ensure information infrastructure has the required controls in place to protect citizen and societies while accessing and using provided services.

Thirdly, it improves ePrivacy protection: Data protection good practice ensures any risk on identity information is mitigate during the processing of the information.

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

Part of the objectives of the project is to support systematic reviews, 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?

Yes, I have contributed to drafting a set of technical reports on common terminology, recommendations for revised standards, reference materials and on development of a new standard.

These two WGs of ISO/IEC and CEN/CLC are contributing to two of the fundamental action plan drivers of the ICT Standardization in the EU, which are Cybersecurity and information security, and e-Privacy. Both SDOs are intending to deliver confidence in establishing business relationships, protecting actors from each other and from external risks introduced from business data exchanges.

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

Most developed texts are achieving maturity. The referred work items are being more and more used or referred in the industry. Some efforts are still required to achieve publications. This could take up to 18 or 24 months. This activity will continue over 2023, and achieve publications during 2023, 2024, and 2025.

Online references related to the fellowship work

 https://standards.cencenelec.eu/dyn/www/f?p=205:7:0:::FSP_ORG_ID:2307986&cs=1BFE244DDA2A68D1B5C93795034A8DD05

 <https://www.iso.org/committee/45306.html>

Advance Biometric System-on-Card standard series ISO/IEC 17839



Robert Mueller

*Expert, Dr. Robert Mueller IT Consulting
Germany*

Sector

Cybersecurity

Engaged SDOs, WGs and TCs



ISO/IEC SC17 WG11 Application of biometrics to cards and personal identification

Role

Editor of 3 standards and technical expert contributor

Addressed EU standardisation priorities and gaps

The first version of the Biometric System-on-Card (BSoC) standard series ISO/IEC 17839 has been published 2014 to 2016 and is the ISO base standard referenced by application standards including e.g. payment schemes Mastercard and Visa. During the last few years, technology has advanced. Industry and users had a chance collecting field experience and several usability studies have been performed by leading universities globally. All of this makes a revision of the standards necessary which started 6-12 months ago.

The priority of this fellowship is on advancing the key ISO standard series for the Biometric System-on-Card technology and contribute to related documents and liaisons of the working group ISO/IEC SC17 WG11. It is of particular relevance for small and medium-sized enterprises who deliver only one component in the entire eco- system of payments, access control or digital identities and depend on interoperability. The major industry players delivering BSoC components and solutions are based in France, Germany, Sweden, Norway and some other European countries. Delegates participating in the development of the standard come from all European nations mentioned, plus Asia and US. European interests point not only to the industry needs but also preserving privacy for citizens which this technology allows by storing and processing personal biometric data only on personal secure devices, namely smart cards.

The main challenge is that some industry players dominate national bodies and want to promote their own product by making contributions to the industry standard. This may not always be in the interest of European citizens or companies with legit interest in solutions with a high level of privacy and security. The contributions need to be carefully reviewed and negotiated to a consensus that is acceptable by all parties.

Concerned ICT Standards and contribution to the related landscape

The Biometric System-on-Card standard series ISO/IEC 17839 addressed in this fellowship engagement has 3 parts: core requirements, physical characteristics and logical information interchange system. It described the architecture and characteristics of an ISO smart card that encompasses an entire biometric verification system including the biometric capture device.

This solution has many advantages with respect to privacy, security and convenience for cardholder citizens. It is linked to several other ISO standard including ISO/IEC 18328, ISO/IEC 24787 or ISO/IEC 7816-11 and complements the existing standardization landscape with a biometric solution that has a higher level of system integration, therefore bridging the smart card and biometrics ecosystems. Liaisons with both ISO/IEC SC17 WG4 and SC37 WG3 underline how this series of standards is embedded into the landscape.

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

Impact on SMEs

The ISO/IEC 17839 series of standards set requirements and boundaries for vendors to comply with and establishes interoperability for the benefit of users and SMEs. Having clearly defined interfaces and realising interoperability enables changing single components of a biometric system including a Biometric System-on-Card. This is of particular relevance for SMEs who typically provide only a single component while larger corporations are capable of delivering an entire proprietary system. The majority of companies delivering this platform of components thereof are based in France, Germany, Sweden, Norway.

The interoperability is also in the interest of society because it generates competition and reduces dependencies from dominating players.

The BSoC as a technical solution is beneficial for European society because it allows a high level of privacy since the individual biometric data never leaves the card.

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

Yes, I contribute to revising the existing standards series The Biometric System-on-Card ISO/IEC 17839.

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

The ISO/IEC 17839 standard series is currently under revision. Contributions from national bodies have been collected and a proposed disposition prepared that was turned into an approved disposition during the working group meeting and resulted in revised base texts. These have now been distributed for the next cycle, meaning that the work is in progress.

Online references related to the fellowship work

 www.iso.org/committee/45144.html

Consent records and privacy principles in eIDAS2 wallet



Jan Lindquist

*Privacy Standards Developer, Linaltec AB
Sweden*

Sector

E-privacy

Engaged SDOs, WGs and TCs



ISO SC27/WG5 (identity management and privacy technologies)
CEN TC 224 WG20 (Ad hoc group on European digital identity wallet)

Role

Member

Addressed EU standardisation priorities and gaps

This fellowship contributed to two standardisation activities, one within ISO and another one within CEN.

For ISO/IEC TS 27560 Consent Record Information Structure, ISO SC27 WG5 reached final agreements to go for publication in July 2023. Final agreement was reached so that WG5 approved with one noted objection. In September 2023 the standard was finally published with a good response in the industry.

EUDI Wallet Held Attributes Access Control is a new standard proposal discussed with several experts both in CEN/TC WG20 and ETSI ESI to work on a new standard proposal. Incredible collaboration to help clarify the access control of the held attributes in the wallet. It started as high level discussion and work out terminology and an access control framework. The work was presented at a Paris WG20 meeting and received support from the whole group. The Swedish technical committee (TK 448) endorsed the project proposal where I will be lead project leader. The project proposal has been submitted to TC224 for ballot. I am humbled to have the opportunity to develop this new standard with collaboration with well-respected experts.

Concerned ICT Standards and contribution to the related landscape

With this fellowship, I have contributed to the completion of the publication of ISO/IEC 27560 Consent Record Information Structure. The StandICT.eu 2026 funding also made it possible to start a new CEN TC224 project with working title "EUDI wallet held attributes access control" which will make it clearer the conditions for retrieving information from the wallet. This clarity or transparency is fundamental to have trust on the wallet.

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

Impact on SMEs

The publication of ISO 27560 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 3rd parties (SME's).

Establishing trust for the wallet with the new work in WG20 will help SME's get involved with the deployment of the wallet. SME's will be encouraged to build services on the wallet when there are key benefits for wallet holder focusing on privacy and security when sharing personal data.

Impact on Society

The publication of ISO 27560 will help the society to limit the indiscriminate sharing of personal data and encourage creation of digital consent receipts as evidence of what was consented to.

The development of digital wallet and adoption of the new standard "EUDI wallet held attributes access control" will make it clear the conditions for sharing of personal data with a record of transaction AND ability to withdraw any previously disclosed information which today can be very difficult to achieve.

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

Yes, the work on this project has directly influenced ETSI ESI to create a new standard relating to Relying Party access to personal data in the wallet.

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?

EUDI wallet has yet to be deployed and achieve interoperability between countries. The standards to achieve the interoperability are being developed. Countries may be promoting their own flavour which may take time to agree. There is an aggressive time plan to get something out at national level and it will take time to settle the differences to have true compatibility. The project proposal "EUDI wallet held attributes access control" addresses one aspect of the wallet ecosystem but all need to work together (ex ETSI ESI) to reach maturity. It will take time and compromises.

Online references related to the fellowship work

www.iso.org/standard/80392.html

https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=69585

Security and privacy of biometrics for remote authentication



Julien Bringer
CEO, Kallistech
France

Sector

E-privacy

Engaged SDOs, WGs and TCs



ISO/IEC JTC 1/SC 27 Information security, cybersecurity and privacy protection



ISO/IEC JTC 1/SC 27/WG 5 Identity management and privacy technologies

ISO/IEC JTC 1/SC 37 Biometrics/WG 5 Biometric testing and reporting

ISO/IEC JTC 1/SC 37/WG3 Biometric data interchange formats

CEN/CNLC JTC 13 Cybersecurity and data protection

Role

Member, and project leader of ISO/IEC 27553-2 and of ISO/IEC 19792

Addressed EU standardisation priorities and gaps

Addressing privacy protection, cybersecurity, identity protection, and potential applications in fintech/regtech: This fellowship aims to lead and contribute to on-going projects in ISO/IEC JTC 1/SC 27 and SC 37 related to biometrics authentication and identification to enforce highest security and privacy requirements to protect end-users following the core principles of EU personal data protection regulation, and even further by enforcing security and privacy by technical design. ISO/IEC JTC 1/SC27 has recently developed a new standard (publication late 2022) 27553-1 on security and privacy requirements for biometrics authentication towards remote services when biometrics information remain on a mobile device. However, there are already many deployed solutions for which some biometrics information are sent remotely, without clear guidelines or requirements, thus leading to huge risks for end-users. SC27 has consequently initiated a new project 27553-2 for the cases where some info is sent to remote services. It is critical to support this project with a strong basis to lead the way toward privacy and security by technical design and to enforce the highest practices for a better protection of end-users, as well as related projects around security and privacy of biometrics. The EU has a strong position on privacy of personal data, and among those information biometrics are seen as among sensitive ones. Based on GDPR and the standards developed in SC27 (for instance ISO/IEC 29100 and ISO/IEC 24745 for biometric information), it is important to ensure that the standards developed for specific businesses/domains remain consistent with these principles, and even more, that they rely on up-to-date privacy and security enhancing technologies.

Concerned ICT Standards and contribution to the related landscape

This fellowship is related to the following standards under development:

- ▶ In SC27, ISO/IEC CD 27553-2 Security requirements for authentication using biometrics on mobile devices: remote modes and the revision of ISO/IEC 19792 Security evaluation of biometrics. I am involved as a project leader in both.
- ▶ In SC37, ISO/IEC CD 9868 Remote biometric identification systems — Design, development, and audit.

This fellowship led the development of the next drafts of 27553-2 and 19792. In addition, the activity included commenting and contributing to the on-going projects leveraging biometrics (and other personal information) for identification or for authentication, as ISO/IEC 9868. This is made to ensure security and privacy of sensitive data (of biometrics) are taken in account, to ensure consistency with the highest standards, and also taking in account recent progresses in privacy enhancing technologies. This will enable to be aligned with the high requirements from EU market, at least, and even to reach additional protection by technical design.

During the fellowship I have been also involved on providing comments on 2 other SC 37 projects (20059, 29794-5) to emphasize the needs to take in account security and privacy concerns. And I managed the liaison by ensuring communication with SC37 and presenting biometrics standardization activities to SC 27.

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

Impact on SMEs

Helping the development of EU-friendly solutions for biometrics-based services, employing strong privacy enhancing technologies, thus going further contractual/organizational requirements, to ensure privacy and security by design. Promoting the use of the newest privacy enhancing technologies is in particular very important as sharing or leaking biometric information without appropriate protection can be very critical. This will support innovation in EU market and a common approach between the member states. It will also help the EU providers to get ahead of the competitors internationally.

Impact on Society

The topics considered in this activity are of direct impact on society as they relate to the protection of personal information in biometric systems and the way to ensure the security of authentication to use online services.

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

There is not a specific recommendation yet, but discussions have been conducted for potential future alignment between several projects.

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

The fellowship was related to standardization projects at working draft stage. New drafts have been released thanks to the fellowship reaching committee stage, but final publications are not expected before one year.

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

There is a need to support further those standardization projects until their publication.

In addition, there are related discussions in CEN TC224 to define EU frameworks for testing and evaluating biometric systems in European Union that require further efforts to ensure that best of the standards are taken in account.

Online references related to the fellowship work

 www.iso.org/committee/45306.html

 www.iso.org/committee/313770.html

 <https://www.cenelec.eu/areas-of-work/cenelec-sectors/digital-society-cenelec/cybersecurity-and-data-protection/>

Proposal for requirement regarding the elimination of publicly known exploitable vulnerabilities



Octavian Popescu

Consultant, researcher, EUCOMREG
Belgium

Sector

Network and information security

Engaged SDOs, WGs and TCs



CEN-CENELEC Joint Technology Committee 13 Cybersecurity and data protection WG8 CEN-CENELECJTC 13 WG 9
ETSI Technical Committee (TC) Cyber Security (CYBER).

Role

Member

Addressed EU standardisation priorities and gaps

With this fellowship, I focus on the gap concerning the fact that there are no ICT standards that are ready for being published and referenced in the OJEU for the requirements activated in the RED Delegated Act. The RED Standardisation Request is meant to produce a set of three horizontal harmonised standards, each covering one essential requirement 3.3 d, e, f. With this work, the priority is on the three horizontal standards that are requested to contain technical specifications that ensure that internet connected radio equipment, is provided, on a risk basis, with up-to-date software and hardware, at the moment of placing on the market, that do not contain publicly known exploitable vulnerabilities.

However, there are multiple challenges that would make the standardisation incomplete or obsolete from very early on in its life cycle. To test for vulnerabilities, the tester needs to have an up-to-date database of publicly known, exploitable vulnerabilities, against which the test should be performed. Such a list is difficult to assemble, even for one successful technology, let alone for all radio equipment.

Concerned ICT Standards and contribution to the related landscape

I am active in both CEN-CENELEC JTC13 WG8 and WG9, and in ETSI TC CYBER. The proposed standards in Working Group 8 are prEN 18031-1, -2, -3 for 3.3. d, e, f correspondingly.

In ETSI TC CYBER a new work item (NWI) for a Technical Report with the title Multi-Party Coordinated Vulnerability Disclosure is in the process of being approved and I am a supporting member for this proposal. This activity was made possible by this current fellowship.

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

Impact on SMEs

Clarifying for the EU SMEs and European societies the direction they would have to take to evolve and change their product, ensuring their compliance with the regulatory obligations activated in the RED Delegated Act.

Impact on Society

European society is under constant threat from bad actors due to the process of dealing with vulnerabilities. This process is the result of complex interactions among multiple entities and organisations and it can be improved but not made completely risk free to the society. The society needs to be informed to be able to adapt to the evolving threats presented by the interconnected world.

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

Yes, I contribute to the NWI proposed in ETSI TC CYBER, will identify Multi-Party Coordinated Vulnerability Disclosure challenges, variants, existing specifications, existing tools and cybersecurity uses, including compliance obligations (e.g., regulatory and contractual). The report will identify gaps and make recommendations for further work. My intention is to use the findings of this work and report to contribute to the CEN-CENELEC standard prEN 18031 which is currently in drafting.

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

This project is at the basis of my participation on the topic of the requirement regarding the elimination of publicly known exploitable vulnerabilities in both the standardisation deliverable in ETSI TC CYBER and the one in CEN-CENELEC JTC 13 WG 8. The most important might be the fact that the two ESO groups are working on the same topic, and I would like to make sure that the standardisation deliverables complement each other.

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

This is just the beginning of the process, and it will be a long way to the point where the known vulnerabilities can be handled in a way that addresses the problem of the vulnerability while avoiding creating situations that are financially disastrous for the users of the affected technology or its creators. Trusted parties should be incentivised to share the information regarding the vulnerabilities in a manner that does not create problems, while preventing bad actors to access the network.

Online references related to the fellowship work

https://standards.cenelec.eu/dyn/www/f?p=205:7:0:::FSP_ORG_ID:2307986&cs=1BFE244DDA2A68D1B5C93795034A8DD05

Participation in the development of standardisation work in support of RED Articles 3(3) (d/e/f)



Octavian Popescu

Consultant, researcher, EUCOMREG, Belgium

Sector

Network and information security

Engaged SDOs, WGs and TCs



CEN-CENELEC JTC 13 Cybersecurity and data protection WG8 Special Working Group RED Standardization Request

Role

Member

Addressed EU standardisation priorities and gaps

This fellowship is related to the gap concerning the lack of harmonised European Norms referenced in the Official Journal of the EU for the requirements activated in the Radio Equipment Directive Delegated Act.

Moreover, CEN-CENELEC accepted the RED Standardisation Request, and JTC13 Working Group 8 is tasked to produce a set of three horizontal harmonised standards, each covering one essential requirement 3.3 d, e, f.

In consequence, my project engaged my participation in producing the three horizontal standards. My aim is to contribute especially with formulating technical specifications that ensure that internet connected radio equipment, conforming to the standardisation deliverables, complies with the essential requirements upon being placed on the EU single market.

Concerned ICT Standards and contribution to the related landscape

My fellowship focuses on contributing to the development of three new standards related to the RED Standardization Request. The proposed standards in WG 8 are EN 18031-1 Common security requirements for radio equipment - Part 1: Internet connected radio equipment, -2 Common security requirements for radio equipment - Part 2: radio equipment processing data, namely Internet connected radio equipment, childcare radio equipment, toys radio equipment and wearable radio equipment, -3 Common security requirements for radio equipment - Part 3: Internet connected radio equipment processing virtual money or monetary value for 3.3. d, e, f correspondingly.

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

Impact on SMEs

Without a Harmonised European Norm covering the RED Art. 3.3 d, e, f essential requirements activated in the Delegated Act the European companies will not be able to evaluate their products for these cybersecurity related requirements and they will not be able to apply CE Mark without a Notified Body.

Impact on Society

The improvement of the cybersecurity situation will help create trust in EU regulation and should also increase the confidence level among users of radio communication equipment.

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

The objective of the project is to enable my participation in the work leading to the publication of three new standards, namely EN 18031-1, -2, -3.

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

This work is in progress, with standards in the final drafting stages, after which these will be presented for voting.

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

If the standards will get published, there are places where the cybersecurity situation evolves very fast, and the standards will need to be reviewed frequently for omissions.

Online references

https://standards.cencenelec.eu/dyn/www/f?p=205:22:0:::FSP_ORG_ID,FSP_LANG_ID:2307986,25&cs=1ED41A3D97E9C0D226A9087045F5D181C

Standardisation of multiparty computation in ISO/IEC JTC1 SC27 WG2



Thomas Loruenser
Independent expert
Austria

Sector

Network and information security

Engaged SDOs, WGs and TCs



ISO/IEC JTC SC27 Information security, cybersecurity and privacy protection WG 2 – Cryptography and Security Mechanisms
ISO/IEC JTC SC27 WG 3 – Security Evaluation, Testing and Specification
ISO/IEC JTC SC27 WG 4 – Security Controls and Services
ISO/IEC JTC SC27 WG 5 – Identity Management and Privacy Technologies

Role

Editor of ISO (IEC 4922-1 and co-editor of ISO/IEC 4922-2
National expert contributing to IOS/IEC 4922-3

Addressed EU standardisation priorities and gaps

My fellowship project is dedicated to support standardisation of secure multiparty computation (MPC) in ISO/IEC. MPC is a cryptographic technique which allows for computations on encrypted data and is expected to be an enabling technology for privacy-preserving collaboration in emerging dataspace and data ecosystems.

