



Enjoy!
THE ETSI MAG

Sustainability

Lead the standardization,
make it clean, keep it green.

THE INTERVIEW with Luis Neves, GeSI CEO ■ **NEW MEMBER INTERVIEW** with Megan Brewster, vice president of advanced technology, Impinj ■ **TECH HIGHLIGHTS**, KPIs for ICT infrastructures ■ **IN THE SPOTLIGHT**, making ICT greener and more sustainable ■ **NEWS ON 3GPP**, Energy Efficient ■ **NEWS ON oneM2M**, IoT and Sustainability

APRIL 2023

ETSI 
The Standards People

The digital transformation will be fundamental to the green transition.



Over the last few years, the world has been waking up to the fact that sustainability is critical to our future and an important issue for all of us. When analysing what our part is in this quest for sustainability, we realize that the digital transformation will be fundamental to the green transition. Operators, vendors and policy makers have announced ambitious energy-efficiency and emissions targets. In this new edition of Enjoy!, we invited some

of them to talk about their goals and the key role of standards for ICT sustainability.

Luis Neves, CEO of GeSI (Global Enabling Sustainability Initiative), answers our questions in our **main interview**, telling us why sustainability aims to fulfil the needs of current generations without compromising the needs of future generations. In our **zoom on Europe**, Ilias Iakovidis, from DG CONNECT, observes that for the green transition to succeed, the digital transformation needs to be its "ally". Megan Brewster, Impinj Vice-President of Advanced Technology, interviewed as our **new member**, explains how in connecting 'everything' they are driving efficiencies, reducing waste and enabling the circular economy.

Our **tech highlights** articles address the challenges of IoT in correlating multiple sources of information for sustainability and energy-efficient new services, and the challenges facing operators when it comes to reducing their environmental impacts during operation. As for our **Spotlight** section, Beniamino Gorini, Chair of the ETSI technical committee of "Environmental Engineering", gives us an overview on how ETSI standards can help mitigate the environmental impact of ICT.

And I hope you like the new design of our magazine,

Enjoy reading!



Luis Jorge Romero,
Director-General ETSI

The Interview

with Luis Neves,
CEO, GeSI

P. 4/5

Meet the New Standards People

P. 6/7

New Member Interview

with Megan Brewster,
Vice President,
Advanced Technology, Impinj

P. 8/9

Tech Highlights

KPIs for Sustainable ICT Infrastructures

P. 10

In the Spotlight

Making ICT greener and more sustainable

P. 14/16

Research

The Innovation cycles of Standardization

P. 18

Inside

Behind the scene: how the secretariat makes it greener

P. 24/25

What's On?

Upcoming events

P. 26/27

A breakthrough! Software Development Groups

Building on the success of hosting open-source projects operating alongside standards committees, ETSI has adopted a new instrument, **Software Development Groups (SDGs)**, that will provide industry with an easy path to link software and standards. With the continuous evolution of communication systems from hardware-based to software-defined, there is a greater need for collaboratively developed software to accompany traditional standards. While there are various existing open-source software foundations, ETSI Software Development Groups provide industry with an easy path to link software and standards. In addition, ETSI offers a neutral venue and a governance model derived from open, transparent standards development.

"With this decision to adopt Software Development Groups, ETSI is capitalizing on our experience in linking software and standards to prepare for future standardization needs in the age of 6G and pervasive AI," says Luis Jorge Romero, ETSI Director-General.

Developing software to accompany standards will accelerate the standardization process, providing faster feedback loops and improving the quality of standards. Tailored for collaborative software development, these groups will utilize tools and processes already

familiar to developers. Various software copyright licences are available, including open-source licences. The adoption of Software Development Groups brings new opportunities for innovation and collaboration and prepares ETSI for an exciting future.

Digital technologies for smart and sustainable cities

On 9 and 10 February 2023, the city of Montrouge and the non-Governmental Organization e.Green for Users (eG4U) held a **"Colloque sur les technologies numériques pour une ville intelligente et durable"** (symposium on digital technologies for smart and sustainable cities) with the support of the Greater Paris Metropolis, the European Commission and ETSI.

The participants explored two topics: how technologies can help combine innovation and sustainable development within our cities and the challenge of reducing the environmental impact of digital technologies.

ETSI, represented by Luis Jorge Romero, Director-General, and Xavier Piednoir, Technical Expert, as well as several members, highlighted the role of standards in enabling a smart and sustainable society.

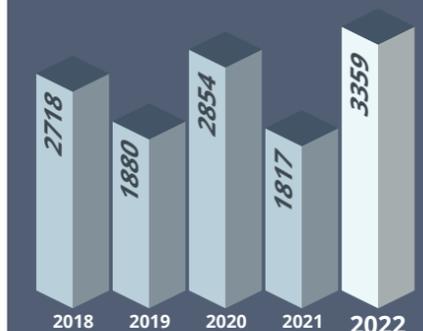
They explained in particular the objectives and achievements of several of ETSI's groups, including the committees in charge of Access, Terminal Transmission and

Multiplexing (**TC ATTM**), environmental Engineering (**TC EE**), the group on Operational Energy efficiency for Users (**ISG OEU**) and the partnership project **oneM2M** and **3GPP**.



ETSI's production of standards takes off!

2022 was a record year for ETSI with 3,359 specifications and reports published! This is the total number of all deliverable types produced by Technical Bodies, Industry Specification Groups, and our partnership projects, oneM2M and 3GPP, throughout the year. The previous record year was 2010 with 2,568 specifications and reports.





Luis Neves
CEO, GeSI

Sustainability aims to fulfil the needs of current generations without compromising the needs of future generations.

Luis has been CEO of the **Global Enabling Sustainability Initiative (GeSI)** since 2017. Prior to that, from 2008-2017, he worked at Deutsche Telekom in positions such as Head of Sustainable Development and Environment, VP of Corporate Responsibility and Chief Sustainability and Climate Protection Officer. Luis has also held positions and played relevant roles at European and international levels in organizations such as the UN Global Compact Lead Group, Econsense - the German Sustainability Association, World Resources Forum Association and UNFCCC Momentum for Change Initiative. Luis was born in Portugal and obtained a degree in History from the University of Lisbon.

Have you noticed a change of mindset in organizations over the last 20 years?

Sustainability aims to fulfil the needs of current generations without compromising the needs of future generations, while ensuring a balance between economic growth, environmental stewardship and social well-being. These three dimensions were not visible in organizations 20 years ago. Looking back, corporations were involved in some social or charity

“Corporations now understand that they need to encompass the economic, environmental and social dimensions of sustainability.”

activities and the buzz words were very much “Corporate Social Responsibility”; more recently, corporations have started to understand that responsible business practices needed to encompass these three dimensions. But this change in mindset has been too slow. The world is at a crossroads. We now find ourselves in a situation where humanity is facing multiple concurrent catastrophes: the existential threat of climate change, the collapse of biodiversity, growing inequality of income and opportunity and a growing population expected to be 10 billion by 2050.

All of this has led companies to strategically and deeply explore how to embed sustainability into their corporate strategies. Much of this change has been driven by regulatory change, mainly in Europe, with the implementation of the European Green Deal. So there is a change in mindset, but as I said, far too slow for the challenges ahead.

How do you see your collaboration with ETSI?

GeSI recognizes the importance of collaboration and knowledge-sharing.

We understand that ETSI's mission is to provide platforms where interested parties collaborate on global standards for ICT systems and services. GeSI has been developing technical work in the sustainability field that could benefit from a collaboration with ETSI in transforming it into standards. It would move the ICT industry forward as a whole.

Although GeSI and ETSI signed an MoU of collaboration a long time ago, we have never been able to leverage that agreement in a proper and substantial manner. It is now time for both organizations to explore and bring together their areas of expertise.

We consider the partnership between GeSI and ETSI to be essential, as it will allow more experts to contribute to this very complex topic and identify possible areas of alignment with other global standards and methodologies.

With the growing number of datacentres, ICT may contribute to increased greenhouse gas emissions; what are your thoughts on this?

Between 2007 and 2019, GeSI did extensive research with several prominent consulting firms. This substantial research concluded that the Global ICT footprint is quite stable, representing 2% of the global emissions. It must be said, though, that the same ICT Industry is enabling substantial greenhouse gas emissions reductions. The GeSI Smarter2030 report calculated that the ICT Industry could reduce 20% of the global emissions and generate a business value equivalent to the GDP of China. The message is clear: ICT is a fundamental technology to combat climate change.

Datacentres, part of the GeSI research, certainly consume a lot of energy, materials, and water, making sustainable operations difficult.

