StandICT.eu 2023

ICT STANDARDISATION OBSERVATORY AND SUPPORT FACILITY IN EUROPE

FOLLOWING THE FELLOWS

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

FOURTH OPEN CALL

Editors:

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Disclaimer

About StandICT.eu

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StandICT.eu 2023 would also like to thank **Thomas Reibe, StandICT.eu 2023 Project Officer & Senior Expert at DG Connect European Commission, and Emilio Davila-Gonzalez, Head of ICT Standardisation sector at DG Connect leading Unit F3-Blockchain & Innovation** for their leadership and guidance.

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Finally, we would like to thank all our **EUOS Technical Working Groups (European Observatory for ICT Standardisation)** chairs and members for the investment in gathering expertise and producing outstanding landscape reports of the standardisation status across different ICT sectors. We warmly thank the TWG chairs guiding this work: **Lindsay Frost, Ismael Arribas, Matthias Pocs, Dimosthenis Kyriazis, Jeroen Broekhuijsen, Antonio Kung, Claude Baudoin, Joel Myers, Arkopaul Sarkar, Georgios Karagiannis, Brian McAuliffe and Fiona Delaney.**

Foreword

We are very pleased to see the continuation of our "*Following the Fellows*" series with the issue of the fourth dedicated booklet, bearing a tangible testimony of the **impact** generated by European ICT experts working within international Standardisation Developing Organisations, thanks to the financial support provided through the **StandICT.eu 2023 Fellowship Programme** Open Calls, as part of the broader mission of the StandICT.eu 2023 Coordination and Support Action, funded by the European Commission's H2020 Framework Programme.

The goal of these regular publications is to place the work carried out by our fellows at the centre stage and to illustrate the demonstrable outcomes that excellent research can make to both society and to the economy. Therefore, we attempt to substantiate how each effort on which the fellows are engaged provides a potential benefit to society and contributes to the achievement of specific, desired, societal outcomes as a result of the ICT Standardisation efforts. This edition comes timely after the release of the **EU Strategy on Standardisation** outlines the reasons to consider Standards as a vital tool to valorise research result:

- Standards can help researchers to bring faster their innovation to the market and spread technological advances by making their results transparent and ensuring high quality.
- They ensure confidence for consumers about safety of innovation.
- They codify the technology requirements and inform both manufacturers and consumers on what to expect.
- They allow technologies and materials to be interoperable.

«*Technical standards are of strategic importance. Europe's technological sovereignty, ability to reduce dependencies and protection of EU values will rely on our ability to be a global standard-setter*». (Thierry Breton, European Commissioner for the Internal Market).

In this regard, the work undertaken by our Fellows will concretely contribute to strengthening the link between R&I and the standardisation ecosystem as well as to pushing towards the path of the twin green and digital transition in support of the resilience of the single market.

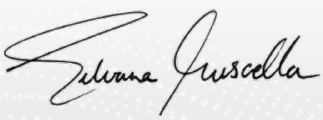
Finally, we believe that this Report can effectively respond to the recommended approach envisaged under Horizon Europe to implement a more **evidence-based impact**, presenting the tangible results available from each activity in a tidy fashion, as the result of careful and continuous monitoring of the impact that each successful applicant is making to European priorities and European contributions.

Special thanks in putting together this booklet go to External Advisory Group who, as always, have provided high-level input to fine-tune the topics covered by the Open Calls, as well as the dedicated work of our External Pool of Evaluators who have scrupulously vetted the numerous applications received in response to this call, to our Partners, Dublin City University and AUSTRALO key to the monitoring activities, our project officers at the European Commission of DG Connect for their relentless support and, of course, to our fellows for the strenuous months of work behind each activity and impact.

Silvana Muscella

CEO, Trust-IT Srl

StandICT.eu 2023 Project Coordinator



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Introduction

This report provides an immersion to user empowered outcomes of the StandICT.eu 2023 Open Call #4 from the perspective of fellows that were selected and funded in this call. Our team is delighted to showcase the fourth series of StandICT.eu 2023 success stories of the funded fellowships detailing the addressed standards and landscapes, how these will fill in the identified gaps as well as impact the related stakeholders and society. The results obtained by our Fellows fully respond to many of the objectives set out in the **EU Strategy on Standardisation**[1], mainly prioritise and address standardisation needs in strategic 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 a powerful driver for Innovation and Growth by helping researchers bring their innovation to the market and spread technological advances by making their results transparent and ensuring high quality.

One of the key-purposes of StandICT.eu 2023 is to support the activity of European ICT experts to contribute to the modernisation and consolidation of the European Standardisation system as well as to the valorisation of their research outputs, with a view to efficiently respond to the EU's ambitions towards a climate neutral, resilient and circular economy that cannot be delivered without European standards.

The primary purpose of this document is to share the results attained through the work carried out by the funded expert, 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 as a whole.

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

In this report, the Open Call #4 is presented with key takeaways and figures, then the fellowship outcomes are presented in the targeted technology areas addressed by the 38 Fellows:

- Cybersecurity (6)
- Blockchain (5)
- 5G (3)
- Artificial Intelligence (3)
- Smart Grids and Smart Metering (3)
- Cross Domain Technologies (3)
- FinTech & RegTech (2)
- Electronic identification & Trust Services (2)
- Semantic Interoperability (2)
- Smart Cities (2)
- Accessibility of ICT (2)
- Ontology (1)
- Industry 4.0 (1)
- eHealth (1)
- Privacy (1)
- Intelligent Transport System (1)

1 https://ec.europa.eu/docsroom/documents/48598

Overview of the Open Call #4

The third StandICT.eu 2023 Open Call was launched on the 15th of July 2021 and closed on the 15th of September 2021. 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 Standardisation2.

This Open Call identified "**Digital, Industry and Space**" as its leading theme. The development of open technical specifications and standards that aim to represent European values and ethics, strengthen the take-up, scalability cross-border and cross-sector interoperability of their technological solutions, as well as decreasing the costs of technical due diligence on the private and public procurers. This will build a competitive, digital, low-carbon and circular industry, ensure sustainable supply of raw materials, develop advanced materials and provide the basis for advances and innovation in global challenges to society.

The Open Call was however completely open for applications tackling a broad range of ICT domains (as encompassed in the ICT Rolling Plan for Standardisation) and treated as equally valid.

Fellowship profiles

This first Open Call totalled 82 eligible applications received out of which **38 have been selected for funding,** with an overall 322,000 Euro granted. This Open call confirmed once more the excellent high quality of most of the submitted proposals, marking a noticeably high average quality score (the minimum threshold to access funding was 7,90 score in a 1 to 10 scoring scale).

The funded applications provided an extensive geographical coverage with 14 different EU

2 https://joinup.ec.europa.eu/collection/rolling-plan-ict-standardisation/rolling-plan-2021

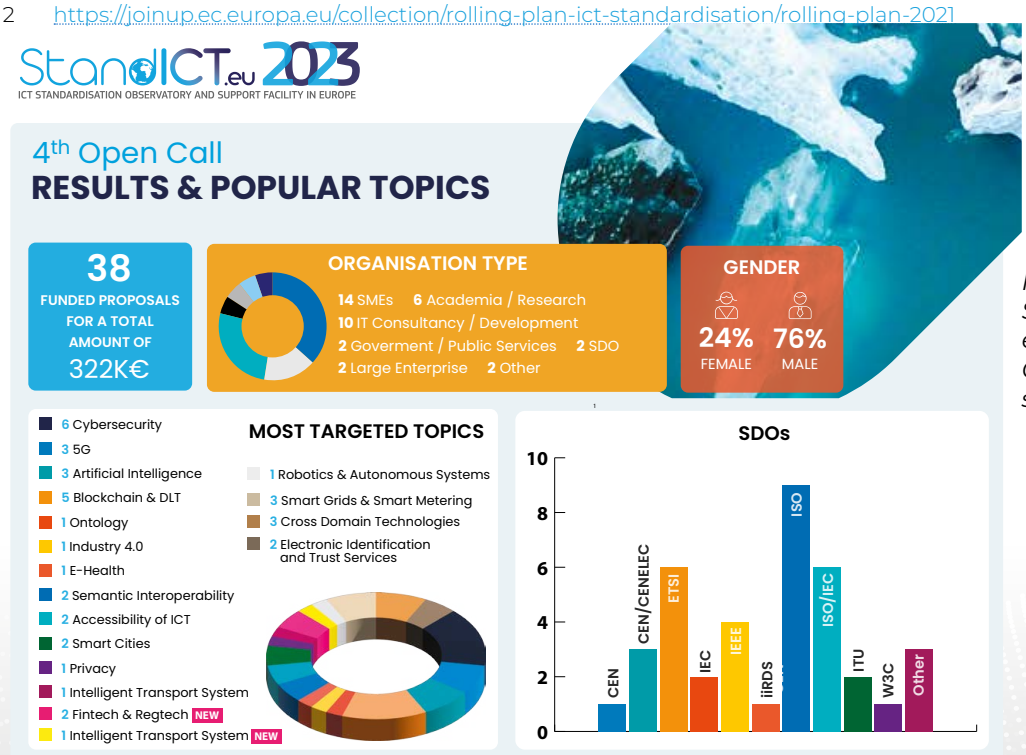


Figure 1 - StandICT.eu 2023 OC#4 Results snapshot

countries represented (*see Figure 1*), with a satisfying balance across the key technologies and priority topics of the fourth Open Call, and with a wide spectrum of SDOs that will benefit of the competence and expertise of the applicants.

As outlined in Figure 1 above, trending areas as Cybersecurity (and correlated sub-domains as privacy or accessibility), 5G, Artificial Intelligence and Blockchain proved to be the most tackled by the StandICT.eu 2023 fellows. It is noteworthy to point out how fundings have been allocated for the first time to carry out research in new technological fields, FinTech and RegTech and Intelligent Transport System (ITS).

Engaged SDOs, Organisations and European Projects

Around 70% of the fellows' activity will contribute to the activities of Committees or Working Groups operating in global SDOs, while the remainder will be engaged with European SDOs. One of the most apparent advantage that SDOs can benefit is the wide and solid know-how of the funded experts that can be instrumental to achieve a better understanding of standards (and their underlying design), trade-off and compromising during the development process, and the operating conditions and environments they are intended to serve. Moreover, SDOs can leverage the expertise of the fellows in view of building consensus within key areas of technology.

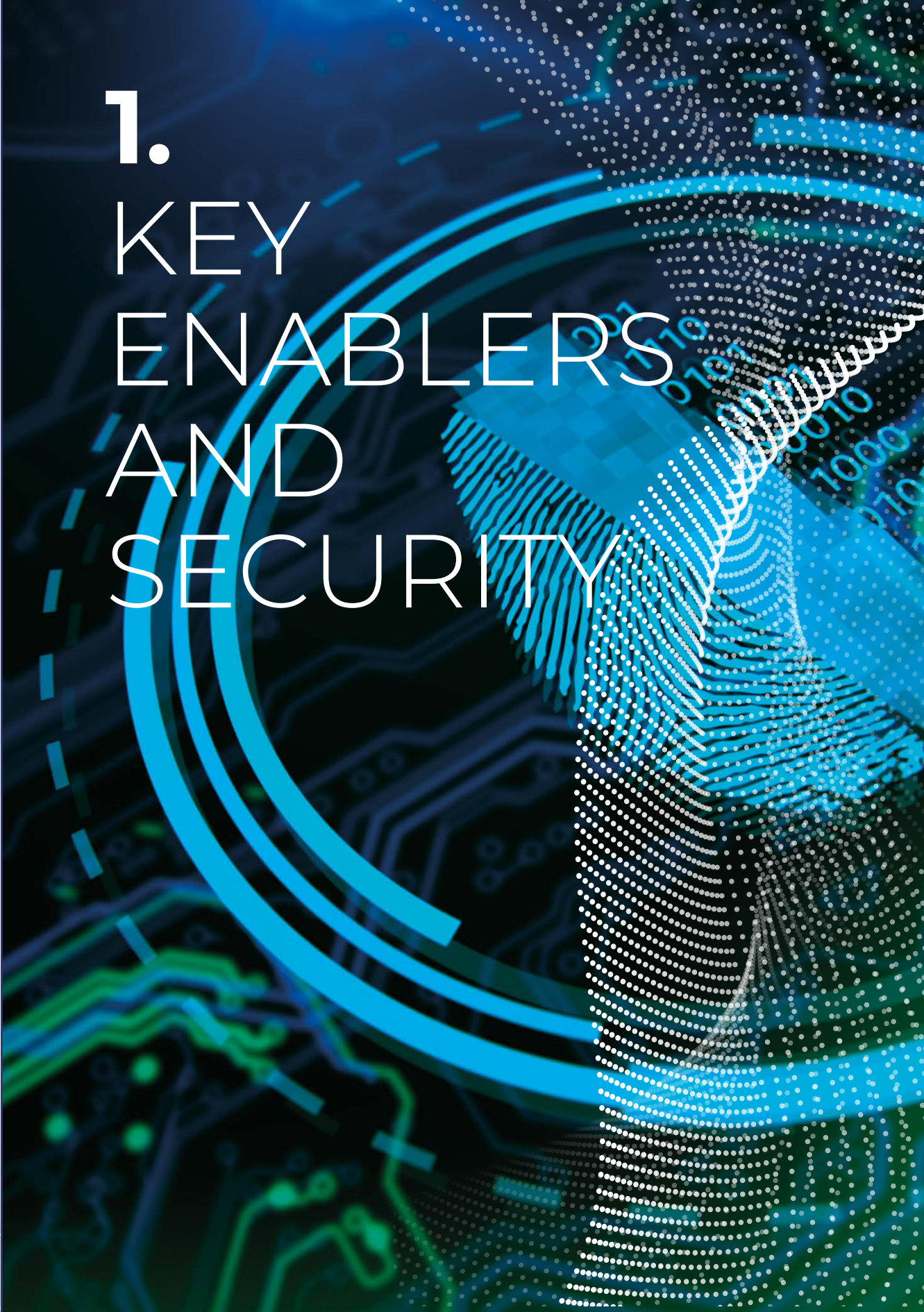
14 European or National funded research projects (see Table 1 below) are related to the presented StandICT.eu fellowships, with a strong focus on Smart Cities, Artificial Intelligence, Renewable energy and Quantum technology.

Table 1 – European Research Projects related to StandICt.eu 2023 OC#4 Fellowships

Research Project	Programme	Domain	Contributing StandICT.eu OC#4 Fellow
Research Center on Interactive Media, Smart System and Emerging Technologies	H2020	Smart Specialisation Strategy	Alessandro Artusi
InterConnect (857237)	H2020	Data science	Olivier Genest
GIFT (824410)	H2020	Renewable energy	Olivier Genest
SENDER (957755	H2020	Aritificial intelligence	Olivier Genest
MAESHA (957843)	H2020	Renewable energy	Olivier Genest
Collaboration with BRIDGE H2020 projects. ETIP SNET. OPEN-DEI H2020 CSA project	H2020	Smart Grid	Olivier Genest
H2020 CENTURION	H2020	AI	Peter Baumann

Research Project	Programme	Domain	Contributing StandICT.eu OC#4 Fellow
IDEAL-CITIES	H2020	Smart Cities	Marios Angelopoulos
MARVEL	H2020	Smart Cities	Theofanis Raptis
JURAND	Polish Development and Research Project within the Smart Growth Operational Programme SGOP 1.1.1.1 of The National Centre for Research and Development	Quantum Technology	Witold Jacak
re-Isearch	Funded under NGI Zero Open calls - NGI	NGI	Edward Zimmermann
SealedGrid	H2020 - MSCA	Access control	George Suciu

Now, we are delighted to share with you the insights from our granted fellows' work – and we truly hope that these results encourage you to follow even more closely all activities that the StandICT.eu 2023 initiative leads in the framework of the Open Calls and the fellowships but also on the European Observatory for ICT Standards (EUOS) - via the **Technical Working Groups (TWGs)** delivering up-to-date landscape and gap analysis and policy recommendations to help shaping together and reinforcing the European and international ICT standardisation arena.



1. KEY ENABLERS AND SECURITY

Agri-food in ISO TR6039 - Identifiers of subjects and objects for the design of blockchain systems

Fiona Delaney
CEO, Origin Chain Networks Ltd.
Ireland

Sector

Blockchain/DLT

Engaged SDOs, WGs and TCs

CENELEC
IEEE
ITU
ISO TC307 Blockchain and DLT use cases

Addressed EU standardisation priorities and gaps

In the multi-party and cross-border marketplace in which many systems are required to operate, awareness of and access to a list of existing industry standards in various domains would be a helpful resource. To this end, and in order to promote systems and data interoperability in the agriculture and agri-food domain, I compiled an EU-focused listing of common subject and object identifiers for use in the agri-system design.

Concerned ICT Standards and contribution to the related landscape

ISO TR 6039 - emerging data and systems interoperability frameworks for blockchain and DLT systems.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

I am the CEO of my own agri-tech company, this listing is useful for companies like my own and for our clients, in order to inform and enhance systems development by creating a useful reference framework of common subject and object identifiers in the domain. I have workshopped and shared the content of this contribution with a number of similar agri-blockchain providers from EU, US, Caribbean and Africa in order to review and enhance the content. In blockchain system design there is a tendency for software development teams to problem solve internally, referring to internal standards, pretexts and familiar patterns.

Impact on society

In the multi-party and cross-border marketplace in which many systems are required to operate, an awareness of and access to a list of existing industry standards in various domains would be a helpful resource. To this end, and in order to promote systems and data interoperability in the agriculture and agri-food domain, I compiled an EU-focused listing of common subject and object identifiers for use in the agri-system design.

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

YES - ANSI proposed a Technical Specification on the topic on the strength of interest on this NEN lead TR. While the ANSI NWIP did not pass ballot, it is likely that the interest in developing a TS, once the TR is published, and taken as input it is quite possible that a TS will emerge.

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

YES – Technical reports (Reference data & Recommendations for new/revised standards)

What future efforts or activity are still necessary in your area of application?

The TR6039 has been finalised and it is going to TC ballot. While there will be the usual comment resolution to complete, it is anticipated the TR will be published in the new year.