The technology has been researched for decades and recent scientific progress lead to many practical applications in real-world scenarios. Thus, it is an emerging technology with strong industry support and many big industry players are already adopting it. However, standardised protocols are missing and prevent from large scale adoption and deployment of interoperable solutions.

The standardisation effort in this project will help to push to publication the first two parts of a standard on multiparty computation, which were already initiated years ago by the experts from Austria and Japan. It also builds on previous work on standardising secret sharing (ISO/IEC 19592 Part 1 and 2). Additionally, a newly created third part on the standard is also supported by the project and a related effort on the standardisation of fully homomorphic encryption (FHE) is monitored by the initiative.

Concerned ICT Standards and contribution to the related landscape

This project helped me to continue my editing support on a previously initiated series of standards on secure multiparty computation. It allowed me to further increase my focus on standardisation of privacy-enhancing technologies within ISO/IEC and increased the contribution of the Austrian national standardisation institute (ASI) to International Standards. Additionally, I was also able to provide feedback to standardisation projects beyond those I am currently focusing on.

In essence, the project contributes to ISO/IEC's ambition of publishing international standards based on broad consensus among participating countries, which in turn is a key requirement for broad acceptance of their standards.

Within this project, I closely followed the final phase of ISO/IEC 4922-1 process towards publishing as editor. Fortunately, the standard was published recently and is one of the deliverables with major impact.

Furthermore, work in preparation of ISO/IEC 4922-2 FDIS version as co-editor was done which paves the way for publication of the second part. Just recently positive voting results on FDIS were circulated with only minimal editorial comments left to be fixed before publication.

Also, I contributed to newly started part 3 (ISO/IEC 4922-3) of MPC and assured the alignment with existing parts.

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

Impact on SMEs

The proposal at hand is expected to directly contribute to increasing the real-world take up of advanced privacy-enhancing technologies, thereby advancing the technical state of the art in this domain and helping to maintain the privacy and data sovereignty of European SMEs and ultimately also citizens. In that sense it addresses the need for innovation in cryptography to cope with modern use cases encountered in emerging data ecosystems (e.g. Gaia-X) or large-scale interconnected systems (e.g. Internet of Things).

Additionally, a substantial number of European SME working on the commercialisation of MPC will benefit from the results of the project (Sharemind, Partisia, Unbound, ...)

Impact on Society

As this was a technical contribution to cryptography standards, no direct societal impact was made. However, indirectly it has manifold impact by supporting better data protection and security for data in emerging ecosystems.

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 development of three different parts of a new standard, ISO/IEC 4922 Secure Multiparty Computation (-1, -2 and -3).

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?

ISO4922 part 1 and part 2 have been successfully finalised. However, continuous support for part 3 would be desirable, as well as support for alternative technical approaches like FHE. Moreover, alignments with ongoing activities of other SDO would be highly desirable.

Online references related to the fellowship work

 <https://committee.iso.org/home/jtc1sc27>

 <https://www.mpcalliance.org/>

 [/www.iso.org/standard/80508.html](http://www.iso.org/standard/80508.html)

 www.iso.org/standard/80514.html

■ O-RAN infrastructure evaluation tests



Jordi Mongay Batalla

*Associate Professor, Security expert, Warsaw University of Technology
Poland*

Sector

Network and information security

Engaged SDOs, WGs and TCs



O-RAN Alliance - O-RAN Working Group 11 Security Working Group
O-RAN Security Test working group

Role

Member

Addressed EU standardisation priorities and gaps

In the last years, the O-RAN Alliance Security Working Group (No.11) specified security requirements for new elements (interfaces such as O1, AI, etc., and network functions such as Radio Intelligent Controller) that the O-RAN (Open Radio Access Network) architecture introduced beyond the 3GPP (Third Generation Partnership Project) 5G standards. These requirements were specified for the network equipment providers in order O-RAN to have a common security baseline. The requirements were at the network layer and complemented the 3GPP security standards (3GPP for 5G elements and O-RAN for O-RAN elements).

The focused standardisation gap concerns the fact that in the last months, the most outstanding European Mobile Network Operators, MNOs (Deutsche Telekom, Orange, Telefónica, TIM and Vodafone), published a number of security requirements at all levels as a pre-condition to using O-RAN network equipment on commercial networks. These requirements include the O-RAN network layer (mainly already considered in O-RAN security requirements) and Open Cloud (O-Cloud) layers, which include underlying layers such as virtualisation, cloud, and physical.

As a result of these security requirements, published under the Memorandum of Understanding (MoU), the O-RAN Alliance will deliver a comprehensive list of security controls at all levels, and the O-RAN network equipment will need to demonstrate that fulfils all requirements and implements the required security controls. This is the priority addressed with this fellowship.

Therefore, O-RAN security WG11 will need to extend evaluation tests provided up till now in order that tests confirm all new requirements.

Through this fellowship, I contribute to O-RAN security test standardisation specification by O-RAN Alliance WG11.

Concerned ICT Standards and contribution to the related landscape

The O-RAN deployment has accelerated in the last few years. In the market, there is quite a high number of companies (many of them are small or medium enterprises - SMEs) producing network components with open standards that may contribute to the deployment of O-RAN 5G networks. The final important push to O-RAN has been given by the necessity to break with the classical supply chain of network equipment components.

Even when O-RAN network equipment has clearly gained a part of the market, some impediments related to security appeared for the use of O-RAN equipment in big commercial networks: O-RAN has been developed on the assumption that the underlying infrastructure is secure, and this has created some confusion on the possibility of closing a secure network only at the network layer.

So, it's now vital that all stakeholders be reassured that the infrastructure accomplishes the common security baseline. For this, security evaluation tests need to be set in standards for all the infrastructure, not only the network but especially the Open Cloud infrastructure. Security assurance is the capacity of a product to show that it is secure, and it is provided through the realisation of security evaluation tests.

The security standards, containing security requirements and security controls fulfilling those requirements, have been deployed in O-RAN; however, the specification of security tests that should provide security assurance is still a little behind.

This fellowship aims to contribute to the O-RAN Alliance Security Tests specification, the main standard, bringing a security assurance methodology for all O-RAN equipment. The Security Tests specification standard that will be finalised in the next months must comply with 3GPP Security Assurance Specifications (SCAS). However, O-RAN standards will apply to O-RAN components, whereas 3GPP applies to 3GPP-standardised components.

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

Impact on SMEs

Currently, European MNOs rely on only a few established big vendors for 5G equipment (Huawei, Nokia, Ericsson, ZTE) who have a joint market share of as much as 75% of the big commercial networks worldwide. The deployment of O-RAN networks will open the market of commercial telcos for small players, providing new opportunities for European companies (especially SMEs) and fostering innovation and competition. The network will be more decentralised, which increases competence and encourages technological development.

A decentralised infrastructure's advantages will also be observed in security and trustiness. European telco infrastructure will be more resilient thanks to extended competence and an expanded supply chain. These developments align with the EU Chips Act and EU 5G Toolbox, which call for strengthening European ICT supply chain independence.

Impact on Society

Secure O-RAN network infrastructure will provide both economic and social profits: the economic profit will be visible thanks to two factors: on the one hand, the European Mobile Network Operators (MNO) will be able to break the oligarchy of networking hardware (purpose-built) providers, which will increase competition and reduce prices and, on the other hand, more European software developers will be capable to enter to the telecommunications market not only as consumers but also as providers. The social profit derives from the openness of the model so that critical aspects of the 5G can be made ad-hoc and by trusted providers.

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 completion of O-RAN Alliance - O-RAN Work Group 11 (Security Work Group) - O-RAN Security Test Specifications (version 7.0).

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

Yes, I have provided Change Requests to the standards. The deliverables aim to extend the range of the tests in O-RAN standards so more security features may be evaluated in the security assurance process.

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

The first step is the extension of the Security Tests Specification. It must include all the security controls (covering the security requirements) defined in the Security Requirements and Controls Specifications. Posteriorly, the range of the fuzzy tests should also be extended to cover vulnerability evaluation, at least for the most common vulnerabilities.

Online references related to the fellowship work

 <https://mobilenetworks.tele.pw.edu.pl/include/home.php.inc>

2. Key Enablers & Security

The background is a complex digital composition. It features a central fingerprint scan rendered in a glowing blue and white dot-matrix style. Surrounding the fingerprint are various digital motifs: binary code (0s and 1s) scattered throughout, glowing green and blue circuit traces, and several concentric, glowing blue circular lines that create a sense of depth and motion. The overall color palette is dominated by deep blues, bright cyan, and vibrant greens, giving it a high-tech, cybernetic feel.

Phase-2: STD Gen Framework: X-Dom Federated ETSI GANA KPs for 5G E2E Autonomic Security Man & Control



Ranganai Chaparadza

Senior Advanced ICT Technologies Consultant and Standardisation Expert on Evolving and Future Network Technologies, Altran Capgemini Germany

Sector

5G & beyond 6G

Engaged SDOs, WGs and TCs



ETSI TC INT (Core Network and Interoperability Testing) / AFI WG (Autonomic Management and Control (AMC) Intelligence for Self-Managed Fixed & Mobile Integrated Networks (AFI))
NIST Multi-Domain Knowledge Planes for Service Federation for 5G & Beyond Public Working Group (MDKP-PWG)
IEEE International Network Generations Roadmap (INGR) /Future Networks Technical Community (FNTC) / Systems Optimisation Working Group (WG)
ITU-T SG11 FG-TBFXG Focus Group on Testbeds Federations for 5G and Beyond

Role

Co-chair of NIST Multi-Domain Knowledge Planes for Service Federation for 5G & Beyond Public Working Group (MDKP-PWG)

Co-chair of IEEE International Network Generations Roadmap (INGR) /Future Networks Technical Community (FNTC) / Systems Optimisation Working Group (WG)

Co-chair of ITU-T SG11 FG-TBFXG Focus Group on Testbeds Federations for 5G and Beyond

Addressed EU standardisation priorities and gaps

With this fellowship, I address the following gaps; Development of a Standard for a Generic Framework for Multi-Domain (Cross-Domain) E2E ETSI GANA Federated Knowledge Planes (KPs) Platforms for E2E Autonomic Security Management & Control (powered by Artificial Intelligence (AI) Models/ Algorithms, Distributed Ledger Technologies/Blockchain, NFV, SDN, Big Data) across Multiple Network Domains, by Leveraging and Further Developing the Draft of the Generic Framework that has been based on the ETSI GANA Multi-Layer Autonomics Components and their associated AI Algorithms for Closed-Loop Network Automation.

Hence, the priority of this work is on 5G related to Cybersecurity. Also the theme of "Resilience and Green Transition", due to the aspect targeted by the Framework's work on ETSI GANA Autonomics Use Cases on Resilience of 5G Networks and Services to Detected and Predicated Security Risks and Known and Unknown Attacks through Self-Protection and Self-Defence

Mechanisms use by ETSI GANA Knowledge Plane (KP) Autonomic Security Management and Control GANA Decision- making- Elements (DEs) for closed control- loops (autonomics) based 5G autonomous network operations.

The main challenge is related to addressing 5G security challenges towards Resilience to Attacks in 5G Networks. Address Security challenges through automated orchestration of security mechanisms and services and usage for 5G network slices, network segments and services delivered by the End-to-End (E2E) network; through automated orchestration of security mechanisms and services and usage for 5G network slices, network segments and services delivered by the End-to-End (E2E) network; and automated security policy computation and dynamic enforcement in various points in the network infrastructure using GANA autonomics (closed control-loops).

Concerned ICT Standards and contribution to the related landscape

This fellowship is a continuation of my previous activities under StandICT.eu 2023 Programme. Now, the focus is on the ETSI TR 103 857 Standard and towards its completion and publication in the very close future:

- ▷ Elaborating more on ETSI GANA Autonomics Use Cases on Resilience of 5G Networks and Services to Detected and Predicated Security Risks and Known and Unknown Attacks through Self- Protection and Self-Defence Mechanisms use by ETSI GANA Knowledge Plane (KP) Autonomic Security Management and Control GANA Decision-making-Elements (DEs) for closed control-loops (autonomics) based 5G autonomous network operations. This means advancing and extending the work started in the ETSI TR 103 857 Draft
- ▷ Research and elucidate in ETSI TR 103 857 the roles ZERO Trust Framework standard by NIST (USA) and Distributed Ledger Technologies/Blockchain along with Artificial Intelligence (AI) Models/Algorithms, should play in the Generic Framework.
- ▷ Research and elucidate in ETSI TR 103 857 the impact of the Emerging Network Evolution Trends such as E2E Disaggregation such as the emerging OpenRAN, MEC Federations, Service Based Architecture (SBA) in 5G on the Generic Framework and provide insights on how to take into account such scenarios within the Generic Framework.
- ▷ Research and elucidate in ETSI TR 103 857 Perspectives on Use of Federated Testbeds in Testing Federated Autonomic Security Management and Control DEs of the ETSI GANA Knowledge Plane (KP) Platform.
- ▷ Work with others in ETSI TC INT AFI WG on completing the work in ETSI TR 103 857 on Autonomics Use Cases for Closed- Loop Self- Adaptive Orchestration and Context-Aware Application of Security Protocols/ Mechanisms/ Functions in 5G by GANA Security Management DEs and their AI-Algorithms. This means advancing and extending the work started in the ETSI TR 103 857 Draft.

Work with others in ETSI TC INT AFI WG on Perspectives regarding Consolidated Requirements for Enabling Security as a Service (SaaS) in ETSI and Across Multiple SDOs. This means advancing and extending the work started in the ETSI TR 103 857 Draft

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

Impact on SMEs

The activity helps enhance European SMEs and ISVs (Independent Software Vendors) Business Models/Products based on the Standard of the targeted Framework and on the Joint SDOs/Fora Integration Framework for ETSI GANA (ETSI TS 103 195-2), SDN, NFV, Big-Data, and E2E Orchestration Software for 5G and Beyond Network Services.

Impact on Society

The presentation I gave at IEEE Future Networks World Forum 13–15 November 2023 /

Baltimore, MD, USA: Imagining the Network of the Future² on the value of the newly launched NIST Public Working Group³ does contribute to the development of Digital Skills.

In addition, the Tutorial on “Standards and Standardisation” I gave together with colleagues at IEEE Future Networks World Forum 13–15 November 2023 Baltimore, MD, USA: Imagining the Network of the Future does contribute to the development of Digital Skills.

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

Yes, the development of ETSI TR 103 857: Generic Framework for E2E Federated GANA Knowledge Planes for AI-powered Closed-Loop Self-Adaptive Security Management & Control Across Multi-Domain 5G Networks.

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

Yes, I have contributed to a technical report for the development of a new standard.

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

While the work we accomplished in the ETSI TR 103 857 standard on Generic Framework for E2E Federated GANA Knowledge Planes for AI-powered Closed-Loop Self-Adaptive Security Management & Control Across Multi-Domain 5G Networks has matured significantly and the ETSI TR 103 857 is expected to be published soon in 2024, the topic and challenges on Security in 5G and Beyond Networks needs to be further addressed to close any gaps in ETSI TR 103 857 but also to use the ETSI TR 103 857 to launch Industry Proof-of-Concepts on the Generic Framework for E2E Federated GANA Knowledge Planes for AI-powered Closed-Loop Self-Adaptive Security Management & Control Across Multi-Domain 5G Networks.

Online references related to the fellowship work

https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=63106

https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=63527
https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=63106

<https://www.nist.gov/programs-projects/multi-domain-knowledge-planes-service-federation-5g-beyond-public-working-group> https://portal.etsi.org/webapp/WorkProgram/Report_WorkItem.asp?WKI_ID=63106

2 <https://fnwf2023.ieee.org/program/symposiums/symposium-system-optimization-%C2%A0future-networks>

3 <https://www.nist.gov/programs-projects/multi-domain-knowledge-planes-service-federation-5g-beyond-public-working-group>

Contribution to AI-based Network Application standardisation in 5G and beyond



Alexandru Vulpe

*Contributor, University Politehnica of Bucharest
Romania*

Sector

5G& beyond 6G

Engaged SDOs, WGs and TCs



6G-IA Trials WG and 6G-IA Vision and Societal Challenges WG
IEEE: P1609 – Dedicated Short Range Communication WG;
IEEE P3332 – Control Oriented System Safety Analysis
IEEE P1950 – Communications Architectural Functional Framework
for Smart Cities.
IEEE for AI-based Network Applications

Role

Member

Addressed EU standardisation priorities and gaps

One of the primary gaps this standardisation activity addresses is the lack of harmonised guidelines and protocols for AI integration in 5G/6G networks. While both are evolving rapidly, there is a need to establish common principles and best practices to ensure seamless integration and interoperability across different vendors, platforms, and geographic locations.

Developing a standard specifically tailored to AI-based network applications in cellular networks would provide a unified framework, promoting consistency, compatibility, and efficient utilisation of resources.

From a European perspective, this standardisation effort supports the EU's ambition to become a global leader in AI and fosters the development of innovative solutions within the European market. Establishing a standardised approach to AI integration encourages cross-border collaboration, fosters competition, and drives economic growth in the European ICT sector.

Furthermore, my fellowship addresses the challenges related to data protection, privacy, and security, which are key concerns in the European context. AI-based network applications require access to large amounts of data, and ensuring compliance with stringent data protection regulations is of utmost importance. The IEEE standard would incorporate guidelines and mechanisms to address these challenges, promoting transparency, accountability, and ethical use of AI technologies within cellular networks.

Moreover, with these contributions, I aim to bridge the gap between research and deployment. While there are ongoing research projects and initiatives exploring these solutions, the transition from research prototypes to practical deployments faces hurdles

related to interoperability, scalability, and reliability. My objective is to provide a roadmap and guidelines for practical implementation, ensuring that AI-based network applications in 5G/6G are not confined to the research lab but are effectively deployed in real-world scenarios across Europe.

Also, for this fellowship, the aim is to establish a new working group within IEEE for AI-based Network Applications so I am leveraging the contacts that I have from these WG/TCs.

IEEE VTS AI in Wireless Communications Committee.

Concerned ICT Standards and contribution to the related landscape

Some standards that are relevant are IEEE P2840 Standard for Responsible AI Licensing, IEEE P2894 Guide for an Architectural Framework for Explainable Artificial Intelligence, IEEE 2941.1 Standard for Operator Interfaces of Artificial Intelligence

The existing standards have not kept pace with the recent advancements in technology development, including the perspectives of 5G and AI. Although there are standards related to AI in wireless, such as those established by IEEE or ETSI, they are still in the development phase and do not fully align with the latest findings and accomplishments from EU projects.