Our Industry is good at innovating and constantly developing disruptive technologies. And when it comes to datacentres, we are seeing many operators deploy more innovative solutions, leading to greater efficiencies. An example of promising solutions is Microsoft's underwater datacentre, “Project Natick”.

“The partnership between GeSI and ETSI will allow more experts to contribute to this very complex topic.”

Research around cooling, latency, and sustainability measures are on-going. It's an interesting prospect, yet other companies do not seem to be in a hurry to investigate innovative experiments such as these.

Complementary to innovation is knowledge-sharing. It is also important that ICT corporations invest in, along with innovative solutions for greater efficiency, clean energy.

What are the roles of policymakers for a greener world?

Policymakers must make a greater effort to integrate the real-world experiences of the private sector, inviting corporations to contribute and inform regulatory reform towards sustainable growth. The **EGDC (European Green Deal Coalition)** is a step in the right direction, but this is not enough.

As an example, the EU Taxonomy does not include telecom networks and there is a lack of recognition of how strongly digital technologies can be an enabler towards emissions reductions. This is very much a missed opportunity, as our entire mission at GeSI is to prove just how essential digital solutions are to driving the green transition. I am hopeful that the European Commission will ensure an inclusive consultation period is on the horizon.

Globally, I would also like to see stronger policy actions around circularity – one cannot depend on companies and recyclers alone to manage this. There continues to be conflicting or limited information on the transboundary movement of e-waste, allowing unlawful e-waste management, which is to the detriment of our planet's health, as well as that of humans.



Welcome to our New Members

AB Handshake Corp.

 United States of America

The AB Handshake technology is a universal solution, working for all types of networks, aiming to prevent voice fraud by call validation. The AB Handshake Corporation has established a large trusted community of telecom service providers that share the common goal of eliminating fraud.

Yunex Traffic

 Germany

Yunex Traffic is a global leader in intelligent traffic solutions that develops novel mobility options for cities, highway authorities and mobility providers. It creates products for efficient mobility ecosystems that use digitalization to transform cities into places where people can live, work, and move more freely.

Broadcom Europe Ltd

 United Kingdom

Broadcom is a global infrastructure technology leader that designs, develops and supplies a wide range of semiconductor and infrastructure software solutions. Broadcom's product offerings serve the data centre, networking, software, broadband, wireless, storage, and industrial markets.

Etherstack Wireless Limited

 United Kingdom

Etherstack is a global leader in essential push-to-talk communications. The company is specialized in wireless and network communications technologies for customers in the public safety, defence, utilities and resources industries. Its technologies are licensed by the leading names in wireless communications globally. The company also manufactures digital radio networks and tactical communications products.

CSIRO

 Australia

CSIRO is an Australian Government agency responsible for scientific research. CSIRO's primary functions are to carry out scientific research and to contribute to the achievement of national objectives. From its headquarters in Canberra, CSIRO maintains more than 50 sites across Australia and in France, Chile and the United States, employing about 5,500 people.

Hytera Communications Corporation Limited

 China

Hytera Communications Corporation Limited is a designer and manufacturer of professional mobile radio communications equipment. Their portfolio of devices, systems and software applications offer voice, video and data services, providing fast, safe and reliable connectivity solutions for mission- and business-critical communications. With its ten R&D centres around the world, Hytera aspires to leverage its technologies to improve organizational efficiency.

Kepler Communications GmbH

 Germany

Kepler designs, builds, launches, and operates an advanced network of low-earth orbit satellites with the goal of providing real-time, continuous connectivity for space and abolishing barriers to make space-generated data universally accessible. Kepler's products keep customers connected to on-orbit assets by enhancing telemetry, tracking, and commanding (TT&C) availability through intersatellite links and significantly increasing capacity for mission-essential data being downlinked back to earth.

Digitel on Trusted Services, SLU

 Spain

DIGITEL TS are experts in customer management, process, technology and electronic signatures. With more than three million electronic contractual operations certified per year, DIGITEL TS is the reference supplier for the main Spanish telecommunications and public services companies. They are experts in designing and implementing comprehensive electronic procurement and communication processes.

Impinj UK Limited

 United Kingdom

Impinj enables digital transformation by extending the Internet's reach from the cloud, through edge connectivity devices, all the way to billions of everyday things, such as medical supplies, automobile parts, pallets, and shipments. The Impinj platform uses RAIN RFID to deliver timely data about these physical items to business and consumer applications (see page 8).

Instituto de Telecomunicações

 Portugal

The Instituto de Telecomunicações (IT) is a private, non-profit association of Portuguese universities, a public telecom operator and a telecom equipment manufacturer, established in 1991 with a mission to create and share scientific knowledge in telecommunications at world level and to host and tutor graduate and post-graduate students. Its expertise spans all areas of telecommunications.

CLAP-N-CLANK

 Japan

CLAP-N-CLANK provides consulting services to help the global development of society and companies through international standardization activities. The company's mission is to provide a systematic approach to creating mechanisms that realize mutual growth between individuals and organizations.

Obserwatorium.biz Sp. z.o.o.

 Poland

Obserwatorium.biz is a business & IT consulting company providing support to IT firms and financial institutions for the development and optimization of electronic distribution channels, electronic payment systems and implementation of digital strategies. It also cooperates with companies specialized in network & IT system security services for the development and implementation of cybersecurity strategies for financial institutions, software houses, non-profit organizations and public institutions.

Queen Mary University of London

 United Kingdom

Queen Mary University of London is one of the largest campuses in London that is internationally recognized for its world-leading research, high-quality teaching and dedication to the public good. Teaching and research are provided across four faculties: Science and Engineering, Humanities and Social Sciences, Interdisciplinary, and Medicine and Dentistry.

Stellar telecommunications

 France

Stellar is developing a full suite of products and services for the land mobility sector, capable of combining the very best of cellular, Wi-Fi, and satellite networks to enable persistent in-vehicle digital services, as well as enhancing automated driving and road safety for automotive customers.

Bevuta IT GmbH

 Germany

Bevuta is an IT company based in Cologne offering consulting for digital processes and products and developing complex software solutions using cryptographic methods as well as well-proven programming languages.

Trust Agency BV

 Belgium

Trust Agency is specialized in services related to Trust Services and Electronic Identity Means and has expert knowledge on eIDAS, ETSI ESI, digital signatures and identification, validation and PKI infrastructures, data encryption services and hardware security modules. Trust Agency helps organizations to make the most of the opportunities offered by the eIDAS regulation.

SOVOS

 Sweden

Sovos (TrustWeaver) is a global provider of IT solutions for tax and regulatory compliance. It provides tools and services to adapt to the digitalization of governments' tax enforcements. The Sovos Intelligent Compliance Cloud is the first complete solution for modern tax, combining tax determination, e-invoicing compliance and tax reporting on Sovos' reliable, scalable and secure S1 Platform.

University College London

 United Kingdom

Founded in 1826 in the heart of London, UCL is a leading multidisciplinary university, with more than 16,000 staff and 50,000 students from over 150 different countries. The University College of London was rated second in the UK for research power in the Research Excellence Framework 2021 and have top position in the UK for research power in medicine, health and life sciences as well as social sciences.

Vestel Elektronik Sanayi ve Ticaret A.S

 Turkey

Vestel is a multi-industry manufacturing company with 24 firms specialized in electronics, defence and information technology. With its subsidiary brands, Vestel represents a significant share in the European market of consumer electronics and home appliances, in particular TV sets.



Megan Brewster
Vice-President of Advanced Technology, Impinj

Megan brings more than 15 years' experience in technology and public policy. At **Impinj**, she brings clarity and strategy to the company's product roadmap and fosters growth in emerging opportunities to deliver the Internet of Everything. Prior to joining Impinj, Megan served at the White House Office of Science and Technology Policy, the Senate Committee on Energy and Natural Resources, and at GE Global Research. Megan earned a Ph.D. in materials science and engineering from MIT, with a minor in technology and public policy and a bachelor's degree from the University of Washington.

By connecting "everything" we are driving efficiencies, reducing waste and enabling the circular economy.

Your vision is to connect every item in our everyday world. Which applications are those items for?

Our vision is a boundless IoT, expanding the Internet's reach to trillions of items — apparel, packages, pallets, airline baggage, medical supplies, food, and much more. If you've purchased products from a retailer like Zara or Decathlon, enjoyed a drink from a Coca-Cola Freestyle soda fountain, or checked in bags with an airline like KLM or Air France, then you've probably interacted with Impinj products. By connecting "everything" that is manufactured, transported, or sold, we are helping businesses and people engage items at manufacturing, through the supply chain, in stores, at point of sale, to home and eventually, to recycling; giving each and every one of those items a digital life. Through this, we are driving efficiencies, reducing waste, enabling the circular economy, and ultimately, we hope, improving peoples' lives.