Online references related to the fellowship work

Democracy 4 All - blockchain for Governance event, Barcelona Nov 10-12.

Panellist: Blockchains for Public Administration - referenced emerging standards and emphasis on interoperability as smoothing the path for public administration adoption.

https://www.linkedin.com/posts/democracy4all_what-does-it-take-to-put-public-administration-activity-6869182282951876608-ZCrF

Workshop co-lead with Convenor at WG6 Caroline Thomas: 'How to Pitch a Blockchain Startup' assessment criteria of value proposition in decentral businesses, reference to TR6039, TR6277 and TR3242 - blockchain and DLT use case related studies promoting standardised approaches to modelling innovative, distributed and decentralised multi-party systems.

https://www.d4a.io/workshop

Standardisation actions towards the safety of EU citizens on roads and during emergencies - Part 3

Michelle Wetterwald

Senior Standardisation expert in networking & mobile communications

NETELLANY, France

Sector

IoT, ITS/automated driving, Other

Engaged SDOs, WGs and TCs

ETSI ITS
ETSI ITS WG1
ETSI TC EMTEL

Addressed EU standardisation priorities and gaps

Even though the work on the ITS VRU standards was considered as terminated (one of the objectives of my previous fellowship), some delegates were still willing to refine these standards, especially ETSI TR 103 300-1 which describes VRU-related use cases. They needed support from the standard rapporteur to decide whether this was really needed and ensure that the set of standard parts remains consistent.

The TR 102 445 report was analysed as part of my former fellowship. The study concluded that the Technical Report (TR) would be very useful to emergency services and decision-makers when establishing their communication networks, but the application of its content to communications networks is mostly outdated because the document is 14 years old and would need a deep revision. A new standardisation project was prepared under Open Call 3 and approved by TC-EMTEL. This project needed support until its final approval by ETSI governing bodies.

Concerned ICT Standards and contribution to the related landscape

This work will enhance the capability of ETSI standards to improve European citizens' safety and prevent injuries and fatalities on roads (ETSI TC ITS) and during emergency situations (ETSI TC EMTEL). Vulnerable Road Users or VRUs (pedestrians, cyclists, motorcyclists, large animals) account for a large percentage of road fatalities. I led the team that prepared a standard (ETSI TS 103 300) for Intelligent Transport Systems (ITS) VRU awareness.

For the emergency communications part of my fellowship, communication systems and networks must be designed to resist the impact of unforeseen hazards and enable the system to return to a previous normal condition in case of failure. This work addressed ETSI TR 102 445 that provides guidelines for preparedness and resilience of emergency communication networks and needs to be updated, as it was lastly published in 2006.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

SMEs are indirectly impacted by these actions as they may be able to develop new services complying with these standards.

Impact on society

The actions in this fellowship bring the capability to ETSI to improve European citizens' safety and prevent injuries and fatalities. The VRU standards will improve the protection of pedestrian, bicyclist, motorcyclist and animals when travelling on roads. The revision of the TR 102 445 Technical Report has the potential to prevent and fasten the resolution of emergency network failures in Europe. The failure of the emergency calling network in France in June 2021 demonstrated that this is an important topic.

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

YES - Proposal for the revision of ETSI TR 102 445:

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

YES – Technical reports (Reference material & Recommendations for new/revised standards)

What future efforts or activity are still necessary in your area of application?

The TR 102 445 report is obsolete and needs revision. The TS 103 300 standard is mature. For this reason, continuation of action is needed. The EMTEL standardisation project has been approved at ETSI level by its governing bodies, so this part of the fellowship is considered as terminated. Regarding the new Work Item to revise the VRU use cases standard TR 103 300-1 which was approved by TC ITS, the work is expected to continue until October 2022.

Online references related to the fellowship work

All documents that demonstrate my work are internal to ETSI members.

On the ETSI ITS part, the contribution numbers are ITSWG1(21)057014, ITS(21)044051, ITS(21)044003. The first one is my contribution, the second and third ones are respectively the TC ITS and ITS WG1 meeting reports.

The contribution numbers are EMTEL(21)000042 and EMTEL(21)000052. The first one is my contribution, the last one is the TC EMTEL meeting report.

AI-ML based video encoding evidence activity for standard development

Alessandro Artusi
Head of the DeepCamera group
CYENS, Cyprus

Sector

IoT, Artificial Intelligence, Other

Engaged SDOs, WGs and TCs

Moving Picture, Audio and Data Coding by Artificial Intelligence (MPAI)

Addressed EU standardisation priorities and gaps

We are tackling four major trends in the current video encoding scenarios world-wide:

- Video encoding moving to cloud from on-premises.
- Upgrading video encoding infrastructure to newest encoding systems.
- Increasing and offering higher quality experience to the users, i.e., SDR vs. HDR, SD vs. 4K vs. larger than 4K.
- Streaming moving from computers to mobile and TVs.

Moreover, we are assisting to a large increase of video streaming activities in a number of applications that are not within the classical entertainment sector. This has brought the definition of a large number of new use cases, to satisfy a large variety of requirements, increasing the standardisation activities among different standards bodies.

With the last 10 years, standards bodies such as JPEG and MPEG have started large variety of activities to partially respond to the current trends explained above. However, this has not been sufficient to address all the open issues.

More encoding efficiency is required, for responding to an increase of content quality that it needs to be delivered. Also, reduced complexity is required to satisfy large number of applications where computational resources may be limited.

AI/ML has been demonstrated to provide good performances in the context of video coding that may be able to address some if not all the needs/trend explained above.

The proposed activities, are going into that direction, providing an initial study to understand the evidence of improving existing traditional video coding technology by substituting component/blocks with AI/ML based one. If evidences will be found, a call for proposal will be initiated, by the MPAI standard body, for the submission of new technology that through AI/ML tools higher coding efficiency will be delivered, which will mean to respond to the needs required from the above trends and the new video streaming activities that are within a variety of applications in various sectors.

Concerned ICT Standards and contribution to the related landscape

Standard Organisation - Moving Picture, Audio and Data Coding by Artificial Intelligence (MPAI)

MPAI aims to use the advances in AI technologies to code multiple data types more efficiently and to develop standards for data coding that have AI as its core technology. One of those active areas is the MPAI AI-Enhanced Video Coding (MPAI-EVC). It is focused on understanding how AI/ML can help in improving the performance of existing digital video

coding technologies and standards. At this stage, MPAI is undertaking an explorative activity to verify how significantly AI/ML is improving the encoding performances of state-of-the-art existing video codecs. This is the first step which will allow MPAI to understand and then define the required requirements for the development of a related standard. Then this will be followed by the issue of a call for proposal for the new standard, for which the applicant will apply.

These fundings have facilitated and helped myself in being actively part of these activities, in the exploration phase of finding evidence of improvement introduced by AI-based solution to an existing video coding system. This includes the development of a general framework on how to substitute blocks of a state-of-art encoding system with existing AI-based blocks and verify if any quality/efficiency improvement is introduced. Through this activity, MPAI aims to identifying the requirements needed for the development of a new planned standard, which will start with the issue of call for technology.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

There will be a high impact on several sectors where EU based SMEs will be operating. The digital video technology and the availability of large number of digital devices on the market, have been characterised by a high need of innovation into encoding standards. On one hand, we are facing an acceleration in the deployment of innovative applications in various sectors. On the other hand, to provide an accurate outcome, these applications, need to operate on high quality digital content. Only in this way, the requested goal of better satisfying the consumers/developers expectation is reached. However, either the working conditions where these systems need to be placed, i.e., limited infrastructure, or the high quantity of digital content are preventing the efficient and smooth operation of these systems. This work will provide an innovative video encoding standards solution that is going beyond the performances of the current operating standard.

Impact on society

The outcome of this activity will have an impact on several sectors that are within the chosen priorities of the call and the European Interests. The digital video technology and the availability of large number of digital devices on the market, have been characterised by a high need of innovation into encoding standardisation.

If we consider the applications and products that may take advantage of the technological advancement introduced by the proposed activity, it is clear the huge impact that it will have to society. The expected impact will be on the following major key areas (sub-areas):

1. Innovative services/applications, which will provide an improvement of the consumers expectations in their daily life).
2. Providing better engagement of the consumers, i.e., highly realistic immersion into the content delivered).
3. With more than 45 billions of cameras by 2022, based on LDTV market analysis, the consumers experience will be clearly improved.

Has your project directly involved or led to a specific recommendation or proposal for the development of new or revised standards? Or was it aimed at supporting the development or revision of a standard already under development?

YES - This activity, when finished, will lead to the call for a new standard proposal will be issued.

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - With the fellowship I have contributed to the working group MPAI-EVC, which at this stage conduct an explorative activity to understand how the utilization of AI/ML tools can be used to improve the quality performances of existing video decoding standards. In particular, the group is investigating how changing building blocks, of the existing EVC standard decoding, with AI/ML tools may improve the quality of EVC.

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

YES – Technical report (It is an explorative activity to verify how significantly AI/ML is improving the encoding performances of state-of-the-art existing video codecs. This is the first step which will allow MPAI to understand and then define the required requirements for the development of a related standard. Then this will be followed by the issue of a call for proposal for a new standard.)

What future efforts or activity are still necessary in your area of application?

The work supported with this fellowship is an exploration activity to verify if AI/ML tools can improve the quality performances of existing video decoding standard systems, e.g., EVC. This activity it is not finished yet, other blocks need to be evaluated when AI/ML tools will be used. At the end of this activity a call for new standard proposal will be issued.

Other activities are needed before a call for proposal of a new standard can be issued. First, a more general and common data set needs to be identified to be used to verify the quality performances of all the current EVC blocks under examination. A general test on these blocks will need to be performed to confirm the preliminary results obtained under this fellowship. Other blocks of the EVC decoding standard system need to be identify, which can be substituted with AI/ML tools for achieving better quality performances.

Online references related to the fellowship work

This link is the project link under MPAI:

https://mpai.community/standards/mpai-evc/

These are the details of the publications:

MPAI Book:

https://mpai.community/the-mpai-book-2021/ https://www.researchgate.net/publication/357205043_Towards_Pervasive_and_Trustworthy_Artificial_Intelligence_How_standards_can_put_a_great_technology_at_the_service_of_humankind

IBC 2021 publication:

https://www.researchgate.net/publication/358987274_AI-based_media_coding_and_beyond

IBC 2022 is under submission

SMPTE journal publication is under submission

Implementation and Evaluation of Authenticated Encryption Algorithms for the Internet of Things

Johann Großschädl
Research and development specialist
University of Luxembourg, Luxembourg

Sector

Cybersecurity/ePrivacy

Engaged SDOs, WGs and TCs

NIST

Addressed EU standardisation priorities and gaps

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

Concerned ICT Standards and contribution to the related landscape

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

This project has contributed to the assessment of the software performance of five of the 10 final-round candidates (namely ASCON, GIFT-COFB, Sparkle, TinyJAMBU, and Xoodyak) on

the MSP430 family of 16-bit low-power microcontrollers. Such microcontrollers are used in a wide range of IoT devices, most notably miniature sensors and actuators. In the course of this project the most-performance-critical components of the five final-round candidates were implemented in MSP430 Assembly language and detailed benchmarking results were generated taking into account both the execution time and binary code size. The Assembler source codes as well as the benchmarking results are available on GitHub and represent a valuable input for the NIST LWC team in their assessment of the software efficiency of the finalists.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

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

Impact on society

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

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

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

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

YES – Development of a new standard; Reference Data.

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

The NIST lightweight cryptography standard is currently under development. More concretely, the evaluation of candidate algorithms is now in the final round, which is expected to continue until the end of 2022. The 10 algorithms that made it into the final round (out of 57 initial submissions) are currently evaluated for security and efficiency in hardware and software. It is expected that NIST will announce the algorithms that they intend to standardise in early 2023. A first draft standard will likely be available in the second half of 2023.

In this project, the performance-critical components of five of the ten final-round candidates were implemented in the MSP430 Assembly language. The implementation, benchmarking, and documentation took about 30 hours for each of the five algorithms, which is why the project was limited to half of the final-round candidates. The fellow is interested also in implementing the remaining five candidates to have a complete picture of the efficiency of the final-round candidates on 16-bit MSP430 microcontrollers.

Online references related to the fellowship work

https://github.com/johgrolux/aead430

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

Advance ISO/IEC 39794-2 Extensible Finger Minutiae Format as editor and contribute to SC37 WG3

Robert Mueller
Editor and expert contributor to ISO/IEC 39794-2
Germany

Sector

Cybersecurity / ePrivacy

Engaged SDOs, WGs and TCs

ISO/IEC SC37 WG3 Biometric data formats

Addressed EU standardisation priorities and gaps

The data format and compliance standards developed in ISO/IEC SC37 WG3 are used in Europe and worldwide for storing and transferring biometric data. Standardised formats enable interoperability across countries and industrial organisations. The currently published standards from ISO/IEC 19794 series have some flaws with respect to forward and backward compatibility as well as XML and ASN.1 compliance. SC37 therefore decided to develop the ISO/IEC 39794 series specifying extensible formats that are future proof. Part 2 specifically covers finger minutiae as one of the most prominent biometric data formats.

Concerned ICT Standards and contribution to the related landscape

Within the ISO/IEC subcommittee SC37 Biometrics, the working group WG3 develops inter-industry standards for data formats. The ISO/IEC 39794 series of standards specify an extensible format for storage and exchange of biometric data. This series complements the widespread ISO/IEC 19794 series of inter-industry standards. ISO/IEC 39794-2 covers fingerprint minutiae and is designed for various applications including government ID. The standard is currently at CD3 stage and needs to be advanced to become published in the timeline of ISO business plan. Target is to recommend promoting to FDIS during the next meeting in January 2022.

This project is a continuation of the development of ISO/IEC 39794-2 successfully progressed through 2021 and sponsored by StandICT.eu 2023.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

Data standards enable interoperability between different components, systems and solutions. Biometric data formats allow applications to combine biometric capture devices, algorithms, storage systems, smart cards and other media from different vendors. This is important for small and medium sized enterprises, because they typically offer only one critical component and otherwise would not be able to compete with large corporations having every required component in their portfolio.

Impact on society

Biometric data formats developed in ISO/IEC SC37 WG 3 are used in many applications including national ID cards and passports. The finger minutiae data standard developed during this fellowship in particular helps to improve privacy for citizens since interoperable security systems can be implemented without storing finger image data being considered as sensitive personal information.

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

YES - During the development of this standard, several errors and inconsistencies in other standards have been detected including ISO/IEC 39794-1 and ISO/IEC 39794-4, also in alignment with ANSI/INCITS standards catalogue.

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

YES – Technical specifications (ISO/IEC 39794-2 (DIS stage).

What future efforts or activity are still necessary in your area of application?

Continuation of action is needed. The standard is developed in a typical 3-year timeframe with publication target in 2023. The fellowship in the role of the editor is expected to continue collecting comments from national bodies, suggest dispositions and make required edits to the base text until final publication by ISO.

Online references related to the fellowship work

N/A

Advance Biometric System-on-Card standard (ISO/IEC 17839)

Robert Mueller
Editor and expert contributor to ISO/IEC 17839 series
Germany

Sector

Cybersecurity / ePrivacy

Engaged SDOs, WGs and TCs

ISO/IEC SC17 WG11

Addressed EU standardisation priorities and gaps

Interest in the BSoC technology increased significantly since the dawn of the COVID pandemic, because biometric payment cards relying on this architecture and standard enable avoiding to touch a point of sale terminal for financial transactions. They turn transactions contact-free even for larger transaction amounts that would normally require a PIN. The application is not limited to payment, but can also be used in access control and ID segments. Within the EU, contactless transactions rose significantly during the pandemic and the transaction limit for requiring a passcode has been raised to 50 EUR. According to payment scheme regulations, a PIN-based cardholder verification is usually still required after every 5 transactions – regardless of the accumulated balance. A biometric card enhances the security while improving safety and convenience by not requiring to touch a terminal at all - even for higher transaction amounts. Surveys across Europe have shown that cardholders would prefer their next banking card to carry in-card biometric user authentication.

Concerned ICT Standards and contribution to the related landscape

The Biometric System-on-Card (BSoC) multi-part standard addresses the definition, architecture, physical characteristics and logical interface of a smart card being capable to identify biometric characteristics. PIN codes and passwords are currently used to authenticate a cardholder (2-factor authentication) for payment and other use cases. Biometrics help eliminate remembering a password by identifying users via physical or behavioural characteristics. The first publication of this standard was 2014-2016. An amendment has been developed and published in 2021. The standard in 2021 also started a regular revision cycle which will update with the latest input from industry, academic and governmental experts. Technology has advanced since the first publication and makes this update necessary.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

The Biometric System-on-Card architecture enables safe and secure validation of identities and transactions while preserving privacy for citizens. The card industry is traditionally strong in the EU with the largest manufacturers based in France and Germany and there are also many small and medium-sized companies with dedicated products, know-how and mission. Companies focusing on biometric capture devices for cards, BSoC system solution, inlays, operating systems, manufacturing equipment and many other components are spread all across Europe and play an important role for this technology platform. It is in particular the smaller companies that benefit from standardisation because they cannot offer a comprehensive solution but only a small and compliant contribution.

Impact on society

The Biometric System-on-Card architecture enables improved privacy, security and safety for citizens in Europe and beyond. The multi-part standard ISO/IEC 17839 developed and advanced during this initiative is referenced by major payment schemes and plays an important role for mass adoption with a plurality of compliant vendors. In addition, contributions to WG 11 of SC17 have been made to on-card biometric comparison ISO/IEC 24787. Citizens benefit from improved privacy, security and safety.

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

YES - This standard has been developed with close alignment of ISO/IEC SC17 WG 4 and WG 1. Therefore, multiple comments and suggested enhancements have been made to ISO/IEC 7810 and to ISO/IEC 18328 series.

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

YES – Technical specifications ISO/IEC 17839-2 (WD under review)

What future efforts or activity are still necessary in your area of application?

Continuation of action is needed. The multi-part standard ISO/IEC 17839 series just started regular revision cycle and received multiple comments for fundamental changes from national bodies mostly within the EU. The ISO revision cycle is typically 3 years before publication of a new edition of the standard reflecting the latest state of technology.