The incorporation of recent advances in technology, especially 5G and AI, necessitates updating and aligning existing standards to ensure their relevance and effectiveness. With the rapid evolution of wireless communication networks and the increasing integration of AI-driven applications, it is essential to have up-to-date standards that address the unique challenges and requirements of these technologies in the context of wireless communications.

By leveraging the insights and achievements from EU projects, standardisation bodies can enhance their standards and protocols, bringing them in line with the latest state-of-the-art developments. The continuous input from these projects enables the standardisation committees to incorporate the latest research, innovative methodologies, and best practices into their standards, fostering a more comprehensive and robust framework for AI-based network applications in wireless communications.

As such, I consider my envisioned contributions to be an added value, not just from a European perspective, but from a worldwide one. Being able to start a specific PAR with the IEEE for a new standard stemming from research in AI network applications would be extremely useful for both researchers, practitioners, 3rd party developers as well as the entire service market.

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

Impact on SMEs

The contribution may impact European SMEs and societies, addressing key challenges of incorporating AI technologies into products and services, compatibility with larger ecosystems, interoperability, and overall digital transformation. As such, SMEs can generate new business opportunities, create jobs, and stimulate economic prosperity in local communities. They can also contribute to the deployment of smart city solutions, improvement of public services, and enhancement of the quality of life for European citizens. Finally, SMEs that adhere to recognised standards can more easily participate in international markets and collaborate with partners worldwide.

These benefits, in turn, have a ripple effect on European societies by advancing technology, addressing societal challenges, and ensuring the responsible and ethical use of AI in the digital era.

Impact on Society

The impact of developing standards for AI-based network applications in 5G extends beyond technological advancements and directly influences European society in several ways.

The aim is for standards to promote the responsible and ethical use of AI in 5G networks.

This is enabled by the establishment of guidelines and best practices, and, in this way, we ensure that AI-driven technologies are developed and deployed considering data privacy, security, and ethical considerations. This safeguards the rights and interests of European citizens, building trust in AI systems and fostering a more transparent and accountable digital landscape.

The standardisation of the integration of AI into 5G networks, has far-reaching implications for various sectors. For instance, in healthcare, AI-powered 5G applications can enhance patient care through remote monitoring, personalised treatment recommendations, and improved diagnostic accuracy. In transportation, these technologies can lead to safer and more efficient systems, reducing accidents and congestion and improving business costs. Additionally, in environmental sustainability efforts, AI in 5G can optimise resource consumption, helping Europe advance its green initiatives and minimise its ecological footprint.

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

Yes, a working group for a new standard is under establishment, in the IEEE Communications Society.

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

Not yet.

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

I think that efforts are still needed such as defining clear ethical guidelines, approaching the issue data privacy and security, and establishing interoperability such that seamless integration of AI technologies is possible.

Also, beyond standardisation activities, building a skilled workforce proficient in AI and 5G technologies and encouraging collaboration between industries and sectors is essential and extremely important. Given the global nature of AI and telecommunications, fostering international cooperation and alignment of standards is also equally important.

Online references related to the fellowship work

 <https://6g-ia.eu/6g-ia-working-groups/#trials>

■ Support as Secretary for ETSI ISG SAI



Alex Cadzow

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

UK

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs



ETSI TC SAI (formerly ISG SAI)

Role

Secretary

Addressed EU standardisation priorities and gaps

The aim of Technical Committee Securing Artificial Intelligence (TC SAI) is to develop technical specifications that mitigate against threats arising from the deployment of AI, and threats to AI systems, from both other AIs, and from conventional sources. Whilst in the short to medium term the focus of TC SAI will be on the application of Machine Learning (ML) the group shall also give guidance and evaluation reports to ETSI and its stakeholders on the wider developments of AI.

TC SAI will produce both informative documents (Technical Reports (including Special Reports and ETSI Guides)) and normative documents (Technical Specifications (including ENs and if requested hENs)). In addition, TC SAI will inherit and maintain the work done under the auspices of ISG SAI. In addressing secure AI with the broad interpretation of security to include safety and societal aspects as above TC SAI will engage with EU and other regulatory bodies to ensure that the output supports relevant global, regional, and national requirements.

Concerned ICT Standards and contribution to the related landscape

TC SAI addresses 4 main aspects of AI security standardisation:

- ▶ Securing AI from attack e.g. where AI is a component in the system that needs defending.
- ▶ Mitigating against AI e.g. where AI is the 'problem' (or used to improve and enhance other more conventional attack vectors),
- ▶ Using AI to enhance security measures against attack from other things e.g. AI is part of the 'solution' (or used to improve and enhance more conventional countermeasures),
- ▶ Societal security and safety aspects of the use and application of AI. Achieving a common understanding of the duality of attack and defence is key to the successful development of guidance and specifications from the TC. The purpose of TC SAI is to develop the

technical knowledge in the form of ETSI deliverables that act as a baseline in ensuring that AI is secure, safe, societally relevant, and suitable. The stakeholders impacted by the activity of the TC include all the member groups represented in ETSI and some of the wider societal environments that AIs will be deployed in. This includes end users, manufacturers, operators, and governments. The activity of TC SAI will include gathering concerns of each stakeholder group to ensure that ETSI and the output of TC SAI correctly address all those concerns.

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

Impact on SMEs

The published work of TC SAI help SMEs to meet regulatory obligations under the EU AI Act.

Impact on Society

The work of SAI will help ensure AI the risk of harmful impact on society is hopefully minimised.

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

Due to the change from ISG to a TC there a republishing and in cases updating of work done as ISG SAI. To have the capability to directly contribute to standardisation requests, which may include, but not limited to, the future AI Act, Cybersecurity Resilience Act and NIS2, it was decided to transfer the SAI Industry Specification Group into a Technical Committee.

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

In inheriting the work programme of the former ISG SAI a set of several work items were adopted by the group, in total 11 work items were adopted including technical reports and technical specifications that will be published in the next few months. The new Reports will address the traceability of AI Models, collaborative Artificial Intelligence, these inherited from ISG SAI and updated, and AI critical security controls and the global AI Ecosystem as new work areas. The Committee will also deliver its first technical specification on an Artificial Intelligence computing platform security framework.

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

The primary goal of the Technical Committee for Securing Artificial Intelligence (TC SAI) is to develop technical specifications that mitigate threats arising from the deployment of AI. These threats may originate from other AI systems or conventional sources. In the short to medium term, the Committee will focus on the application of Machine Learning (ML). However, the group will also provide guidance and evaluation reports to ETSI and its stakeholders on broader AI developments.

Online references related to the fellowship work

 https://portal.etsi.org/Portals/0/TBpages/SAI/Docs/Terms%20of%20Reference%20of%20TC%20SAI.pdf?ver=PxFPRoDaxQPGgz_Phq0sQ%3d%3d

■ AI standardisation roadmapping



Patrick Bezombes
Independent Expert
France

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs



CEN-CENELEC/JTC 21/WG 1 (Strategic Advisory Group)
ISO-IEC/SC 42/AG 3 (AI standardisation roadmapping)

Role

Convener of the CEN-CENELEC/JTC 21/WG 1 (Strategic advisory group)
Convener of the ISO/IEC SC 42/AG 3 (AI standardisation road mapping).

Addressed EU standardisation priorities and gaps

Within the framework of my StandICT.eu fellowship activities, I have developed and maintained the AI standardisation landscape for ISO-IEC/SC 42. Also, I have managed the JTC 21 response to the AI standardisation request, which includes a list of standards to be developed, and a list of gaps. I am dealing in priority with standards supporting the AI Act, including 2 strategic ones: “AI trustworthiness characterisation” and “AI risk catalogue and risk management”.

Now, new topics are also being explored, such as how to cover cybersecurity of AI systems in collaboration with ETSI and CEN-CENELEC/JTC 13. In that regard, I have initiated within JTC 21/WG 1 (SAG) a Task Group to address cybersecurity of AI systems. This Task Group has resulted in the creation of a specific JTC 21/WG5.

Concerned ICT Standards and contribution to the related landscape

JTC 21/WG 1 (also named Strategic Advisory Group - SAG) is in charge of the JTC 21 Work Programme response to the Standardisation request (SR) of the European Commission in the context of the AI Act.

As of today, the identified gaps are on AI robustness, human oversight, accuracy, transparency, logging, and conformity assessment of AI systems. A list of potential harmonised standards has been identified by SAG, with some standards already published or under development and others still to be developed either by ISO-IEC or by CEN-CENELEC.

In addition, SAG has reached out to “Verticals” and is considering the development of a “Trustworthiness profile” that will support the articulation between horizontal standards and vertical specificities.

In addition, I am directly dealing with standards which are now being balloted, such as “AI trustworthiness framework” and “AI risk management and risk check-list”, or that are at a

preliminary development stage, such as the PWI “Guidance for operational design domain of AI systems”. Note: I am editor of the later. All three items are related to the EU standardisation request.

In that context, I have developed an AI standardisation landscape (see attachment), and I encourage experts to contribute to filling gaps and support their initiatives.

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

Impact on SMEs

SMEs will be strongly impacted by the future set of harmonised standards in support of the AI Act. One of the aims of the JTC 21 is to provide standards that are innovation-friendly and actionable. Following JTC 21/WG 1 work, a dedicated AHG (AHG 9) has been set up to support SMEs.

Impact on Society

My work supports AI trustworthiness characteristics such as robustness, human oversight, accuracy, cybersecurity, 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 am contributing to the development of two new standards:

- ▶ At the SC 42 level: “AI maturity model”
- ▶ At the JTC 21 level: “Operational design domain for AI systems” and “AI trustworthiness framework”

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

Yes, within SC 42/AG 3 and JTC 21/WG 1 (SAG), I have contributed to developing landscape and gap analysis for road mapping. Also, JTC 21/WG 1 (SAG) has provided strategic documents such as and architecture of standards in support of the AI Act plus a response to the Standardisation request of the European Commission.

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

In this topic, the maturity of standards is in preliminary phase. As the CEN-CENELEC response to the standardisation request in support of the AI Act has been sent in September to the EC, additional EU experts are needed to ensure that related standards are developed in time.

Online references related to the fellowship work

https://standards.cencenelec.eu/dyn/www/f?p=205:22:0:::FSP_ORG_ID,FSP_LANG_ID:2916257,25&cs=1827B89DA69577BF3631EE2B6070F207D

www.iso.org/committee/6794475.html

Development of standards for AI enabled Photovoltaics



Agnieszka Rządowska

*Chair of the European Solar Network, Member of the Board of the International Solar Energy Society, International Policy Director for Smart Energy Systems, the European IT Certification Institute European Solar Network
Belgium*

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs

Smart-PV WG of EITCI SESG which has been established in 2019 acting as a cross-SDO WG with members including contributors to relevant smart energy WGs of international SDOs/SSOs promoting cooperation in smart PV standards drafting & dissemination

Role

Chair of the EITCI Smart Energy Standards Group (SESG)

Addressed EU standardisation priorities and gaps

The main gap in the current standardisation efforts is lack of defining standards on directly applying AI to smart PV systems. Accordingly with the EU Rolling-Plan 2020 ICT standards in energy are focused on smart grid management, grid-balancing, and devices interfacing. Dynamically growing smart PV market sees however a lot of AI based innovation for solar cells from multiple vendors. Relevance of continued efforts upon this engagement concerns the EU Rolling-Plan 2020 for ICT standardisation overlooking needs for digital standards in support of the EU policy for Smart Grids and Smart Metering, with a direct focus set on AI enabled smart PV solar systems. The work aims at further technical aspects detailing of reference standardisation efforts for many already identified domains of AI applications to PV systems (in terms of AI assisted optimisation of solar cells designs and production phases, planning of optimal solar cells systems deployments and optimisation of solar cells operation in smart power grids systems).

Concerned ICT Standards and contribution to the related landscape

In the framework of this fellowship, my contribution is in advancing reference standards development combining recent progress in Artificial Intelligence based on neural networks and machine learning with management of renewable energy generated in grid-connected photovoltaic (PV) systems along with their operation-and-maintenance (O&M) and their smart on-grid integration and control. Continued standardisation efforts in smart PV assisted

by AI are expected to contribute to growing digital energy standards inventory and support uptake of AI assisted smart energy technologies of crucial importance for the EU climate and energy policy framework, especially in view of recent emphasis on joining digital agenda and green agenda as two major pillars for the EU development strategy. In particular continuation of standardisation efforts aims at defining higher level of abstraction for possible domains of the state-of-the-art AI applications in smart PV systems of all scales (from residential installations to PV power plants). The continued work aims at technical development of the SESG accepted technical reference standards. Efforts also address integration with other developed standards for smart energy and smart grids.

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

Impact on SMEs

The smart energy is currently not only an important market trend of a dynamic growth and rapid technological development, but also a central axis in the EU's Green Deal strategy joining ICT and energy sectors as main pillars for the EU development facing serious energy challenges. Furthermore, the green transformation is currently considered to be an important aspect of the European energy security, especially in view of the international situation, the Russian invasion on Ukraine and the scaling energy crisis concerning hydrocarbons. Regarding these challenges the European Commission strategically plans to secure advancing renewable energy technologies further enabled by ICT and a leading global position of the EU in smart energy, transforming the global warming and the international situation challenges into a growth opportunity for EU SMEs driving European innovation with a focus on smart energy. Hence the project implemented international standardisation efforts support EU SMEs.

Impact on Society

AI assisted smart PV systems enhance efficiency and performance of solar energy. By optimising design, production, deployment and operation of PV, AI can maximise energy generation, leading to increased renewable energy adoption, reducing reliance on fossil fuels. This is especially important in the context of energy crisis caused by the Russian invasion on Ukraine, as well as helps mitigate the environmental impact of energy production and addressing the problem of the related climate change. Standardisation driven adoption of AI enabled smart PV technology supports transition to a cleaner and a more sustainable energy future globally. AI enabled smart PV systems can enhance resilience of the energy infrastructure in general. By generating electricity in an optimised way closer to the point of consumption, they reduce vulnerability to power outages and disruptions. Moreover, in remote or off-grid areas, smart PV technology can provide reliable and decentralised energy solutions, promoting energy independence and access to electricity. Finally, the dynamic market uptake of AI enabled smart PV technology supported by standardisation efforts will generate demand for new, skilled professionals in areas joining competences in PV and AI/ML. This creates employment opportunities and contributes to economic growth. Additionally, the growth of the renewable energy sector can stimulate private investments and foster innovation, leading to new business ventures and entrepreneurship.

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

The action led to publishing advanced versions of the technical reference standards of the EITCI SESG: 1) in AI Smart PV systems definitions, concepts, architectures and use cases, and 2) in AI Smart PV technical specification of processes and devices.

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?

Design, production and operation PV efficiencies are critical to enabling wide adoption of solar energy directly translating to cost-to-energy ratios of solar cells. New developments lead to solar cells devices in a single-junction technology reaching on average ca. 25% efficiency. AI can be very helpful in supporting further material science progress in PV. However, another way to make solar cells more efficient is to support their deployments, operations and maintenance with data processing capabilities of AI models. The action delivered recommendations & references identify preliminarily concepts, architectures and use cases for AI in Smart PV systems, along with further technical specifications of processes and actual systems. It is clear however that for an industrial adoption these recommendations have to be further developed towards increasing technical details upon experts' cooperation. With multiple companies developing proprietary technologies utilising AI in PV systems increasing efficiencies of energy conversion and smart grid integration, a consensus can be noticed that the rapidly developing AI enabled smart PV requires further efforts in standards setting under extending international cooperation.

Online references related to the fellowship work

<https://eitci.org/technology-certification/sesg>

<https://eitci.org/smart-energy-standards-group.pdf>

<https://eitci.org/technology-certification/sesg/smart-pv>

<https://eitci.org/technology-certification/sesg/smart-pv/eitci-sesg-smart-pv-concepts>

<https://eitci.org/technology-certification/sesg/smart-pv/eitci-sesg-smart-pv-technical>

<https://www.linkedin.com/groups/12498639/>

<https://www.setplan2022.eu/speakers/>

Harmonised AI cybersecurity standards in response to the EC AI standardisation request



Francisco Medeiros-Filho

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Belgium*

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs



**CEN/CENELEC JTC21 WG1 Strategic Advisory Group
New JTC21 WG5 Cybersecurity for AI Systems**

Role

Co-convenor of CEN/CENELEC JTC21 WG1 (Strategic Advisory Group)

Co-convenor of JTC21 WG5 Cybersecurity for AI Systems

Addressed EU standardisation priorities and gaps

My fellowship work addressed the following gaps: although cybersecurity standardisation for IT and information systems is well advanced in the context of ISO/IEC JTC1/SC27, currently there are no specific standards applicable to cybersecurity for AI systems. CEN/CENELEC JTC21 is under pressure to re-use as much as possible, ISO/IEC JTC1/SC27 work and adopt SC27 deliverables without modification. As of today, there are no specific cybersecurity standards applicable to AI systems originated within SC27. However, work has just begun on ISO/IEC 27090 "Guidance for addressing security threats and failures in artificial intelligence systems".

The aim of my fellowship targets recital 61 of the proposed AI Act, which states that "standardisation should play a key role to provide technical solutions to providers of AI systems to ensure compliance with the AI Regulation. Compliance with harmonised standards should be a means for providers of AI systems to demonstrate conformity with the requirements of the AI Regulation". Therefore, the standardisation work I am addressing will have a direct impact on the industry, especially in the field of cybersecurity for AI systems.

The main challenges are described in Clause 15.1 of the proposed AI Act: high-risk AI systems shall be designed and developed in such a way that they achieve, in the light of their intended purpose, an appropriate level of accuracy, robustness and cybersecurity, and perform consistently in those respects throughout their lifecycle. Furthermore, as described in Clause 15.4 of the proposed AI Act: high-risk AI systems shall be resilient as regards attempts by unauthorised third parties to alter their use or performance by exploiting the system vulnerabilities. Technical solutions aimed at ensuring the cybersecurity of high-risk AI systems shall be appropriate to the relevant circumstances and the risks. The technical solutions to address AI-specific vulnerabilities shall include, where appropriate, measures to prevent and control attacks trying to manipulate the training dataset (data poisoning), inputs designed to cause the AI model to make a mistake (adversarial examples) or model flaws.

