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TECHNOLOGY ON THE R.I.S.E.



The narrative around technology is very diverse depending on your audience but there can be no doubt that ICT is helping us through times when physical interpersonal interactions are limited. Over the last decades, “e” has become a common prefix to several words: e-Meetings, e-Tickets and e-Books, for example. But, will there ever be an e-Human?

In this edition, Technology on the R.I.S.E, where R.I.S.E stands for Research, Innovation, Standards and Ecosystem, we are exploring future technological breakthroughs, from artificial intelligence to teleportation. Even if we are not there yet, and these technologies seem to be aiming at our next generation of mobile communications, what seemed to be futuristic at one point in time is now paving its way into the ETSI standardization groups on IoT, quantum computing, blockchain or communication networks, to name just a few. These technologies have not yet reached the same maturity on the market, and they range from the emerging (quantum computing) to the booming (IoT).

Nevertheless, and as you flick through the pages of this magazine, you will find out that some technologies or underlying components, which still need a lot of research to mature, are starting to be used in the field, while others remain in the research stage.

In this edition, we are exploring future technological breakthroughs, from artificial intelligence to teleportation.

In our **Spotlight**, we showcase how a facility in Geneva implemented a quantum key distribution system to secure their data centres, while the main article gives a helicopter view of ETSI’s versatile offer for researchers and universities. In **Tech Highlights**, we explore the latest research updates on teleportation, while our exclusive **Interviews** touch base on several promising future applications. In the **Working Together** section, SMEs are on stage and can engage in R&D for EU-funded IoT programmes. The green and digital transitions are now a fact, as shown by the Industrial Ecosystems in Europe article in **Zoom on Europe**.

The interviews and several other articles outline how standardization methods must evolve to meet the challenges ahead, how the processes and standards need to be more flexible, make use of AI tools and be more accessible to members who are not familiar with the world of standardization. At ETSI, we have started working on all these improvements...but this will be the subject of a future edition!

Enjoy reading!

Luis Jorge Romero,
Director-General ETSI



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Enjoy! The ETSI Mag

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Partnership between ETSI & TelecomTV: virtual events and a dedicated ETSI media channel

ETSI is pleased to announce a partnership with TelecomTV who provides 400,000 visitors annually with a unique blend of video and text-based content. Supported by its 900+ members, ETSI regularly and actively contributes thought leadership and insights into the challenges facing the industry as it embarks on the transformation journey that will fundamentally change the way it operates technologically, commercially and culturally.

September saw the launch of the ETSI Channel on TelecomTV: a dedicated place to access any content where ETSI officials and staff are speaking, or where ETSI activities are being discussed: www.telecomtv.com/content/etsi-channel/

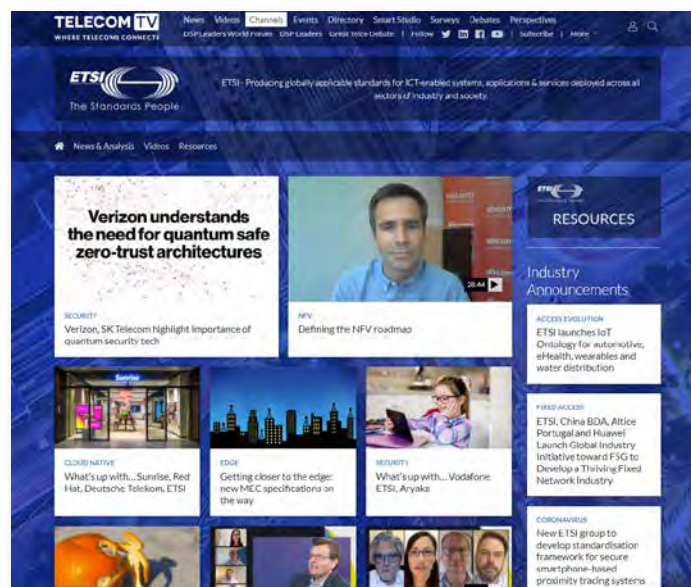
In partnership with TelecomTV, ETSI is also organizing the virtual edition of the **ETSI / IQC Quantum Safe Cryptography Virtual Event on 27-28 October 2020**. The event is composed of an executive track and a technical track. The highly interactive virtual executive track, debating on the state of the quantum threat and quantum risk management, will be moderated by Guy Daniels

of TelecomTV; the technical track is composed of a series of technical presentations.

In November, ETSI and TelecomTV will broadcast a second virtual event: **'Boosting the Impact of Research & Innovation through Standardization'**, taking place on 24-25 November 2020.