“ Our chips enable up to 18% reduction in label material usage.

Aren't these billions of RFID tags going to pollute with the metal, plastic, and adhesives they are made of?

RAIN RFID is well-suited to support sustainability initiatives as tags don't require a battery. Avoiding the use of batteries is a massive sustainability win. RAIN RFID tags can be made with paper and with a biodegradable adhesive. For some labels, excess aluminium used during manufacturing can be fully recycled and the paper re-pulped.

Impinj M700 series tag chips support the design of small tags and the use of eco-friendly materials. Our partners shared that our chips enable up to 40% reduction

in label size and 18% reduction in label material usage.

We work closely with the **RAIN Alliance** Sustainability Workgroup, our partners, and enterprise end users to deliver innovative advancements that support sustainable practices.

So, you think RFID and IoT can help enterprises build circular systems and create sustainable processes and practices?

Yes, RAIN RFID products help companies minimize their environmental impact. For instance, using the real-time data the Impinj platform provides, healthcare organizations can ensure medications get used before they expire and logistics companies can optimize delivery routes to eliminate excess driving, fuel usage, and emissions. Enterprises, governments, and scientists across the globe can study and protect natural resources and deliver fresh, safe food to communities. In addition, enterprises can build circular systems to receive, reuse and recycle items.

For example, the Impinj platform helps **Post Norway** reduce fuel consumption and vehicle maintenance costs through transport optimization analysis and process improvements that helped reduce CO₂ emissions and meet sustainability goals. **Coöperatie Hoogstraten** uses the Impinj platform to track cartons of strawberries from farm to table to maintain freshness and reduce the chance of wasted fruit. In the event of a recall, only the affected product must be taken off the market.

As a US based company involved in the RAIN RFID standard, why was it important for you to join ETSI?

Impinj is committed to facilitating RAIN RFID solution deployments across the globe and has a long-standing history of working with ETSI and other standards organizations. We spearheaded the development of the RAIN radio standard, lobbied governments to allocate frequency spectrum, and cofounded the RAIN

“ The EU and US frequency bands commonality reduces infrastructure costs.

Alliance. As part of these efforts, Impinj actively advocated for regulatory changes to expand RAIN RFID operations into the ETSI upper frequency band of 915-921 MHz using 4W e.r.p radiated power and 400 kHz channels. The EU upper-frequency band closely resembles the FCC frequency band in the United States. This commonality facilitates the easier development of global RAIN RFID solutions by enabling the integration of tags and antennas that support multiple regions. It allows RAIN RFID reader devices to increase read range and coverage area, reducing the number of readers and antennas needed to cover the same area and, in turn, reducing infrastructure costs for solution deployments. The increased channel bandwidth also enables faster item inventory and improved read accuracy, and simplifies global RAIN RFID deployments.

What are Impinj's new opportunities?

We have recently launched the **Impinj Authenticity** solution engine to aid brand owners, retailers, and supply chain owners in combating counterfeit goods.

Impinj Authenticity offers cost-effective, cryptographic authentication for everyday items — such as retail merchandise, automotive parts, and medications — across the entirety of an enterprise's supply chain, from manufacturing through shipping, customs, store inventory, point-of-sale, and returns processing. The implications are enormous — brand owners can have a more secure supply chain and consumers can have confidence that what they are buying is authentic.

We are on a path to connect the trillions of everyday items in people's lives to the Internet and are very excited about the opportunities ahead!



KPIs for Sustainable ICT Infrastructures

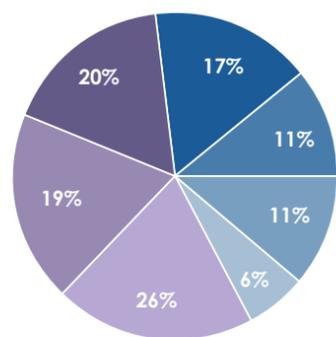
ICT infrastructure, including both network infrastructure and IT infrastructure, represent more than 35% of digital energy consumption worldwide and 2% of worldwide CO₂. To help operators progress in reducing environmental impacts during operation, ETSI has published several global KPIs.

What are global KPIs?

The ETSI **ATTM** (Access, Terminals, Transmission, Multiplexing) committee is standardizing sustainable ICT infrastructure as well as implementation of sustainable ICT solutions. Its group on Smart Communities works closely with **SmartM2M** and **oneM2M** for deployment of sustainable solutions allowing real interoperability of Smart Grids.

ETSI ATTM has defined a set of standards, both for telecom operators (**ES series 205 200**) and for European use (**EN series 305 200**), that define global KPIs as well as user guides (TS series 105 200). These KPIs are driven by a yearly master indicator (e.g. yearly energy efficiency, carbon intensity) related to service provided (ICT energy for ICT sites, data exchanged for network) combined with several weighted bonuses. They reflect the conformance of a network or group of ICT sites to a user-defined policy for sustainability defining which consideration is given to what bonus.

All energy sources enabling ICT operations (e.g. ICT equipment, cooling, power, safety



■ Terminals (use) ■ Computers (production)
 ■ Data Centers (use) ■ TVs (production)
 ■ Networks (use) ■ Smartphones (production)
 ■ Others (production)

Distribution of the energy consumption of digital technologies for production (45%) and use (55%) in 2017. (Source: Lean ICT, The Shift Project 2018)

and security infrastructures) coming from various sources (e.g. grid, district cold and heat, diesel, CHP), including renewables, are considered. KPIs are presented as site yearly energy consumption and a class which is a banded value of a performance indicator. When applied to groups of sites, this indicator is the weighted average of the classes.

Helping ICT operations become greener

The bonuses reflect local implementation efforts by the operator. They are the use of renewables and the reuse of energy for DCEM KPI (see figure 1) and the use of local low-carbon energies and the reuse of heat in neighbouring sites for DCCM (see figure 2).

Bonuses only consider renewable energy produced locally or energy coming from a dedicated power plant over the grid, allowing efforts from actual implementations to be distinguished from those from financial operations or delegated to grid producers. As for the energy produced, it can be reused on neighbouring sites. Bonuses also include an incentive to use local energy sources as a low-carbon energy source.

The ETSI standards are similar to those defined by the shift project for greenhouse gas emissions in its 'net zero initiative' by clearly differentiating efforts designed to reduce one's own fossil footprint from efforts to reduce the footprint of others. These KPIs allow communities and industry to justify their level of sustainability over time for a more sustainable planet.

■ Olivier Bouffant, **ETSI Vice Chair of the technical committee ATTM (Access, Terminals, Transmission, Multiplexing)**

■ Guillaume Gérard, **Member of ATTM**

DC _{EM} Class	kWh/kWh	
	≥	<
A		1,00
B	1,00	1,40
C	1,40	1,70
D	1,70	1,90
E	1,90	2,10
F	2,10	2,30
G	2,30	

Figure 1: Example of DC_{EM} classes for ICT sites.

DC _{CM} Class	g/kWh	
	≥	<
A		40
B	40	100
C	100	180
D	180	280
E	280	400
F	400	540
G	540	

Figure 2: Example of DC_{CM} classes for ICT sites.



The S in SAREF standing for Sustainability

Collecting and sharing data is the major benefit of IoT. Generating new services for sustainability and energy efficiency requires those data and their ontology to be integrated in a common semantic interoperable framework.

Nobody should be surprised about the role that ICT and telecommunication technologies are actively playing to support sustainability and the green transformation. Knowledge is essential, and the ability to collect and share information is the major benefit of IoT technology, together with the ability to control remote devices and systems.

Simple examples can be found in people's everyday behaviour. I find myself checking the solar panel production and the battery charging level of my home photovoltaic system every time I switch on the washing machine remotely.

More sophisticated cases can be found in looking at the management of smart cities, industrial plants, utility distribution and, more generally, any complex system.

AI, sensing and context technologies help to raise awareness, understanding and control of resources, but the precondition is the capacity to correlate multiple sources

of information and to assemble such information into new services tailored for sustainability and energy efficiency.

In this context, one of the major challenges that standards help to overcome is that each service and each solution produces data in its own format and meanings.

ETSI has addressed this issue by standardizing SAREF, a methodology to enable different services and solutions to understand each other, integrating different existing ontologies in a common semantic interoperable framework. SAREF stands for Smart Application Reference Ontology and has been developed with the strong support of the European Commission and in close collaboration with the industry.

SAREF is composed today of a core of common elements, a set of dedicated domain extensions. Used in combination, they cover a wide set of application contexts.