Online references related to the fellowship work

N/A

Big Earth Datacube Analytics

Peter Baumann
Professor of Computer science and entrepreneur
Rasdaman GmbH, Germany

Sector

Data Commons, Cloud computing, Big Data

Engaged SDOs, WGs and TCs

ISO TC211 WG6 Geographical Imagery
OGC (Coverages.DWG - Coverages.SWG - BigData.DWG)

Addressed EU standardisation priorities and gaps

Big Earth Data today often consist of spatio-temporal raster data. In standardisation terms, these are addressed by the notion of coverages, a general concept for mathematical "fields" describing in particular space/time raster data (commonly called "datacubes"), such as 1D sensor data, 2D satellite imagery, 3D x/y/t image timeseries and x/y/z geophysical data, 4D x/y/t/z atmosphere and ocean data.

In a previous StandICT.eu activity, the ISO candidate datacube standard 19123-1 "Coverage Fundamentals" was established which defines coverages at a high conceptual level. In the current activity, target is the companion specification 19123-3 "Coverage Processing Fundamentals" (due to the complexity of the coverage domain focus in the first place is on raster data, so datacubes, also recognizing their prime practical importance). Both together establish a high-level data and processing model suitable for harmonization of the manifold standards available in the field by allowing mappings from one to another following an agreed set of common concepts.

The 19123-3 draft has been presented to OGC for considering it as an OGC standard once adopted by ISO. This is currently an ongoing discussion.

Concerned ICT Standards and contribution to the related landscape

ISO TC211 19123-3 has been written in the reporting period and has been submitted for DIS ballot which will finish soon after the StandICT.eu support's conclusion. Hence, this specification will have been accompanied along the entire adoption cycle.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

A solid conceptual foundation for datacubes establishes a basis for interoperable Earth services by giving guidance and interoperability to product developers. This opens up business opportunities for tool and service providers, allows service providers to stand up interoperable services, and allows users to rely on a choice of clients able to attach themselves to these services.

Impact on society

Better standards allow better tools and services, allowing us to gain better understanding and insight on our planet. In particular analysis of timeseries and fusion of multiple data sources, from in-situ to orbit, are critical enablers. The 19123-3 specification defines flexible, scalable, and interoperable ways of combining a variety of spatio-temporal data sources into a common picture; suitable tools may even provide dynamic services answering "any query, anytime".

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

YES- ISO TC211 19123-3

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

YES – Technical specifications.

What future efforts or activity are still necessary in your area of application?

Continuation of action is needed. The work accomplished has led to a successful submission, based on a unanimous decision of the ISO TC211 WG6 members involved in the editing committee. While the subsequently initiated ballot is still ongoing there is already unofficial communication that the UK plan to vote No. Should this materialise, this will require further discussion towards a convergence, so further active work through email exchanges, webcons, WG6 meetings, etc.

Online references related to the fellowship work

https://external.ogc.org/twiki_public/bin/view/CoveragesDWG/WebHome#Related_Standards

A Guide on Development & Maintenance of MultiSDO Standards-Driven 5G Open Networking Platforms(ONPs)

Ranganai Chaparadza
Senior Advanced ICT Technologies Consultant and Standardization Expert on Evolving and Future Network Technologies
Altran Capgemini, Germany

Sector

5G

Engaged SDOs, WGs and TCs

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

Addressed EU standardisation priorities and gaps

The Application is addressing the following gaps, priorities, and challenges:

1. Providing Guide/Framework for "Development and Maintenance of Multi SDO/Fora "Standards Driven" Open Networking Platforms (ONPs) for Standards Driven Innovation, Multi-SDO Standards Harmonization, and Validation of Pre-Deployment Technology Use Cases in 5G & Beyond" that helps Industry to Develop and Maintain Multi-SDO Standards Validation Facilities in form of ONPs. The variety of Testbeds that can be built as ONPs and get federated means bringing various SDOs/Fora and Open Source and Open Hardware Projects closer together in Standards Validation, Harmonization and Standards-Driven Innovation, thanks to ONPs and the Emerging Joint ITU-T & ETSI Testbeds Federations Reference Model and its APIs.
2. The industries (SDOs/Fora, 5G Network Operators, Enterprises) are in dire need of Open Networking Testbeds for use in Validation of the Fusion of Multi-SDO/Fora Standards, Harmonisation, and Trials through Industry-Grade Proving Grounds Testbeds. Unfortunately, most of the Open Testbeds available (e.g. for 5G) are mainly suitable for Research purposes only and are not built based on Standards and for Standards Validations based on SDOs/Fora Standards-Driven requirements as drivers for Building the Testbeds. Standards-Driven Open Networking Platforms (ONPs) implemented in form of Components that for a Testbed (consisting of Network Infrastructure Layer and Management and Control Layer Components) that can be federated with other ONP Testbeds are what the industry is calling for. An ONP is meant to be a "Neutral Environment" that is meant to be an Open Platform that enables to Test certain targeted Standards Fusions and Use Cases from the SDOs/Fora that provide Inputs for the fusion of Standards selected for fusion and validations at a particular time (built upon Open Source/Hardware mainly).

Concerned ICT Standards and contribution to the related landscape

My application is contributing to the ICT Standards landscape in the following way:

1. It contributes to Standards for Testbeds Federations for 5G and Beyond that are to be built upon the recently developed ITU-T & ETSI Joint Reference Model and its associated APIs for Testbeds Federations (produced by ITU-T SG11 and ETSI TC INT)—ITU-T Recommendation Q.4068 (https://www.itu.int/rec/T-REC-Q.4068-202108-P). The contributions of the application are through the Newly Launched Focus Group (FG-TBFxG) in ITU-T SG11 on Testbeds Federations for IMT-2020 and beyond (https://www.itu.int/en/ITU-T/focusgroups/tbfxg/Pages/default.aspx) and the ETSI 5G PoC Project (https://intwiki.etsi.org/index.php?title=Accepted_PoC_proposals). The application is introducing the Concept of Open Networking Platforms (ONPs). An ONP(s) is to be considered as a Playground (Proving Ground) for trying out New Technology Pre-Deployment Real Use Cases for 5G (particularly), based on Industry Harmonized and Cross-SDO/Fora fusion of standards (to implement Cross-SDO Industry Harmonization of Multi-SDO/Fora Standards), and for Validation of the Interworking of Multi-SDO Standards deployed to interwork in certain environments and scenarios. The building of ONPs need to be driven by Multi-SDO/Fora Standards Fusion and the Testbeds Federation Reference Model and APIs being jointly specified by ITU-T SG11 and ETSI TC INT.
2. It contributes to what should be considered as Enablers for supporting Validation and Acceleration of Time-to-Market of Emerging Standards that are being derived from the growing trend in the industry on E2E Network Disaggregation and Network "Software'rization" in the Network Infrastructure Layer and in Management and Control Software Layer (as being advanced by various SDOs and Standards oriented Fora, such as O-RAN, TIP, ETSI, BBF, TMForum, ITU-T, IEEE, 3GPP, etc.). The Enablers required are "Open" Testbed-oriented Platforms (ONPs) built on Standards and for Standards Validations.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

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

Impact on society

It supports the collaboration of Stakeholders to work together in the newly formed ecosystem on Standards on Testbeds Federations for 5G and Beyond, namely the following Stakeholders:

SDOs/Fora, Research Communities/Researchers on 5G and Beyond, Industry Users of Testbeds, Testbeds Suppliers for 5G Testbeds and other Testbeds, CSPs & Enterprises, Infrastructure Vendors/Suppliers for ICT and Verticals, ISVs, Open Source & Open Hardware Projects, Regulators, Owners of Existing Testbeds and Platforms for 5G& Beyond, and any other interested parties

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

YES - It has led to a specific recommendation or proposal for the development of new Standard. I introduced the ONP Concept to the ITU-T SG11 for its incorporation into the ToR, under the Objective in the ToR: "To define steps that can be pursued by the Industry towards Developing and Maintaining ONPs (Open Networking Platforms) for IMT-2020 and beyond, and the Use of the Testbeds Federations Reference Model and APIs to build ONPs". The Reference of the ToR of the Newly Launched Focus Group (FG-TBFxG) is now available here https://www.itu.int/en/ITU-T/focusgroups/tbfxg/Documents/FG-TBFxG--ToR.pdf, and the Concept of ONP was included so as to accommodate a Deliverable that will include the concept and the Guide (Framework) on "Development and Maintenance of Multi SDO/Fora "Standards Driven" Open Networking Platforms (ONPs) for Standards Driven Innovation, Multi-SDO Standards Harmonization, and Validation of Pre-Deployment Technology Use Cases in 5G & Beyond". The Concept of ONPs has been adopted in ITU-T FG-TBFxG as "Deliverable 3.3" of the WG3 of the FG-TBFxG as shown in the Attached Document.

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - The Concept of ONPs has been adopted in ITU-T FG-TBFxG and a New Working Group 3 (WG3) of the Focus Group was created and the Guide on Build and Maintenance of ONPs concept has been adopted as Deliverable 3.3 of the WG3 of the FG-TBFxG.

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

YES – Technical report Development of a new standards

What future efforts or activity are still necessary in your area of application?

The formation of the New ITU-T Focus Group (FG-TBFxG) on Standards for Testbeds Federations for 5G and Beyond is creating a new ecosystem that has huge work to be addressed moving forward as demonstrated by the ToR of the Focus Group. For this reason, continuation of action is suggested.

Online references related to the fellowship work

https://www.itu.int/en/ITU-T/focusgroups/tbfxg/Pages/default.aspx

https://extranet.itu.int/sites/itu-t/focusgroups/tbfxg/SitePages/Home.aspx

https://extranet.itu.int/sites/itu-t/focusgroups/tbfxg/SitePages/WG3.aspx

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

Marios Angelopoulos
Associate Professor at Bournemouth University
United Kingdom

Sector

5G, IoT, Industry 4.0, Smart Cities

Engaged SDOs, WGs and TCs

ITU-T Study Group 20 "Internet of Things, smart cities and communities"

Addressed EU standardisation priorities and gaps

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

Concerned ICT Standards and contribution to the related landscape

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

Impact (on European SMEs, related project or in the society)

Impact on SMEs

According to Allied Market Research, the Wireless Power Transfer market is projected to be worth USD 35 Billion by 2030 at a 27 CAGR. The development of international standards will help provide SMEs, policy makers and regulators with common references thus helping overcome market barriers such as technology fragmentation, thus promoting market growth.

Impact on society

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

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

YES - This fellowship has been successful in supporting work on the work item ITU-T YSTR. P2P-CC as well as supporting my presence and involvement in the new Focus Group.

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

Yes – Technical report (Reference material)

What future efforts or activity are still necessary in your area of application?

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

Online references related to the fellowship work

Link with SG20 list of Questions and Rapporteurs:

https://www.itu.int/net4/ITU-T/lists/loqr.aspx?Group=20&Period=17

Link with active Q5/20 work items:

https://www.itu.int/ITU-T/workprog/wp_search.aspx?sg=20&q=5

Link to the new Focus Group:

https://www.itu.int/en/ITU-T/focusgroups/ai4a/Pages/default.aspx

Key Management and Public-key infrastructure - Establishment and maintenance

Erik Andersen
Contributor and editor
Denmark

Sector

Cybersecurity/ePrivacy

Engaged SDOs, WGs and TCs

ISO/IEC
ITU-T Study Group 17, Question 11 and ISO/IEC JTC1/SC 6 WG 10

Addressed EU standardisation priorities and gaps

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

Public-key infrastructure (PKI) is currently used in traditional areas such as banking, e-government. New areas for deployment of PKI are smart grid and Internet of Things (IoT). A guidance on how to deploy PKI in these new environments has so far been missing. The new standard is also intended to fill that gap.

Concerned ICT Standards and contribution to the related landscape

Rec. ITU-T X.509 | ISO/IEC 9594-8 (X.509) and Rec. ITU-T X.510 | ISO/IEC 9594-11 (X.510) are two important standards for which the applicant is the project editor both within ITU-T and ISO/IEC. X.509 is mostly concerned with system protection while X.510 is concerned with protection of the communication between systems.

The standard that is subject for the fellowship is suggested to be published as Rec. ITU-T X.507 | ISO/IEC 9594-12 with the title “Key management and public-key infrastructure establishment and maintenance”. It is intended to supplement the above-mentioned standards and together with them form a trilogy that will cover a wide range of security functions.

The standard under development has two major sections:

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

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

Yes - The standard is expected to ibe issued as common text between ITU-T and ISO/IEC under the title Rec. ITU-T X.507 | ISO/IEC 9594-12.

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

YES – Technical report (Development of new standard)

What future efforts or activity are still necessary in your area of application?

There is a lack of resources in the area. More EU experts would give a higher visibility to EU and EU specific interests could be better protected.

Online references related to the fellowship work

n/a

supporting Security & Privacy international Standardizsation development covering IoT & AI topics

François Lorek
ISO JTC1 SC27
TRAX, France

Sector

IoT, Cybersecurity/ePrivacy, Cloud computing, Artificial Intelligence, Big Data

Engaged SDOs, WGs and TCs

ISO/IEC JTC1 SC27
ISO/IEC JTC1 SC42
CEN/CENELEC JTC013
CEN/CENELEC JTC021
AFNOR French mirror committees Cybersecurity and data protection, IoT, AI

Addressed EU standardisation priorities and gaps

Coordination and synchronisation between technical committees and working groups is one of the biggest challenges to face with lots of meetings on various intertwined topics (cybersecurity & privacy, artificial intelligence, internet of things, governance) with several initiatives with different schedules at different international/european and national scales. We are facing in WG4 work programme with lots of projects having very different progress status (PWI to FDIS) and having many interlocks with other Working groups (WG5 Privacy both at ISO/IEC and CEN-CENELEC level), with other TC's, SC's or liaisons (CEN/CLC JTC13, SC42 and CEN/CLC JTC21, SC41, TC68/SC2, SC32, TC22, SBS). Priorities are given mostly by the SDO's directives, the market's expectations and the maturity of consensus between experts. Hopefully, lots of experts (especially european) are taking actively part to several cross work across TC's, SC's and WG's and help to manage coherence overall.

Concerned ICT Standards and contribution to the related landscape

It allows, both as an expert and as vice convenor to prepare and/or participate to all TC's/SC's/WG's meetings concerning Cybersecurity & Privacy (ISO/IEC JTC1 SC27, CEN-CENELEC JTC13, AFNOR Cybersecurity and Privacy), Internet of Things (WG4 AhG IoT & DT, Afnor IoT) and Artificial Intelligence (ISO/IEC JTC1 SC42, CEN-CENELEC JTC21, Afnor AI). In addition, especially as JTC1 SC27 WG4 officer to manage our management duties related to scheduling meetings, manage meetings notifications and projects communications, distributing projects and liaisons documents, gather projects meetings reports, ensure their accuracy, reliability, completeness and compliance by quality checks to deliver in time mandatory documents to SDO's, TC' and SC's, their respective chairs and committee managers as well as liaison reports to our numerous liaisons.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

Many small and mediums companies are about to be impacted by Cybersecurity & Privacy standards on IoT or Artificial Intelligence and we are closely working for several projects

within ISO/IEC JTC1 SC27 WG4 with our liaison Small Business Standards (SBS).

Impact on society

As per its business plan (SC27 N22264), ISO/IEC JTC1 SC27 states to contribute with 23 standards to the following Sustainable Development Goals

(SDG) of the United Nations:

- SDG 3 Good health and well-being
- SDG 8 Decent work and economic growth
- SDG 9 Industry, innovation and infrastructure
- SDG 10 Reduced inequalities
- SDG 11 Sustainable cities and communities
- SDG 12 Responsible consumption and production
- SDG 16 Peace, justice and strong institutions

For SC 27, gender and geographical balance is an important goal. As of December 2021, ISO Global Directory lists 1905 experts as committee members, officers or liaison representatives for SC 27 including working groups (duplicates removed). 23% of these experts are female, 77% male. 3% of the SC 27 experts come from Africa, 21% from America, 36% from Asia Pacific and 40% from Europe.

One expert from Africa, four experts from America, seven from Asia Pacific, and eleven from Europe work in SC 27 officer positions. Four out of the 23 SC 27 officers are female. Five experts from Africa, 40 from America, 92 from Asia Pacific, and 84 from Europe currently work in SC 27 editor positions. 52 out of the 221 SC 27 editors and co-editors are female.

WG4 is the SC27 working group with the best balance with 46% in the latest WG4 Gender study presentation (WG4 N5657) given during recent SC 27 Plenary Meeting in April 2022

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

YES - Within SC27 WG4, there are currently 68 projects listed within SC27 WG4 ISO Projects including 41 published standards 9 PWI on going (one on Security and Privacy for IoT and one for Big Data Security and Privacy), 8 projects in Proposal phase, 8 projects in Preparatory phase within CEN/CLC JTC13, currently working on EUCS1, Within CEN/CLC JTC21, currently working on several NWIPs within several AhGs, mostly AhG2 AI Conformity assessment (NWIP AI Conformity assessment about to come out), AhG3 Green and sustainable AI and AhG5 Data Governance and Quality for AI

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - CEN/CLC JTC21 WG2, replacing AhG2 (decision 11 taken by JTC 21 on 2022-02-28/2022-03-01) convened by Emilia TANTAR (LU) (decision 12 taken by JTC 21 on 2022-02-28/2022-03-01).

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

YES – Technical reports (Development of a new standard; Recommendations for a new/revised standard)

What future efforts or activity are still necessary in your area of application?

The standards in this field are in preliminary phase. Within SC27 WG4, there are currently 68 projects listed within SC27 WG4 ISO Projects including 41 published standards:

- 9 PWI on going (one on Security and Privacy for IoT and one for Big Data Security and Privacy)
- 8 projects in Proposal phase
- 8 projects in Preparatory phase
- 10 projects in Committee phase including 1 DTR on security assurance
- 4 projects in enquiry phase (DIS)
- 3 projects in approval phase (FDIS)

For this reason, continuation of action is suggested.