Recognizing the importance of research and innovation in the domain of ICT, it will present the latest developments and initiatives from the European Commission, leading research institutes, European technology platforms and also showcase the tools that ETSI offers researchers to engage in standardization. The event will feature rich online content, interviews, status presentations and offer multiple opportunities for the audience to interact with the expert speakers and panellists.

Our events are free of charge and open to all upon prior registration. Sponsorship opportunities for both ETSI/TelecomTV virtual events exist to connect your brand, message to and educate the ETSI and TelecomTV audiences. Contact Anthony Streeter for details: Anthony@telecomtv.com



ETSI Education about Standardization

Education is an important instrument in raising awareness and providing support for standardization. To promote the ICT standardization process, it is important to increase the understanding and attractiveness of standards with lecturers and students alike. Strong teaching materials provide a major tool that can be used to convey the value of standardization.

ETSI has published a detailed textbook and corresponding slide presentation in 2018. Entitled "Understanding ICT Standardization: Principles and Practice", they have been produced in order to assist academia and students in

understanding the value of well written technology standards. The textbook and slides can be downloaded from the ETSI website. The overall objective of this EaS initiative is to increase the level of demand and get feedback for the material as we move into 2020-2021 as ICT is an ever-changing field.

ETSI is seeking to involve all stakeholders and to enable this held a first webinar on 24 September on the topic with a series of further events scheduled for 2020 and early 2021. The recorded webinar is available at this link: <https://www.etsi.org/events/1820-2020-09-education-about-ict-standardization>

Enjoy! invited Dr Ulrich Dropmann and David Kennedy to share their forecasts for



Dr Ulrich Dropmann,

Head of Standardization, Bell Labs CTO, Nokia

Ulrich heads standardization activities for Nokia, where he is responsible for global and regional standardization and technical regulation of spectrum. A board member of the 5G Alliance for Connected Industries and Automation (5G-ACIA), he is also VP and Executive Committee member of the Global Mobile Suppliers Association (GSA).

What ICT developments do you foresee as being significant over the next decade?

Ten years from now 6G will be introduced. We are familiar with the technology elements in 5G like massive MIMO, network virtualization and cloud optimization. So, what components will we see with 6G, and what use cases will they enable?

One vision we have in the 6G era is ‘digital twins’ – a complete representation of the essence and states of something that is real. Take road transportation, where every vehicle and pedestrian would have their precise digital counterpart within a virtual model. This could allow us to optimize traffic flows and avoid accidents. To make sense of all this data we will need an extremely powerful ubiquitous computing environment, and sensing capabilities with sub-millisecond latency. We will require new interfaces between us and the machines, probably

“One vision we have in the 6G era is ‘digital twins’ – a complete representation of the essence and states of something that’s real.”

Ulrich Dropmann

quite different to tapping on a screen or keyboard. We will also need knowledge-oriented systems, where AI determines how best to react to a situation.

Some of these use cases will demand extremely high data rates. With 6G we will go into the terahertz range. In environments like the home these very short wavelengths will enable super high throughput as well as very high accuracy in location of the device.

Today there is a clear separation between the radio and core parts of the network, but we see these aspects as progressively converging in 6G. Trust and security will also be embedded more deeply, both within the network itself and in the services it provides. And with 6G the underlying radio technology will itself be much more reliant on AI and ML.

And crucially, as demands on the network grow massively we must ensure that all this performance is more energy efficient and consumes less resources than today’s networks.

How do you characterize the changing role of research?

Concerning 6G, we will soon see the phase of what I call ‘system research’, which stitches these components together and models what a complete 6G system looks like.

With 6G we will need strong collaboration with research institutes, including the involvement of universities. We will also

need a strong basis for funded research, especially with the financial challenges Europe is facing due to the COVID-19 pandemic.

Compared with research, standardization is much closer to real products. So as a community we need to ensure that standards are always relevant to the market. Near-term research also shapes the evolution of our current standards. There are already a lot of ideas for evolving the 3GPP 5G technology base. So we need ‘standardization related research’ that develops ideas of how we can take current technology and evolve it for new use cases.

Where do you see standardization undergoing a transformation over the next decade?

ETSI should rightly be proud of its outstanding global reputation as an SDO, especially when you look at the sheer magnitude of what we produce – 3GPP is a great example of that. This is also illustrated by what it has achieved for example with NFV and MEC, and this is something that comes from the quality of the process that ETSI provides.

Yet, until recently we’ve been doing things pretty much as we did twenty years ago, relying on traditional tools like emails and meetings. But the COVID situation has demonstrated that the way we collaborate in standardization could be automated much more.

innovation, research and standardization over the next decade.