Sustainability is at the heart of SAREF. The first extensions were dedicated to the energy and environment domains, and the first use cases considered were related to metering, home appliances and demand site flexibility services. The number of use cases has grown significantly and more domain extensions have been developed.

As of now, the list of extension includes energy, environment, building, smart cities, industry and manufacturing, smart agriculture and food chain, automotive, eHealth/ageing well, wearables, water, smart lifts, and smart grid and smart escalators are in preparation.

Experts and interested stakeholders can contribute to the green transformation enabled by SAREF via the **SAREF Portal**, expanding the domains already considered as well as proposing new ones.

■ Enrico Scarrone, **ETSI Chair of the technical committee SmartM2M**



ETSI MEC Federation Enablement APIs

The ETSI Multi-access Edge Computing group has just released **MEC Federation Enablement APIs**. GS MEC 040 describes the information flows and required information and specifies the necessary operations, data models and API definitions. This specification is critical for supporting the requirements received from GSMA OPG (Operator Platform Group) to enable inter-MEC system communication and allow 5G operators to collaborate among themselves, with service cloud providers and with other stakeholders. New APIs are introduced for the enablement of the MEC federation, helping operators to "federate" edge computing resources by offering their MEC service capabilities for mutual consumption, application developers, and customers (e.g. vertical market segments).



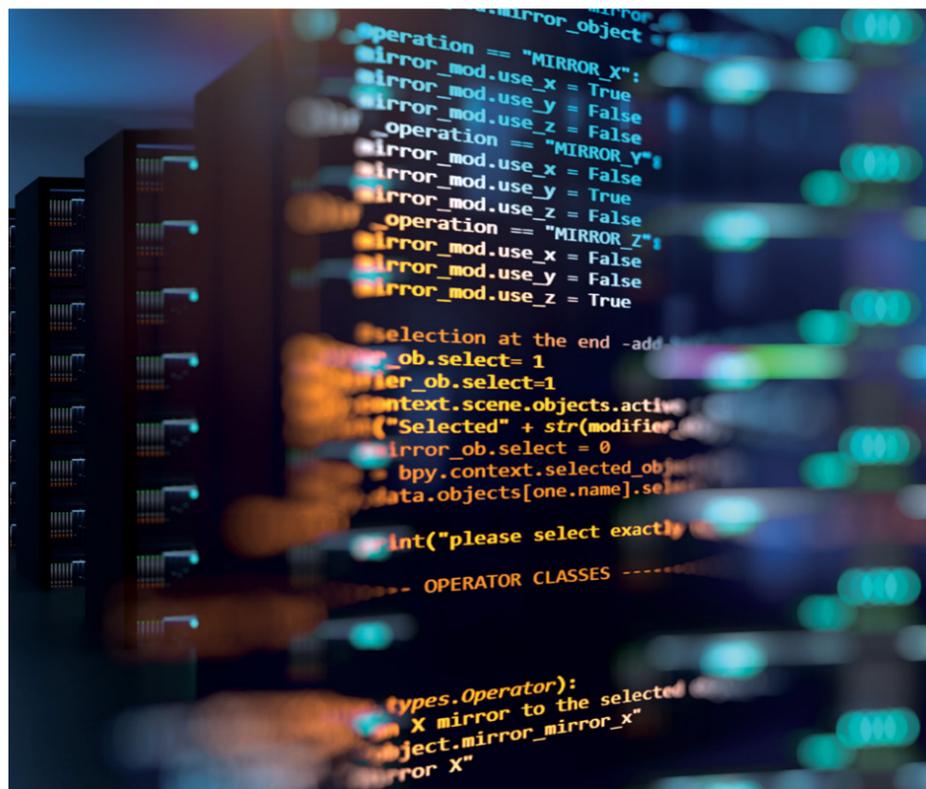
NFV to support Cloud-Native Network Functions

The ETSI Network Functions Virtualization group has just released the Release 4 version of **ETSI GS NFV 006** for new enhancements of the NFV architecture that will support cloud-native network functions. This specification enables the NFV framework to manage containerized VNFs (virtual network functions) as well as

multiple OS (operating system) container clusters. The flexible management of the OS container clusters allows operators to create the necessary isolation of network functions needed in telco networks. At the same time, the announcements allow a smooth evolution path for the operators' NFV infrastructures, supporting virtual machine-based and cloud-native network functions in parallel.

F5G Security Countermeasure Framework

The Fifth Generation Fixed Network group has released an F5G Security Countermeasure Framework Specification, **ETSI GS F5G 012**, which specifies security countermeasures against security threats to F5G. It also identifies mitigations that require non-technical measures.



Taken overall where network elements (software or hardware) and services operate dynamically and where the principle of security by default applies to F5G and mapping to the obligations arising from regulation, two principles have been taken into account in the high-level approach to security provisions in F5G: make "security by default" an active choice and verify every aspect of every security connection that has the potential to be malicious.

Two annexes of the specification address quantum-safe cryptographic provisions and the role of trust in security assurance.



ICT Greener and more Sustainable

Making ICT Greener and more Sustainable

Beniamino Gorini, Chair of the ETSI technical committee of "Environmental Engineering" gives us an overview on how ETSI standards can help mitigate the environmental impact of ICT.

Environmental Sustainability at ETSI

The term environmental sustainability covers the actions and processes intended to preserve our limited natural resources and protect ecosystems to support the health and well-being of the population, while ensuring economic growth. The activities at ETSI on environmental sustainability focus on the sustainable digital transformation by defining the processes and requirements for the sustainable use and deployment of Information Communication Technology (ICT) products and networks. Several ETSI groups are involved in sustainability, the main ones being the technical committee of "Environmental Engineering" (**TC EE**), the technical committee Access Terminal Transmission and Multiplexing (**TC ATTM**), the **Operational energy Efficiency for Users** Industry Specification Group and our partnership projects, **oneM2M** and **3GPP**.



A deep dive into the EE committee

The ETSI technical committee of "Environmental Engineering" (TC EE) defines the specifications and standards for the design, use and deployment of ICT equipment and networks. This committee is also in charge of the sustainability aspects of ICT equipment and networks and cooperates with the ATTM committee on the operational aspects of ICT networks.

In the field of sustainability, the ETSI Environmental Engineering committee has produced the necessary standards to determine the environmental impact and how to mitigate it. The group is also providing deliverables to support EU Regulations on ICT products. Examples

ETSI TC EE fields of activity

- Environmental classes and tests for storage, transportation and operation
- Acoustic noise limit for ICT equipment
- Equipment use and thermal management for the installation of telecommunication equipment
- Power supply interface requirements for the operation of ICT equipment
- Grounding and bonding aspects
- Control and monitoring of the different parts of ICT installations
- Energy efficiency measurement methods
- Life Cycle Assessment process
- Circular Economy aspects (eco-design and Digital Product Passport)

include the deliverables for the Regulation 1275/2008, amended by EU Regulation 801/2013 (**EN 303 423**), and Regulation 2019/424 on eco-design requirements for servers and data storage products (deliverables in preparation).

The standard to determine the environmental impact of ICT

ETSI ES 203 199 defines the environmental Life Cycle Assessment (LCA) that is a systematic analytical method, by which the potential environmental effects related to ICT goods, networks and services can be estimated. LCAs have a cradle-to-grave scope, in which all the life cycle stages (raw materials acquisition, production, use and end-of-life treatment) are included. Moreover, transport and energy supplies are included at each stage of the life cycle assessment. This ETSI specification also gives guidelines for the determination of input data and the reporting of the LCA results.

We also need to consider that ICT goods, networks and services have the potential to reduce the environmental load and impact by reducing the amount of energy consumption and materials used in society. This potential of reducing the

ETSI defines the environmental Life Cycle Assessment (LCA) assessing the potential environmental effects related to ICT goods, networks and services.

environmental impact is also referred to in ETSI **ES 203 199**.

ETSI TC EE deliverables to address sustainability

- Progress in the determination of CO₂ emissions and the use of resources in the cycles of products, network and services
- Eco-design aspects and guidelines for the creation of sustainable installations
- Methods to determine the power consumption and energy efficiency for each type of ICT equipment and networks and for radio access networks
- Methodologies to monitor and manage energy efficiency Key Performance Indicators for equipment and installations in cooperation with the TC ATTM

ICT has the potential to reduce the environmental load and impact by reducing the amount of energy consumption and materials used in society.

Are the environmental parameters related to sustainability?

The TC EE has produced, and is updating, the standards for environmental requirements, whose reference is **EN 300 019**. This EN is a series of standards defining the parameters for various environmental classes and the test methods for the compliance with the environmental class in which a product is intended to be deployed/used. One can wonder: how are these standards related to sustainability? Well, one aspect linked to the circularity aspect is product durability and these ETSI standards define the environmental parameters to take into account the design and the use of an ICT product in a specified environment.