Online references related to the fellowship work

N/A

CrowdWireless: Crowd Wireless Energy Sharing in Smart Cities

Theofanis Raptis
ITU-T Work Item Lead Editor
Research Scientist
Consiglio Nazionale delle Ricerche, Italy

Sector

IoT

Engaged SDOs, WGs and TCs

ITU

Addressed EU standardisation priorities and gaps

The standardisation of the technological basis of wireless energy sharing is becoming more and more mature in the consumer electronics sector. The advancements in P2P wireless power transfer have empowered the portable and mobile devices to wirelessly replenish their battery by directly interacting with other nearby devices. However, one of the core challenges in energy sharing applications in Europe and beyond is the identification of standardised methodological opportunities on how to enable and ensure seamless, network-wide wireless energy exchange in a P2P manner among the users of such pervasive devices. Specifically, energy from two unknown users is difficult to share, infrastructures from different systems cannot be fully shared, resulting in a large number of unconnected energy silos at the edge of IoT networks. While some standardisation activities focus on the low level of individual device technology, very few activities focus on a higher, system level, considering large scale P2P energy sharing in large user crowds. The technical work of this fellowship reviews and analyses the actual state of P2P crowd charging systems in terms of currently available technological solutions, ongoing research, and recent and ongoing standardisation activities in this area. Furthermore, it introduces several additional concepts that could prove handy at the application level, such as battery aging mitigation methodologies.

Concerned ICT Standards and contribution to the related landscape

The fellowship is backing the development of the ongoing work item YSTR.P2P-CC in SG20 of ITU-T. A P2P crowd charging system is a distributed system comprising ICT infrastructure provided by the general public (e.g., smartphones). The distributed resources of a P2P crowd charging system operate in a collaborative manner driven to perform energy sharing tasks by using their built-in power transfer modules. This work item is conducting a review of and provide an analysis of the current state of P2P crowd charging systems in terms of currently available technological solutions, ongoing research, and recent and ongoing standardisation activities in this area. In parallel, there have been related research developments which are being continuously published to prestigious peer-reviewed journals and conferences. In this respect, the crowd charging process is facilitated by additional methodological enablers such as battery aging mitigation. Current battery aging mitigation approaches only partially leverage the available options to prolong battery lifetime. In this regard, crowd wireless energy sharing via network-wide smart charging protocols could provide a useful setting for applying battery aging mitigation.

Impact (on European SMEs, related project or in the society)

Impact on society

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

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

YES - The fellowship has backed the development of ITU Work Item YSTR.P2P-CC in Q5 of SG20.

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

YES – Technical report (Reference material)

What future efforts or activity are still necessary in your area of application?

The current standards in P2P wireless energy sharing are in very early stage. The lifetime of the YSTR.P2P-CC work item spans until May of 2023. Therefore, there is still one year of active developments left. Given that the work item's appreciation is high from the point of view of different industrial and academic stakeholders, it is highly probable that it will result in at least the publication of an ITU Technical Report. The work conducted during this fellowship has raised awareness of the enormous potential of the concepts under development and the engaged ITU working group editorial team is aligned and continues working in crowd wireless energy sharing.

Online references related to the fellowship work

"Wireless Crowd Charging with Battery Aging Mitigation". Accepted paper in IEEE SMARTCOMP 2022 conference.

arxiv draft: https://doi.org/10.48550/arXiv.2204.09311

"Current state of P2P crowd charging platforms and corresponding market needs".

ITU YSTR.P2P-CC work item:

https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17940

Non-Entanglement Based Quantum Random Numbers Generation Technical Standardisation

Witold Jacak

University Professor at WUST, Chair of the Board of Directors of EITCI Institute, Coordinator of the EITCI Quantum Standards Group

European Information Technologies Certification Institute

Sector

Cybersecurity/ePrivacy, Quantum Technologies

Engaged SDOs, WGs and TCs

ITU
ETSI
IEEE
IEC
ISO
CEN/CENELEC
NIST

Addressed EU standardisation priorities and gaps

The action contributes to quantum cryptography standardisation however in terms of its key enabling technology, namely quantum random numbers generation. Continued effort in QRNG standards including approaches based on non-entanglement schemes, with technical referencing of various implementation techniques is expected to contribute to supporting uptake of the QRNG technology which is considered to be of enabling importance for the future of cryptography and communication, especially in view of recent quantum supremacy breakthroughs conditioning quantum internet's operability.

While the QKD technical standards are developed for several years and are now mature enough to provide device independent security (e.g. due to efforts of the ETSI QKD-ISG Industry Specification Group, in works of which the applicant participates since 2013), there are currently limited technical reference standards scopes for quantum randomness, despite the QRNG being a key enabler for QKD. The only two international QRNG standardisation initiatives both from 2019 include ID Quantique's coordination of the efforts towards a dedicated WG establishment on the forum of the ITU-T, and the applicant's coordinated EQRNG-QSG WG hosted by EITCI (cf. https://eitci.org/technology-certification/qsg/eqrng).

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

Concerned ICT Standards and contribution to the related landscape

The action is supporting standardisation efforts in quantum information processing and communication (QIPC) technologies for facilitating their uptake as roadmapped in the EU

Quantum Flagship program (€1b funding in 10 years timescale). It aims to advance international work on standardization of non-entanglement quantum random numbers generation (non-entanglement QRNG), simultaneously supporting Europe's position on international SDOs/SSOs forum and leveraging on EU's far-reaching quantum infrastructure projects.

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

In October 2019 another breakthrough was reported with the Google Sycamore quantum processor achieving the result of the quantum supremacy (i.e. advantage over all classical computing power in regard to a specific problem related to binary sequence randomness verification – the result was preceded by the EQRNG work which took place in 2019, cf. https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2019132679 and https://www.nature.com/articles/s41598-019-56706-2).

Impact (on European SMEs, related project or in the society)

Impact on SMEs

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

Impact on society

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

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

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

in order to provide information-theoretic security level of communication.

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

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

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

YES – Technical specification

What future efforts or activity are still necessary in your area of application?

Only 3 years ago the European Commission launched EuroQCI, a large-scale program implemented by all EU member states, targeted at building quantum terrestrial & satellite network acting as an infrastructure for quantum systems developed in the EU's Quantum Flagship program and prospectively for anticipated quantum computers. In 2019/2020 two important breakthroughs have been reported by Google (USA) and USTC (China) with the so called quantum supremacy of quantum processors (Sycamore implemented on superconducting Josephson junctions and Jiuzhang built on entangled photons), able to solve real problems beyond the reach of classical computational power.

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

Online references related to the fellowship work

- https://eitci.org/technology-certification/qsg
- https://eitci.org/quantum-standards-group.pdf
- https://www.linkedin.com/groups/8850635
- https://eitci.org/technology-certification/qsg/qrng
- https://eitci.org/technology-certification/qsg/qrng/eitci-qsg-qrng-protocols
- https://eitci.org/technology-certification/qsg/oqp/eitci-qsg-qrng-implementation
- https://segre.net/qrng

Contribution to e-privacy and e-identity standards at CEN/CLC/JTC 13 WG5 and ISO/IEC JTC 1/SC 27 WG5

Christophe Stenuit

Editor of and contributor to standards at SDO CEN/CLC/JTC 13 WG5 and SDO ISO/IEC JTC 1/SC 27 WG5

Viewconcept.be, Belgium

Sector

Cybersecurity / ePrivacy

Engaged SDOs, WGs and TCs

ISO/IEC JTC 1 SC 27 WG 5
CEN/CLC JTC 13

Addressed EU standardisation priorities and gaps

The proposed activity aims to positively influences 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-privacy. Furthermore, it aims to enhance existing references and promote the use of these references through adoption in the European market.

Concerned ICT Standards and contribution to the related landscape

The proposed standardisation activity intends to develop appropriated architecture models and practices. The scope includes the revision/amendment of existing standards, and the creation of new ones. Progress was made on the following ICT standards:

- ISO/IEC 24760 about identity management
- ISO/IEC 29146 about access management
- ISO/IEC 29184 about online privacy notices and consent

Other supporting activities were also carried out, e.g. contributions on possible action and standardisation activities in relation to eIDAS2 as part of the CEN-CLC-JTC13-WG5_N243_ CEN-CLC-JTC 13-WG 5 activities.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

SME are better aware of risks and of controls required in IT and information protection. Recent EU GDPR, eIDA2 regulations and NIS directive 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 confidence establishment and maturity improvement in matter yesterday far from SMEs' concerns.

Impact on society

- Secure societies - protecting freedom and security of Europe and its citizens;
- Cybersecurity, network and identity information security;
- ePrivacy protection.

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

YES - Part of the objectives of the project is to support revisions and amendments of existing work items, and by this guarantee the sustainability of existing references in a changing world.

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

YES – Technical reports (Common terminology; Recommendations for new/revised standard; Development for a new standard).

What future efforts or activity are still necessary in your area of application?

Most of developed standards are achieving maturity. Some work items are still at draft stage. Some other are nearly published (e.g. ISO/IEC 29146 about access management). 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 publication. This could take up to 18 or 24 months. This activity will continue over 2022, and achieve a publication during 2023 and 2024.

Online references related to the fellowship work

N/A

Develop European and International use cases for DLT and blockchain standards

Caroline Thomas
Innovation Expert
IT Consultancy/Development, United Kingdom

Sector

Cybersecurity/ePrivacy, Artificial Intelligence, Blockchain/DLT, Big Data, FinTech/financial services/eInvoicing, eHealth, Smart Cities, eGovernment

Engaged SDOs, WGs and TCs

BSI
ISO
CEN
ISO/IEC
CEN/CENELEC

Addressed EU standardisation priorities and gaps

Gaps:

There is a gap to understand into how DLT/blockchain technologies are being applied in the market, and what is best practice in the business world. My fellowship contributes to bringing market and SME perspectives through use cases to inform and upskill standards development.

Use cases are relevant to ICT standards development as that they provide technical experts with new market insights and knowledge-share into market-led demand and examples of different technical solutions in this emerging technology. This gap is particularly relevant as in current market adoption where large organisations, governments and SMEs are running ahead of standards, in areas from fintech, supply chains, smart energy.

Priorities:

There are multiple uses of blockchains, and these Technical Reports apply the priority towards the highest volume of business and government activity. The use case template creates a common framework for faster adoption and reflects the European perspective in international applications including fintech, data provenance, sustainability, supply chains.

This approach allows experts to meet the challenge of anticipating change in emerging technologies, and meets the 4th Open Call of aim of 'strengthening take-up, scalability cross-border interoperability of their technological solutions, as well as decreasing the costs of technical due diligence on the private and public procurers'.

Challenge:

For EU standards development in DLT/blockchain a key challenge is to enable its European voice and values are reflected in an area of:

- Dominant players with different perspectives (larger countries, traditional global corporations, new BigTech companies, and the emergence of Web3 experts etc).
- Differing legislation (eg: privacy (GDPR), identity (EiDas), crypto or digital currencies.
- Provenance of EU trade eg: DLT can safeguard environmental, safety and fraud in the EU supply chain

Concerned ICT Standards and contribution to the related landscape

This StandICT.eu support enables me to contribute to the development of the ICT Standards landscape, and enable European impact, in a number of ways:

For ISO TC/307 Blockchain and DLT, I am the elected Convenor of Working Group 6 – Use Cases. I am responsible for leading 3 new ICT Technical Reports listed below:

- ISO/ DTR 3242 Blockchain and distributed ledger technologies – Use Cases Summary https://www.iso.org/standard/79543.html
- ISO/WD DTR 6039 - Blockchain and distributed ledger technologies - Identifiers of subjects and objects for the design of blockchain systems https://www.iso.org/standard/8197
- ISO/WD TR 6277 - Blockchain and distributed ledger technologies – Data flow model for blockchain and DLT use cases https://www.iso.org/standard/82158.html?browse=tc
- I am also co-editor of ISO/ DTR 3242 Blockchain and distributed ledger technologies – Use Cases Summary https://www.iso.org/standard/79543.html

In addition, my contributions during this Fellowship have fed into related ISO TC307 standards and contributions to other Working Groups, Technical Committees and SDO's.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

As Convenor of ISO TC307/WG6, my work has impacted SMEs in 2 ways:

1) Enable European SMEs to demonstrate their DLT technology to the ISO community and readership, as well as the SME stakeholders and future markets.

European SMEs worked with ISO technical experts in ISO/TC307 WG6, to create an ISO level use case of their pioneering business and technology for publication in DTR3242.

2) European SME members became experienced in understanding and participating in Standards Development in the DLT technical sector, and may contribute to future standards.

Some have become reviewers and/or providing expertise into other DLT use cases and/or contributing to new standards

Examples of European SMEs in TRs include:

- DTR3242 – European Commission data provenance, Spain energy markets, Irish energy markets, Irish agricultural provenance, Italian finance.
- TR6039 Blockchain Identifiers – Irish agriculture
- o.dhaher@digitalsme.euTR6277 DLT Data Flows - TBA.

Impact on society

Societal impacts include:

UN Sustainable Development Goals (SDG) alignment: All use cases in ISO DTR3242 are classified against the relevant UN SDGs.

Demonstrating the benefits of Blockhain for society: The DTR3252 Use Cases demonstrate how this technology has been used to tackle fraud in the pharmaceutical market financial inclusion, smart sustainable energy in Europe and India, provenance of European food etc. (see ISO INNOVATION - BLOCKCHAIN'S TECHNOLOGY OF TRUST https://www.iso.org/news/isofocus_142-5.html)

British Standards Awards (BSI) recognised my societal work in developing ISO use cases to show how blockchain technology could increase transparency and trust in global medicine supply during the pandemic. The collaborative international networks resulting from this work helped keep many fake goods from reaching the marketplace and causing harm. https://memberportal.bsigroup.com/public/2020/december/thanks-a-million-the-special-edition-2020-bsi-standards-awards/

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

YES - Proposal of new Technical Standard: ISO/DTR 6039 'Blockchain and distributed ledger technologies - Identifiers of subjects and objects for the design of blockchain systems' has been followed by a specific new proposal in a TC 307 WG for a Technical Specification ISO/AWI 7603 'Decentralized Identity standard for the identification of subjects and objects' https://www.iso.org/committee/6266604/x/catalogue/p/0/u/1/w/0/d/0 https://www.iso.org/standard/82842.html?browse=tc

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - https://www.iso.org/committee/6266604.html

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

YES – Reference material

What future efforts or activity are still necessary in your area of application?

The three technical reports should continue to publication, subject to ISO consensus process.

There is a call for a new TR on Blockchain Use Cases, to follow ISO DTR 3242, to reflect standards for the evolving technical applications and new regulations,such as eiDAS 2023, digital currencies, NFTs, and digital wallets.

https://www.biometricupdate.com/202204/eu-digital-wallet-the-race-is-on-for-pilot-funding-tech-supremacy-hearts-and-minds

https://www.reuters.com/technology/european-crypto-industry-steps-up-efforts-influence-eu-policy-2022-04-19/

https://www.wired.com/story/blockchain-copyright-portrait-piracy/

https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/documents/what-is-EU-ID-wallet

The methodology created for ISO DTR 3242 Use Cases is continuing beyond ISO/TC 307, and is being shared and used by other SDOs and members of national bodies, SMEs and businesses. This methodology and toolset enable faster technology adoption by making it accessible for market-led contributions to standards making. We can make this methodology available to StandICT.eu members also. The focus on attracting and educating SMEs to become involved in standards development is outlined in sections 2.2 and 2.5

Online references related to the fellowship work

EUOS TWG Trusted Information

https://www.standict.eu/news/trusted-information-digital-space

https://zenodo.org/record/5926395#.YhPu8ejP3iY

Development of Draft OGC Points of Interest (POI) Standard and leadership of OGC POI Standards WG

Christine Perey
Contributor, architect and editor POI SWG
Switzerland

Sector

Cross-domain technologies – Big data, Ontologies & Open data standards

Engaged SDOs, WGs and TCs

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

Addressed EU standardisation priorities and gaps

The lack of standards has an impact when citizens move between geographically-defined spaces (e.g., borders) such as within Schengen zone in Europe. If the POI provider is not international, users must change POI client applications to match the local POI data publisher's format.

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

Concerned ICT Standards and contribution to the related landscape

I serve as the co-chair of the OGC POI SWG. The standard to which this grant is contributing is called OGC Points of Interest Encoding Standard v 1.0. The recipient of the StandICT.eu grant has finally built a team of 10 members with diverse skills and interests. A standard architect with a model-based approach reviewed past requirements and proposed a draft for the first POI logical model. Under the leadership of the grant recipient, the SWG is now working together through weekly meetings and using GitHub to reframe, write and complete the editing of a new POI standard. The focus since March is on the development of the conceptual and data model for POI in full compliance with ISO and OGC standards for model development.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

By meeting the requirements of many stakeholders across multiple domains, in Europe and around the world, in a single, domain-neutral POI data model and set of data encodings, this activity will reduce data and industry fragmentation. When successfully published by a world-renown standards development organization with a tight cooperation with European standards groups such as TC211, an open POI data format will:

- Enable existing local and regional POI data providers who adopt the standard to expand their business opportunities to many new domains, and
- Support the creation of new business opportunities for citizens, users and publishers in Europe and beyond.

Impact on society

There are no known societal impacts of the current work due to the fact that the Points of Interest specification has not yet been ratified and the supporting materials have not been publicly released. However, the impacts of having a widely adopted standard for encoding points of interest will be high in many industries, reducing barriers to data portability and interoperability of solutions and services for society and industry.

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

YES – Technical specifications

What future efforts or activity are still necessary in your area of application?

There are no other standards on the topic of points of interest. All publishers and services that deliver POI must have their own data models. Since the original proposal was submitted for support, the POI specification has been expanding on GitHub.

We have created/opened and managed over 20 issues. Since it has not been submitted to the OGC Architecture Board and the members of OGC have yet to ratify the specification, the website has not been launched and supporting materials have not been publicly released.

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

Online references related to the fellowship work

- The main repository for the draft POI specification is here https://github.com/opengeospatial/POI

Editor of first draft IEEE SA Spatial Web Specification and Leadership (co-chair) of IEEE P2874 WG

Christine Perey
Editor of first draft IEEE SA
Switzerland

Sector

Cross-domain technologies:

Engaged SDOs, WGs and TCs

IEEE

Addressed EU standardisation priorities and gaps

The proposed Spatial Web standards will provide the mechanisms for the locally defined governance of people, places and things in virtual and physical spaces, and connected through the Spatial Web. While the scope of the P2874 WG is broad, the targets for standardization are well-defined and there has been significant engineering effort invested towards the identification and documentation of areas for modular standards.