Concerned ICT Standards and contribution to the related landscape

As co-lead of the Task Group “Cybersecurity for AI Systems” within JTC21 WG1 until mid-December 2023, I have facilitated the drafting of a gap analysis report, which investigated existing standards originated from ISO/IEC SC27 (for instance ISO/IEC 27001). In this context, it was noted that ISO/IEC JTC1/SC27 had initiated the development of ISO/IEC 27090, which is likely to become a key standard addressing cybersecurity for AI systems. However, it may be necessary to develop additional ‘home-grown’ standards in the context of CEN/CENELEC JTC21 to fill some of the identified gaps. This additional work will be done under the remit of the new JTC21 WG5 Cybersecurity for AI Systems. The kick-off meeting of JTC21 WG5 will be held on 25 January 2024.

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

Impact on SMEs

The proposed AI Act highlights the importance of EU harmonised standards and conformity assessment (based on such harmonised standards) for the industrial stakeholders (providers) and users of AI systems. Harmonised cybersecurity standards for AI systems need to be developed and adopted, as a matter of urgency, for the benefit of the European industry, including SMEs and startups, as well as European users and consumers. In this context, it is necessary to demonstrate the trustworthiness of AI systems. Cybersecurity is one of the aspects of trustworthiness.

Impact on Society

It is well known that AI is bound to have a significant impact on society. This subject has been debated at length by different academic, industrial, and governmental organisations. Cybersecurity for AI systems, although being just one of the aspects, is essential to demonstrate the trustworthiness of AI systems, hence providing assurance to users and consumers.

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

It will possibly contribute to the “parallel development” between ISO/IEC and CEN/CENELEC of the draft standard ISO/IEC 27090.

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

Yes. The gap analysis report produced by the WG1 Task Group Cybersecurity for AI Systems.

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

The engaged work will be continued with the formal development of ‘homegrown’ European standards in JTC21 or the adoption/adaption of ISO/IEC 27090 in the near future.

Online references related to the fellowship work

 www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/

Progress projects on logging and record keeping to support the AI Act



Adam Smith

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BCS, The Chartered Institute for IT
Spain*

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs



CEN/CENELEC JTC 21 / WG 3 Artificial Intelligence

Role

Proposed Project Leader

Addressed EU standardisation priorities and gaps

The draft EU AI Act (including both sets of amendments) lays down significant requirements for logging and record keeping in AI systems. As a result of the EC standardisation request, it is necessary to establish standards supporting this requirement. There is very little state of the artwork of a similar nature. This clearly addresses a gap in the EC standardisation request, there is no prior work that can be used. Without clear requirements in the form of harmonised standards, organisations will need to interpret the AI Act itself.

Also, with this fellowship, I will address the gap in minimising SME effort for compliance with this aspect of the Act, as there is little work underway to achieve this. However, to truly address this gap, 3rd parties would need to create reference implementations of the standardisation deliverable (which is out of scope for standardisation). This also may help reduce resource requirements for market surveillance, and potentially conformity assessment.

Concerned ICT Standards and contribution to the related landscape

The funded application supported several virtual meetings, and a full day face to face meeting in Copenhagen. This allowed to produce a first draft standard under the PWI. As a result, a clear new work item proposal is in front of CEN/CENELEC JTC 21. This was represented at plenary and national bodies are currently identifying experts to participate. The ballot will be launched in December 2023 for three months and will be developed under the Vienna Agreement with an ISO lead.

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

Impact on SMEs

Providing technical clarity on the right information elements to log is key to supporting the AI Act, and the more clarity that is available, the cheaper it will be for SMEs to comply. There are also many SMEs providing tools to support AI governance, which could receive a significant boost by aligning with the resulting standardised log files.

Impact on Society

The AI Act envisages that logging can enable post-market monitoring. In future, these standardised logs may provide the ability to have a “black-box” associated with high-risk AI systems, potentially monitored in real-time, reducing the manifestation of risks that have an impact on society.

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

The project has led to a new work item proposal, currently under ballot simultaneously in the ISO/IEC and CEN/CENELEC AI committees.

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

Subject to the balloting process, the new work item proposal will lead to an ISO/IEC and CEN/CENELEC standard.

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

The next step is to actually develop the standard. While this project has supported the production of a detailed working draft, there is a whole set of project stages still to go through and various ballots to gain consensus.

Online references related to the fellowship work

 www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/

Advancing the PWI on Competence Requirements for AI Ethics Professionals to the NWIP stage



Alessio Tartaro

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Italy*

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs



CEN/CENELEC JTC 21 – Artificial intelligence, CEN/CENELEC JTC 21 WG 4 - Foundational and social aspects

Role

Project editor of JT021019 prEN XXX “Competence Requirements for AI ethicists professionals” and member of UNI CT 533, CEN-CENELEC JTC 21 e ISO/IEC JTC 1 SC 42.

Addressed EU standardisation priorities and gaps

My work concentrates on the inclusion and implementation of ethics in technical standards for artificial intelligence. As standards have evolved from technical product specifications to service guides and governance processes, their social impact and intersection with ethical concerns have become increasingly prominent. While there are standards describing processes for considering ethical and social concerns in product and service development, such as AI systems, no standard currently addresses the competencies of individuals tasked with implementing these processes in various organisational types. My project addresses this gap by defining competency requirements for AI ethicists, an emerging role in the AI ecosystem responsible for overseeing and implementing ethical considerations in AI system development.

The primary challenge here is to foster the inclusion of ethical themes in a technically oriented environment. Additionally, ethical considerations have only recently become a topic of standardisation, leading to a lack of expertise within technical committees and some resistance to including these topics.

The development of trustworthy AI systems is a policy priority in Europe. Soft law instruments like the “Ethics Guidelines for Trustworthy AI” and emerging regulations such as the AI Act are pushing for AI systems that respect European values and fundamental rights. Clearly defining competencies for AI ethicists can significantly contribute to achieving this priority. On one hand, competency definitions provide AI ethicists with the necessary knowledge and skills to address these issues. On the other hand, clear competency definitions will help build market trust in these professionals, enabling them to uphold European values and fundamental rights more effectively in the design, development, and use of AI systems.

Concerned ICT Standards and contribution to the related landscape

This project stems from the understanding that AI systems are sociotechnical, involving

the interaction of human and technical components. To ensure the optimal functioning of these systems, specifications are necessary for both technical and human components. Standardisation plays a role in both, and my project focuses on the human aspect. This type of standard is crucial in the ICT Standards landscape, as it ensures excellent integration of technical and human components within sociotechnical systems. Specifically, my project outlines the competencies that professionals should possess in AI ethics when analysing and addressing ethical and social concerns related to the design, development, and use of AI systems.

This project expands the scope of ICT Standards beyond purely technical matters, which is vital given the significance of information and communication technologies, including AI systems, in shaping our lives and impacting our values and fundamental rights. Extending the scope of ICT Standards enhances their capacity to integrate technological ecosystems, as purely technical standards are insufficient for building trust in complex systems like artificial intelligence.

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

Impact on SMEs

The standard will benefit SMEs active in the AI field by providing a clear framework for AI ethicists' competencies. SMEs without the capacity to employ an in-house AI ethicist but seeking contractual consultations on the ethical and social implications of their AI systems will find this standard a valuable reference for understanding the competencies required for these tasks.

Impact on Society

My project contributes to the realisation of Trustworthy AI in Europe, aligned with European values and fundamental rights. This is essential for European society to benefit from AI while minimising risks. By determining clear competencies for AI ethics professionals, we can be sure that the people in charge of these delicate tasks are equipped with the relevant knowledge, skills, and professionalism to take on their duties.

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

Yes, my fellowship involves developing the current PWI on "Competence Requirements for AI Ethicists Professionals" into a New Work Item Proposal (NWIP) to be submitted for national body voting. This is being achieved by creating an NWIP form agreed upon by experts participating in the project development and a draft outline outlining the structure and potential contents of the document.

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

Yes, the standardisation activities within my project have successfully culminated in the creation and submission for ballot of the NWIP form and a draft outline. This draft outline delineates the principal clauses of the future standard and provides an overview of the content slated for development in subsequent stages of the standardisation process. The standard is currently under ballot until February 2024. Additionally, comments received from experts has been thoroughly addressed and resolved.

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

Integrating ethics into standardisation represents a novel approach, with considerable work yet to be accomplished. Initially, it is crucial to heighten awareness about the importance of incorporating ethical and social considerations into the development of standards. This is particularly pertinent for products and services with significant social impact, such as artificial intelligence, among others. Furthermore, this approach necessitates a more inclusive standardisation process, one that actively involves a diverse range of stakeholders. It is also essential to include experts from various disciplines — such as humanities, sociology, governance studies, and law — who have traditionally been underrepresented in technical committees.

Online references related to the fellowship work

 <https://www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/>

 https://standards.cencenelec.eu/dyn/www/f?p=CEN:110:0:::FSP_PROJECT,FSP_ORG_ID:78133,2916257&cs=1202C436710754208918990D8EDC54435

Considerations for Multimodal and Interactive Artificial Intelligence



Rami Mochaourab

Research Leader, RISE Research Institutes of Sweden
Sweden

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs



Swedish Institute for Standards SIS/TK 421 Artificial Intelligence
ISO/IEC JTC 1/SC 42 Artificial Intelligence

Role

Member

Addressed EU standardisation priorities and gaps

In the framework of this fellowship, I have conducted a comprehensive review of all published and ongoing ISO standards efforts which ISO/IEC JTC 1/SC 42 Artificial Intelligence has been co-creating. My approach involved classifying the standards according to themes related to characteristics of trustworthiness. From this analysis, several key insights emerged:

- ▷ The number of ISO Artificial Intelligence standards is rapidly increasing, with more focused topics.
- ▷ Three foundational standards have been established so far, with the latest, ISO/IEC 4200, issued in December 2023. I have noticed that newer standards adopt slightly different categorisations of AI topics, deviating from the structure specified in the foundational standards. For example, requirements of trustworthy AI in ISO/IEC 22989:2022 are different than those in other newer standards. This shift reflects the dynamic nature of AI considerations.
- ▷ Contemporary standards embrace a more inclusive definition of AI systems, as seen in ISO/IEC DIS 5392, which includes automated knowledge generation and new information creation.

In this work, the identified gaps pertain to standards and reports associated with transparency, particularly those in early stages, such as ISO/IEC AWI TS 6254 and ISO/IEC AWI 12792. Given the significance of transparency, particularly emphasised in the context of the EU AI Act, it is imperative to address and develop these standards further.

Additionally, it is noteworthy that there is presently one technical specification, ISO/IEC AWI TS 8200, specifically addressing the controllability of autonomous AI systems. This specification is highly relevant to my project.

Concerned ICT Standards and contribution to the related landscape

My work thus far has involved reviewing published standards and engaging in meetings of the Trustworthiness working group of ISO/IEC JTC 1/SC 42 Artificial Intelligence. Additionally, I participated in a panel discussion at the Swedish Institute for Standards, on “opportunities and risks of AI”, which was well-received by industry experts and stakeholders.

While I haven’t made direct contributions to specific ISO standards yet, the meetings I attended focused on the following project: ISO/IEC AWI TS 6254: Objectives and approaches for explainability of ML models and AI systems. Furthermore, my Standards Development Organisation (SDO) recently initiated a relevant standard that aligns well with the consideration of multimodality and interactive AI: ISO/IEC AWI TS 22443: Guidance on addressing societal concerns and ethical considerations. Looking ahead, I will participate in the WG2 Data to contribute specifically to the following technical specification project: ISO/IEC AWI TS 8200: Controllability of automated artificial intelligence systems.

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

Impact on SMEs

My project, which focuses on considerations for multimodal and interactive AI, holds significant implications for Small and Medium-sized Enterprises (SMEs). It has the potential to elevate efficiency through automation, reduce costs, enhance customer experiences, and foster innovation. The evident rise of such AI models promises personalised, dynamic, trustworthy, and diverse user experiences.

Crucially, the ongoing efforts in standards development play a pivotal role in supporting SMEs. Establishing best practices is essential for leveraging the full potential of these powerful state-of-the-art AI approaches and models. These standards will guide SMEs in effectively implementing and benefiting from the advancements in interactive and multimodal AI, ensuring positive integration into their operations and business strategies.

Impact on Society

Multimodal and interactive AI, due to their direct engagement with human senses through language, images, sound, video, and interaction, wield a profound influence on society. These AI systems possess significant potential for manipulation, exert an impact on education, influence democratic processes, and necessitate advanced controllability approaches. Moreover, their effective operation demands the thoughtful integration of human values into their design and functionality.

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?

Several essential activities are still required in my area of application, foremost among them is the need to enhance transparency through comprehensive technical documentation for

multimodal and interactive AI systems. This encompasses the documentation of various types of datasets and multimodal AI models. Currently, there is a lack of guidance on technical documentation in this domain, and my intention is to initiate efforts to fill this gap.

Moreover, addressing aspects related to controllability and providing guidance on methodologies for the incorporation of human values into interactive AI models are imperative. These elements play a crucial role in ensuring not only the functionality but also the ethical considerations and user control aspects of the developed AI systems.

Online references related to the fellowship

 www.sis.se/standardutveckling/tkidor/tk400499/sistk-421/

 www.iso.org/committee/6794475.html

 www.cenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/

 managing-ai-risks.com

Artificial Intelligence – Guidance on addressing societal concerns and ethical considerations



Viveka Bonde

*Advokat, Bonde Advokater AB
Sweden*

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs



ISO/IEC JTC1 SC42 WG3 (Trustworthiness)

Role

- ▷ Project Editor ISO/IEC JTC 1 SC42 WG3 AWI TS 22443 Artificial Intelligence – Guidance on addressing societal concerns and ethical considerations
- ▷ 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

The focus of this fellowship is to provide additional practices, guidance and information, for identifying, analysing, evaluating and treating societal concerns and ethical considerations of AI.

The purpose is to help organisations to deal with societal concerns and ethical considerations when developing, producing, deploying, or using AI. This will help organisations 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 42001 – AI - Management system [AIMS]
- ▷ ISO/IEC DIS 42005 – AI system impact assessment
- ▷ ISO/IEC 23894 – AI - Guidance on risk management
- ▷ ISO/IEC 37000 – Governance of organisations - guidance
- ▷ ISO/IEC 38507 – Governance implications of the use of artificial intelligence by organisations

- ▷ 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
- ▷ Other relevant documents will be identified

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

Impact on SMEs

TS 22443 Artificial Intelligence – Guidance on addressing societal concerns and ethical considerations is applicable to any organisation, regardless of size, type and nature. Notwithstanding, it is of particular importance to SMEs, with more limited resources, to have access to practices and guidance when developing, providing or using systems, products, and services that utilise AI. For instance, this will be important in relation to the European AI Act.

Impact on Society

To specifically provide guidance and address a broad range of concerns and considerations affecting AI-subjects and the protection of fundamental rights. The aim is to provide practical, action-guiding methods and tools 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?

Yes. A technical specification (TS).

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

Yes. Prior to the current TS 22443 project, TR 24368:2022 was published in 2022, which emphasised 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?

In terms of societal concerns and ethical considerations of AI, synergies between ISO/IEC JTC1 SC42 WG3 and CEN-CLC/JTC 21 have been identified and fellow activities have emerged. Further efforts and activities between the two are in the pipeline.

Online references related to the fellowship work

 www.iso.org/standard/87119.html

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



Thomas Frisendal

*Expert in the ISO 39075, TF Informatik
Denmark*

Sector

Big data, open data, and public sector information

Engaged SDOs, WGs and TCs



ISO IEC/JTC1/ SC32/WG3 Database languages

Role

Expert

Addressed EU standardisation priorities and gaps

Standardised database languages are large, complicated and somewhat abstract. At the same time, they reach a substantial number of business users, who are not computer scientists but rather business educated. Larger companies, organisations and corporations can afford to employ technical specialists for the more difficult tasks. Such options are not common for the average European organisations.

I am putting a European fingerprint on the GQL standard by also considering the human and business aspects of applied database technologies. I am contributing discussion papers in an area such as human perception, intuition, temporality, records management, accountability, reliability, and ease of use.

Since graph database technology is a key for meaningful and explainable machine learning and generative AI, it is evident that the GQL standard will have positive impact on applications in our societies. Key aspects of using graph technology and query language are very important for the acceptance. The SQL universe was/is somewhat technical, but graph database concepts have a lower learning curve and thus are accepted more rapidly (by users of ICT solutions), also in the SME world.

Concerned ICT Standards and contribution to the related landscape

I am contributing to the development of two new standards:

- ▶ ISO/IEC/JTC 1/SC 32 Information technology — Database languages — SQL, Parts 1 through 16 & (priority 1 now)
- ▶ ISO/IEC CD 39075 Information Technology — Database Languages.

ISO 39075 is in the final FDIS stage right now and has been so since December 2023.

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

Impact on SMEs

The SQL universe was somewhat technical, but graph database concepts have a lower learning curve and thus are accepted more rapidly (by users of ICT solutions), also in the SME world. Hence, this is my focus in this fellowship work.

Impact on Society

Since graph database technology is a key for meaningful and explainable machine learning and generative AI, it is evident that the GQL standard will have positive impact on applications in our societies. Key aspects of using graph technology and query language are very important for the acceptance. The SQL universe was/is somewhat technical, but graph database concepts have a lower learning curve and thus are accepted more rapidly (by users of ICT solutions), also in the SME world.

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

With the work in this fellowship, I have contributed to the development of a new ISO standard: ISO 39075 GQL will come out in April 2024 in its first release.

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

Yes, I have contributed to technical reports on recommendations for a new standard as well as to technical specifications.

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

I estimate that more European experts need to get invested in the standardisation in my area to foster the EU's position. The US and Asian tech giants dominate the large ICT standards such as SQL and GQL. Europe has strong traditions in the graph technology area, and we could contribute considerably with better, more pragmatic approaches suited for more general audiences.

Online references related to the fellowship work

 www.iso.org/standard/76120.html

Towards standards convergence for digital identity wallets



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France

Sector

Electronic identification

Engaged SDOs, WGs and TCs



ISO/IEC JTC 1/ SC 27 Information security, cybersecurity, and privacy protection /WG 5 Identity management and privacy technologies
ISO/IEC JTC 1/ SC 17 Cards and security devices for personal identification
CEN/ CENELEC JTC 13 Cybersecurity and Data Protection
CEN/TC 224/WG18 Interoperability of Biometric Recorded Data

Role

Member

Addressed EU standardisation priorities and gaps

As well summarised by the latest report from ENISA (July 2023) DIGITAL IDENTITY STANDARDS - Analysis of standardisation requirements in support of cybersecurity policy, there are many standards developed by different groups that have dependencies with each other's and there is a strong need for better coordination for preparing the future applications of trusted and more decentralised digital ID. From the EU digital identity wallet initiative, several EU standardisation groups have already started to define future projects or are working on gap analysis to identify the needs (e.g. CEN/TC 224/WG 8 with TR 17982 European Digital Identity Wallets standards Gap Analysis). Nevertheless, standardisation around new use cases for digital identities started before the EU initiative, and other standards or on-going works exist (in particular standards developed within ISO/IEC JTC 1/SC 27/WG 5 on identity management, and the under development series of TS 23220 on Building blocks for identity management via mobile devices within ISO/IEC JTC 1/SC 17). More communication is needed, and some legacy standards need to evolve to support the new concepts (for instance, integration of verifiable credentials concepts within 24760). Also, there are related discussions in CEN/TC 224 to define EU frameworks for testing and evaluating biometric-based digital ID systems in European Union that require further efforts to ensure that the best of the standards are taken in account. The goals of this fellowship are to strengthen the communication and coordination, as well as prepare proposals and contributions for new projects and the revision of existing legacy standards when appropriate.