Therefore, these standards are used to determine whether a product can operate, and is robust enough, to work in the intended environment. For instance, the standard for non-weather protect environments (**EN 300 019-1-4**) defines the environmental parameters, and their ranges, that can be present in such environments (i.e. temperature, humidity, rain, wind, dust, chemical agents, etc.). If an ICT product is not designed to comply with these requirements, applying the test methods in **EN 300 019-2-4**, then it can have issues with correct operation

The standard for non-weather protect environments defines parameters such as temperature, humidity, rain, wind, dust, chemical agents.

and durability in such environments, with frequent failures and repairs.

Another aspect considered in these standards is the adaptation to climate change. The environmental parameters defined in these standards have to be kept aligned with the changes in the climatic conditions. For instance, if rain is heavier than in the past, or wind is more frequent and stronger than in the past, these standards have to reflect the latest environmental conditions. This is the current work in the committee for the maintenance of these standards.

Note that other parameters have to be considered for product durability (robustness). For instance, the lightning conditions or other electromagnetic effects, but these conditions are not in the scope of TC EE. They are considered in the standards for the circularity score.





Supporting the eco-design Regulations

The upcoming standards for Regulation 2019/424 on eco-design requirements for servers and data storage products are related to:

- server and data storage product secure data deletion functionality (EN 303 800-2)
- server and data storage product availability of firmware and of security updates of firmware (EN 303 800-3)
- server and data storage product disassembly and disassembly instructions (EN 303 800-5)
- energy efficiency metrics and measurement methods for storage equipment (EN 303 804)
- energy efficiency measurement methodology and metrics for servers (EN 303 470)

EN 303 800-2 specifies the method for the verification of compliance with the requirements on the secure data deletion functionality of servers and data storage equipment. The scope of Regulation 2019/424, includes subsequent product modifications or updates provided or specified by the manufacturer or their authorized representatives. Obviously, this scope is not addressed in this standard. This EN also provides the end-user verification of successful data

deletion and the assessment of data deletion documentation and functionality.

EN 303 800-3 specifies how manufacturers of server products and online data storage products make available the latest firmware versions, the security updates of the firmware and the skill levels required to deploy and install these updates. This EN is specific to the products in the scope of Regulation 2019/424.

The new EN 303 800-5 addresses the method to assess the following requirements of Regulation 2019/424 regarding:

- The ability to disassemble, with particular regard to assessing that joining, fastening or sealing techniques do not prevent disassembly for repair or reuse purposes
- The provision of instructions on the disassembly operations, including the type of operation, the type and number of fastening technique(s) to be unlocked and the tool(s) required

The other deliverables for Regulation 2019/424 concern the methodologies used to measure the energy efficiency of servers (EN 303 470) and data storage equipment (EN 303 484) and to determine compliance with the Regulation. EN 303 4760 1 specifies the following parameters for servers: active efficiency state metrics, idle state metrics, measurement and calculation of the operating conditions, requirements for equipment to perform the measurement process of the active

The standard for non-weather protect environments defines parameters such as temperature, humidity, rain, wind, dust, chemical agents.

efficiency state and idle state power. Similarly, EN 303 484 specifies the following parameters for data storage equipment: energy efficiency metrics in active and idle state mode, requirements for equipment and measurement methods to perform the energy efficiency measurements.

Actions on sustainability in the ICT sector are direct and indirect. The direct actions on ICT equipment, networks and services focus on improving energy efficiency, reducing the use of natural resources and reducing waste. Indirect actions include those in which digitalization can help to reduce CO₂ emissions, the use of raw materials and waste from the use of ICT equipment networks and services. ETSI is in the front line in producing deliverables supporting sustainability, direct or indirect, linked to ICT, the technical committee of "Environmental Engineering" is one of the actors.

Master MTech: Collaboration to foster education about standardization

Since 2013, **ILNAS**, Luxembourg's National Standardization Organization, and the University of Luxembourg have been working on developing educational programmes involving technical standardization, with the continuous support of the European Standardization Organizations (ESOs).

This fruitful collaboration, also involving the Chamber of Employees of Luxembourg, made it possible to launch the Master MTECH "Technopreneurship: mastering smart ICT, standardization and digital trust for enabling next generation of ICT solutions" in February 2020. The first promotion of the Master, which included 9 students, has recently graduated, and a new edition is now running until February 2025. The Master is a two-year training designed for Smart ICT professionals. Composed of 11 modules for a total of 327 hours of teaching, it combines ICT, innovation, technical standardization and digital trust, providing to students a technical background and a range of tools to engage in innovative projects. The success of this Master is based on a joint effort from the academic, research and standardization communities. It involves university professors, standardization experts from ILNAS and ESOs, and industry professionals, some of which are members of ETSI or other standards development organizations.

ILNAS is, in particular, responsible to provide an adequate level of understanding of technical standardization, offering practical examples and case studies illustrating its use to give a common technical language, build trust, and foster effectiveness. Through a teaching module of 27 hours dedicated to standardization, students discover its mechanisms and analyze its role in the ICT ecosystem. To this end, ILNAS notably relies on ETSI's outstanding teaching material, the textbook **'Understanding ICT Standardization'**. ETSI is also directly involved: during the first edition of the Master, it provided webinars on various topics such as cybersecurity, testing and interoperability.

Students directly use this knowledge during the fourth semester, in which they have to complete a company internship to

demonstrate their mastery of the concepts acquired through a real use case. The outcome of the internship can be a new service, a new product, a new internal process, etc. In this context, students prepare a Master Thesis that they defend at the end of the programme. Students are encouraged to consider standards and standardization projects all along the Master, and have, in their thesis, to illustrate how they used standardization in their internship. In this frame, ILNAS notably provides them access to technical committees and encourages their participation as national standardization delegates.

ILNAS and its partners are now focusing on the second edition of the Master, which started in February 2023. Thus, ILNAS welcomes the second edition of the ETSI textbook, which will be a great help to familiarize Luxembourg's professionals with standardization, and is very grateful for the ESO's support, that contributes to the success of the Master MTECH.

- Dr. Jean-Philippe Humbert, **Deputy Director, ILNAS**
- Mr. Jean-Marie Reiff, **Director, ILNAS**
- Mr. Nicolas Domenjoud, **Responsible "ICT&Technical Standardization", ILNAS**



Addressing the Innovation cycles of Standardization

Softwarization

The ever-increasing pace of innovation, along with the impact of novel ICT systems over multiple domains present us with new challenges. The current “softwarization” trend is one consequence of these two pressures. Somewhat naively, Software is generally perceived as faster to update and easier to configure than more “traditional” hardware approach.

The rapid way we approach the transfer of new concepts from research to market may see the role of traditional standards decreasing: infrastructures that integrate a more software-approach promise to be faster in realizing the transformation from concept into deployment.

Market fragmentation or diversification?

The upcoming discussions on 6G will potentially stress these trends to breaking point. The long cycle of 3GPP standards production, that guarantees reliability, interoperability and universal operation, is increasingly challenged by the fast pace of technological and societal evolution. The multiple technological options present in some standards, as we are currently witnessing in 5G, are struggling to reach the market, where no hard economical drive exists for certain solutions. But, at the same time, we witness ecosystems bypassing standards efforts and driving custom developments in several areas which increasingly rely on end-point solutions at the application layer. Do we face market fragmentation or do we explore a market diversification?

Universality of technology

How to retain the essential role of standardization in such a software-driven society? We need to retain the universality of technology, whilst at the same time becoming much faster and reactive to innovation. One possible path could be the approach pursued within Bluetooth, which separated basic infrastructure from customized application deployments, via the profile concept. This provides a blueprint where a minimal set of technology aspects are guaranteed, whilst providing the flexibility for different ecosystems to develop their own optimized solutions. Such an approach can allow the development of multiple solutions that rely on the higher layers of the communication, allowing the deployment and proof in those specific ecosystems, while creating the conditions to revisit the fundamental underlying technological aspects at a more relaxed pace.

Innovation eye

Regardless of the path chosen, standardization processes will need to evolve, as research and innovation are increasingly transformative of our society, and the ecosystem can be rapidly altered by such radical innovations. Standards have to be able to react to these changes, operating in a lockstep with the fast pace of innovation we witness today. Only then will we be able to effectively provide the required solutions, whilst developing the value of the communications infrastructure. Without addressing these challenges, our efforts into the development of 6G standards will always be limited in terms of ecosystem impact.

Let us all keep an innovation eye on where we need to be before 2030.