David Kennedy,

Director, Eurescom

An engineer with many years of professional experience in international R&D, David is Director at Eurescom, a leading provider of project management services in the high-tech sector with a focus on R&D in the ICT sector. He is responsible for the company's policy, the representation of Eurescom at major business events worldwide and senior level relations with member companies and other organizations. David is also closely involved in the H2020 5G-PPP programme.

What ICT developments do you foresee as being significant over the next decade?

In 2020 we have learned to rely less on personal interaction. But wouldn't it be even better if we could bring in other sensors as well? When could we have a realistic virtual hug, and how would we achieve it?

The density of components and the real-time interactions between them in tomorrow's infrastructure pushes us into a scenario where we need help from intelligent systems which will have many manageable parameters. Human thought alone will not be enough to assess and act on all these permutations and combinations.

Networks have always been about the interplay between processing, storage and transmission. In the future this discussion will be about when and where do we process our data, where do we store it, who owns it and when do we transmit it. Here blockchain-type distributed ledgers have a role in ensuring your data has a good degree of credibility, since you cannot modify it without other actors knowing about it.

The wireless domain will get crowded as more frequencies are used for short range communications. This drives the need for innovative propagation solutions, like active RF surface coatings on buildings working in collaboration with active antennae. Other technologies

like neuromorphic systems, quantum systems, nano technologies, new sensing capabilities and radical data engineering methods are all poised for big breakthroughs.

And crucially, as demands on the network grow massively we must ensure that all this performance is more energy efficient and consumes less resources than today's networks.

How do you characterize the changing role of research?

'Applied research' exploits the outputs of pure research in a commercial context that's driven by your customers. You either want to enhance a current product, or you see the opportunity for a totally new product or solution. I'd say there's a big underestimation of the sheer amount of innovation that is needed to take an emerging technology – like AI – and translate that into a new product or service.

"There's a big underestimation of the amount of innovation to turn an emerging technology into a new product or service."

David Kennedy

Complementing this, the 'visionary' side of research is an ongoing activity that tries to capture the requirements of future systems. For instance networks would be dramatically enhanced if we can get latency down to levels where we could use haptic feedback – the sense of touch. This could let you virtually spin a basketball remotely on your gloved fingertip; equally it would allow very significant applications like remote surgery.

Where do you see standardization undergoing a transformation over the next decade?

Standards need to be generic and flexible; but that means we inevitably end up with a lot of options. Today it's a challenge to identify whether we need to implement all these options or just a subset. For many years we've had discussions about the workflow and formal methodologies for evaluating standards. An AI tool could quickly assess all these permutations and combinations to validate a standard in ways that we can't achieve today.

We also need to think about the accessibility of the standards development process. When stakeholders from a vertical sector like railways or automotive come to a 3GPP meeting, can they really understand what's going on? We need to engage these voices effectively and help them to express what they do or don't want.

Welcome to our **NEW** members

Allion Labs Inc., Taiwan, province of China

Allion is an international engineering company that provides customized product testing, validation and consulting services for IT, automotive, entertainment and interoperability with the whole AIoT ecosystem. Allion has world-wide branches in the USA, Europe, Japan and Korea with the mission to bring localized and timely testing and validation services around the world. They provide comprehensive testing services and engineering consulting solutions which satisfy even the most demanding client requirements.

ARGE, Germany

The European Federation of Associations of Locks and Builders Hardware Manufacturers represents lock and hardware manufacturers in Europe and Scandinavia. ARGE operates through an Executive Board, its 12 National Secretaries and their WG Convenors. The association lobbies and provides positions to the European Commission. ARGE and its members have mainly involved in the standardization of construction hardware products under previous mandates and now standardization requests, ARGE also supports its members in complying with complex EU Regulations.

Brose Fahrzeugteile, Germany

Brose is the fourth largest family-owned automotive supplier worldwide. Brose makes mechatronic components and systems for automobiles and every second new car worldwide is equipped with at least one of their products. Usually invisible to the driver, they ensure safety, comfort and efficiency. To achieve this, they invest 9% of sales in research and development. In 2019 they had around 25 000 employees at 65 locations in 24 countries generating 6,2 BEUR. The large number of patents underline the innovative strength of their international and interdisciplinary team.

CICT, China

China Information and Communication Technology Group was officially established in July 2018. They aim to create a world-class information and communications high-tech enterprise with global competitiveness. Morningcore Technology as the core enterprise of CICT, is focused on the integrated circuit industry. It integrates the high-quality resources in the field of SoC chip design for mobile communications from CICT, and masters the key technologies such as: 3G/4G/5G mobile communication terminal technology, large-scale integrated circuit design and SDR chip technology platform.