Concerned ICT Standards and contribution to the related landscape

This fellowship enables to monitor and contribute to several committees and working groups dealing with the mentioned topics. This thus helps to ensuring consistency between the different groups, in particular contribution to more consistency between ISO existing standards and new works from CEN/TC 224/WG 18, as well as to ensure EU-compatible contributions to on-going preliminary work items on identity and authentication frameworks in SC 27/WG 5.

The activity includes monitoring, commenting and participating on the different on-going projects:

- ▷ ISO/IEC 24760-4 A framework for identity management - Part 4: Authenticators, credentials and authentication (3rd WD)
- ▷ ISO/IEC 29115 Entity authentication assurance framework (also related to PWI 6087)
- ▷ ISO/IEC PWI 8887 (now closed)
- ▷ ISO/IEC TS 23220 Building blocks for identity management via mobile devices
- ▷ TC 224/WG 18 project on biometric digital injection attack, project on European guide for biometric recognition applications based on ID documents (ERG), project on European requirements of biometrics products
- ▷ ISO/IEC JTC 1/SC 17/AG 3 on digital [identity] wallets

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

Impact on SMEs

Yes, as it has an impact on the compatibility between EU and international frameworks related to digital identities and digital credentials.

Impact on Society

I estimate that digital identities, and the way to ensure appropriate levels of assurance and handling of corresponding credentials, are key for the digital society.

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

Not yet but there are ongoing discussions for revision of ISO/IEC 29115. Early discussions for potential new projects or revisions around digital identity.

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

No. This fellowship deals mostly with comments and contributions to on-going draft documentation.

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

There is a strong need for further efforts in the next 2-3 years to cover digital identity standardisation needs.

Online references related to the fellowship work

 <https://www.iso.org/committee/45306.html>

 www.iso.org/committee/45144.html

 https://standards.cencenelec.eu/dyn/www/f?p=205:7:0:::FSP_ORG_ID:6205&cs=1E59B4D3EFD280E27AAC0C16CC13CD4FD

■ Request for funding for IETF IoT work



Maria Ines Robles
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Finland*

Sector

IoT

Engaged SDOs, WGs and TCs



IETF Routing Over Low power and Lossy networks (ROLL) Working Group
IETF Internet of Things (IoT) Directorate
IETF Routing-Directorate
IETF Gen-Area Review Team

Role

Co-chair of the Routing Over Low power and Lossy networks (ROLL) working group,
Co-chair of IETF Internet of Things (IoT) Directorate,
Member in other WGs

Addressed EU standardisation priorities and gaps

The ROLL Working Group is tackling critical challenges in routing for energy-constrained environments, focusing on developing efficient and secure protocols. A key achievement is the RPL (Routing Protocol for Low Power and Lossy Networks), which integrates energy-saving mechanisms and supports diverse metrics, catering to the needs of use cases such as smart industries, AMI networks, and smart cities.

A significant challenge for European industrial plants is ensuring reliable connectivity and interoperability among wireless devices. RPL has been developed to specifically address these challenges. Its self-healing capabilities ensure that the network can quickly recover from disruptions, maintaining consistent communication even in the face of device failures or environmental interference. This resilience is crucial in industrial settings, where downtime can have costly implications.

Furthermore, RPL addresses scalability, as it can adapt seamlessly, accommodating an increasing number of nodes without a corresponding increase in network complexity. Additionally, RPL's zero-touch configuration feature eases the deployment and management of IoT devices, thereby enhancing IoT applications in these sectors.

However, RPL has identifiable gaps such as the need for enhanced support for asymmetric links, improvements in secure network enrolment, and faster border router crash detection. The ROLL Working Group is actively working to address these issues, focusing on enhancing RPL's capabilities and broadening its application.

Furthermore, the IETF IoT Directorate plays a crucial role in bridging informational gaps within the IoT community. One of its priorities is to enhance communication and knowledge

dissemination across organisations, particularly those not fully engaged with the IETF's work. This strategy is vital for keeping pace with the rapidly evolving IoT standards and fostering collaboration across the industry.

Concerned ICT Standards and contribution to the related landscape

I used this fellowship to support my work within the IETF working groups.

The IETF develops Internet protocols and recommendations that are used worldwide. At the IETF, I am the co-chair of the ROLL (Routing Over Low-power and Lossy Networks) Working Group (WG). The ROLL WG is dedicated to developing advanced routing protocols integral to a variety of IoT applications, including Industry 4.0, smart healthcare systems, smart grids, intelligent home solutions, and urban smart city initiatives. Our efforts primarily revolve around enhancing connectivity in low-power and lossy network environments and refining protocols such as RPL (IPv6 Routing Protocol for Low-Power and Lossy Networks) and MPL (Multicast Protocol for Low-Power and Lossy Networks), with a particular emphasis on routing security. Our work is focused on the implementation and evolution of IPv6, aiming to meet the milestones set by the working group.

Additionally, I am the co-chair of the IETF IoT Directorate. This group, comprised of a team of experts, orchestrates the coordination of various IETF IoT groups engaged in diverse areas such as routing, security, the application layer, the transport layer, and operations. My role entails enhancing the visibility of these groups, fostering engagement with external Standards Development Organisations (SDOs), and facilitating collaborative efforts. This initiative is crucial for harmonising the IETF's IoT-related efforts with other SDOs and for promoting the dissemination and coordinated development of IoT standards.

Furthermore, my involvement as a reviewer in the Routing Directorate is geared towards elevating the quality of IETF standards related to routing protocols. My participation in the Gen-Area Review Team also extends to improving the overall quality of IETF standards and recommendations related to Internet functionality. This role allows me to contribute significantly to the development and refinement of protocols that are foundational to the modern Internet landscape.

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

Impact on SMEs

The work of the IETF ROLL WG significantly impacts European SMEs by developing internationally recognised open standards, such as RPL. RPL presents multiple open-source implementations, has been tested through extensive simulations and continuous evaluations. Also, RPL meets all their required capabilities, such as energy-efficient mechanisms, which are pivotal for sustainable growth.

Moreover, the continuous enhancements by the ROLL WG are vital for the evolution and adaptation of new use cases pertinent to the European context. These improvements ensure robust interoperability and adherence to security standards, both of which are critical for SMEs operating in the dynamic European market. This commitment to excellence and relevance is applied in the standard reviews carried out within the IETF Directorates, such as IoT, Routing, and General-Area sectors. Such endeavours underscore our dedication to supporting the technological advancement and operational efficiency of European SMEs.

Impact on Society

The IETF's IoT Routing protocols are revolutionising how we interact with technology, significantly expanding the range of Internet of Things applications to meet the diverse needs of European society. These protocols profoundly impact various sectors, including smart cities, where they facilitate improved urban planning and management through connected infrastructure. In the smart industry sector, they enable more efficient manufacturing processes and logistics by enhancing IoT integration. Moreover, these advancements play a crucial role in developing smart grids, essential for energy efficiency and sustainability.

These protocols address critical challenges such as ensuring seamless connectivity, security, safety, and interoperability among a rapidly growing number of wirelessly connected IoT devices. In doing so, they improve operational efficiency and enhance the quality of life, making daily activities more streamlined and convenient.

Furthermore, the IETF ROLL Working Group's commitment to addressing routing issues in constrained IoT environments is vital. Their work focuses on adapting solutions to the unique needs of Internet users in constraints areas, including remote locations, regions with limited infrastructure, and environments with extreme conditions. By overcoming these connectivity challenges, the ROLL Working Group is helping to bridge the digital divide, ensuring that the benefits of IoT technologies are accessible to everyone, irrespective of geographical and infrastructural limitations. This inclusive approach is pivotal in fostering a more connected, efficient, and equitable society.

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

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; Root initiated routing state in RPL; Controlling Secure Network Enrolment in RPL networks; Mode of Operation extension; Common Ancestor Objective Function and Parent Set DAG Metric Container Extension; RNFD: Fast border router crash detection in RPL.

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

Yes, I have contributed drafting technical specifications and technical reports on the development of a new standard.

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

My ambition is to continue the work within the different IETF groups, including:

- ▶ 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 envisioned also future work such as the development of RPLv2, YANG models for AODV-RPL protocol, DIS-modification, and the evaluation of semantic for routing.
- ▶ 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 organisations. IoT is a very rapidly growing area of technology and connects with number of other emerging technologies. There is ever increasing need for collaboration with other IoT standard organisations and alliances that are developing solutions.
- ▶ 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

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

<https://datatracker.ietf.org/doc/minutes-118-roll/>

<https://datatracker.ietf.org/meeting/118/session/roll>

<https://github.com/iot-dir/Meetings/blob/main/20230719/iot-dir-preIETF117meeting-2023-07-19-notes.md>

<https://datatracker.ietf.org/doc/review-ietf-mpls-sfl-control-04-genart-lc-robles-2023-11-27/>

Standards for Information security and cloud service providers



Karim Tobich

Director, CST Consultancy
UK

Sector

Cybersecurity, Cloud Computing

Engaged SDOs, WGs and TCs



ISO/IEC/JTC1/ SC27 Information security, cybersecurity, and privacy protection/ WG1 Information security management systems

Role

Contributor and standards Editor

Addressed EU standardisation priorities and gaps

This fellowship enables meeting the European strategy on Cybersecurity/Network, Information security, cloud, and edge computing. The actions proposed in the EU Data Strategy, to facilitate the move to the edge while developing interoperable cloud and edge services to support the building of common European data spaces, will be achieved only through a good harmonisation between all the stakeholders. This fellowship allows for increased convergence of standardisation makers' efforts, achieving EU policy goals, providing common standards to EU and international SDO, and reducing time for adoption. In addition, developing and providing such international standards to organisations allow them to implement the EU values and policies in an easy manner.

Concerned ICT Standards and contribution to the related landscape

My fellowship is leading and contributing to the development of different ISO/IEC standards related to Information security, cybersecurity, and privacy protection, including:

- ▷ ISO/IEC 27003 - Guidance on ISO/IEC 27001 - This standard provides guidance on the requirements for an information security management system (ISMS) as specified in ISO/IEC 27001 and provides recommendations ('should'), possibilities ('can') and permissions ('may') in relation to them.
- ▷ ISO/IEC 27028 - Guidance on ISO/IEC 27002 attributes - The objective of the standard is to identify criteria that can be given to organisations to define and use customised sets of attributes based on those mentioned in ISO/IEC 27002.
- ▷ ISO/IEC 27017 - Information security controls based on ISO/IEC 27002 for cloud services. This standard gives guidelines for information security controls applicable to the provision and use of cloud services by providing additional guidance for relevant controls specified in ISO/IEC 27002:2022 for cloud service customers and cloud service providers. This standard

is developed with the ITU-T and will be published under ITU-T Recommendation X.1631 to keep a harmonised approach to cloud services.

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

Impact on SMEs

This fellowship's work will provide guidance to SME and help them implement different international standards and reach an ISO/IEC 27001 compliance. It will help them reduce their exposure to cybersecurity risk, provide increased assurance to businesses, public administrations, and citizens that their data are secure wherever they are stored or processed.

Impact on Society

ISO/IEC JTC1 SC27 aim to contribute with its standards to the following Sustainable Development Goals (SDG) of the United Nations related to good health and well-being, decent work and economic growth, industry, innovation and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption, and production as well as peace, justice and strong institutions. This fellowship is meant to increase confidence in cybersecurity through the convergence of international SDOs and the alignment behind a common international standard which relates both to the market and society. In the long-term perspective, all the organisations will have achieved a certain level of certification for their services or products meeting a harmonised cybersecurity scheme able to serve the society.

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

Yes, as contributor and editor of those standards my work has led to the revision of ISO/IEC 27003, ISO/IEC 27017 and the development of new standard ISO/IEC 27018. Each of them follows its own development cycle as they haven't started at the same time. So far:

- ▶ ISO/IEC 27003 work has just started a Preliminary Work Item (PWI) stage, waiting for achieving a mature state through the launch of different PWI iterations before moving to the next stage.
- ▶ ISO/IEC 27028 work just finished the Working Draft (WD) stage and will enter a ballot stage to move into a Committee Draft (CD) stage.
- ▶ ISO/IEC 27017 work is currently in the Committee Draft (CD) stage, waiting for achieving a mature state to move to the next stage.

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

Yes, as contributor and editor of those standards, I managed to lead the work to specific deliverables. In fact, ISO/IEC 27003 project went through different reviews by the editing team to address some concerns raised from the previous version. It is now at a PWI stage where experts and contributors can improve it and make it ready for the next stage. Through the fellowship ISO/IEC 27028 has been upgraded from a WD to a CD stage, benefiting from different WD iterations. ISO/IEC 27017 is currently at a CD stage after a period of balloting.

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

The development of international standards is a lengthy process with different stages that take an average of 3 years to achieve. Therefore, there is a need for a couple of iterations to reach a status of maturity for each of those projects.

Online references related to the fellowship work

 <https://www.iso.org/committee/45306.html>

 <https://www.iso.org/standard/63417.html>

 <https://www.iso.org/standard/61007.html>

 <https://www.iso.org/standard/82878.html>

Standards for Quantum Interconnect and Quantum Photonic Integrated Circuits



Richard Pitwon

Consultant, Resolute Photonics UK Ltd
Ireland

Sector

Quantum technology

Engaged SDOs, WGs and TCs



IEC Technical Committee 86 – Fibre Optics
ISO/IEC Joint Technical Committee 3 – Quantum Technologies
BSI GEL 86 – Fibre Optics
BSI ICT/1/1/2 – Quantum Technologies

Role

Chair of IEC TC86/SC86B

Chair of BSI GEL 86

Chair of BSI GEL 86/2

Addressed EU standardisation priorities and gaps

Europe is positioning itself as a world-leader in quantum networks and computation and possesses considerable expertise in integrated photonics and quantum technologies, but the route to commercial deployment is hampered by several factors including the absence of large end-users (e.g. Microsoft, Meta, Google, Amazon, Tencent) in Europe itself and insufficient transfer of project results to commercial entities for exploitation (“valley of death”).

In contrast great advances are being made in the USA and China to develop quantum computers and quantum communication technologies.

The key priorities of this fellowship were: Firstly, enabling new collaborations between European quantum SMEs and larger organisations by organising quantum conferences (BICOP 2023 and 9th Symposium on Optical Interconnect in Data Centres).

Secondly, introducing and establishing a quantum agenda and standardisation roadmap for IEC TC86, the mainstream standards technical committee on fibre optics, the activities of which directly affect broad range of key enablers from the European ICT standardisation rolling plan including 5G and Beyond, Big Data, Internet of Things, Cloud and edge computing and broadband infrastructure mapping.

The challenge is that the UK and EU are currently leading the world in quantum science, however commercial realisation of that knowledge is hindered by the fact that many companies that have the capabilities required for elements of the QPIC supply chain do not frequently collaborate. Consequently, EU QPIC developers must seek out bespoke solutions from a still fragmented ecosystem or take advantage of more responsive and coherent offerings available outside of the EU.

Concerned ICT Standards and contribution to the related landscape

In this fellowship, I completed the NP draft “IEC 6xxxx Technical Report – Introduction to Quantum Interconnect and Standardisation Roadmap” and submitted this on 25th October 2023 to IEC TC86/JWG9. This Technical Report provides a comprehensive introduction to the relevance of quantum technologies to IEC TC86. As IEC TC86 covers all aspects of optical interconnect including passive and active components and devices, there is very broad overlap between IEC TC86 and all forms of optical quantum interconnect including cables, connectors, QPICs, quantum sources and quantum detectors. The TR also includes a comprehensive standardisation roadmap for quantum technologies in IEC TC86.

Given its relevance, at the IEC TC86 plenary, the TR draft was both accepted and elevated from JWG9 up to TC86 level. It will now proceed rapidly through the IEC review stages and sets the scene for the potential creation of a new working group in IEC TC86 on Quantum Interconnect, which is the subject of a new OC fellowship proposal.

In addition, I contributed to the effort by BSI and NPL to form an ISO/IEC Joint Technical Committee on Quantum Technologies, which has now been ratified as ISO/IEC JTC3 – Quantum Technologies. This activity was partly inspired by my own unsuccessful attempt two years ago as part of another StandICT.eu fellowship to establish a JTF between ITU, ISO and IEC on Quantum Technologies.

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

Impact on SMEs

The “IEC 6xxxx Technical Report – Introduction to Quantum Interconnect and Standardisation Roadmap” will streamline the development of a new generation of fibre optic interconnect standards in IEC TC86 to address quantum networks. European companies such as Senko UK, Diamond, Huber Suhner will benefit from developing connectors and cable assemblies to meet these requirements. QPIC designers such as SME Wave Photonics in the UK who are designing advanced PIC interfaces for quantum connectivity will benefit from such standards.

In addition, the BICOP 2023 conference and 9th Symposium on Optical Interconnect in Data Centres (that I organised) brought together many quantum SMEs including Orca Computing, Digistain, Vanguard Automation together with major industrial organisations including BT, Toshiba, Airbus, Intel and academic institutions to form new collaborations.

Impact on Society

Generally speaking, the global quantum marketplace requires a comprehensive, robust, and consistent set of standards. Therefore, proactive coordination and collaboration between standardisation development and standards specification organisations will be required.

With this fellowship work, by organising and chairing a flagship conference (the Optica BICOP 2023), I connected for coordination and collaboration various different stakeholders from the European and International Quantum arena (such as, Orca Computing, Toshiba, BT, NPL, Senko, Walton Institute (Ireland), Fraunhofer, Tyndall National Institute, Vanguard, and academic talks from Universities of Glasgow, Bristol, Strathclyde, Bath and Imperial College London). By assuming a strong position on quantum technologies from industrial, academic and standardisation angles, Europe will be in a stronger position to establish a global competitive edge in this field.

Even more, Europe is already a world-leader in the scientific research and industrialisation of quantum technologies, especially with regards to quantum communication and quantum computation technologies. And this fellowship helped to establish dominant European influence on the first standards for QPICs. This project provided the critical pre-requisite to developing the first standards for quantum interconnect and QPICs in the IEC.