■ Rui Luis Aguiar
*Instituto de Telecomunicações,
Universidade de Aveiro NetworldEurope,
Steering Board Chair*



Research & Standards converge in ETSI

February 2023 saw a significant milestone in the evolution of European Research and Standardization, with over 170 people attending face-to-face the ETSI **Research Conference**.

Already at the beginning of 2023, the Smart Networks and Services Joint Undertaking (SNSJU) launched the first phase of beyond 5G/6G research projects. The ETSI research conference provided a unique opportunity for 25 of the 35 SNSJU projects to present their plans and standardization roadmaps.

The ETSI perspective focussed on providing clear guidance to researchers and how they could make the most of standardization, with clear examples and success stories of research already being integrated into standards, such as MEC (Multi-access Edge Computing), RIS (Reconfigurable Intelligent Surfaces) and THz (Terahertz).

The 3 day event was rich in content, with the main messages being summarized

in the final concluding session giving clear guidance to three important communities.

Recommendations to the SNS-JU projects

They were provided by Bernard Barani, deputy Head of Unit DG Connect Future Connectivity Systems.

Bernard highlighted the 2 year window of opportunity leading up to the 3GPP Release 20 where work will most probably begin on 6G.

Recommendations to researchers

They were provided by Rui L. Aguiar, the Steering Board Chair of the Networld-Europe.

Rui encouraged researchers to work with

standards bodies and exchange with standards experts as early as possible.

Recommendations to standards groups

They were provided by Diego Lopez, a recognized expert in research and standardization.

Diego recommended that standards groups help researchers by welcoming feedback to the standards work in an agile manner, avoiding the complexity of rules that can exist within some standards bodies.

Take-aways from the conference are provided in the following figure.

■ David Boswarthick,
ETSI Director New Technologies

Take what you need

Research Workshop Recommendations	<h3>Recommendations to EC Projects</h3>	<p>Anticipate and plan for the 6G standardization opening, probably 2025, in 3GPP Release 20 and beyond.</p> <p>Check project standardization objectives against the ITU IMT2030 vision and complement/adjust as appropriate (e.g. KVI's).</p> <p>Ensure SNS project cooperation using appropriate Working Groups for pre-standardization preparation.</p> <p>Engage with standards groups early (rather than late), and interact with the widest possible EU stakeholder community.</p>
	<h3>Recommendations to Researchers</h3>	<p>Ground your ideas on the existing state-of-the-art of standards, it is a worthwhile investment of time and effort.</p> <p>Establish close links with standardization oriented professionals, you can learn as much from them as from traditional researchers.</p> <p>Ensure you clearly define your personal objectives and standards needs, then engage with the standards bodies best suited to deliver.</p> <p>Explore existing mechanisms for driving your innovations into society including standardization.</p>
	<h3>Recommendations to Standards Groups</h3>	<p>Provide up-to-date roadmaps on research result expectations and share with research communities.</p> <p>Facilitate reporting of research results, as well as feedback to researchers and projects.</p> <p>Support links to research results: experiments, reference implementations and connections to open-source projects.</p> <p>Seek the formal academic recognition of standards contributions.</p>

Energy Efficient 3GPP

As 5G has been taken up by a wide range of industries and has spread to all geographical areas, the need to manage the environmental impact of the network has increased proportionally.

3GPP has made big steps – since the start of Release 15 – to establish a more balanced work plan between the desired expansion of the system and the need for greater efficiency.

The efficiency challenge is not insignificant, impacting the entire network, from the User Equipment to the switch, passing by the radio. It will be a combination of clear guidance in the specifications and the arrival of new equipment - phones, routers, transmitters, etc. – from manufacturers that will deliver on the promise to meet it.

(TR 21.866). That first report gave a high-level view of the key issues and potential solutions, serving as an introduction to the work that has followed.

3GPP WG SA5 made early progress

Working group SA5 - covering Management and Orchestration for 3GPP systems - has provided NR and core network KPIs for EE performance - using the appropriate metrics for each of them.

The 3GPP website features an article about that detailed work '**EE - SA5 work and results**', by J-M Cornily (WG SA5 Rapporteur). Major deliverables on the Network Resource Model (NRM), 5G Performance Measurement and 5G end-to-end KPIs are referenced there.

Measuring NR energy savings

The TSG RAN 'Study on network energy savings for NR' (TR 38.864) looks to develop a network energy consumption model for the base station (UE power consumption model was defined in TR38.840). The study has identified Release 18 techniques that can provide energy savings in various dynamic scenarios, where data transmission & reception is ongoing.

TR 38.864 also considers an evaluation of the effect of energy saving on system

performance. It establishes KPIs for measuring its impact on spectral efficiency, capacity, UPT, handover performance, call drop rate, initial access performance, latency, UE power consumption, complexity and SLA assurance.

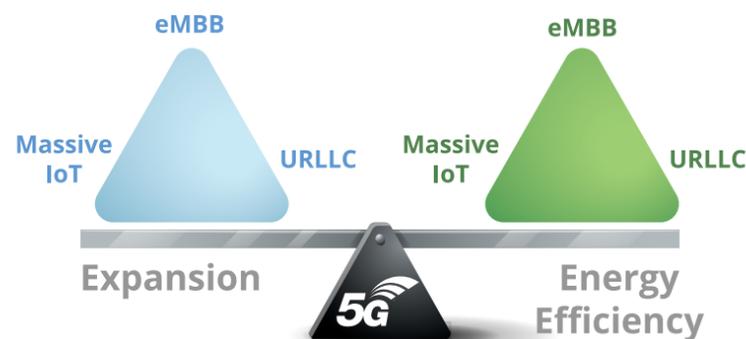
Future Features

There is a new study proposal (Release 19) on Energy Efficiency as service criteria, supporting the exposure of information on energy consumption or level of energy efficiency to vertical customers. This takes the work beyond a focus on energy efficiency within the network, towards meeting the needs of new industries and various customer specific requirements. The proposal (SP-220446) notes that "[...] It is worth considering how to deliver services with energy efficiency as service criteria, associated with verticals' preferences, and how to support the policy of handling energy as part of a subscription."

Look out also for two Rel-18 studies; about Smart Energy and Infrastructure (WG SA1) and on Network and Service Operations for Energy Utilities (WG SA5).

Keep an eye on the **3GPP Work Plan**, to monitor the creation of new features for this area of work.

■ Kevin Flynn, **3GPP Marketing and Communications**



Since Release 15, more efficient Self organizing networks (SON), MIMO antenna enhancements, Location and positioning features, work on Dual connectivity and on Device capabilities exchange are all contributing to power savings.

Some specific EE work items have also started. Early work on EE aspects of new radio (NR, the new radio for 5G) and the next generation core (NGC) kicked off in Release 15, with the first 5G Study on EE

IoT and Sustainability

IoT is a well-positioned technology to help reduce environmental impact and inefficiencies for many use cases. But with the growing number of connected IoT devices, networks and systems, the importance of minimizing the carbon footprint of IoT technologies deployments is also becoming critical. The oneM2M standard provides key features enabling more sustainable IoT deployments.

Greening via ICT

The IoT's economic impact depends on access and use of data about the physical world. Without access to granular and time-series farm data, there is little scope to optimize crop yields. Data includes readings about micro-climate conditions, fertilizer treatments and harvesting patterns among other topics. Getting to this data, however, depends on a massive expansion of connected sensors. The vast majority will be low-cost and long service-life devices.

Of course, it is important to strike the right balance between the resources consumed for remote sensing and the benefits derived from improved decision making. This is central to the notion of sustainability that some **industry leaders describe as "greening via ICT"**. In farming, for example, sustainability benefits can be measured in relation to fertilizer use, less wasteful irrigation, and efficient movement of farm machinery across vast tracts of land. There are many other beneficial opportunities in other sectors of the economy. That being the case, how should developers design solutions that are inherently sustainable?

5 Design Principles to Make IoT Sustainable

In the case of IoT systems, **five principles contribute to sustainability**. One of these is to encourage reusable designs for hardware components and for software libraries. This reduces the need for one-off solutions.

Two other principles involve the use of open standards and modular designs. In the context of a highly fragmented industry, these principles make it easier for IoT developers to combine elements across the technology stack.

Interoperability is a fourth key principle. It helps designers to combine different technologies and to interchange components from different suppliers. Interoperability also applies to the growing practice of exchanging IoT data across application and operational silos. This will arise as organizations collaborate across departmental and company boundaries for better decision making. These benefits lead to the fifth design principle, scalability. Here, the aim is to extend the full potential of IoT solutions beyond business-critical and high asset-value use cases.