Deakin University, Australia

Deakin University focuses on harnessing the power, opportunity and reach of the digital world and ensures that engagement and innovation is grounded in their teaching, research and enterprise. Their goal is to be Australia's premier university by enabling a globally connected education for the jobs of the future, and research that makes a difference to the communities they serve. Research at Deakin is divided into four themes that together advance knowledge, better humanity and preserve the planet – they are improving health and wellbeing, designing smarter technologies, enabling a sustainable world and advancing society and culture.

DFKI, Germany

Deutsches Forschungszentrum für Künstliche Intelligenz is Germany's leading business-oriented research institution in the field of innovative software technologies based on methods of artificial intelligence. It is financed through grants from public funding sources such as the European Union, the Federal Ministry of Education and Research (BMBF), the Federal Ministry for Economic Affairs and Energy (BMWi), the federal states and the German Research Foundation (DFG) as well as development contracts from industry. The successful DFKI model of a non-profit public-private partnership is nationally and internationally regarded as a forward-looking structure in the field of cutting-edge research.

DigiCert, Ireland

DigiCert was founded in 2003 with the belief that Internet security could be human and easy. They are the world's leading provider of scalable TLS/SSL, IoT and PKI solutions for identity and encryption. The most innovative companies choose DigiCert for its expertise in identity and encryption for web servers and IoT devices. DigiCert supports TLS and other digital certificates for PKI deployments at any scale through its certificate lifecycle management solution, CertCentral. It is also recognised for its enterprise-grade management platform, fast and knowledgeable customer support, and market-leading security solutions.



GM-ATCI, Israel

Part of General Motors, the Advanced Technical Center in Israel is following the company goals of Zero Crashes, Zero Emissions and Zero Congestion. They are seeking to help to create safer, better and more efficient solutions. Their goal is to redefine the future of personal mobility and to improve our energy efficiency – from vehicle electrification to self-driving cars they remain committed to delivering safer, simpler and more sustainable solutions for our customers and communities around the world.

ISED, Canada

ISED is the federal institution of Canada that leads the Innovation, Science and Economic Development portfolio. It works with Canadians in all areas of the economy to enhance their innovation performance, increase their share of global trade and build an efficient and competitive marketplace. ISED's efforts focus on improving conditions for investment, supporting science, helping small and medium-sized businesses grow, building capacity for clean and sustainable technologies and processes, increasing Canada's share of global trade, promoting tourism, and building an efficient and competitive marketplace.

JSI GmbH, Canada

JSI is a privately owned Canadian corporation with offices in Canada, the US, the UK, Germany and Australia. It provides a data visualization platform designed to support the broad and ever-changing array of data types available to modern Law Enforcement, Intelligence, and Security organizations. It provides a single, unified product suite to all their users, allowing every organization to benefit from the solutions developed for their entire customer base. With hundreds of customers and offices throughout the world, customers join a worldwide community of users.

SITA, Switzerland

SITA is the world's leader in air transport communications and information technology. They are the industry experts in powering and innovating the digital transformation of the air transport industry. SITA delivers to the air transport industry (ATI) the promises of the connected aircraft, and power innovation with recognized expertise and future-proof solutions. Their connected aircraft solutions include the technology, applications, solutions and services they create in partnership with airlines, original equipment manufacturers (OEMs), air navigation service providers (ANSPs) and airframers. They address industry challenges and opportunities – from driving the digital transformation of operations and deriving value from aircraft data, to meeting passenger expectations.

Wi-SUN Alliance, United Kingdom

The Wi-SUN Alliance came together in 2011 to form a global alliance to drive the adoption of Interoperable Smart Utility Networks as described by IEEE 802.15.4g. Energy conservation, automated metering controls, and monitoring requirements are top priorities for progressive cities and communities around the world, and internet-based controls and monitoring strategies are gaining momentum. Work remains to be done to identify and articulate the common goals that will help Utility companies and Municipalities to optimize sophisticated and cost-saving energy controls.

**Dr. Arkady Zaslavsky
tells us why it was
important for Deakin
University to join ETSI.**

**What is the role of the Centre for
Internet of Things ECOsystems
Research and Experimentation?**

Deakin University defined Internet of Things as one of its three pillars of R&D in ICT, so we set up the Center for IoT about a year ago. It consists of three labs populated with around 45 researchers and PhD students. We're currently forming the teams and looking for funds. For instance, we applied for funding to support our project on building an IoT infrastructure, including a 5G mobile infrastructure.