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

Yes, it has resulted for a recommendation of a new standard in IEC 6xxxx Technical Report on Quantum Interconnect and Standardisation Roadmap.

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

Yes, I drafted the before-mentioned technical report.

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

The structure of the newly approved ISO/IEC Joint Technical Committee 3 - Quantum Technologies will over the next 6 months be meticulously agreed with international stakeholders in particular South Korea, USA and Japan.

Participation in the formative stages of the JTC-3 will be critical to ensure EU organisations gain critical strategic influence over the structure of quantum standards for the next 50 years and beyond. The UK already maintains very strong influence as the proposer and holder of the secretariat, which is permanent, but it will be critical to attract wider EU participation to support the UK and form a more united European front to counter China and the USA and establish quantum technical sovereignty in Europe.

Proposed continuation of action should entail forming new TC86 WG on Quantum Interconnect with a view to becoming a JWG with JTC3 to provide pipeline to JTC3 to mainstream industrial standards experts. This will accelerate validation of JTC3 and provide a strong opportunity for EU industrial partners to engage through the IEC TC86 with JTC3. This is the basis for my StandICT.eu OC#3 fellowship application.

Online references related to the fellowship work

IEC TC86 webpage https://www.iec.ch/dyn/www/f?p=103:7:0:::FSP_ORG_ID,FSP_LANG_ID:1279,25

BICOP webpage www.optica.org/events/Topical_Meetings/Optica_British_Irish_Conf_on_Optics_Photonics

9th Symposium webpage www.ecocexhibition.com/visit/whats-on/9th-international-symposium-for-optical-interconnect-in-data-centres

OCP quantum Future Technology Summit committee webpage www.opencompute.org/blog/meet-the-an-ocp-future-technologies-initiative-program-committee-for-the-upcoming-special-focus-track-on-quantum

R. Pitwon and B. Lee, "Advanced photonic integrated circuit building blocks for reconfigurability in hyperscale data centres," Invited paper to European Optical Society Annual Meeting (EOSAM 2023), EPJ Web Conf., 287 (2023) 01007, doi: <https://doi.org/10.1051/epjconf/202328701007>

Effective Characterisation of Quantum Computing Systems



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Sector

Quantum technology

Engaged SDOs, WGs and TCs



UNI/CT 535 “Quantum Technologies”
CEN/CENELEC JTC 22 “Quantum Technologies” WG1 “Strategic Advisory Group”
CEN/CENELEC JTC 22 WG3 “Quantum Computing and Simulation”

Role

Member

Addressed EU standardisation priorities and gaps

The field of quantum computing (QC) encompasses a wide range of implementations, and numerous enterprises are working on providing solutions for a fully developed quantum computer. The idea of a “Modular Quantum Computer” has given rise to a new European market that has drawn numerous SMEs to manufacture specialised modules in competition with more monolithic full-stack companies. From the perspective of standardisation, this market necessitates the division of the field of quantum computing into various modules that can interact with one another through clear interfaces (hardware and software), as well as agreement on the functional and performance requirements of each relevant module.

Another relevant aspect concerning quantum computing is the integration with high performance computing (HPC) systems. From the perspective of standardisation, QC-HPC integration projects require interfacing protocols for matching different classes of QC hardware with existing, highly standardised HPC facilities.

All in all, modular quantum computers and QC-HPC integrated systems will run quantum applications. To choose the best quantum algorithm for solving a problem, the performance of quantum algorithms on a given quantum hardware must be easily comparable. This is important for end users but even more for quantum hardware vendors. From the perspective of standardisation, all these companies are looking for widely accepted procedures and metrics for measuring and comparing the performance of their products.

Concerned ICT Standards and contribution to the related landscape

I am contributing to CEN/CENELEC JTC 22's Working Group 3 (JTC22/WG3) "Quantum Computing and Simulation", to which I belong since its foundation. There are three main activities being carried out in JTC22/WG3, namely: 1) defining a layer model of quantum computing, with clear boundaries between software and hardware layers; 2) specifying requirements and preliminary interfacing protocols for the hybridisation of quantum computers and HPC systems; 3) and providing guidelines on how to characterise the performance of quantum algorithms for classes of quantum applications implemented on different quantum hardware.

The definition of a layer model of quantum computing is the most advanced activity within JTC22/WG3. I submitted six contributions related to communication, hardware abstractions, programming, and assessment of the whole layer model.

Regarding the hybridisation of quantum computers and HPC systems, I am actively participating to the brainstorming sessions, providing inputs on the state of the art (especially concerning distributed quantum computing).

Finally, I am contributing to the review of existing proposals for performance benchmarks and indicators of quantum computing applications, considering that current quantum computers are noisy and not fault tolerant.

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

Impact on SMEs

My contributions in JTC22/WG3 are mostly related to quantum software, i.e., software that is executed on quantum computers but also software that is executed on classical computers for enabling/supporting quantum computations. In Europe, new SMEs are growing around the quantum software topic. Therefore, I feel that the activity I am carrying out in the context of JTC22/WG3 will be beneficial for those companies.

Impact on Society

The activity of JTC22/WG3 concerns Quantum Computing and Simulation. Quantum computing will offer a game-changing solution to complex search and optimisation problems in fields like logistics, finance, transportation, and manufacturing. Quantum simulation will have a huge impact on the study of new materials and new drugs, as well as finding chemical catalysts to remove CO₂ from the atmosphere or reduce the amount of energy to produce fertilizers.

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

Within JTC22/WG3, I am contributing to the writing of one New Work Item and two Preliminary Work Items (Technical Reports).

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

Technical Report drafts (with different degrees of maturity) have been circulated within JTC22/WG3 members.

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

Defining a layer model for quantum computing, hybridisation strategies and widely accepted benchmarks requires a huge effort for studying the body of existing proposals (from academia and industry) and for converging toward useful standards. JTC22/WG3 is currently working on Technical Reports. The road toward standards is still very long.

Online references related to the fellowship work

 www.cenelec.eu/areas-of-work/cen-cenelec-topics/quantum-technologies/

Launching generalised quantum cryptography standardisation



Jacak Witold

*Chair of the Board of Directors, and Coordinator of the EITCI Quantum Standards Group, European Information Technologies Certification Institute
Belgium*

Sector

Quantum technology

Engaged SDOs, WGs and TCs



EITCI QRNG Workgroup of the Quantum Standards Group (OQP-QSG)
CEN/CENELEC JTC22 Quantum Technologies
ETSI QKD-ISG
ITU-T SG13 (Future Networks) and SG17 (Security)
IEEE (and IEEE ISTO with formal quantum Project Authorisation Requests)
IETF
IEC TC 57, TC 292, and TC 65/WG10
ISO/IEC JTC 1/SC 27
ANSI/ASC
NIST

Role

Member

Addressed EU standardisation priorities and gaps

While QKD standards are already mature there are not yet technical reference drafts nor workgroups pursuing more general quantum cryptography – applicable in contrast to QKD to encryption of quantum and not just classical communication. In 2019 European Commission launched the Quantum Communication Infrastructure (EuroQCI), as a test-bed for quantum internet. The EuroQCI main objective is to allow international QKD deployment, but an extended scenario of connecting quantum computers calls for general quantum cryptography directly encrypting streams of qubits instead of bits (as is QKD). In view of EC recognising potential of the QIPC technology and allocating considerable resources in the quantum race it is important that such crucial prospective application as a generalised encryption of quantum communication is technically discussed and standardised with EU securing a leading role in this field.

Concerned ICT Standards and contribution to the related landscape

The proposal's effort supports upholding a leading role by Europe in international quantum communication technology commercialisation by undertaking gap-filing initiatives in international quantum standardisation. Many quantum technologies are in early TRL levels, and mature ones (reaching TRL 7) are quantum cryptographic systems targeted at securing classical information transmission (known as Quantum Key Distribution, QKD). Europe is a world-leader in QKD. The landscape of the standards this action contributes to encompass quantum cryptography, however going beyond a standard scheme of the Quantum Key Distribution, initiating international work on technical standardisation of generalised quantum cryptography extending beyond QKD, stemming from the One Qubit Pad (OQP) protocol, a general quantum encryption scheme (quantum cryptography primitive), simultaneously supporting Europe's position in terms of international SDOs/SSOs quantum standardisation efforts.

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 startups in Europe, with a lot of their founders and/or key engineers engaging in the standardisation effort of the action, and the cooperation is developing rapidly.

Impact on Society

The societal impact of the action is in supporting European's leading role in quantum technologies. Quantum engineering is expected to revolutionise 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, standardised upon this fellowship, beyond the well-known quantum key distribution QKD protocol, to more advanced generalised quantum cryptography and the OQP protocol to secure the future quantum networks.

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

Yes, with this fellowship, I directly contributed to further advancement of 2 technical reference standards in protocols and implementations for qubits encryption and the scheme, i.e. RS-EITCI-QSG-OQP-PROTOCOL-STD and RS-EITCI-QSG-OQP-IMPLEMENTATION-STD.

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 European Commission has recently launched the EuroQCI program implemented by all the EU member states, targeted at building quantum terrestrial and satellite network as an infrastructure for quantum systems in the EU and for anticipated quantum computers. In recent years 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 computational problems beyond the reach of classical computational power.

The advent of quantum computers pronounces the need to develop quantum standards and especially so in quantum cryptography domain for fully quantum networks. The OQP protocol is only one of the steps on a path for generalised quantum cryptography that needs to be pursued to provide quantum security for the future of communication in terms of a fully quantum Internet.

Online references related to the fellowship work

 <https://www.etsi.org/committee/1430-qkd>

3. Sustainable Growth



Environmental Sustainability for Blockchain and Distributed Ledger Technologies



Belen Suarez

Go To Innovation CEO, Reaccion Economica Spain

Sector

Digital product passport

Engaged SDOs, WGs and TCs



CEN/CENELEC JTC 19 Blockchain and Distributed Ledger Technologies, WG 2 Environmental Sustainability for Blockchain and DLTs

Role

Convenor at CEN/Cenelec JTC 19 WG2
Chair of ISO TC 307 WG5

Addressed EU standardisation priorities and gaps

In my activity, I focus on tackling the gap related to blockchain and Blockchain and Distributed Ledger Technologies as digital enabler technologies and their applications have a great potential for supporting use cases, such as future European Digital Product Passports and other use cases that could contribute positively to sustainable development and create a positive impact. At the same time, there are concerns about the environmental negative impact of these technologies and their applications. Currently, there is no methodology yet to rank those according to environmental footprint. This research will also inform some ISO development on auditing guidelines regarding the issue of organisational risks.

The priority is to address the lack of standards and scientific research recognised at the world level on this topic requires to development of a set of standards from which to understand and manage the environmental impact of Blockchains and Distributed ledger technologies. On the other hand, these technologies are usually classified based on the consensus mechanisms which represent the “backbone” of developments. Consequently, this research initially will focus on the preliminary work to develop a Technical Report on the environmental sustainability classification methodology of the consensus mechanisms of Blockchain and DLTs. It will be the key input for developing posterior research to provide a complementary classification of applications based on Blockchain and DLTs which can serve as a basis for labelling these technologies and crypto assets according to categories of energy efficiency, among other goals.

Finally, the challenge is that this research requires a multi-domain approach integrated into one research, to facilitate a common language between experts on DLTs, Sustainability, and Innovation Management. One of the main challenges this research faces is the lack of substantial scientific research in the domain. Although there are some scientific papers

related, however, due to the market changes and the dispersion of Blockchain solutions and DLTs in general the degree of relevance of the academic input is also very limited and in some scientific papers not reliable due to the lack of empirical validations to support the theoretical assumptions.

Concerned ICT Standards and contribution to the related landscape

CEN and CENELEC, consider the Green Transition as a priority and have identified the digital and green twin transition as a core driver for their joint 2030 Strategy, recognising that standards are a critical enabler of the solutions needed for the Green Deal transition.

On the other hand, The EU commitment, the political priorities and the social pressure for the fight against climate change make the need for environmental sustainability methodologies to understand and classify the potential ICT solutions, it becomes critical to support the Green Deal goal's purpose.

For instance, the new Eco-design legislation and the digital product passport proposal highlight the need to include decentralised identifiers and interoperable with centralised solutions is highlighted. To ensure trust, stakeholder engagement and adoption of the DPP, it is needed to include environmental considerations.

In this framework, my fellowship research supports a set of standards at CEN/CENELEC JTC 19 WG 2 Environmental Sustainability of Blockchain and Distributed Ledger Technologies (DLT):

- ▶ Technical Report, Environmental sustainability classification methodology of consensus mechanisms of Blockchain and DLT.
- ▶ New work item proposal of technical specification: Environmental Sustainability Taxonomy of Blockchain and DLT.

On the other hand, the research would inform a set of standards in development under the JTC 24 Digital Product Passport (DPP), which highlights the need to include decentralised identifiers and interoperable with centralised solutions. To ensure trust, stakeholder engagement and adoption of the DPP by disclosing the environmental considerations of the final solution itself.

At the ISO TC 307 WG5 Governance, it would be useful for the development of a guideline standard on auditing. The research output can represent a key input for informing the organisational risk in terms of Environmental, Social and Governance indicators.

At the high level, ICT standards must establish a framework for ensuring trust, interoperability and interoperation via secure and reliable applications, as well as facilitate the stakeholder ´s engagement. This research contributes to this goal by facilitating understanding and environmental impact management of the Blockchain and DLTs.

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

Impact on SMEs

In the pre-commercial and commercial stages of Blockchain and Distributed Ledger Technologies applications, stakeholder engagement and adoption represent one of the main bottlenecks. To guide the applications to provide environmental sustainability information and easier compliance with the new EU legislation, this research will allow the attraction of investment and stakeholders' adoption when the application and technologies are developed from proactive risk and environmental impact management and including the energy consumption criteria. It also promotes trust and interoperability, comparability and integrability of applications, and contributes to the Digital Single Market. The environmental classification methodologies proposed could allow a better understanding and comprehension of environmental sustainability for better impact management and provide trust.

Impact on Society

The research is aligned with the EU values in terms of democratising the knowledge to understand and manage the impact of the Blockchain and DLT in terms of the environment, however, also allows the SMEs to grow and support the single market goals by attracting investors and customers. At the same time mitigating the negative environmental impact is a priority also at the societal level, when the development of the technology considers the potential impacts on the main stakeholders which is beneficial for all the community.

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

Yes, I am involved in developing two new standards within at CEN/CENELEC JTC 19 WG 2, namely:

1. Technical Report, Environmental sustainability classification methodology of consensus mechanisms of Blockchain and DLTs.
2. New work item proposal of technical specification: Environmental Sustainability Taxonomy of Blockchain and DLT's.

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

Yes, I have contributed to the before mentioned technical report as well as technical specifications.

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

I reckon that more important involvement of European experts would be needed to better support the EU position. At the ISO level the TC is underrepresented in terms of EU representatives due to most convenors coming from the US and UK, as well as Japan, Korea and China represent some of the main qualified contributors, so the European values and leader perspective on key topics such as the environmental sustainability should be supported by European expert defending the EU values.

Online references related to the fellowship work

https://standards.cencenelec.eu/dyn/www/f?p=205:7:0:::FSP_ORG_ID:3321039&cs=122D0A35B5BFF706E739FFC96116FB037

Standards for Robotics and Autonomous Systems: Knowledge, Reasoning, Multiple Robots and HRI



Paulo Gonçalves

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Portugal*

Sector

Robotics and autonomous systems

Engaged SDOs, WGs and TCs



IEEE WG 1872.3 – Standard for Ontology Reasoning on Multiple Robots.
IEEE WG 3140 - Semantic Map for Autonomous Robots.

Role

Chair of a working group for developing a new standard titled: IEEE WG 1872.3 – Standard for Ontology Reasoning on Multiple Robots

Addressed EU standardisation priorities and gaps

To obtain a proper and formally defined interoperability amongst robotic agents, is needed a systematic way of representing knowledge and a common set of terms and definitions, ranging from the ICT, industry 4.0/5.0, social sciences and humanities (SSH), ethics, healthcare, IoT, and autonomous systems domains. These allow for unambiguous knowledge transfer among humans, robots, and other AI systems, as well as provide a foundational basis for the definition of the tasks that each robotic agent must perform, in each environment that should be semantically represented for interoperability, through semantic maps. Moreover, HRI formal terminology definitions and concepts are key to proper interactions with multiple robots and humans, also for semantic interoperability and ontological reasoning.

Four main ideas (semantic maps, HRI, reasoning, multiple robots) are key to properly deploy robotic and autonomous systems in each mission, and, as such, there is a clear need to standardise this knowledge on an ontological framework.

A first step was done with the IEEE standard 1872-2015, from a robotics perspective, to obtain semantic interoperability between robot agents and other agentive systems, using ontologies. Work is still to be done to have a proper interoperability between autonomous systems standards and industrial and healthcare standards, e.g., existing IEEE and ISO specifications.

Within this scope, the activity aims to fill the identified gaps above, taking also in consideration ethical issues (IEEE Std 7007:2021) of autonomous systems usage, under the work of four IEEE WGs works. As the main effort, this activity aims to develop work towards standardisation of ontology reasoning (within WG 1872.3) in several robotic domains: affordances in human robot interaction; trust and security for autonomous robotics; artificial intelligence and machine learning for autonomous robots; multiple autonomous robots and cloud robotics.

Concerned ICT Standards and contribution to the related landscape

The focus of this fellowships relates to the already published standards IEEE 1872-2015, IEEE 1872.2-2021, IEEE 7007-2021, and the recently approved IEEE 1872.1, that tackled basic definitions, and missed other core concepts such as, reasoning, semantic maps, HRI, multiple robots, and robot affordances.

These concepts need to be tackled in the future, worldwide, and specially within the EU, that must have a strong say on these subjects. This is largely justified by the strong industry in Europe, that needs to keep envisioning the application of AI based robotic and autonomous systems, to continue evolving using digital technologies for increasing income in the EU.

The combined result of this effort is that a robotic solution defined and developed by one vendor or research group should be able to work without modification on another group's hardware. It is envisioned that these series of standards will be applicable anywhere that complex robot tasks and reasoning is required. This includes domains ranging from industrial automation and manufacturing, healthcare, to deep space exploration. These WGs work are a follow-up effort of the IEEE Std 1872-2015, which was a seminal step for ontology-based AI for robots and autonomous systems.

As such, within the scope of IEEE RAS standards, the activity proposes to adopt ontological frameworks, for autonomous systems and robots, its semantic maps, reasoning, interactions to be performed in real scenarios, in any given operating environment.