The WG founders are entrepreneurs who lack experience with open standards development. This project permits a standardization expert with experience with processes for developing successful, open standards in IEEE (and other SDOs) to support the development of the Spatial Web Standard. Having this expert as a leader of the P2874 WG and editor of the draft specifications ensures that IEEE SA policies are upheld/followed, that the requirements, opinions and voices of diverse stakeholders are correctly and completely documented and reflected in the draft specifications.

Concerned ICT Standards and contribution to the related landscape

There are many societal, technical and legal limitations to the full development of the Spatial Web. One of the obstacles to realizing the vision is that there are no specifications for disparate Spatial Web components to interact with and create value while maintaining autonomy, and respecting legal policies and societal norms.

With the support of this grant, I have continued to chair meetings and serve as an officer of the IEEE P2874 towards the successful delivery of one or more new specifications by members of the IEEE Spatial Web WG. I am currently:

- Serving as the primary editor of the first Spatial Web draft standards, presently working with contributors on the development of the second draft.
- Expanding the WG membership to include a high level of European participation.
- Leading, in accordance with IEEE policies and procedures, all P2874 WG meetings,
- Preparing and distributing all meeting minutes, maintain voting records, maintain lists and increase member participation, and otherwise serve as secretary for the IEEE Spatial Web WG.
- Establishing liaisons with other WGs and SDOs.

Impact (on European SMEs, related project or in the society)Impact on SMEs

By meeting the requirements of many stakeholders across multiple domains, in Europe and around the world, a single, domain-neutral Spatial Web protocol will reduce data and industry fragmentation. While the proportion of WG members from the European region and from SMEs is growing, there is still room for improvement. SMEs are needed to ensure that the values of European citizens are fully represented and their requirements met in Spatial Web standards.

Impact on society

The societal impacts of the Spatial Web will be significant, including decreased energy consumption, higher performance and compliance with laws, local customs and regulations. However, the Spatial Web specification remains ill-defined and more of a vision than a concrete set of requirements which can be measured. For this reason, the work of the chair is particularly challenging. When it is achieved, the impacts of having a widely adopted standard for the Spatial Web architecture and governance will be high in many industries, reducing barriers to data portability and interoperability of solutions and services for society and industry.

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

YES - Development of a new standard in IEEE P2874 WG.

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

YES – Technical specifications

What future efforts or activity are still necessary in your area of application?

The WG is already large with over 150 members, of which 120 are actively attending the meetings. While there are already 25% of the WG members from the European region, there needs to be a higher WG engagement from both public and private European entities to ensure that the values of European citizens are fully represented and their requirements met in Spatial Web standards.

Online references related to the fellowship work

https://sagroups.ieee.org/2874/

Cybersecurity evaluation based on Common Criteria of ETSI TC CYBER standardisation deliverables

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Sector

Cybersecurity/Network and information security

Engaged SDOs, WGs and TCs

ETSI TC CYBER

Addressed EU standardisation priorities and gaps

Different standards are in use for the same (or similar) purpose in different areas, trying to bring technology on the desired level of cybersecurity. Given the complexity of the consumer IoT cybersecurity issue, it seems reasonable to expect different approaches that may lead to different solutions. Also considering that no overarching institution / organisation / body has authority when dealing with global IoT ecosystems, a fragmented approach is natural and probably unavoidable under the circumstances.

However, the fragmentation of the cybersecurity processes leads to inefficient use of resources and, very likely, to insufficient coverage of threatened products.

It is therefore useful to analyse and align standardisation deliverables related to cybersecurity, with the aim of reducing fragmentation of the approach to cybersecurity evaluation and certification.

Using ETSI Standardisation cybersecurity deliverables - including future ICT cybersecurity standards, in the evaluation and certification schemes produced by ENISA is underpinned by how well such standards fit with the EUCC scheme. My proposal is aimed at starting the process of using the standard in the certification scheme.

Concerned ICT Standards and contribution to the related landscape

My proposal wants to start discussing and examining the ETSI TC CYBER cybersecurity standardisation deliverables, for example EN 303 645, from the perspective of Common Criteria for Information Technology Security Evaluation (CC v3.1).

More recently ENISA is in the process of finalising the EUCC scheme which is applicable to IoT. There are currently a number of standards and standardisation deliverables which are in progress through ETSI TC CYBER. It is important to have those aligned, especially in terminology for the regular standards user to be able to use the standards confidently.

For future standardisation products developed by ESOs, an alignment of terms is therefore needed and this activity needs to be done in a consistent manner. While currently these standards don't exist, the ICT standards developed for requirements under RED Art 3.3, CSA, NIS2 should be aligned with the EU CC scheme in order to be fit for the purpose.

Impact (on European SMEs, related project or in the society)

Impact on society

My work supports the development of the international alignment for standards or the mutual recognition process in a common framework. An important component of this effort

is the clarification and whenever possible the alignment of the terms used in the CYBER deliverables to those used in the EU Common Criteria.

I also stressed that if ETSI TC CYBER standardisation deliverables are aligned and possibly integrated in the Common Criteria evaluation process this may create the basis for a certification scheme that is recognised globally. This was mentioned in the document "Council of the European Union conclusions on the cybersecurity of connected devices" (2 December 2020), where it is emphasised that any certification scheme for connected devices and related services should specify how the applicable security requirements at the relevant assurance level should be met on the basis of specific European and internationally recognised standards. My work aims to support this approach by examining the TC CYBER deliverables and aligning terminology as much as feasible.

What future efforts or activity are still necessary in your area of application?

During the discussions initiated by my presentation in TC CYBER Meeting 28 and before, I managed to gain the support of two ETSI Members who are not necessarily EU experts: UK and Chinese companies. It became apparent to me that EU resources are needed to support this EU initiative and realise the potential of this EU position.

As my funding for this proposal ends here it is unclear to me if the resources will be available for continuing this project. The conclusion of the discussion was that the action in TC CYBER is supposed to continue pending on finding resources for supporting a New Work Item. In order to launch a NWI 4 ETSI Members are needed for supporting it, and a rapporteur is also needed to be actively involved in progressing the drafting work.

DTechMC Phase II: Technical Specification for a Digital Technologies Management Container

Luis Moran Abad
ICT Senior Advisor
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Sector

Fintech and Regtech Standardisation

Engaged SDOs, WGs and TCs

ISO/IEC
UNE-CTN71/SC40

Addressed EU standardisation priorities and gaps

Gaps

ISO and IEC have a great presence in the standardisation of management systems (MSS) for multiple areas of organisations. But these models do not contemplate the integration of non-ISO frameworks (Agile, Lean, Startup, etc.) and specific Best Practices (Management 3.0, Kanban, BM Canvas, etc.).

Challenges

- Understand how different companies are adopting ISO standards, market Frameworks, and specific Best Practices.
- Select relevant industry uses cases that provide different scenarios and approaches for implementation, and guide the definition of the Adoption Model.
- Define a universal best practice adoption and integration model, applicable to big corporations and small companies.
- The Adoption Model defined must use as a basement ISO management systems standards approach (SL Annex structure).
- Position PDCA improvement cycle used in ISO world as an alternative to well accepted agile Srcum Spring cycles, as an incremental way of working.
- Do not define another Project Management methodology, establishing a set of knowledge helpful for organizations integrating needed market best practices.
- The defined model should incorporate the initiative Phase I case studies and its insights.

Concerned ICT Standards and contribution to the related landscape

This initiative is framed within the scope of the ISO / IEC JTC 1 Information Technology committee, subcommittee SC40 Governance and Management of Information Technology. The work is sponsored and validated by Spanish mirror subcommittee UNE-CTN71 / SC40 “Governance and Management of Information Technology”.

This standard will be deployed under:

ISO/IEC JC1 – Information Technology.

UNE CTN71 – Tecnología habilitadoras para la transformación digital.

UNE SC40 – Sub Committee for ICT Governance and Management.

ICT STANDARDS LANDSCAPE: Having a standard that allows the integration between

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

EUROPE: This standard will allow Europe to produce a new standard whose mission is to integrate any management trends. Therefore, digital disruption plays a key role, providing an inclusive and elastic work structure.

Impact (on European SMEs, related project or in the society)Impact on SMEs

BUSINESS: Emerging digital projects are highly technically focused and are often not accompanied by adequate management models, which leads to many failures. The new standard will be an instrument to facilitate the incorporation of new technical standards, management systems, frameworks, and best practices. In such way, ICT organisations and their companies can adapt current work models to the demands of the Digital Age.

SMEs: The industry has generated worldwide a multitude of accredited knowledge, but SMEs are not able to take advantage of all this knowledge due to the difficulty involved in understanding it and especially applying it. This work prepares the first step (TR or State of the Art Report of how to adopt frameworks) for the creation of a new ISO/IEC standard to help SMEs to adopt the needed knowledge in order to solve specific business or organizational challenges.

Impact on society

In the new Digital Era, all societal activity is driven by the intensive use of technology and its services. Having well-managed and motivated ICT areas will be key in this new Digital Era.

In this context, StandICT.eu has supported the creation of a new ISO/IEC standard series that facilitates to any organization execute their IT or Digital transformation. This new set of standards we are creating will boost the competitiveness of organisations by facilitating the generation of radical improvements in the management of ICT areas.

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

YES - It has been edited and promoted a new standard Spanish UNE PNE 71401 Technical Report.

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - Spanish UNE-CTN71 / SC40 / GT4 "Working group on Adoption and integration of management systems, frameworks and best practices"

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

YES – Technical specifications

What future efforts or activity are still necessary in your area of application?

This is the Phase II of a four phases initiative (see Phase I, ID 02-279), although current Phase II has been finished with full success, it is planned continue next phases in order to complete the series of three UNE and ISO standards (Technical Report, Technical Specification and Requirements) on adoption and implementing a mix of accredited knowledge. Next Phase II will be presented to StandICT.eu #7 Open Call.

Online references related to the fellowship work

1) Main documents and deliverables of the to demonstrate the work is in this shared Google Drive folder:

https://drive.google.comn?id=1OdMNReJmiEdO4zhfYAW698E0w0iE5KFS&authuser=luismoran2014%40gmail.com&usp=drive_fs

2) Link to Spanish Government Bulletin BOE published for public information and comments of the new standard UNE-PNE 71401 “State of the art in the adoption and integration of management systems standards, management frameworks and best practices for ICT”:

https://www.boe.es/diario_boe/txt.php?id=BOE-A-2022-6095

3) Link to UNE (Spanish SDO) new standardisation project identification UNE-PNE 71401:

https://www.une.org/encuentra-tu-norma/busca-tu-norma/proyecto/?c=P0056572

4) Link to UNE (Spanish SDO) public information access in order to citizens can access to the full text of the new standard UNE-PNE 71401 IN is accessible for comments with previous free register in the UNE website (free account needed):

https://srp.une.org/Home/View/157182

Towards explainable AI for autonomous systems: from fuzzy logic to ontological formalisations

Paulo Gonçalves
Professor
Instituto Politecnico de Castelo Branco, Portugal

Sector

IoT, Artificial Intelligence, Industry 4.0, eHealth

Engaged SDOs, WGs and TCs

IEEE
OMG

Addressed EU standardisation priorities and gaps

During my activity, several actions were performed to contribute to fill the gap in ICT standards, and pursue the challenges defined in the IEEE 1855 and 2976 standards:

1. Review the definitions included in the previous version of the FML, defined in IEEE 1855 standard, considering the ontological relationships between the concepts contained therein.
2. Add use cases that show the correct interoperability of P1855 and P2976 standards, for example, with standards based on ontologies for robotics and automation (IEEE 1872, 1872.2 and/or P7007), that were defined based on upper-level ontologies.
3. Propose the first steps to an ontological high-level methodology for classification of partially or fully explainable AI systems, based on ontologies.

Concerned ICT Standards and contribution to the related landscape

The funded application is related to the development of two standards:

1) IEEE P1855 - Standard for Fuzzy Markup Language;

2) IEEE P2976 - Standard for XAI – eXplainable Artificial Intelligence - for Achieving Clarity and Interoperability of AI Systems Design;

The application contributes to the ICT standards landscape in artificial intelligence, ranging from fuzzy systems to explainable AI.

The activity is, in the first part, related to the revision of the definitions within the Fuzzy Markup Language (FML). My activity was to revise the definitions and to introduce ontologies on the previous standard, i.e., to perform steps to formalize the FML using ontologies. During the last weeks, the work evolved towards the contribution to the extension of the standard to include fuzzy systems for unsupervised approaches.

The second part of the activity is based on the need to standardise XAI definitions in a common framework. My activity was aimed at introducing knowledge representation (ontologies) in the definitions for XAI to be defined by the working group.

Impact (on European SMEs, related project or in the society)Impact on SMEs

The contribution is related to knowledge representation of fuzzy systems and general explainable AI (XAI).

AI based systems play a significant role in the digital transformation of European SMEs. Reasoning based on those systems needs trustworthy intelligent agents, also capable to explain its outcomes. Moreover, the European General Data Protection Regulation (GDPR) has considered the right to explanations.

Many renowned robotic companies based in the EU use and/or develop AI based systems that must comply with GDPR and AI standards under strong development worldwide. As such, AI standards will have a huge impact on the AI systems developed by companies.

Impact on society

The work on WG P1855 and P2976, is expected to have an impact on the interactions between humans and autonomous systems, based on AI, that uses fuzzy systems.

With the large spread of autonomous systems, e.g., robots, decision-making systems, etc, that are working with/for humans, it is essential that a correct and unambiguous description and design of autonomous behaviours is done. To obtain a proper acceptance of autonomous in our societies, they needed to have proper intrinsic explainability capabilities.

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

YES – It has led to the support in the development of the standard: IEEE P2976 - Standard for XAI – eXplainable Artificial Intelligence - for Achieving Clarity and Interoperability of AI Systems Design and to the support in the revision of the standard: IEEE P1855 - Standard for Fuzzy Markup Language.

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

YES – Technical report (recommendation for new/revised standards)

What future efforts or activity are still necessary in your area of application?

My response is twofold:

1) General:

AI standards are in a preliminary phase and the IEEE P1855:2016 was one of the first to be developed for fuzzy systems. AI research is advancing at a tremendous pace, and the standardisation efforts need to have a strong push, also because real world applications are developed for close collaboration with humans. This arise ethical issues and the need for expandability in AI, that need to be added to the existing standards repertoire.

Standards do exist that defined upper-level ontologies and with application to specific domains in autonomous systems, e.g., autonomous robotics. Ontologically frameworks already showed proper results, allowing proper interoperability within such complex systems. This clearly shows that this field needs to further be explored: to allow explainability of AI systems and its interoperability with existing ontologically defined standards.

2) Specific:

The two working groups P1855 and P2976, did not finish the work. In fact, they are in its initial stage, i.e., to receive contributions of the working group members, such as mine. After approval of my proposals further work is needed to complete the ontologies developed with the work of other working group members.

For the P1855 working group effort, the ongoing ontology needs to include the ongoing works of other colleagues, e.g, to include definitions of type-2 fuzzy sets and fuzzy systems for unsupervised approaches. For the P2976 working group effort, due to the complexity of the concepts in XAI, the group is still in the discussion of the basic concepts, based on the contributions of the working group members, such as mine. This is clearly an indicator pointing to the need of continuation of the action to formally define the concepts, using ontologies.

In the next call is my intention to propose the continuation of this important fellowship in call 7.

Standards for Robotics and Autonomous Systems: Ontological Specification for Tasks and Services

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Professor
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Sector

IoT, Artificial Intelligence, Industry 4.0, eHealth

Engaged SDOs, WGs and TCs

IEEE
OMG

Addressed EU standardisation priorities and gaps

Several actions are ongoing to contribute to fill the gap in ICT standards, and pursue the challenges defined in the IEEE 1872.1 and OMG RoSO standards:

1. Provide a foundational basis for the definition of the tasks and services that each agent must perform (tasks) and the services that each can have, to be deployed in each task. Standardise this knowledge on an ontological framework.
2. Propose a systematic way of representing knowledge and a common set of terms and definitions, ranging from the ICT, robotics, and autonomous systems domains.
3. Propose an unambiguous knowledge transfer among humans, robots, and other artificial agents/systems.
4. Obtain semantic interoperability between ICT autonomous systems, e.g., physical agents and software agents.

Concerned ICT Standards and contribution to the related landscape

The funded application contributed to the ICT standards landscape in the robotics and autonomous systems, specific domains. It is related to the development of two standards:

1. IEEE P1872.1 - Robot Task Representation.
2. OMG Standardization Project - RoSO - Robotic Service Ontology.

The activity is, in the first part, related to IEEE standards, that are defined using ontologies for task representation for robotics systems, e.g., that include basic definitions on tasks definitions, task composition, task constraints, task results, task resources. These issues are tackled in IEEE WG P1872.1.

The activity is, in the second part, related to OMG robotic standards. The aim is to represent services provided by robots in different contexts, its description and execution. These issues are tackled within the OMG robotic task force.

Impact (on European SMEs, related project or in the society)Impact on SMEs

The contribution is related to robotics, and knowledge representation, based on ontologies. Many renowned robotic companies are based in EU. An increasing number of state-of-the-art Robotics and autonomous systems use AI based systems to reasoning, mainly because of the increasing complexity of such systems. Nowadays, knowledge representation for robotics

services and tasks are currently being regulated worldwide, to which EU SMEs must also comply. As such, knowledge representation for robotics standards will have a huge impact on future robotic and autonomous systems developed by companies.Impact on society

The work on WG P1871.1, related to the description of robotic tasks will have a major societal impact on the design of unambiguous tasks that must be ethical performed by robots, for example, in cooperation with humans. The work allows the robotic task developer to send a precise and explainable task to the robot. The task definition comprises constraints that the robot must comply to enhance its behaviors, complying with ethical and social norms to have a greater impact in society.

The work on the RoSO task force, related to the description of robotic services will have a major societal impact on the design of interactions between robots and service consumers based on a standard vocabulary, such that users and other agents can easily understand.