Technologies for Sustainability

Beyond the use of sustainable design principles, the next step builds on technical innovation. These will address new deployment characteristics where many more devices will connect to communication networks. Furthermore, these will be constrained devices, limited by processing capacity, available memory, or power supply.

A recent study involving participants in oneM2M's Sustainability initiative described several challenges the communications industry can expect under such operating conditions. The group's **White Paper listed eight technical innovations** to make deployments more sustainable. They feature digital twins, message profiles, device triggering, event processing, time synchronization and compensation, group management, interworking, and scheduling & throttling. These features are supported within the individual services defined in the open and internationally recognized oneM2M standard for IoT.

■ Dale Seed, **Convida Wireless**



Sustainable IoT Features

- IoT Digital Twins
- IoT Message Profiles
- IoT Device Triggering
- IoT Event Processing
- IoT Time Synch & Compensation
- IoT Group Management
- IoT Interworking
- IoT Scheduling & Throttling

No Standardization Pain, No Green Digital Gain

For the green transition to succeed, the digital transformation needs to be its "ally". This article focuses on the need for standards in assessing the environmental impact of digitalization.

Green transition and digital transformation

Digital transformation needs to contribute to emission and pollution reduction, biodiversity preservation and circular economy transition. Likewise, for the digital transformation to succeed, it needs to be properly integrated in the green transition policies, deployed in climate critical sectors and supported by sustainable finance. This interdependence has been identified by the Commission and the twin (green digital) transition has been set as an overall guiding policy priority for the implementation of the Green Deal and Digital policies, such as the [Declaration on Digital Rights and Principles](#) and the [Digital Decade Policy Programme](#).

To guide digital policies and deployments towards positive impact on green transition, we need standardized assessment of the environmental impact of digitalization, consistency in their implementation and proper governance to minimize the negative impacts. However, the current mainstream indicators of digital performance and progress focus more on the economic and social dimensions of sustainability and less on the environmental, e.g. [Digital Economy and Society Index](#).

Existing standards

So far, we seem to be better at applying standardized methods to assess the negative environmental impacts of the digital sector (ICT). Standardized life cycle assessment (LCA) methods and energy consumption metrics point clearly to the rising energy consumption of ICT (currently **over 7% of total electricity** demand with projections pointing to 13% by 2030), **moderately rising GHG emissions** due to increased use of renewables (~3% of total GHG emissions globally, higher

in more digitalized regions of the world), and excessively high levels of eWaste (**10.3kg per capita**) due to sub-optimal circularity (durability, reparability, reuse, refurbishment, recycling) of digital devices and equipment.

When it comes to assessment of the positive impacts, most of the efforts and publications point to 'potentials' and future scenarios. For example, the potential of emission reduction using existing technologies **is estimated at 15%** of total GHG emissions by 2030. More examples of potentials and extrapolated examples can be found in the [SFR'22](#) and specialized reports, e.g. [Digital with a Purpose - delivering a Smarter2030](#).

Further standardization efforts needed

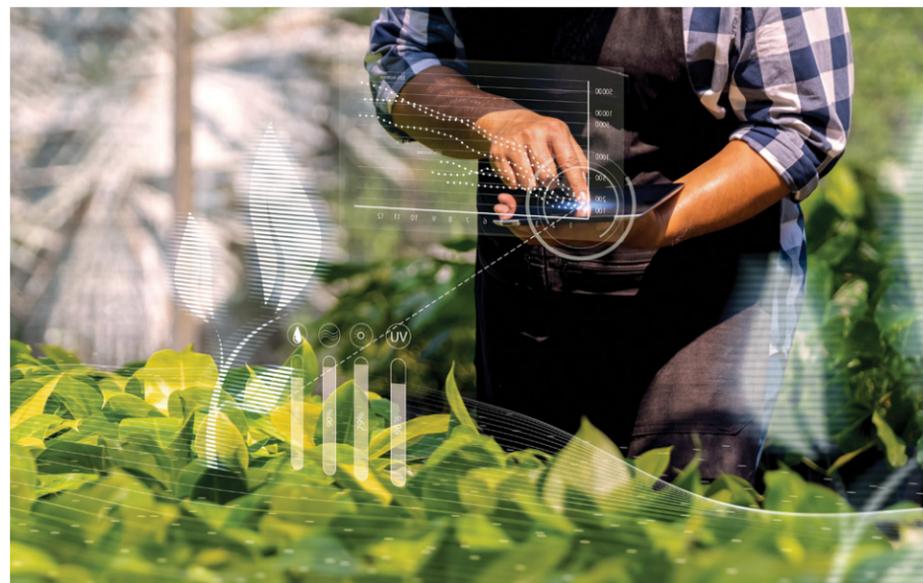
So what do we need to move away from estimating the potential and start assessing the real impacts? We need science-based, standardized assessment methods (metrics). Standardization bodies such as ETSI and ITU have in the past worked together on such metrics, e.g. [ETSI ES 203 199](#). ITU has recently adopted

a new recommendation, L.1480, on how the use of ICT solutions impacts the GHG emissions of other sectors. More needs to be done to validate such efforts with real-life data and to develop implementation guidelines. For that reason, the European Commission supported the establishment of the [European Green Digital Coalition](#) of major ICT companies committed to working with expert organizations on validation of current metrics and development of implementation guidelines. Standards organizations are welcome to join this effort as [Supporting Partners](#) to achieve these needed metrics.

In conclusion, twin transition needs further standardization efforts in order to deliver measurable benefits on all three dimensions of sustainability: economic, social, and environmental.

■ Ilias Iakovidis,
Adviser on digital aspects of green transition, DG CONNECT, European Commission

Disclaimer: Information and views set out in this article are those of the author and do not necessarily represent the official opinion of the European Commission.



New White Papers

WP51: ENI - Cognitive Management

"ENI Vision: Understanding the Operator Experience Using Cognitive Management", describes the design of a novel cognitive network being carried out in the ETSI Industry Group on Experiential Networked Intelligence (ISG ENI). This White Paper explains how the ETSI ENI novel system architecture (based on ETSI GS ENI-005) intelligently manages, predicts, adjusts and optimizes network behaviour using cognition management, thereby enhancing the operator experience.

WP52: ETSI Activities in Artificial Intelligence

Preparing the implementation of the European AI Act, **"ETSI Activities in the field of Artificial Intelligence"** has been developed by a variety of members and experts and provides information to all involved stakeholders on the current implementation status of standards potentially suitable for ensuring compliance with the original draft of the AI Act. It offers a summary of societal challenges outlined in the AI Act and details activities in ETSI Technical Committees and Industry Specification Groups that are relevant to the AI Act and thus can be exploited and driven forward for its implementation.

WP53: NFV - 10 Years After it all Began

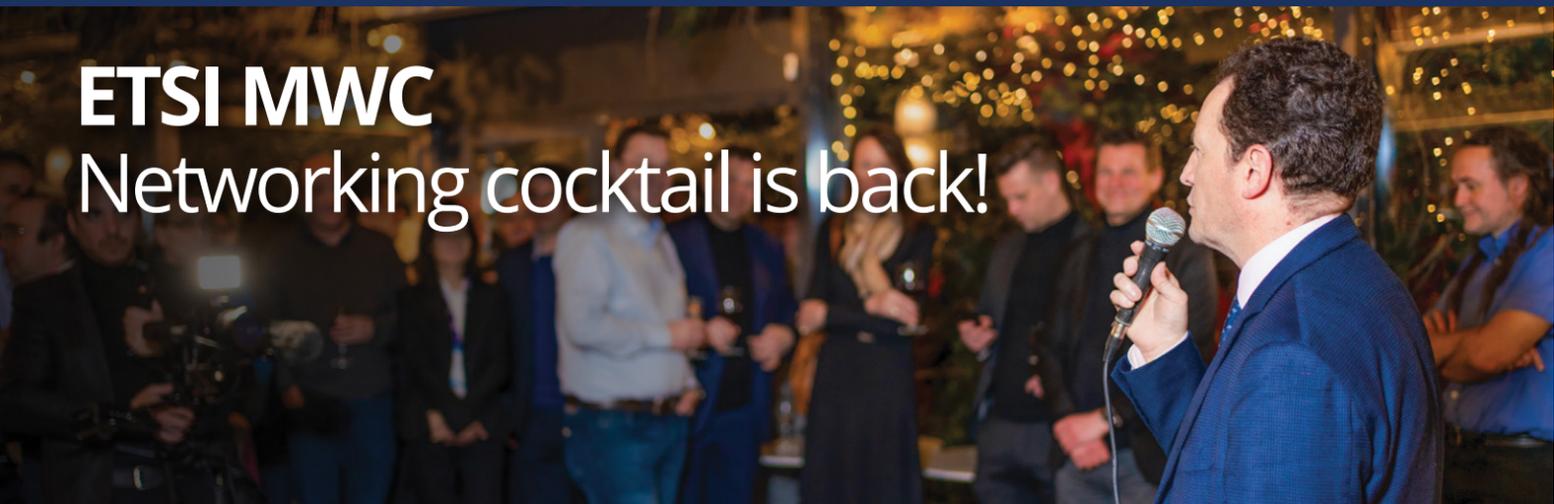
NFV has been a major element of the network transformation in the last decade. **"In the Light of Ten Years from the NFV Introductory Whitepaper"** provides a view on the evolution and impact of the technology concepts since the inception of ISG NFV, and also analyses and explores the new application environments and challenges that will shape the technology and its industry adoption in terms of interoperable solution.