The stated IEEE WGs (1872.3, 3140) will fill the gap on these series of IEEE 1872 ontology driven standards, along with the HRI related WGs (3107, 3108)

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

Impact on SMEs

The contributions are related to knowledge representation, based on ontologies, robotics, semantic maps, and HRI. Many worldwide renowned robotic companies are based in EU. Because of the complexity of robotic systems performing in real world scenarios, with a high level of autonomy, the use of AI based systems to reasoning is on the rise. Nowadays, knowledge representation and AI based systems, also for robotics, are being regulated worldwide, to which EU SMEs must also comply. As such, knowledge representation, and reasoning, within robotic related standards will have a huge impact on future robotic and autonomous systems developed by companies.

Impact on Society

The impact of formal knowledge representation, and reasoning, 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 and increase the trustworthiness of autonomous robots to the society.

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

Yes, I act as a chair of a working group for developing a new standard titled: IEEE WG 1872.3 – Standard for Ontology Reasoning on Multiple Robots.

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

The first main deliverable was the development of an application use case for semantic maps for the elderly care domain and a second one for an industrial setting, that were accepted to be included in the under development standard IEEE 3140.

The second main deliverable was a first draft for the ontology related to IEEE 1872.3, related to the sub-topic: artificial intelligence and machine learning for autonomous robots.

A third main deliverable was the co-organisation of the International Workshop on Ontologies and Standards for Robotics and Automation (WOSRA 2024) @ ICRA to be held in Japan, next May. There, several works from the community will be presented, i.e., working groups related to the project, along with application use-case of ontology-based standards to the robotics in healthcare, elderly care, domains.

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

The envisioned needs, other than the identified for the IEEE 1872.3 project standard, relate to develop application guides to roboticists for a proper applicability of the standards, standards for robot learning and intelligence in robotics, as well as to develop standards related to reasoning and its explainability within AI, Data and Robotics.

Online references related to the fellowship work

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

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

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

 <https://standards.ieee.org/ieee/3108/10710/>

 <https://wosra.github.io/wosra/>

IRTF NMRG agenda refinement for assessing and reducing the environmental impact of networking



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Luxembourg

Sector

ICT environmental impact

Engaged SDOs, WGs and TCs



IETF NMRG Network Management

Role

Co-chair of IETF NMRG Network Management

Addressed EU standardisation priorities and gaps

The 2023 rolling plan for ICT standardisation acknowledges that ICT is “one of the fastest growing greenhouse gas-emitting and energy management sectors”. The same plan emphasises the lack of clear assessment methods for the environmental impact of ICT. There are a lot of debates about the Internet carbon footprint, sometimes comparing it to CO2 emissions produced by transportation with oversimplified calculations. However, conservative estimations assume that around 3% of CO2 emissions are due to ICT in 2020 and a third by Internet (Gesi SMARTer2030 report). While it is acknowledged that networking can serve as a green enabler by reducing travel and facilitating remote tasks, Internet and networking themselves have a non-negligible environmental footprint and also need to be considered to reach the climate-neutrality in 2050 as part of the European Green Deal.

This requires thus a more in-depth investigation on assessing the environmental impact of Internet technologies and how they can be optimised to limit their footprint. This fellowship work supported by StandICT.eu focuses on the environmental impact of networking technologies. However, today’s networks are not limited to provide connectivity among endpoints through links and intermediate equipment such as routers but also provide multitude services. Those services which have been usually provided by hardware equipment tends to be virtualised in cloud infrastructures hosted in datacentres. Hence, energy consumption can be reduced using more power-efficient hardware, using sustainable power sources, deploying datacenters in cooler locations, optimising protocols, using environmental metrics in routing and traffic engineering, etc.

Sustainability slightly becomes a primary interest in the networking area with on-going discussions in different communities including at the IETF. In the research sister society IRTF, initial work has been engaged in NMRG (Network Management Research Group) to better delineate the related challenges and it is time now to progress from that through the following activities:

- ▷ Roadmapping of NMRG for green networking to refine the objectives of NMRG in regard to green networking by proposing a multi-year work plan.
- ▷ Integration of NMRG and liaisons with other WGs and SDOs to ensure a focus contribution of the group on network management aspects and its visibility towards others standardisation groups and fora.
- ▷ Technical workshop series to invite researchers and engineers to present their recent results related to green networking for better understanding the environmental impact of networking and above all support the refinement of NMRG roadmap.

Concerned ICT Standards and contribution to the related landscape

Networking-related technologies tackle challenges at different levels. Among them physical networks, logical routing or virtualisation of network services are some examples. As a result, standardisation occurs in different organisations and groups. Although the environmental concerns are more considered, activities happen in different standardisation bodies. Recently, ETSI Standard (ES) 203 237 about a 'Green Abstraction Layer' (GAL) aims to ease the access to green capabilities of devices such as with energy management protocols. ITU-T Study Group 5 (SG5) has a broader scope including providing guidance about the sustainable use of ICT technologies. For instance, the L.1300-L.1399 recommendations focus on "Energy efficiency, smart energy and green datacenters". In 2022, the IETF IAB (Internet Advisory Board) workshop on Environmental Impact of Internet Applications and Systems concludes that Internet technologies have a role in supporting a sustainable society. Because clear quantitative assessment and identifying impactful orientations are not straightforward, it was important to maintain the discussion at the IETF level. The informal e-impact mailing list received a large attention since then allowing participants to share opinions and documented studies. In IRTF NMRG, a first draft was proposed and is entitled "Challenges and Opportunities in Management for Green Networking".

To summarise, there are initiatives at IETF/IRTF and beyond proposing solutions for greener networking. Discussions at the IETF/IRTF reveal the necessity to further progress collectively. The NMRG document serves as starting point to identify a set of challenges, but a better scope of network management related contributions is indeed.

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

Impact on SMEs

Networking device manufacturers, telecom operator or internet service providers are incited to reduce their energy due to legal or society pressures, corporate decisions will go in this direction. While energy costs are a valid argument, the European green deal and its implementation in national law also sustain this effort. This increases the market size for existing SMEs in sectors such as renewable energy to provide their solutions to telecommunications or actors but also opens opportunities with new ones as enhancement to networking products are also expected, as for example on management of green capabilities of network devices, which is aligned with the scope of NMRG and this project.

Impact on Society

With the ever-growing number of connected devices (29.3 billion forecasted by Cisco in 2023) and the associated Internet traffic (expected to increase by 23 % in 2023 in a Sandvine report), the carbon footprint of Internet became an unavoidable question. Quantifying to carbon footprint or energy consumption of Internet technologies is still challenging but this problem cannot be ignored.

On one hand, advances in ICT will support the green transition. This is advocated by many reports including Recommendation 2013/105/EC. The recent COVID-19 crisis has emphasised the positive environmental benefit of using communication technologies for home working or remote meetings. On the other hand, world digitalisation leads to the development of

new services always creating new demands for networking technologies, recently with 5G deployment. Internet technologies have thus an ambivalent role that requires a good assessment and balancing to ensure the society will benefit from the best while reducing its environmental impact.

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

The main aim of the project is to create a multi-annual roadmap for NMRG on green networking alongside with work-items which are expected to deliver different types of outputs, possibly including recommendations or experimental studies in the form of informational RFCs (Request for Comments)

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

The project started in January 2024, and a preliminary work was engaged by NMRG participants to define a first set of challenges and opportunities in Network Management for Green Networking. Even if not being an author this draft, I supported its maturation within the group acting in my role of co-chair and document shepherd. It has recently entered into a “last call” phase with the aim to be published as an informational RFC.

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

The project timeframe is six months until June 2023 and the NMRG document will serve as a basis to further enhance discussions between participants but also at a more global scale at the IETF. Joint meeting between NMRG and the informal e-impact group at the IETF could be envisioned as well as with other standardisation organisations since the topic of the project is transversal. I guess a main issue that needs to be addressed on a long-term perspective is the proper monitoring and accounting of the carbon footprint of Internet technologies. We lack a reasonable agreement while this is necessary to evaluate how proposed standards or technical solutions contributes towards a more sustainable Internet.

Online references related to the fellowship work

- 🔗 Challenges and Opportunities in Management for Green Networking, <https://datatracker.ietf.org/doc/draft-irtf-nmr-green-ps/>
- 🔗 237 Green Abstraction Layer (GAL), European Telecommunications Standards Institute (2014) ES 203, www.etsi.org/deliver/etsi_es/203200_203299/203237/01.01.01_60/es_203237v010101p.pdf
- 🔗 ITU-T L.1381, Smart energy solutions for data centres, 2020-06-29, <https://handle.itu.int/11.1002/1000/14305>

4. Innovation for Digital Single Market



Media Coding and API for Metaverse Interoperability



Marius Preda

Associate Professor, Telecom SudParis - Institute Mines Telecom
France

Sector

Media Coding and Metaverse

Engaged SDOs, WGs and TCs



ISO/IEC ISO/IEC JTC 1 SC 29 / WG 2 MPEG Requirements
ISO/IEC ISO/IEC JTC 1 SC 29 / WG 7 MPEG 3D Graphics and Haptics
MSF (The Metaverse Standards Forum) 3D Web Interoperability Working Group

Role

Convenor of ISO/IEC JTC 1 SC 29 / WG 7 MPEG 3DGH

Member of ISO/IEC JTC 1 SC 29 / WG 2 MPEG Requirements

Member of the 3D Web Interoperability WG of MSF

Addressed EU standardisation priorities and gaps

Interoperability is a fundamental concept in the development of the Metaverse, and it plays a vital role in several aspects of its growth and functionality. Interoperability ensures that users can seamlessly navigate and interact within the Metaverse, breaking down barriers between different platforms and ecosystems. This enhances the user experience by providing a unified and frictionless environment for exploration and engagement. It fosters an open and inclusive Metaverse ecosystem, encouraging collaboration and innovation among developers and creators. This openness promotes healthy competition and drives the continual evolution of the Metaverse. Interoperability allows for the transfer of digital assets, such as virtual currency and items, between various Metaverse environments.

To achieve interoperability, industry-wide standards and protocols need to be established and universally adopted. These standards ensure that various components of the Metaverse, such as virtual reality devices and software applications, can communicate effectively and work together seamlessly. Interoperability also encompasses data portability and privacy considerations, allowing users to control their data and move their information between Metaverse services while maintaining privacy and security. In alignment with the principles of decentralisation and user ownership, interoperability empowers users by giving them greater control over their digital presence and assets.

In the flourishing realm of the Metaverse, interoperability emerges as a pivotal challenge, particularly in the seamless integration and transfer of digital content such as assets and avatars across various virtual environments. This interoperability is essential for fostering

a unified, expansive virtual universe, where users can fluidly navigate between platforms without losing the continuity of their digital possessions and identities. However, the current landscape of the Metaverse is fragmented, with different platforms employing disparate systems and standards, leading to a lack of universal compatibility. This fragmentation not only hinders the user experience but also stifles innovation and growth within the Metaverse ecosystem. Additionally, the inherently online nature of these environments demands efficient, compressed representations of digital multi-media assets to ensure swift and smooth transmission over the internet. This compression must be balanced with the need to maintain high-quality, immersive experiences, posing a significant technical challenge. Bridging these gaps in interoperability and efficient data representation is crucial for the Metaverse to realise its full potential as an interconnected, accessible, and immersive virtual world.

Concerned ICT Standards and contribution to the related landscape

The contributions facilitated by this fellowship have had an impact on two standard organisations, ISO/IEC and MSF (The Metaverse Standards Forum). As the Convenor of ISO/IEC JTC 1 SC 29 / WG 7 MPEG 3DGH, I'm leading the projects for defining compressed representation for graphics content. The group is currently working on 3 international standards:

- ▷ ISO/IEC 23090-5:2023 Information technology Coded representation of immersive media Part 5: Visual volumetric video-based coding (V3C) and video-based point cloud compression (V-PCC)
- ▷ ISO/IEC 23090-9:2023 Information technology, Coded representation of immersive media, Part 9: Geometry-based point cloud compression (G-PCC)
- ▷ ISO/IEC AWI 23090-29 Information technology Coded representation of immersive media Part 29: Video-based dynamic mesh coding (V-DMC)

The first two standards aim to compress point cloud representations of static and dynamic 3D objects. The diversity in point cloud densities has led to the development of two approaches: V-PCC, which involves projecting 3D space onto a set of 2D patches and encoding them using traditional video technologies; and G-PCC, which traverses the 3D space directly to create predictors. With the current V-PCC encoder implementation achieving a compression ratio of 125:1, a dynamic point cloud of 1 million points can be encoded at 8 Mbit/s while maintaining good perceptual quality. G-PCC offers a compression ratio of up to 35:1 for sparse content. V-DMC, built on the same concept as V-PCC, compresses mesh representations directly. By enabling high-level immersion at current bandwidths, these MPEG standards facilitate various applications within the Metaverse realm, including immersive media, virtual reality, augmented reality, immersive real-time communication, autonomous driving, cultural heritage preservation, and more.

As a member of SC 29/WG 2 I contributed to the discussions related to "AhG [Market Needs] Metaverse," In October 2023, during the 144th MPEG meeting held in Hanover, I co-authored a technical contribution titled "Inputs for the Definition of an Avatar Coding Format." The objective of this contribution was to address the coding and representation of digital users (referred to as avatars) to ensure seamless interoperability between systems and applications, including the Metaverse, for the transmission and delivery of digital content. The long-term goal of this initiative is to initiate a new project within MPEG focusing on Avatar Media Coding.

In parallel with my ISO/IEC activities, I also played a foundational role as one of the founding members of the MSF 3D Web Interoperability Working Group. In November 2023, I was invited as a keynote speaker at the Web 3D conference, where I presented a paper titled "Compression Factors for Realistic 3D Graphics." The primary message of my presentation emphasised the imperative need for compression technologies within the Metaverse. These two activities will continue into the second phase of the project, with my participation in the 145th MPEG meeting scheduled for January 2024 and continued involvement in the MSF 3D Web Interoperability Working Group.

Finally, I participated to the “Walk & Talk Webinar” - Towards the CitiVerse & a citizen-centric virtual world for EU Cities and Communities organised by StandICT.eu and to the report “CitiVerse Landscape Report”.

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

Impact on SMEs

The implementation of these advanced MPEG standards for compressing 3D objects and point clouds presents a significant opportunity for small and medium-sized enterprises (SMEs) operating in the digital and virtual space. Firstly, these standards level the playing field, allowing SMEs to compete with larger companies by providing high-quality, immersive content without necessitating extensive resources or bandwidth. This accessibility to advanced compression techniques enables SMEs to create and distribute complex 3D content efficiently, opening up new avenues for innovation in product visualisation, virtual prototyping, and interactive customer experiences. Furthermore, the ability to encode dynamic point clouds at lower data rates without compromising quality is particularly beneficial for SMEs focusing on virtual and augmented reality applications, as it reduces both storage and transmission costs. This, in turn, can lead to the development of more sophisticated and immersive experiences for a fraction of the usual cost. Additionally, these standards foster a more collaborative and interoperable ecosystem in the Metaverse, encouraging partnerships and integrations among different platforms and tools, which is especially advantageous for SMEs looking to expand their reach and capabilities. Overall, the adoption of these compression standards can empower SMEs to innovate and grow in the competitive digital landscape, ultimately driving their success in the rapidly evolving Metaverse environment.

Impact on Society

The adoption of advanced MPEG standards for compressing 3D objects and point clouds stands to have a profound impact on society, reshaping how we interact with digital and virtual environments. These standards democratise access to high-quality, immersive virtual experiences, making them more accessible to a broader audience. This inclusivity enhances educational and cultural experiences, as institutions can now offer detailed virtual tours and interactive learning modules, even to remote learners. For the entertainment industry, these standards enable the creation of more realistic and engaging virtual realities, augmenting the user's experience in gaming, movies, and virtual social interactions. In healthcare, the ability to efficiently transmit detailed 3D data can revolutionise telemedicine and remote diagnostics, making medical expertise more accessible, especially in underserved areas. Moreover, these standards facilitate more sustainable practices in industries like architecture and urban planning, as detailed virtual models can significantly reduce the need for physical prototypes and travel. Additionally, by reducing the data requirements for transmitting complex 3D information, these standards contribute to reducing the carbon footprint associated with data storage and transmission, aligning with global efforts toward environmental sustainability. Ultimately, these MPEG standards not only enhance the technological capabilities of various sectors but also significantly contribute to societal advancements by making cutting-edge technology more accessible, sustainable, and beneficial for a wider range of communities and industries.

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

This fellowship supported my activity as a Convenor of WG 7 of SC 29 and directly led to the advancement of several ISO/IEC standards in the ISO/IEC 23090 series (Parts 5, 9, 19, 20, 21, 22 and 29).

I have also supported the revision of MPEG-V (Media Context and Control) Part 4 Virtual World Object Characteristics.

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

During the period covered by this fellowship, several important deliverables were produced. Among them, the most notable include new versions of the Test Models for V-PCC, G-PCC, and V-DMC. Additionally, improved versions of the Working Draft for the G-PCC Second Edition and V-DMC were developed, as well as the finalisation of the G-PCC Conformance at the FDIS (Final Draft International Standard) stage. It is also worth mentioning the progress made in preparing a Call for Proposals for AI-based compression technologies for point clouds.

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

There is a need to pursue further technical development for both point cloud and mesh compression standards, and to finalise the corresponding standardisation projects. Additionally, the interoperability framework for avatars should be continued and enriched by integrating the work performed under the auspices of MPEG-V with the new compressed representations.

Online references related to the fellowship work

 <https://www.iso.org/standard/83535.html>

 <https://www.iso.org/standard/78990.html>

 <https://www.iso.org/standard/85254.html>

 https://portal.metaverse-standards.org/wg/3D_Web_Interop/dashboard

■ Accessibility in the Metaverse



Pilar Orero

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Spain*

Sector

Metaverse

Engaged SDOs, WGs and TCs



ITU Focus Group on Metaverse, Working Group 8 Accessibility and inclusion

Role

Co-chair ITU FG Metaverse WG8 Accessibility and Inclusion

Addressed EU standardisation priorities and gaps

In the framework of this fellowship, I focus on the Metaverse that replicates life in general, and where accessibility is an afterthought when designing an IT system or a product. Against EN 301 549, where it is recommended to design with accessibility in mind, XR environments are designed not taking into consideration accessibility. This was clear when the UN communication agency ITU began the Focus Group on the Metaverse in 2022. Eight working groups were created, and the last one was dedicated to Sustainability, Accessibility & Inclusion. While it started as one working group addressing sustainability on a par with accessibility, it soon became clear they have to be treated separately --even though they are topics that should be applied to all working groups.