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

YES – It has led to the support in the development of the standards: 1) IEEE P1872.1 - Robot Task Representation; 2) OMG Standardization Project - RoSO - Robotic Service Ontology.

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - The new EUOS TWG on Robotics. The IEEE RAS robotic standard WG 1872.2 is currently starting a study for a new standard project.

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

YES – Development of new standards

What future efforts or activity are still necessary in your area of application?

Although the work on the P1872.1 is near to the end, further work needs to be done in the standardisation of robotic tasks and robotic services, under the scope of IEEE P1872.1 and OMG Robotic Services task force, respectively. Especially the latter one, to finish the ontology and standard approval.

The areas of the fellowship, where vocabulary and ontologies were developed for robotic tasks and services, have a logic extension on the topics related to the human-robot interaction (HRI) and sematic mapping of the environment. These later topics need to be standardised because the robotic manufacturers develop solutions with increasing collaboration of humans in robot daily life tasks. In this sense, I will propose a new fellowship in Call 7, covering the areas of HRI, sematic maps and to finalize the effort related to this fellowship. The fellowship title: “Robotics Standards for Human and Robot Interactions: tasks, services, and semantic mapping”.

Cross-SDO Harmonisation for Future Quantum Networks

Richard Pitwon
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Sector

Quantum Technologies

Engaged SDOs, WGs and TCs

IEC
CEN/CENELEC
BSI

Addressed EU standardisation priorities and gaps

Quantum technologies are rapidly emerging as a strategically vital technology for security, especially in the field of quantum computation and quantum communication. Standardisation efforts have been scattered and incoherent with little real collaboration or harmonisation between standards development organisations.

As part of this fellowship project, the consultant prepared a proposal for a cross-SDO (IEC, ISO and ITU) Joint Task Force (JTF) for Quantum Technology Standards, which he submitted to the UK government and BSI for consideration. Early discussions with the UK government on the formation of such a joint task force were followed by discussions with the BSI. This led to engagement on a new IEC Standardization Evaluation Group (SEG) for quantum technologies involving IEC/ISO Joint Technical Committee 1. The Joint Task Force is a hugely ambitions proposal, which if implemented will make an enormous contribution to the standards landscape for quantum technologies.

Concerned ICT Standards and contribution to the related landscape

Over the course of this project the consultant has continued to prepare the draft for the IEC Technical Report (TR) entitled “Introduction to Quantum Technologies”. A progress update was presented at the IEC TC86 JWG9 meeting in May 2022 and approval was secured to produce a final draft in time for the IEC General Meeting in October 2022.

As part of this fellowship, the consultant has participated in key meetings and contributed to the CEN/CENELEC FGQT Roadmap document. Notably the consultant was a Keynote speaker at the UK government Westminster eForum policy conference - Next steps for quantum technologies in the UK on 31st March 2022 where he gave the talk “Establishing the standards framework and supporting growth and adoption” on behalf of CEN/CENELEC FGQT. He was also a contributing author to a joint paper by CEN/CENELEC “Towards European Standards for Quantum Technologies”.

Impact (on European SMEs, related project or in the society)Impact on SMEs

The consultant successfully organised and ran the Joint Symposium for Quantum Interconnect and Metrology, which was held on 24th March 2022. This symposium was the latest in the series of joint symposia in 2021 enabled by the OC#1, OC#2 and OC#3 fellowships. The talks included panel discussion between representatives of standards development organisations (ITU, IEC, IEEE, ISO, CEN/CENELEC, ETSI, BSI) and national metrology institutes (NPL, NIST, PTB, IMRIN, VTT) to identify standardisation priorities for quantum interconnect metrology.

The complete transcript of this panel discussion is included in the extended report, which the consultant has sent separately to StandICT.eu.

Furthermore, the consultant has started organising and will chair the Joint Symposium on Quantum Technologies, which will be a two-day in-person event held at NPL in Teddington on 13th and 14th September 2022.

Impact on society

Quantum communication and quantum computation are the subjects of a new arms race, predominantly between the USA and China. The establishment of a Joint Task Force overseeing quantum standardisation will promote a higher degree of international cooperation from the outset and provide a forum for completing countries to agree on common issues.

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

YES - This project has supported the continued progress of the Technical Report on Quantum Technologies through the IEC.

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - ITU/IEC/ISO Joint Task Force on Quantum Technologies

The consultant prepared a proposal for a cross-SDO (IEC, ISO and ITU) Joint Task Force for quantum standards. Early discussions with the UK government on the formation of such a joint task force were followed by discussions with the BSI. This has led to engagement on a new IEC Standardization Evaluation Group (SEG) for quantum technologies involving IEC/ISO Joint Technical Committee 1. The consultant is working with the BSI to expand and progress this to a joint international level task force proposal.

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

YES - As part of this fellowship project, the consultant organised the Joint Symposium on Quantum Interconnect and Metrology, which is the fifth in a series of cross standards organisation webinars reporting on different aspects of quantum technologies. This symposium focussed on physical layer elements of future quantum networks including Quantum PICs, Hollow Core fibre, glass optical PCBs and help the quantum community create benchmarks and standards to accelerate commercial adoption of these technologies. The talks were followed by a structured panel discussion between representatives of standards development organisations (ITU, IEC, IEEE, ISO, CEN/CENELEC, ETSI, BSI) and national metrology institutes (NPL, NIST, PTB, IMRIN, VTT) to identify standardisation priorities for quantum interconnect metrology.

What future efforts or activity are still necessary in your area of application?

The establishment of a Joint Task Force will have an enormous impact, but it will take time to promote and implement. Therefore, it is imperative that the efforts to establish a joint task force continue to be supported.

Online references related to the fellowship work

https://arxiv.org/abs/2203.01622

https://www.npl.co.uk/events/joint-symposium-on-quantum

Smart grid blockchain Standardisation

George Suciu
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Sector

5G, IoT, Cybersecurity/ePrivacy, Cloud computing, Blockchain/DLT, Smart Grids and Smart Metering

Engaged SDOs, WGs and TCs

IEEE
3GPPP

Addressed EU standardisation priorities and gaps

Microgrids can provide improved electric service reliability and better power quality to end customers and can also benefit local utilities by providing dispatchable load for use during peak power conditions or allowing system repairs without effecting customer loads. Any time a microgrid is implemented in an electrical distribution system, it must be well planned to avoid problems. The project, within this regard, is going to follow and study major standards mentioned below and contribute by providing feedback of modelling and operating constraints, regular usage, usage at peak loads and when source of generation is weak due to the nature of solar power:

- Introduce DLT – Distributed Ledger Technology in electricity market.
- Achieve better understanding of customers behaviour, interest and acceptance of active participation.
- Give suggestions to the national governance method and regulations related to DLT.
- Emergence of new ancillary markets and exploitation of excess of energy from distributed generation.
- Decrease dependence on commodity electricity and disseminate use of renewable energy sources.
- Reduce risks of failure and cyber-attacks by distributed model.
- Help create disruptive business and revenue models.
- Provide smart energy services to customer with trust.

Concerned ICT Standards and contribution to the related landscape

The main contributions have been towards ICT Standards landscape for environmental telemetry and microgrid design with renewables where energy trade is going to be made available through marketplace that consist of independent electricity prosumers. Dealing with ICT standards such as IEEE P2994, P1950.1, P2520.2.1, P1547.4, P2418.5, P825, P2140.2, P2140.4

Impact (on European SMEs, related project or in the society)

Impact on SMEs

The project outcome is going to consist of standards and best practices usable by SMEs for smart microgrid, IoT devices, blockchain infrastructure and other relevant grid elements. IoT devices, such as solar panels, smart metering devices etc., will share collected data with blockchain infrastructure and these data will be stored in distributed ledgers across the

network. Once any transaction is executed in blockchain network, it will obtain immutability, provenance, consensus and finality features. In other words, the transactions are going to be traceable, trusted and not editable (only with another transaction). Transactions will be validated according to the smart contract which contains several rules approved by different authorities. This validation process will reduce validation time compared to traditional approval process. Proposed value/ outcome by Blockchain for multiple scenarios.

Technical Specification (ISO/IEC) on AI Bias Project Initiation

Adam Smith
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Sector

Artificial Intelligence

Engaged SDOs, WGs and TCs

ISO/IEC

Addressed EU standardisation priorities and gaps

There is no current normative standard accepted at an international or European level for AI bias mitigation.

Concerned ICT Standards and contribution to the related landscape

I have secured ISO/IEC SC 42 approval of a new normative project ISO/IEC on AI bias, i.e. one that provides clear recommendations and requirements on mitigation steps. That was not currently planned. This will provide industry, the European Commission and others with a baseline set of technical mitigation requirements relating to bias. We are on track for production of a working draft that is on track to reach Committee Draft by the end of 2022. This is TS 12971. I have also contributed to JTC 21 in expert mode, and as head of delegation for the UK.

Impact (on European SMEs, related project or in the society)Impact on SMEs

This project will provide clear guidance for SMEs, and may contribute towards easing the cost of compliance of the EU AI Act.

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

YES - ISO/IEC TS 12791, new project.

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - ISO/IEC SC 42 WG3, CEN/CENELEC JTC 21

2. SOCIETAL CHALLENGES

Support for Chair of ETSI EP eHealth

Suno Wood
Chair of ETSI EP eHealth
United Kingdom

Sector

e-Health

Engaged SDOs, WGs and TCs

ETSI TC eHealth

Addressed EU standardisation priorities and gaps

- Response by SDOs to the current Pandemic
- Raising the status and the commitment by SDOs to eHealth
- Changing from an ETSI Project to an ETSI Technical Committee
- Writing new Terms of Reference for the Group and Seeking approval from the Group members, from the OCG and the ETSI BOARD
- Identifying and Approving Two Vice Chairs.

Concerned ICT Standards and contribution to the related landscape

- ETSI Standards relating to eHealth:
- Maintaining watching brief and appropriate care to maintain published work items by ETSI ISG E4P (Responsibility passed to EP eHEALTH when E4P closed)
- To identify new ICT standards where appropriate to support society's response to a health crisis.
- Presentation and Publication of a Special Report on "The role of ICT to enable Health crisis management and recovery - Responding to the 2019 SARS-CoV-2 Pandemic" (Q4 2021).
- To produce a draft new White Paper for the eHEALTH group (Q1/Q2 2022).
- To support and enable continued progress on current Work Items for eHEALTH:
- 'DTR/eHEALTH-0015' (Presence preserving proximity function trigger (3PFT). The goal is to design a multi-input, privacy protected, presence aware function triggering framework for use on smartphones and other IoT-devices for a variety of eHealth uses whilst the visitor is present at the venue. (Q3/Q4 2021 and Q1 2022)
- 'RTR/eHEALTH-0009v131' Work Item also to be reviewed In the light of the pandemic experience. (Q4 2021)

Impact (on European SMEs, related project or in the society)Impact on SMEs

We encourage horizontal contact with other groups, internal and external. Most of our members are individuals or SMEs and are interested in networking with a wider group

Impact on society

Considerable attention paid to the effects of the pandemic and how ICT could play a better role especially in the creation of new interest groups, such as concern for mental health.

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

YES - We have accepted a maintenance role for the standards produced last year by ISG E4P. These should be examined now in the light of the changes in the nature of the virus. A new White Paper may be appropriate for this

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - TC eHealth

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

Yes - Special Report completed and generally approved

What future efforts or activity are still necessary in your area of application?

The standards in this topic are in preliminary phase. For this reason, additional EU experts are needed. We need to work together now in order to get a result particularly as we have the opportunity to join with others working on AI matters.

Semantics and concepts to enable interoperable conversions between calendar systems

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NONMONOTONIC Networks
Germany

Sector

IoT, Data Commons, Artificial Intelligence, Big Data, eHealth, eGovernment

Engaged SDOs, WGs and TCs

IETF
NIST
ISO
OASIS
W3C/ERCIM

Addressed EU standardisation priorities and gaps

Multicultural calendars such as the Hebrew, Muslim and Chinese calendars are not based around a Gregorian solar model but include lunar elements and can have different measures of time. These were discussed in our development of EDTF but not further addressed due to complications and the immediate pragmatic need to get something that could be eventually pushed to fast track through ISO. Some of the challenges has been to not just explain some of the more complicated issues but also to bring interested parties from a number of disparate communities interested in alternative calendars into a common dialogue.

A significant constraint is that expressions using the extension should be able to round-trip through intermediate systems which do not understand the extension or have completely implemented the extension without losing the date/time information, albeit mussing some contextual information (Level-1, in Level-2 we relax this).

IETF Sedate (Serialising Extended Data About Times and Events) has been working within the goals of timestamps (RFC3339, a format based upon a subset of ISO8601:1988) to explore similar extensions so some of the challenges has been to work to align the proposal to fit within (and expand as a superset) their work (while also bringing them closer to the ISO-8691:2019/EDTF paradigm). Whence we have the constraint that all extended RFC3339 expressions that comply in core to ISO-8601 need to be properly understood.

Concerned ICT Standards and contribution to the related landscape

The focus of this fellowship is ISO-8601:2019 and EDTF (of which 8601:2019 is based). Date/Time is a basic component of many standards including common ISO, W3 and IETF formats. This project is about going beyond the standard to propose some of the work originally conceived for EDTF.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

Cultural and memory institutions will find this work important as many of their bibliographical references are based on other calendars.

Impact on society

Extending concepts of date and time to include other cultures.

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

YES – Technical report

What future efforts or activity are still necessary in your area of application?

The standards in this field are in preliminary phase. Continuation of action is suggested. For the proposal to gain traction and seek additional inputs from other interested parties, especially in other diverse cultural environments.

Online references related to the fellowship work

General repository: https://github.com/re-Isearch/date-extension/

The RFC: https://github.com/re-Isearch/date-extension/blob/main/RFC

W3C Accessibility Education and Outreach

Victoria Menezes Miller
W3C Web Accessibility Initiative
Conceptivity Sarl, Switzerland

Sector

Digital skills and e-learning

Engaged SDOs, WGs and TCs

W3C/ERCIM

Addressed EU standardisation priorities and gaps

Priority

Information must be available to all. Since Covid, the reliance on digital media and services increased substantially and the need to make information accessible is more critical than ever before.

Challenge

One of the continuous challenges encountered is the general perception that accessibility is "hard to implement", "expensive" and sometimes this requirement falls into lower priorities due to a misperception of the subject matter.

Gap

The EO WG develops a wide range of resources to raise awareness and support WCAG (2.0 and above) in order to make accessibility standards understandable, usable and approachable by different audiences. The resources are free of charge, thereby encouraging a wide audience to adopt standards in a user-friendly manner and are especially useful for SMEs.

The resources to support implementation of WCAG are mainly available in English. With respect to this grant, given my expertise in accessibility and my knowledge of 8 languages, I was requested to review the standard WCAG 2.1 French translation. Given that Europe is multi-language and multi-cultural, my participation provides a European perspective in this international WG.

Concerned ICT Standards and contribution to the related landscape

My work in this funded application contributes to the ICT Standards landscape with respect to accessibility of information and services, specifically WCAG 2.0, 2.1 (Web Content Accessibility Guidelines). The resources developed by EOWG are a valuable support in making the standard easier to understand and comply with, in particular, these resources are free of charge and therefore benefit individuals, SMEs, who may not have resources to cover accessibility studies of their websites or systems. These resources point in a user-friendly manner to how accessibility can be implemented. With respect to this grant, I have contributed to improvements of current resources through several surveys and specifically worked on a review of the translation of WCAG 2.1 to French. In having the standard available in French is an important milestone as a wider audience is reached. This is an extremely useful contribution since increasing the educational resources in other languages increases wider knowledge, understanding and implementation of WCAG.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

SMEs can encounter difficulties in engaging consultants on accessibility as this can be costly process. The educational resources produced by the W3C/WAI EO Working Group are published on its web site and are free of charge. Significant efforts are made to ensure that these resources illustrate how accessibility can be easily and progressively implemented. It is, therefore, important to increase the educational resources on accessibility standard implementation in other languages, given that Europe has many cultures and languages and a wider distribution in several languages is beneficial.

Impact on society

Implementing accessibility ensures that information is available to all. As the UN Convention, Article 9(g) states "States Parties shall also take appropriate measures to promote access for persons with disabilities to new information and communications technologies and systems, including the Internet;" Simply put, everyone has a right to access information. Covid has made our reliance on online information, shopping, reading, communicating even greater than before. Accessibility needs to be implemented more widely so that information is readily available to all without any online barriers which are sometimes created simply due to lack of knowledge, guidance and awareness. Thus, in using this grant, the benefits were:

- Review of the translation of WCAG 2.1 in French.
- Improvement of the resources through several surveys.
- As the knowledge base of support material in the French language is growing, it serves the purpose of moving closer to conformance to standards in accessibility via another language channel.

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

YES - Review Report requested on the French translation of WCAG 2.1

What future efforts or activity are still necessary in your area of application?

The standards in this field are mature. However, additional EU experts are needed to support the EU position.

Online references related to the fellowship work

Reviewed the French translation at: https://wcag.access42.net/ with English translation at https://www.w3.org/TR/WCAG21/

Contributing to accessibility standardisation

Léonie Watson

Director of TetraLogical and member of the W3C Advisory Board

United Kingdom

Sector

Accessibility of ICT products and services

Engaged SDOs, WGs and TCs

W3C/ERCIM

Addressed EU standardisation priorities and gaps

Traditionally, participants in the AG WG (and its predecessor the WCAG WG) have been orientated towards North America, and to a lesser extent the UK and Europe. However, WCAG 2.0 and 2.1 are referenced in European legislation, European Union Directives, and policies used across the public and private sectors. It is therefore imperative that a European perspective is represented as WCAG 3.0 is created, so that the next generation of W3C accessibility guidelines are fit for purpose within the European community.

Concerned ICT Standards and contribution to the related landscape

I'm participating in the Accessibility Guidelines Working Group (AG WG) of the W3C; specifically contributing to the creation of the W3C Content Accessibility Guidelines (WCAG) 3.0.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

In many countries across Europe, Small to Medium Enterprises (SME) are required by law to make their digital products and services accessible to people with disabilities. WCAG is the internationally recognised standard used by SME to determine if they meet this requirement.