New video! ETSI Fellowship Programme

The Fellowship Programme honours and rewards individuals whose outstanding involvement has contributed to building the work of ETSI or raising its reputation in specific sectors of standardization. Since the inception of the Programme in 2015, ETSI has awarded 30 Fellows from among numerous candidates. We took the opportunity of the Fellowship Award Ceremony in the Hotel Negresco in Nice on 29 November, where 2020, 2021 and 2022 fellows were awarded, to produce a video that shows how important and exclusive the ETSI Fellowship Programme is and what it brings to our Fellowship Community. The video is available on our website in our [media library](#).

ETSI MWC Networking cocktail is back!



#ETSIMagic ✨

Mobile World Congress 2023 has finally seen the return of the long-awaited ETSI Networking Cocktail. And we had a blast! On the Tuesday evening, around 200 partners and peers met ETSI and 3GPP representatives for a night of magic, live jazz music, Spanish specialties and much more. Thank you to all our guests who made this evening memorable.

See you next year at MWC 2024!



Behind the scene: How the Secretariat makes it greener



We live in a time when our actions have the power to lead the world into a more sustainable future. At ETSI we know that it is essential that we all play our part and this is why going greener has been an important topic for us for many years. The secretariat implemented green KPIs as early as 2010 to help assess the direct and indirect environmental footprint of ETSI and take relevant measures. Between 2012 and 2021, ETSI made substantial investments in renovation works in its two buildings to enforce green solutions and reduce the utility consumption. These works include the insulation of the roof and terraces of the Einstein building, switching to LED lighting and the replacement of electric heaters with heat/cool pumps.

We also continue to propose remote connection to our technical committee meetings and conferences, when feasible,

to reduce the impact of business flights on the environment.

More recently, decisive actions were taken to comply with the energy saving plan put in place by the French Government in response to the current energy crisis. As ETSI employees might telework up to 3 days per week, the two buildings are closed on Fridays when no meeting is organized on premises. This means that the heating can be switched off for 3 days in a row. Heating has also been reduced on remaining working days. Of course, the ETSI Secretariat is investigating future measures to go even greener. The installation of charging points for electric vehicles on our parking areas is in the pipeline, but we will also consider investing in renewable energy with solar panels. So stay tuned!

Welcome to our New Staff Members



Aldric Hiegel
Junior Systems Administrator

Aldric is originally from the Paris region, which he left temporarily to study construction engineering in Lille. After completing his studies, he moved back to Paris, where he held the position of works supervisor for eight years before being transferred to a company subsidiary in Marseille to work as a deconstruction engineer. Aldric later moved to the Nice area for family reasons and undertook a skills assessment to transition to a new career. This led him to a one-year vocational training in IT Systems and Networks. His position in ETSI is his first systems administrator role.



Zohra Ouarti
Funded Activities Administrator

Born in Algeria, Zohra grew up in Dijon in France. When she was 18 she moved to Bournemouth, UK, where she spent three years, initially as an au pair and then studying English. This was followed by different stays abroad, first in Switzerland and then in Germany. Back in France, she settled in Antibes, Alpes-Maritimes, and for 15 years she held various administrative positions as part of interim assignments in different companies, one of them being ETSI for a whole year in 2010! Zohra was a project manager assistant at the "Office International de l'Eau" (International Office for Water) for 4 years before being hired for her new position in ETSI.

Join us at upcoming events

Supported or organized by ETSI

Find out more and register on our website at <https://www.etsi.org/events>

▶ MPLS, SD & AI Net World Congress 2023

Paris, France
18-20 April

ETSI is pleased to endorse MPLS, SD & AI Net World Congress 2023. The 2023 Programme will focus on IP/Optical Convergence. Other main sessions will cover SRv6 enhancements and deployments, Network Programming, Security, AI & ML, 5G Architectures, Open RAN, Network Slicing and Automation. The event will feature a dedicated ETSI session on network transformation scheduled on 18 April at 9.30 am, focusing on ISG ZSM and NFV activities as well as Software Development initiatives at ETSI.

▶ 6G Symposium - beyond the Hype

University of Surrey, UK
F2F and online
24-26 April

ETSI is pleased to endorse the 6G Symposium 2023 and is actively shaping the conference programme. 6G Symposium Spring 2023 will bring together the international community to build consensus on key issues and further the momentum towards 6G. Join the event for three days of essential debates, updates and technical demonstrations to move beyond the hype towards concrete action and strategies.

▶ FutureNet World 2023

London, UK
3-4 May

ETSI is endorsing FutureNet World 2023. The event will focus on network automation & AI. The world's leading telco executives will discuss the strategic and commercial priorities in today's digital world and will address considerations for the future of the network.

▶ WWRF Huddle 2023

Singapore
9-10 May

ETSI is pleased to support WWRF Huddle again in 2023. The event will focus on the drivers, goals and challenges that are going to be instrumental in ensuring that the early visions of 6G are realised. It will look at the way in which 6G will start to merge the physical and the digital world. Focus will be put on security, sustainability, inclusivity and digital transformation. The line-up of speakers includes a presentation by ETSI's CTO in the session "Achieving a global 6G ecosystem and standards".

▶ OSM#15 Hackfest

Barcelona, Spain
12-16 June

Organized by ETSI's Centre for Testing and Interoperability and the OSM community, the 15th OSM Hackfest will enable OSM developers and users to share, test and demonstrate the latest features delivered with OSM Release FOURTEEN. The event will also allow new OSM community members to acquire hands-on experience with OSM.

▶ ETSI Seminar

ETSI, Sophia Antipolis, France
20 June

The annual ETSI Seminar provides an intensive and interactive course on ETSI, its organization, structure, electronic tools, ways of working and related subjects. It is targeted at newcomers to facilitate their active participation in ETSI, 3GPP or oneM2M but is also open to individuals who are already familiar with the Institute and wish to increase their knowledge. The Seminar is also a great opportunity to meet key people in the ETSI Secretariat. The ETSI Seminar is free of charge to attend and is open to all, members and non-members alike.

▶ TeraFlowSDN#2 Hackfest

Madrid, Spain
20-21 June

Organized by ETSI's Centre for Testing and Interoperability and the TeraFlowSDN Community, the second edition of the TFS Hackfest will enable participants to experiment and build hands-on experience with TeraFlowSDN Release 2. The event will combine theory and practical sessions. Participation in ETSI Hackfests is free and open to all upon registration.

▶ 3rd FRMCS Plugtests

Paris, France
3-7 July

This Interoperability testing event is organized by ETSI with the support of the European Commission (EC), the European Free Trade Association (EFTA), the TCCA-Critical Communications and the Union Internationale des Chemins de fer (UIC). The goal of the FRMCS Plugtests™ event is to validate the interoperability of a variety of implementations using different test scenarios based on the 3GPP Mission Critical Services framework with focus on the rail-specific features.

▶ ETSI IoT Conference

ETSI, Sophia Antipolis, France
F2F and online
4-6 July

The 2023 edition of the ETSI IoT Conference (ETSI IoT Week) is announced. This gathering of IoT experts has become the must-attend event for anyone involved in IoT and who understands the importance of standard-enabled technologies for IoT service deployments. This event offers an up-to-date overview of the major European and global trends in IoT services, technology innovations, deployments, and the relevant standardization work.



 **902**
members

 **511**
standards
Dec 2022 - Feb 2023

 **27%**
SMEs

 **649**
standards
under development

 **>130**
technical groups

 **4 M**
standards' downloads
Dec 2022 - Feb 2023

 **13**
conferences
& Plugtests
Dec 2022 - Feb 2023

 **2.898**
unique participants
Dec 2022 - Feb 2023

 **518**
meetings
Dec 2022 - Feb 2023

 **109**
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ETSI
650, Route des Lucioles
06560 Valbonne, France
Tel: +33 (0)4 92 94 42 00

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