Now, the priority is to establish the human as the centre of the Metaverse, where the human has diverse capabilities. The priority is also to raise awareness and remind all working groups that accessibility has in Europe a solid legislation with three Directives: AVMSD, Accessible Web Directive and the European Accessibility Act. This last piece of legislation has given rise to Mandate 587 about Harmonised Standards supporting the Accessibility Act Directive (EU). It asks for six separate pieces of standardisation. To develop three new standards:

- ▶ Harmonised standard(s) setting up requirements on the accessibility of non-ICT information related to products
- ▶ Harmonised standard for the accessibility of support services related to products and services (help desks, call centres, technical support, relay services and training services)
- ▶ Harmonised standard for the accessibility of emergency communications and for the answering of emergency communications by the PSAPs (including to the single European Emergency number 112)

And to revise three existing standards:

- ▶ EN 301 549
- ▶ EN 17161:2019
- ▶ EN 17210:2021

Concerned ICT Standards and contribution to the related landscape

By developing pre-standardisation deliverables focusing on a human-centric metaverse where accessibility is a pre-condition towards an inclusive metaverse “for all”. This has been achieved in two ICT Standards areas:

ACCESSIBILITY: a) Requirements of accessible products and services in the metaverse: Part I – System design perspective (FGMV-O-004) and b) Requirements of accessible products and services in the metaverse: Part II – End user perspective (FGMV-O-005).

METAVVERSE: i) Guidelines to assess inclusion and accessibility in metaverse standard development (FGMV-O-143). ii) Technical Report on how to Build a Metaverse for all, Part I (FGMV-O-151), iii) Technical Specification on “Requirements for communication between human- avatar languages in the metaverse” iv) Technical Specification “Accessibility requirements for metaverse services supporting IoT” (FGMV-O-148.), v) Technical Report “Accessibility in a sustainable metaverse” (FGMV-O-149.) vi) Technical Specification “Guidelines on interpreting in the metaverse” (FGMV-O-150.)

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

Impact on SMEs

The adoption of accessibility measures (WCAG2.0 and EN301549) by industry is always greeted with reticence. The reason given by industry is that they were not aware of these requirements, and because when they started working there were no clear indications. For this reason, I decided to focus on generating clear and very useful recommendations as part of this ICT standard funding. Creating the deliverables, but also by also creating videos explaining the deliverables, and by participating in other WGs, I believe ITU now is aware that the metaverse is human centric and must be accessible. This in Europe has a further implication, since accessibility also means to have the metaverse in the many languages of Europe, including Sign Language. This has been explained to EU citiverse at ITU by participating from WG8 accessibility to WG1 metaverse definition, so SMEs understand what accessibility is and how the metaverse must be accessible by design.

Impact on Society

The work I do on accessibility to avoid exclusion taps various UN SDGs and specifically in parts related to education, growth and employment, inequality, including the following goals:

- ▷ Goal 4 on inclusive and equitable quality education and promotion of life-long learning opportunities for all focuses on eliminating gender disparities in education and ensuring equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities. In addition, the proposal calls for building and upgrading education facilities that are child, disability, and gender sensitive and also provide safe, non-violent, inclusive and effective learning environments for all.
- ▷ Goal 8 to promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all, the international community aims to achieve full and productive employment and decent work for all women and men, including for persons with disabilities, and equal pay for work of equal value.
- ▷ Closely linked is Goal 10, which strives to reduce inequality within and among countries by empowering and promoting the social, economic and political inclusion of all, including persons with disabilities.
- ▷ Goal 11 would work to make cities and human settlements inclusive, safe and sustainable. Member States are called upon to provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, such as persons with disabilities. In addition, the proposal calls for providing universal access to safe, inclusive, and accessible, green and public spaces, particularly for persons with disabilities.

- ▶ Goal 17 to strengthen the means of implementation and revitalise the global partnership for sustainable development, the collection of data and monitoring and accountability of the SDGs are crucial.

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

Yes, I am contributing to a new standard "ITU Common User Profile" being developed in ITU IRG AVA.

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

Yes, I have contributed to technical reports including reference material and to technical specifications.

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

Within my WG, during this fellowship, we have developed pre-standardised deliverables, but until 2024 standardisation will not happen. It will be interesting to continue co-chairing, or at least participating in further Metaverse work.

Online references related to the fellowship work

www.itu.int/en/ITU-T/focusgroups/mv/Pages/deliverables.aspx

www.itu.int/en/ITU-T/focusgroups/mv/Pages/default.aspx

Develop scope and emerging requirements for new DLT and blockchain use-cases standards



Caroline Thomas

Independent Consultant and technical expert in IT Innovation Greece

Sector

Blockchain

Engaged SDOs, WGs and TCs



ISO TC307 Blockchain and distributed ledger technologies WG 6 Use Cases in Blockchain and DLT Technologies

Role

Convenor of ISO TC307 WG 6

Addressed EU standardisation priorities and gaps

This fellowship is addressing the need to respond to market and regulatory demands for technical standards that address the rapid evolution of DLT/Blockchain technologies and new decentralised business models. The overall priority was to deliver a study to the TC/307 Plenary in November 2023 on the scope and emerging requirements for use cases in DLT. This leads to creating proposals for the May 2024 Plenary.

The gap concerns the rapid evolution of DLT/Blockchain applications. This also aligns to the interoperability gap in related emerging technologies such as AI, IoT, quantum and other edge computing capabilities.

Moreover, the challenge is to provide new Technical Reports that enable standards to keep up with the evolution of new technologies and decentralised business models. An escalating challenge is the role of Artificial Intelligence in 2024, which reflects the forecasts in my co-edited StandICT.eu landscape report on Trusted Information⁴.

Concerned ICT Standards and contribution to the related landscape

The application focuses on creating a separate Technical Report to the existing ICT standards report ISO/TR 3242:2022 *Blockchain & DLT – Use cases* which presented 22 use cases across a DLT standards landscape including Data Provenance, FinTech, Supply Chains and Smart Energy. The new ISO/AWI TR 24878 - *New and emerging DLT/Blockchain Use Cases* includes potential new areas across the ICT landscape e.g.: Digital Currencies, Metaverse, NFTs. A new Project Leader has been appointed for this project, who is a respected European expert in DLT/blockchain.

⁴ www.standict.eu/news/trusted-information-digital-space

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

Impact on SMEs

Many of the proposed use case contributions continue to spring from our outreach to European experts within SDOs, companies and SMEs. The ISO/TC 307 WG6 programme provides an active forum for SMEs to:

- ▶ Contribute and discuss EU technical initiatives on emerging international standards representing European values, ethics & regulations such as privacy (e.g.: privacy - GDPR/eIDAS) and European green transition initiatives (e.g.: EBSI blockchain to create trusted digital audit trails).
- ▶ SMEs can gain the opportunity to understand the value of standards, via example use cases and models. The use cases provide insights and cross-domain example that can inform SMEs in their product development, and adoption of their technologies.
- ▶ Review international use cases and gain insights for EU participation in local markets, or in cross-border /sector issues.
- ▶ The Vienna Agreement enables ISO standards to be freely shared with CEN/CENELEC members, including SMEs.

Impact on Society

The DLT/Blockchain technology is often referred to as 'the technology of trust'. This ISO feature on my work at ISO/TC 307 and WG6 Use Cases explains the societal impacts of trust across supply chains, digital trust, data provenance, Energy trading, records management, Anti-counterfeit pharma and food safety and provenance.

Over recent years, blockchain has evolved into a transformational technology promising to offer secure, real-time transactions across different sectors and industries that will revolutionise the way we do business. ISO is at the forefront of this technology to ensure that its users all speak the same language.

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

Yes. In the framework of this fellowship, I have contributed developing over 8 new standards listed here below.

Standards created in my Convenor role of in ISO/TC 307 WG6 Use Cases

- ▶ ISO/TR 3242:2022 Blockchain & DLT – Use cases. <https://www.iso.org/standard/79543.html>
- ▶ ISO/TR6039: 2023 - Blockchain & DLT - Identifiers of subjects and objects for the design of blockchain systems <https://www.iso.org/standard/81978.html>
- ▶ ISO/DTR6277- Blockchain & DLT –Data flow model for blockchain and DLT use cases

Standards created in the ISO/ TC307 work programme

- ▶ ISO 23257:2022 Blockchain & DLT — Reference architecture
- ▶ ISO 22739:2020 Blockchain & DLT — Vocabulary (New ISO 22739:2024 edition just published)
- ▶ ISO/TS 23258:2021 Blockchain & DLT — Taxonomy and Ontology
- ▶ ISO/TS 23635:2022 Blockchain & DLT — Guidelines for governance
- ▶ ISO/TR 23644:2023 Blockchain & DLT - Overview of trust anchors for DLT-based identity management
- ▶ ISO/TR 6039:2023 Blockchain & DLT — Identifiers of subjects and objects for the design of blockchain systems

My work also feeds into related ICT standards work in ISO/TC 68 Digital Currencies / ISO/TC 322 Sustainable Finance.

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

Yes. I contributed to drafting a new report on the state of the art of the landscape Blockchain and DLT Use Cases Report.

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

The relevance for additional EU experts needed to better support the EU position is the opportunity to 'have a voice' to contribute to develop technical standards in DLT/Blockchain that reflect European democratic values including:

- ▷ Security and Privacy: new Data Act, GDPR, EU Artificial Intelligence Act.
- ▷ Fintech and De-fi: MiCA crypto regulations.
- ▷ Sustainable & green initiatives: carbon markets, smart energy (hydrogen), sustainable finance and insurance, Interoperable platforms: EBSI, Digital product passports.

Online references related to the fellowship work

 www.iso.org/standard/88315.html?browse=tc

 www.iso.org/standard/79543.html

 www.iso.org/standard/82158.html#lifecycle

 www.iso.org/committee/6266604/x/catalogue/p/1/u/0/w/0/d/0

 https://www.iso.org/news/isofocus_142-5.html

5. Societal Challenges



Journey Towards Ethical AI: A European Perspective on Nudging, Competence, and Ethics Roadmap



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France*

Sector

Artificial intelligence

Engaged SDOs, WGs and TCs



CEN-CENELEC JTC21 WG4: “Fundamental and societal concerns”

Role

CEN/CENELEC JTC 21 co-convenor of WG4 “Foundational and societal aspects”

CEN-CENELEC JTC21 WG4 TG2 editor: “AI-enhanced nudging”

CEN-CENELEC JTC21 WG4 TG4 co-editor: “Competence Requirements for AI Ethicists Professionals”

CEN-CENELEC JTC21 WG4 TG5 contributor: “Ethics Roadmap”

Addressed EU standardisation priorities and gaps

In the framework of my fellowship, I contribute to several Task Groups (TG) that target a bit different priorities and gaps:

“AI-enhanced nudging (TG2)” underscores the urgent need for a standard in AI nudges that respects EU principles, as these nudges can endanger protected groups’ safety and dignity. The forthcoming EU AI Act seeks to limit AI mechanisms that subtly shift behaviour or exploit vulnerabilities. Despite existing regulations like GDPR and EU AI Act, unexpected negative impacts from AI nudges persist. These nudges, although designed neutrally, can unintentionally harm, especially when amplified by content personalisation. Their often-unclear nature, combined with issues like spreading misinformation. Making the establishment of a non-harmful AI nudging standard crucial to the EU’s trust and market growth.

With AI’s evolution, a growing need for AI ethicists to address ethical, social, and psychological queries is evident. One gap, however, lies in the absence of standardised competencies for these professionals, causing hesitation among organisations to embrace AI ethics. To bridge this, the proposal under “Competence Requirements for AI Ethicists Professionals (TG4)” seeks to craft a detailed framework, underlining the requisite knowledge, skills and mindset for handling AI’s intricate ethical concerns.

The “Ethics Roadmap (TG5)” initiative focuses on weaving European values, societal considerations, and fundamental rights into JTC21’s standardisation endeavours. By critically evaluating JTC21’s tasks, TG5 aims to ensure ethical consistency in all outputs. To fortify this mission, TG5 provides feedback to other JTC21 factions, keeping the primary users – AI industry

stakeholders – in perspective. It's vital that TG5's communications are easily understood by these users, making AI's ethical principles actionable and aligned with Europe's human-centric vision. Without this concerted ethical lens, there's a risk of misaligned AI practices divergent from European ideals.

Concerned ICT Standards and contribution to the related landscape

This fellowship covers my contribution in the different standardisation efforts;

As the co-convenor of WG4, I coordinated the efforts of other working groups, striving to achieve qualitative consistency across the work of each group.

As the editor for "AI-enhanced nudging (TG2)", I facilitated and amplified the involvement of civil society in drafting (ANEC, ITUC, ForHumanity, 5Rights Foundation). I took an active role in other key TGs in CNCLC JTC21 (conformity assessment, risk catalogue, and AI trustworthiness characteristics) and ISO SC42 (WG3 on Trustworthiness).

As the co-editor of "Competence Requirements for AI Ethicists Professionals (TG4)", I aided in moulding the draft and introduced essential methodologies for the profession.

In my role as a contributor to the "Ethics Roadmap (TG5)", I worked to hone the ethical language and pinpoint the primary objectives.

My hands-on involvement with AI nudges and my input as an AI ethicist are pivotal in reinforcing European standards and values in the standardisation field.

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

Impact on SMEs

My work in AI-enhanced Nudging (TG2) establishes requirement and ethical guidelines for AI nudging, particularly for vulnerable groups providing requirements, definitions and methodologies that safeguard individual free will, benefiting organisations, and consumers.

In the Competence Requirements for AI Ethicists Professionals (TG4), my efforts are shaping a standard ensuring that AI technologies are ethically designed and used, cementing trust among stakeholders: big tech companies, SMEs, NGOs, consumers, and citizens.

Within the Ethics Roadmap (TG5), I work on integrating European values and ethics into the AI standardisation processes of JTC21. My commitment to clear language ensures the standards are user-friendly, promoting an ethical and human-centric AI landscape in Europe. Without this guidance, there's a risk of misalignment in AI implementations and potential breaches of European values.

Impact on Society

The "Ethics Roadmap (former TG5 now integrated into TG4)" is dedicated to embedding European values and fundamental rights into JTC21's standardisation efforts. Moreover, In **AI enhanced Nudging (TG2)**, my work employs the accurate ethical methodology to approach AI-enhanced nudging. Using distributed morality mechanisms on multi-agent systems, we aim to mitigate risks and assist the industry in fostering an ethical ecosystem, thereby facilitating the implementation of EU regulatory requirements. AI-enhanced nudging, particularly concerning vulnerable groups like children and the elderly, raises novel ethical concerns due to their capacity to influence human behaviour. There are also new emergencies due to the inappropriate use of nudges on workers. Therefore, it's essential to establish a common language, procedures, and methodologies to ethically regulate their use and prevent unintentional harm. My objective is to construct a consensus-based taxonomy around AI-enhanced nudging, involving stakeholders from various sectors. This effort aims to create a responsible ecosystem with mechanisms for feedback, assessment, and control, ultimately enhancing trust in AI across Europe.

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

Yes, three projects are directed addressed to NWIP:

- ▷ CEN-CENELEC JTC21 WG4 TG2 editor: “AI-enhanced nudging”
- ▷ CEN-CENELEC JTC21 WG4 TG4 co-editor: “Competence Requirements for AI Ethicists Professionals”
- ▷ CEN-CENELEC JTC21 WG4 TG3 “AI trustworthiness Framework” that I animate as co-convenor of WG4. This will be part of hEN (harmonised European Norm).

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

Yes, I have drafted technical reports on new operating procedures.

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

More European experts are needed to pursue standardisation in the concerned areas. For the “Green and Sustainable AI (TG1)” we must continue action and support the initial draft at ISO level.

For the “AI-enhanced Nudging (TG2)” we support the initial draft at ISO level with more European experts and preserve the original core philosophy of the draft from being altered.

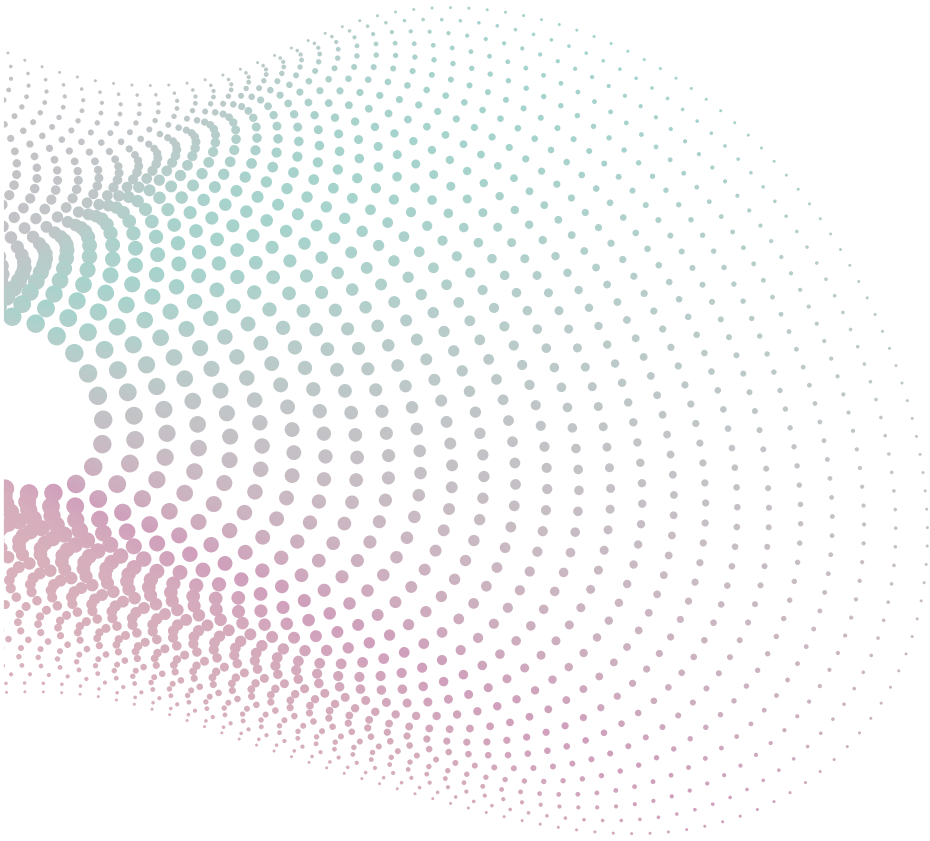
For the “AI Trustworthiness Framework (TG3)” we must continue action and allocate the necessary resources for this standard to be finished in time to support the EU AI ACT.

For the “Competence Requirements for AI Ethicists Professionals (TG4)” and other deliverables in “Ethics Roadmap (former TG5 now integrated into TG4)” we must continue action.

Online references related to the fellowship work

www.cencenelec.eu/areas-of-work/cen-cenelec-topics/artificial-intelligence/







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