Impact on society

The Web Content Accessibility Guidelines (WCAG) are the globally recognized benchmark for web accessibility. WCAG 2.0 and 2.1 are cited in laws and policies around the world, including the European Union. When released, WCAG 3.0 will continue to be the internationally recognized standard.

Without WCAG, organizations would have no framework for accessibility, schools and colleagues would have no standardized way of teaching accessibility, and consequently people with disabilities around the world would find the web a more difficult place to be.

Has your project directly involved or led to a specific recommendation or proposal for the development of new or revised standards? Or was it aimed at supporting the development or revision of a standard already under development?

YES - The Web Content Accessibility Guidelines (WCAG) 3.0 has been in development for about three years (though originally under the code name of Silver.

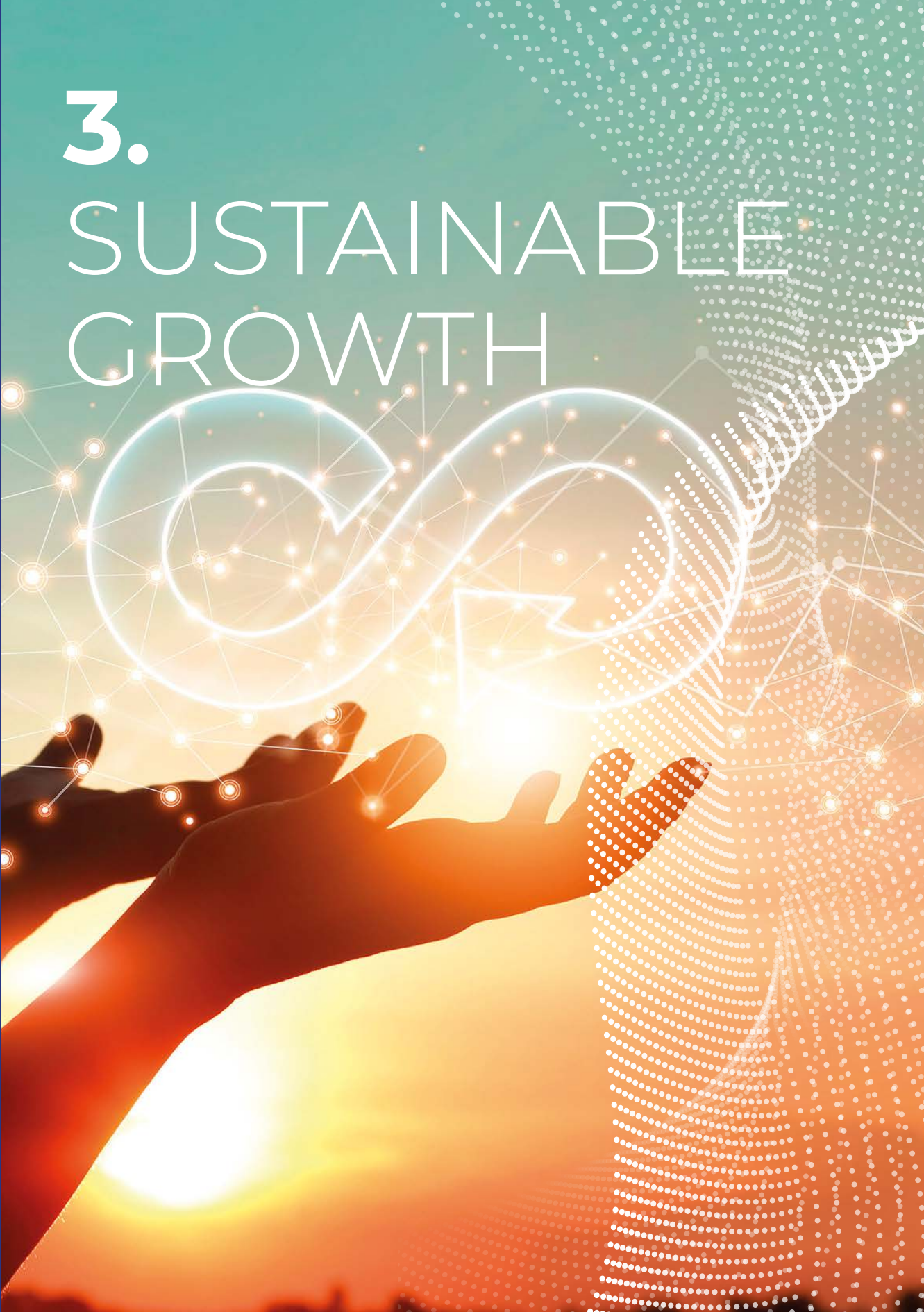
Have the standardisation activities in your project led to specific deliverables?

YES – Technical specifications

What future efforts or activity are still necessary in your area of application?

The standards in this field are in the preliminary phase. The W3C Accessibility Guidelines Working Group continues to be dominated by organizations and people from the USA. There are organizations and people from the UK and Europe that contribute, but a greater contribution from people outside of America will always be a positive outcome. For this reason, additional EU experts are needed.

3.
SUSTAINABLE GROWTH



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

Olivier Genest
Director, Trialog
France

Sector

Smart Grids and Smart Metering / IoT

Engaged SDOs, WGs and TCs

ISO
IEC
ISO/IEC

Addressed EU standardisation priorities and gaps

Based on the rolling plan for ICT standardisation (2021):

Public sector information, open data and big data:

- Action 2: Promote standardisation → We are working on EU data exchange reference architecture within BRIDGE and IEC SyC Smart Energy.
- Action 3: Support of standardisation activities at [...] H2020 R&D&I activities [level] → Within BRIDGE, we have launched an action dedicated to BRIDGE bidirectional cooperation with standardisation bodies.

Internet of Things

- ·Action 2: Continue ongoing work [...] data interoperability → BRIDGE and SyC Smart Energy both work on data exchange and interoperability to improve the data interoperability for smart energy but also with other sectors.
- ·Action 3: Provide standards [...] for IoT [...] → Through IEC Smart Energy roadmap, we will drive the development of standards in relevant TCs to allow IoT products for energy.
- ·Action 5: Promote [...] Reference Architecture for IoT developed in JTC1/SC 41 → As a JWG between IEC SyC SE and JTC1/SC41, JWG3 aims to bring IoT concepts to the smart energy standardization.
- ·Action 7: Further outreach to verticals → By leading cooperation between SyC SE and SC41, we will further develop the application of the IoT technologies to the Energy vertical

Smart grids and smart metering

- Action 1: Reflection of SGTF results on data interoperability, demand side flexibility and cybersecurity → SGTF results and their implementation in BRIDGE projects are driving needs for future standards (via IEC SyC Smart Energy)
- Action 3: Incorporation of SAREF into the full demand-side flexibility chain → BRIDGE and SyC SE have on-going work on ontologies for energy.

From IEC SyC SE perspective, the following challenges are tackled:

- Integration of new challenges such as digital twin into the smart energy roadmap (IEC 63097).
- Taking into account the current EU R&I work on IoT for energy to update existing (old) standards such as ISO/IEC 30101.

Concerned ICT Standards and contribution to the related landscape

The IEC System Committee Smart Energy deals with systems level standardisation, coordination and guidance in the areas of Smart Grid and Smart Energy.

The JWG3 "Smart Energy Roadmap" is a joint Working Group between the IEC SyC Smart Energy and the ISO/IEC JTC1/SC41 which focuses on Internet of Things and Digital Twin.

This purpose of this JWG is to map the existing standards with the relevant systems architectures, identify the standardisation gaps and recommend the development of new standards by TCs. With its systemic approach, the JWG also supports the introduction of IoT concepts into the smart energy domain and co-ordinate their integration into Smart Energy standardisation.

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

1. IEC 63097 Smart Energy Roadmap: the on-going work aims to update this standard (dated 2017) to update the mapping and gap analysis, include novel technology trends such as virtualisation or digital twin, and identify new required standardisation efforts for smart energy.
2. ISO/IEC 30101 Sensor network and its interfaces for smart grid system: this standard has been developed in 2014 to describe the use of IoT technologies for smart grids. Considering the major changes that occurred since then, the on-going work aims to update this standard to align it with the current smart grid standardization landscape and to integrate the latest IoT standards.

As co-Convenor of this JWG3, I am contributing to this on-going work. Also, I am making sure that the EU R&I results/experience from BRIDGE, ETIP SNET and OPEN-DEI are taken into account at worldwide standardization level, and I am disseminating the relevant on-going standardization activities to the three abovementioned initiatives.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

My company is a European SME, which is impacted by my contribution:

- My activities in IEC SyC SE and JTC1/SC41 allow to be aware of on-going standards development in the field of IoT and Smart Energy, which is crucial for a company providing consulting and expertise on innovation.
- My activities in BRIDGE, ETIP SNET and OPEN-DEI allow to share experience based on our R&I projects and to learn from the experience of other projects, enabling our solutions to be aligned with the needs of the EU market.

The EU SMEs from the smart energy sector, in particular when involved in EU R&I projects, can be impacted in the following ways:

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

Impact on society

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

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

YES - My activities aim to develop updates of two existing standards: (a) ISO/IEC 30101 IoT sensor network for smart grid, (b) IEC 63097 Smart Energy roadmap

What future efforts or activity are still necessary in your area of application?

Continuation of actions is suggested - The cross-fertilization between EU R&I ecosystem and worldwide standardization on Smart Energy needs to be pursued. BRIDGE has launched in 2021 an action on "BRIDGE contribution to standardization": the continuation of my work will allow to make this contribution possible, both by pushing EU R&I results to standardisation and by ensuring that EU R&I is aware of worldwide standardisation activities and results.

Regarding the two on-going projects:

- Maintenance of ISO/IEC 30101: this work is discussed to be transferred to another committee, considering the lack of resources in IEC SyC Smart Energy JWG3.
- Update of IEC 63097: the work has started and a methodology and supporting tools have been defined to enable the iterative writing, validation and publication of the updated content. This work should be continued.

Online references related to the fellowship work

Role of IEC SyC Smart Energy JWG3 convenor:

https://www.iec.ch/dyn/www/f?p=103:14:2042610712400 84::::FSP_ORG_ID,FSP_LANG_ID:12621,34

Advancing Standards for the AI Assisted Smart PV

Agnieszka Rządkowska
Chair of the European Solar Network
Member of the Board of the International Solar Energy Society
EITCI Institute, Belgium

Sector

Artificial Intelligence, Smart Grids and Smart Metering

Engaged SDOs, WGs and TCs

IEC
CEN/CENELEC

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 overviewing 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 optimization of solar cells operation in smart power grids systems).

Concerned ICT Standards and contribution to the related landscape

The proposal's contribution is in further progressing technical approach in 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 is 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 project or in the 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 & the COVID-19 recovery. EC

strategically plans to secure leading global position of the EU in smart energy, transforming the global warming challenge into a growth opportunity. SMEs driving European innovation focus on smart energy and international standardisation will support them.

Impact on society

Global warming caused by the greenhouse effect has been proven as a scientific fact. Its dynamics is increasing and the policy makers, with the EU taking a leading role, define decisive strategies as critically required to counter the situation.

Since the energy production sector dominates contribution to greenhouse gases emissions it is well known that the renewable, clean energy transformation is one of top priorities.

In this context both PV systems and the electricity grids are of key importance. In 2012 electricity represented 22% of the EU's energy consumption with renewables accounting for a share of 24% of gross production. Less than a decade later, in 2021, renewables have for the first time dominated traditional fossil fuels in the energy mix for electricity production in the whole EU, combined with an impressive relative growth of the solar energy share.

The societal impact of the AI assisted Smart PV standardisation is in further support of the clean energy transition.

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

YES - The action led to further development of 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- Technical specifications

What future efforts or activity are still necessary in your area of application?

Material science is one road to increasing efficiencies to costs ratios of solar cells. New developments lead to SC devices in single-junction technology reaching on average ca. 25% efficiency.

Another way to make solar cells more efficient is to combine them with advances in digital technologies and most importantly with AI. The current action's developed standards 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 standards have to be further developed towards increasing technical detail level upon expert cooperation. With multiple companies developing proprietary technologies utilizing AI in PV systems to increase efficiencies of energy conversion and electric grid integration, a consensus is present among experts that the technology requires sustained efforts in standards setting to jointly further develop.

Online references related to the fellowship work

A chapter on AI assisted smart PV standardization activities of the EITCI SESG SMART PV "AI assisted solar energy photovoltaic developments" has been published as a part of the monograph "Europe - Energy - Climate: The quest for the clean energy transition in the EU" edited by the proposal's author, available at:

https://press.eusolarnet.org/esnp/catalog/book/europe-energy-climate (chapter 4.3)

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/

Integration of Green aspect inside Internet of Things standard

Thierry Monteil
IoT expert
Professor in computer science at INSA, France

Sector

IoT

Engaged SDOs, WGs and TCs

OneM2M
ETSI

Addressed EU standardisation priorities and gaps

The challenge is not to simply see an IoT system as a way to better control our energy consumption and natural resources, but to go further by making the IoT system a virtuous element in terms of resources through its energy use.

At the level of the services offered by the standard, it is necessary to study the energy impact of the different modes of communication (request-response, subscription-notification, etc.) or of access management. For data, the study of local pre-processing and their location are points that can impact energy consumption. New services around energy indicators would allow dynamic management of the IoT system to optimize its own energy consumption and architecture. This desire to make better use of energy by the IoT system has a direct environmental impact through the energy consumed and indirect, for example via the necessary energy sizing with ultimately less energy-related equipment (battery, solar panel, etc).

This joins the Declaration on a Green and Digital Transformation and the challenge of converging in 2050 towards the first climate-neutral continent.

Concerned ICT Standards and contribution to the related landscape

The proposed project concerns standardisation in the field of IoT and the integration of recommendations in terms of ICT environment impact. This aspect, in particular in the oneM2M standard carried among others by ETSI, is for the moment not present in the standard itself except in the interfacing with 3GPP and the taking into account of the capacities of 5G in terms of reducing energy consumption. On the other hand, at the level of services, data management or the architecture to be deployed to set up an IoT system ranging from the sensor to the cloud, everything remains to be done.

In this project, we propose to raise awareness on the one hand of IoT standardisation players on the energy impact in defining standards and on the other hand to developers of IoT stacks and applications. For this, we propose an approach consisting firstly of starting from the existing to highlight the energy impact in the choices of the use of a standard and its implementations and then secondly to identify a set of recommendations both on possible changes to the standard but also on the choice of implementation and deployment of IoT applications and stacks.

We then propose to exchange with smartM2M ETSI working group during meeting and special event about the work and results done in this project.

Impact (on European SMEs, related project or in the society)

Impact on society

The project concerns two aspects: ICT environment impact and the field of the Internet of Objects and its application in the fields for example in eHealth, Industry 4.0, Intelligent Transport Systems, Smart cities. These areas are part of the development strategy at European level.

Concerning the Internet of Things part, Europe in particular through ETSI and its WG smartM2M supports the development of the oneM2M standard with contributions in various fields: representation of information via ontologies, integration of AI in the IoT, etc. Special assistance is also being given to disseminate the oneM2M standard beyond the borders of Europe with targeted European projects such as INDICO (https://indico-ictstandards.eu) or indian EU-ICT standardisation with the creation of workshops or hackathons to explain and use the oneM2M standard, particularly at the political, industrial and training level.

Likewise, Europe supports many programs around green ICT through projects and charters (for example green digital charter for smart city). The Objectives is to being the first climate-neutral continent by 2050. This materialized in 2021 by Declaration on A Green and Digital Transformation.

The objective of the project is to federate its two objectives for Europe and to propose ways to have a standard for the IoT considering in its specification and in its use green ICT aspects. The demonstration with opensource implementation will help to convince the community of IoT standardisation and increase the impact on future release of the standard. The project also includes an aspect of dissemination of results within the standard community but also developers and users. By this way it will also impact the way they are developing implementation of stack and applications. All results will be published as opensource.

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

YES - In this work, we have first work with opensource implementation of oneM2M to prove that Energy consumption of oneM2M IoT stack should be taken in account in the future. This should be made at the level of standardisation organism, developers of oneM2M IoT stacks, developers of IoT applications and finally at the level of deployment of IoT solutions. Those proposals will be presented to the IoT standardization communities during IoT weeks in October 2022 or/and in a specific meeting of smartM2M working group.

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

YES – Technical report (Reference data; Recommendations for new/revised standards)

What future efforts or activity are still necessary in your area of application?

Continuation of actions is suggested. This work has shown that the energy consumed by the software stack implementing an IoT system had a variable impact depending on the software stack and the use made of it. For this, a first set of experiments was made to prove this. On this first point, no particular domain has been integrated into the uses through the way of structuring a system or the real characteristics of the applications. It would be necessary to go further starting from real scenarios in order to refine the recommendations.

Regarding the recommendations made for the evolution of the oneM2M2 standard, principles have been laid down (notion of energy budget, coupling with QoS, monitoring to put in place dynamic policies) with initial proposal in terms of implementation in the standard. Nevertheless, we could go further by proposing modifications to the standard and by drafting the modification proposals to integrate the energy aspects.

Finally, tools to help IoT application developers and system architects such as energy

consumption simulators for oneM2M would cover the standard definition cycle, use of a software stack and final deployment of an optimal solution in terms of energy consumption.

Online references related to the fellowship work

- The source code of tests has been published as open source: https://github.com/thierry85/oneM2M_energy

4.
INNOVATION FOR THE DIGITAL SINGLE MARKET

Contribution to ISO/TC 307 - ISO/IEC JTC 1/ SC 27 WG, ISO/IEC JTC 001/SC 17 and DIGITAL SME - Phase 2

Ljupcho Antovski
Professor of software engineering
Ss. Cyril and Methodius University Skopje, Macedonia

Sector

Blockchain/DLT, FinTech/financial services/eInvoicing, eGovernment

Engaged SDOs, WGs and TCs

ISO/IEC

Addressed EU standardisation priorities and gaps

1. ISO/IEC JTC 001/SC 17 is mentioned in the EC RP plan as international body that has produced the standards in this area. More the committee is very active and at this moment there are several standard updates, resolutions, and interest in liaison with ETSI SCP. The participation in this committee is in line with the Actions 1-3 in EC RP especially addressing issues like security for apps, access and accessibility, management and portability of customer data, and transparency.
2. Joint ISO/TC 307 - ISO/IEC JTC 1/SC 27 WG - works in one of the priority areas that has been recently added to the EC RP. The EC RC calls standard developing organisations to identify potential standardisation needs. Since the European Commission has established a liaison A with ISO TC 307, this activity supports this action.
3. DIGITAL SME Task Force on Blockchain and DLT - The new European DIGITAL SME Alliance Task Force aims to bring together Blockchain and DLT innovators, experts and policymakers.

Concerned ICT Standards and contribution to the related landscape

The objective of this project is to strengthen the European presence and protect the European interest by joining and contributing in the ISO committees:

- Joint ISO/TC 307 - ISO/IEC JTC 1/SC 27 WG: Blockchain and distributed ledger technologies and IT Security techniques.
- ISO/IEC JTC 001/SC 17 “Cards and security devices for personal identification”.

The project envisages as well participation in the European DIGITAL SME’s Alliance Task Force on Blockchain & DLT.

The above committees work is in direct relation to the priority areas in Innovation for the Digital Single Market:

- Blockchain and Distributed Digital Ledger Technologies.
- Fin-tech and Reg-tech standardisation.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

I have participated in the DIGITAL SME Task Force on Blockchain and DLT - The new European DIGITAL SME Alliance Task Force aims to bring together Blockchain and DLT innovators, experts and policymakers to network, discuss blockchain-related opportunities and challenges, and shape the European blockchain ecosystem.

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

YES – Technical Report (development of new standards); Technical Report (common terminology)

What future efforts or activity are still necessary in your area of application?

Different projects are in different state of maturity. During the past 6 months the following project have had developments:

- ISO/PRF TR 23249 Blockchain and distributed ledger technologies – Overview of existing DLT systems for identity management – Stage 50.20 Proof sent to Secretariat or FDIS ballot initiated: 2 months.
- ISO/DTR 23644 Blockchain and distributed ledger technologies - Overview of trust anchors for DLT-based identity management (TADIM) – Stage 30.60 Close of voting/comment period.
- ISO/AWI 7603 Decentralized Identity standard for the identification of subjects and objects. - Stage 20.00 New project registered in TC/SC work programme.
- ISO/PWI 12833 Re-identification and privacy vulnerabilities and mitigation methods in blockchain and distributed ledger technologies – Stage 00.00 Proposal for new project received.

This is ongoing work in an ISO TC where several projects are ongoing and are in different stage of maturity, so continuation of action is suggested.

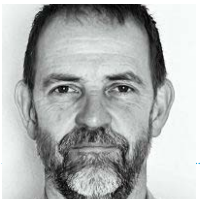
Online references related to the fellowship work

https://sd.iso.org/documents/ui/#!/browse/iso/iso-tc-307/iso-tc-307-jwg-4

https://sd.iso.org/documents/ui/#!/browse/iso/iso-iec-jtc-1/iso-iec-jtc-1-sc-17

https://www.digitalsme.eu/groups/task-force-on-blockchain-dlt/

Consolidating and evolving European traffic management information standards



Jonathan Harrod Booth
Convenor - CEN/TC278
United Kingdom

Sector

ITS/Automated driving

Engaged SDOs, WGs and TCs

CEN
ISO

Addressed EU standardisation priorities and gaps

The strengthening and augmentation of the existing DATEX II (CEN 16157) series standards is bringing a stronger common basis for sharing traffic management-related information. This is the referenced technical basis for some of the objectives laid out in the ITS Directive (2020/40/EU) and many of the related EU Delegated Regulations (2013/885, 2013/886, 2015/962, 2017/1296). As mobility and environmental needs develop the support standards for data exchange as being developed to address needs arising. For example, in this grant period CEN/TS 16157-10 Energy Infrastructure Publications, which addresses electric vehicle chargepoint information exchange, has been published. Also, CEN/TS 16157-11 Machine Interpretable Traffic Regulation Publications has also been published to address the growing need to be able to published and consume information on traffic regulations and urban city zones.

Concerned ICT Standards and contribution to the related landscape

DATEX II is a key cornerstone of the EC's contribution for common terminology and ways of working for road traffic management across Europe. Standardisation is essential. Since mid-1990s, Jonathan has been active in DATEX II developments and as the convenor of CEN/TC278/WG8; lead developer of the DATEX II core standard. The funding supported Jonathan in his role as the WG8 convenor, taking the existing set of DATEX II standards through to being ENs, and supporting the evolution and extension of further Parts to the CEN 16157 DATEX II series.

He is active in work to development and coordinate evolution of a common parking data model and definition, using DATEX II Part 6/APDS/ISO TS5206-1. This stream of activity links across to the on-going desire to bring greater harmonisation to the parking data concepts across European standards.

Also, he leads CEN/ISO activities on the development of standard for the exchange of electronic traffic regulations (work in both CEN/TC278/WG8 & WG17). This forms and is defined in CEN/TS 16157-11, which is being prepared for formal vote, but is also expected to be revised shortly taking on-board and supporting the outputs of the wide consultation across many European cities with the work and outputs of the UVARBox EC-funded Preparatory Action (MOVE/B4/SER/2019-498/SI2.832125). Jonathan has a critical coordination role, being both the convenor of WG8 and actively supporting the specification of CEN/TS 16167-11, but also being the work item leader for the CEN and ISO work items on the "Management of Electronic Traffic Regulations" (CEN WI 278472 and ISO/PWI 24315-1). This is an area of high interest in both standardisation and for the European Commission.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

Availability of open Standards for traffic management data which form the technical basis for European Delegated Regulations brings forward shared traffic management data across the EU and broader Europe. Many of the specialist actors in this field are SMEs, providing services and software to road operators, service providers and data aggregators. The availability of commonly standards and the publication of conformant data sets across Europe eases the technical barriers for SMEs to be able to offer products and services to a European marketplace.

Impact on society

Accessibility to a broad spectrum of standardised traffic information supports strategic societal objectives relating to both mobility and environmental aspects. The CEN 16157 "DATEX II" series of standards are a critical underpinning of such information and mobility services across Europe. Accessibility to this information better informs travellers, especially drivers, with information when planning journeys and also on route - and as a means to provide support to in-vehicle navigation services. This aids better planning of journeys, earlier awareness of disruption and alternative routes, improved information on where to find parking spaces and charge electric vehicles, and guidance travellers on the restrictions that may apply when visiting cities across Europe.

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

YES - Parking data harmonisation between sectoral actors from the parking industry, road operators and public transport authorities is expected to lead to more harmonised standards in late 2022/early 2023.Early developments for the digitisation of traffic regulations has led to the publication of CEN TS 16157-11 in the grant period. Additional user input and clarification of regulatory requirements has established the need to revised 16157-11 in 2022-23 to take account of additional requirements.

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

YES – Technical specifications, Technical report – recommendation for new/revised standards.

What future efforts or activity are still necessary in your area of application?

Although much of the DATEX II (16157 CEN series of Standards) are mature and widely deployed, ongoing maintenance is required to ensure continued relevance and adapt to evolving regulatory requirements. Additionally, the spectrum of needed mobility-related data adapts to current trends (electrification of the vehicle fleet, improved services to inform drivers better, etc.). As the data infrastructure for road transport matures in Europe, there is a clear need to address some of the existing gaps and ensure that opportunities are taken to ensure that the broader spectrum of technical standards is aligned. Upcoming opportunities to seek greater standards alignment for, say, parking data exist and technical work is foreseen in projects such as NAPCore. Standardisation work is also required.

Online references related to the fellowship work

- www.datex2.eu - For DATEX II (CEN 16157 series standards)
- https://iso-tc204.github.io/iso24315p1 - For development work concerning Standards development work on digital traffic regulations

Regulatory Technology (REGTECH) Standardisation in financial risk management

Shakira Bedoya

Senior Risk Officer - Business Risk and Controls at Danske Bank

Danish Standard foundation, Denmark

Sector

FinTech/financial services/eInvoicing

Engaged SDOs, WGs and TCs

ISO

Addressed EU standardisation priorities and gaps

Gaps: Lack of adequate integration of ICT standards into financial regulatory processes.

Priority: Establishment of a common European approach towards technological innovation in financial regulatory processes.

Challenge: Need to improve the alignment between ICT standards and the requirements and needs of financial services, specifically in areas of compliance and risk management.

Concerned ICT Standards and contribution to the related landscape

The objective is to develop standards to promote the use of new technologies for financial risk management. Currently, the nexus between ICT technology and financial risk management is inadequate and there is a strong need to foster standardization that could enhance the use of Regtech in financial services.

By participating in the work of Danish Standards (DS) my objective is to foster standardisation by participating in two committees: ISO/TC 68 (Financial Services); ISO/TC 309 (Governance of organisations).

Impact (on European SMEs, related project or in the society)

Impact on society

In August 2020, The European Banking Authority (EBA) recognize the need to establishment of a common European approach towards technological innovation identifying RegTech as an area to be better explored and understood. My work supported fostering RegTech within Financial Risk Management.

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

YES - ISO/CD 13491-2. Financial Services- secure cryptographic devices (retail) – security compliance checklists for devices used in financial transactions; ISO/DTS 23526 Security Aspects for Digital currencies; ISO/FDIS 9362 Banking- Banking telecommunications messages – Business identifies; ISO/AWI 37006 Indicators of effective Organizational Governance: Guidance; ISO/AWI 37005: Governance of Organizations – Selecting, Creating and Using Indicators: Guidance for Governing Bodies. ISO/DIS 32210. Sustainable Finance-Principles and Guidance.

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - ISO/TC 68/TAG 1; ISO/TC 68/AG 4; ISO/TC 68/AG2; ISO TC 309/WG1; ISO TC 309/WG 3; ISO TC 309/WG4; ISO TC 309/WG6; ISO TC 309/WG7.

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

YES – Technical specifications, Technical reports (development of new/revised standard, recommendation for new/revised standards).

What future efforts or activity are still necessary in your area of application?

Additional EU experts are needed. To be able to work on standardisation at the international ISO/EU level you need to be appointed by a national society which grants memberships only through a payment of annual fees. In practice this is a barrier to many excellent experts (specially females) who cannot secure funding. It is my recommendation to provide additional funding for a longer period of time and to except i.e. membership fees to experts that are working on specific ICT standards.

Online references related to the fellowship work

https://www.ds.dk/da/udvalg/kategorier/samfund/governance

https://www.ds.dk/da/udvalg/kategorier/samfund/finansielle-services

International standards for higher temperature, co-packaged optical interconnect

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Sector

Quantum Technology

Engaged SDOs, WGs and TCs

BSI
IEC

Addressed EU standardisation priorities and gaps

Over the past two years a number of industrial organisations and MSAs have emerged to develop specifications for co-packaged optical assemblies. The industry is preparing for co-packaged optics (CPO), which is expected to arrive in 2024-2025, enabling 25.6 Tbps and 51.2 Tbps switches (Figure 3). While Microsoft and Meta (formerly Facebook) say that 25.6 Tb/s and 51.2 Tbps could be addressed by a combination of CPO and faceplate pluggable modules (FPP), they stated that 102.4 Tb/s switches will only be accommodated by CPO with the main companies now preparing for CPO include Broadcom, Intel, Microsoft, Cisco, Meta, Juniper Networks and Nvidia. These include

The Co-Packaged Optics Collaboration, a Joint Development Foundation (CPO JDF) founded by Microsoft and Meta in 2019, which published the first CPO specification "3.2 Tb/s Copackaged Optics Optical Module Product Requirements Document" in February 2021.

The OIF have introduced the Co-packaged Framework project, which includes the The 3.2T Co-Packaged Optical Module IA and the External Laser Small Form-Factor Pluggable (ELSFP) IA. The Consortium for On-Board Optics (COBO) have also recently started a Co-packaged Optics working group. The CW WDM Multi-Source Agreement (MSA) defines a set of wavelength grids, all in the O-band and 4 covering three different spans. However, there are no SDOs looking at this critical new technology.

Concerned ICT Standards and contribution to the related landscape

On this project the consultant proposed a liaison between two IEC WGs, namely IEC TC86 SC86C/WG4 (photonic integrated circuits) and IEC TC91/WG6 (embedded electronic devices), which collectively have the breadth expertise to address co-packaged optical assembly. The consultant was chosen as the liaison officer between these two groups and proposed a joint Technical Report on Co-packaged Optics, which would serve as a precursor to joint international standards on CPO.

The consultant also saw the publication of the international standard IEC 62150-6:2022 - Fibre optic active components and devices - Test and measurement procedures - Part 6: Universal mezzanine boards for test and measurement of photonic devices, which he authored and which serves as a precursor to CPO technology. The consultant also published 5 papers and delivered 5 talks during this fellowship on CPO and associated standardisation. The consultant created a feasibility study, which will be emailed to StandICT.eu directly with the submission of this final report.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

CPO is dominated by the USA, however extensive know-how exists within European research institutes and SMEs on PIC packaging (Tyndall Institute, Fraunhofer IZM and HHI, CEA LETI, PHIX, CITC, Alter, Bay Photonics, Argotec, Ficontec, Aixemetric, Aifotec). These organisations will benefit strongly by shaping the international standards on CPO, which would inherently have further reach and be more reputable than US centric industrial standardisation.

Impact on society

Hyperscale data centres are very large data centres typically comprising at least hundreds of thousands of servers and associated storage and networking capacity, and they are run by major internet content providers, such as Google, Microsoft, Amazon and Alibaba, to provide "cloud" services. By 2022 hyperscale data centres have become the dominant form of data centre in the world, overtaking private and enterprise data centres, with most organizations outsourcing their data storage requirements to these highly secure facilities with guaranteed quality of service. Hyperscale data centres are a fundamental part of global digital society and CPO technology will be a powerful enabler of bandwidth scalability and power reduction in data centres on a global scale.

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

YES - During the project prior to and following the publication of the international standard IEC 62150-6:2022 (written by the consultant), the consultant used this standard as the basis to justify a liaison between IEC TC91 WG6 and IEC TC86 SC86B/WG4 to investigate Co-packaged Optics and new standards in the 62150 series, which could build directly on this existing published standard. He was successful and the liaison was approved.

Has your fellowship contributed to the development of a new work group (WG) or a new technical committee (TC)?

YES - The liaison formed between TC91 WG6 and TC86 SC86C/WG4 will form the basis of a new JWG if a strong need for CPO standards is identified. The precursor to this will be a technical report on CPO, which the consultant has been approved to start within the IEC.

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

YES – Technical reports (Reference material; Recommendations for new/revised standards; Development for a new/revised standard)

What future efforts or activity are still necessary in your area of application?

Co-packaged Optics are a key enabling technology to accommodate the exponential surge in digital information projected over the coming years. In order to standardise this at an international level a great deal of work needs to be done within the SDOs to find a platform for and justify the standardisation work in CPO. In this fellowship project the consultant has implemented a baseline or "seed" platform for CPO standardisation within the IEC, namely the international standard IEC 62150-6:2022, published in January 2022. Continuation of action is suggested.

Online references related to the fellowship work

Links to conference and journal publications authored by the consultant:

https://doi.org/10.1117/12.2609301

https://www.mdpi.com/2076-3417/12/3/1565

https://ieeexplore.ieee.org/document/9673907

https://ieeexplore.ieee.org/document/9648898

https://www.mdpi.com/2076-3417/11/22/10955

Parson + iiRDS, Working Group participation and Maintenance Domain extension

Mark Schubert
Technical consultant and developer
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Sector

Ontologies & Open standards

Engaged SDOs, WGs and TCs

iiRDS

Addressed EU standardisation priorities and gaps

iiRDS is aligning with other standardisation initiatives. For example, an iiRDS taskforce is working on ECLASS and the iiRDS Steering Committee on Industry 4.0 alignment. None of these activities addresses alignment on ontology level. This funding allows to fill this gap and align the iiRDS metadate model with existing European ontology initiatives.

Within the industry, iiRDS finds use in running projects. But integrating iiRDS data with other knowledge graphs is done on company level and based on proprietary implementations and interpretations of iiRDS and other standards. This project sets a foundation by aligning iiRDS with OntoCommons and existing top-level ontologies. Having a common ground would greatly improve data integration within the iiRDS use cases and open up iiRDS to other European ontologies. The main challenge is a lack of knowledge within the iiRDS consortium regarding top-level ontologies which hamper the ability to assess pros and cons of such an alignment.

Concerned ICT Standards and contribution to the related landscape

The funding contributed to the extension of my activities for the iiRDS consortium. The following tasks were covered:

iiRDS Working Group Development

- Schedule and moderate monthly iiRDS WG Development meetings.
- Participate in monthly iiRDS WG Tools meetings.
- Research impact of top-level ontology alignment for iiRDS and draft an OntoCommons-aligned iiRDS Ontology.
- File and update work packages in the iiRDS task tracker JIRA.
- Draft an iiRDS maintenance domain based on maintenance information in S1000D.
- Research existing maintenance ontologies that might complement or substitute the draft iiRDS maintenance domain.
- Present OntoCommons activities in the working groups and at the tekom Spring conference in Potsdam, Germany.

Coordination with OntoCommons

Alignment with OntoCommons regarding their plans for top-level ontologies.

Research of top-level ontologies and other maintenance initiatives, e.g. IOF maintenance working group.

Impact (on European SMEs, related project or in the society)

Impact on SMEs

I have participated in discussions with OntoCommons experts to promote requirements of the domain of technical communication. In April, I gave a talk about OntoCommons and iiRDS at the annual tekom Spring Conference. Within the activities of iiRDS, I report findings of the research conducted within this project and discuss its potential impact on iiRDS.

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

YES - OntoCommons alignment proposals with iiRDS working groups, in particular with WG Development. Hopefully, my proposed changes will be part of a future iiRDS release

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

YES - As a result of the activities iiRDS has an ontology draft file in OWL that maps iiRDS metadata to the OntoCommons top-level ontology BFO. The work progress is tracked in the internal iiRDS repository. Another deliverable was delivered to make the released ontology publicly available without prior registration, here:

https://raw.githubusercontent.com/iirds-consortium/models/main/iirds-core.rdf

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