Arkady Zaslavsky

Research Centre Director at CITECORE (Centre for Internet of Things ECOsystems Research and Experimentation), Deakin University, Australia.

Dr. Arkady Zaslavsky has been Professor of Distributed Systems and Security at the School of Information Technology, Deakin University, Burwood campus since 2018. Before that he was a Senior Principal Research Scientist with Data61, CSIRO. He leads R&D projects in Internet of Things, mobile analytics and context-awareness science areas. He is a technical leader of the EU Horizon-2020 project bloTope – building an IoT Open Innovation Ecosystem for connected smart objects. Professor

Arkady Zaslavsky holds Adjunct-Professorship appointments with a number of Australian and International universities, including the University of Luxembourg and ITMO University, St Petersburg. He has published over 400 research publications throughout his career and supervised more than 35 PhD students. Arkady Zaslavsky is a Senior Member of ACM, a Senior Member of IEEE Computer and Communication Societies.

Our research evaluates whether 5G is the best infrastructure for IoT applications, which requires low latency and fast

Our research evaluates if 5G is the best infrastructure for IoT applications.

throughput and many data intensive applications. The role of the centre is to consolidate critical mass, inspire ground-breaking research in IoT. We also aim to establish a range of large research projects to encourage early career and mid-career researchers to team up with senior researchers and jointly advance IoT research. Training research students and build links with government, business and industry to target innovation and impact are also key for the centre.

Your research currently focuses on developing a Context-as-a-Service platform, why?

We think the need for contextual intelligence is a fundamental and critical factor for IoT intelligence. Therefore, we developed a Context Management Platform (CMP) Context-as-a-Service

We think the need for contextual intelligence is a fundamental and critical factor for IoT intelligence.

(CoaaS) as part of our involvement in the EU Horizon-2020 project bloTope. One of our latest use cases is an IoT-enabled smart waste disposal system. One of the novel features of the system, compared to existing alternatives, lays in the simple user interface that automatically recognizes the type of waste based on the image taken by a smartphone. Then, the application navigates the user to the closest available container, based on the real-time IoT data from waste containers

and other related IoT entities. In addition, the proposed system provides a way to interact with a potentially locking mechanism of the smart waste container lid to only allow authorized users to use the container. Another use case is a smart parking service where we collaborated with a well-known German car manufacturer.

So, this concept also involves security and privacy concerns?

Yes, that's an interesting question, I think privacy and security issues can kill IoT if they're not addressed properly. They are key issues in context management platforms. This is why my team is in continuous discussions with other ETSI members to work on standards addressing challenges for security and

I think privacy and security issues can kill IoT if they're not addressed properly.

privacy of context specifically in context management platforms. I think privacy is a trade-off and relies on the authorization by the user to use data. To customize a service as much as possible, you need to exchange a lot of data, but the choice remains in the customers' hands.

Were these topics the triggers to join ETSI? Why was it important for Deakin University to enter the world of standardization?

Actually, when we were in one of our meetings with the European Commission, an officer told us about ETSI addressing context information management. ETSI is currently the only standards body in the world that endeavours to develop standards for context information management through the ISG CIM. During the lifetime of our EU bloTope project we held regular discussions with the Chair of the group and other members of ISG CIM and indeed those discussions triggered our interest in joining ETSI. Universities are required to show the impact of research on industry,

ETSI is the only standards body in the world developing standards for context information management.

so it was important for Deakin University to participate in a standards development body driven by industry. We have already attended face-to-face meetings, before the public health crisis, of course.

Would you have a message to convey to your peers regarding research and standardization?

My message to peers is that research and standardization sometimes have different aims. Research tends to test the boundaries of what is possible, while standards aim to maintain stability and compliance. We need to make standards more agile, more flexible and open to changes driven by proven and validated research. To achieve that, you need to engage more researchers and develop mechanisms for agile standards development. Standards should be backward compatible like software. In our field, computer science and ICT are evolving quickly. If you remember the WAP standard, it was developed and then disappeared, so we need to pay attention to this in the future. But from my long experience in various standards bodies, I can tell you that ETSI is one of the best standardization organizations in the world. When I'm asked about my research into the IoT landscape, I usually say that research and investment are in Europe, commercialization is in the US and manufacturing in Eastern Asia.

In the IoT landscape, research and investment are in Europe.

New reference document for European R&D: in the Communications sector

The NetWorld2020 European Technology Platform is contributing to the definition of research areas and developing the Strategic Research and Innovation Agenda (SRIA). It will drive the research in Europe for the upcoming years.

Preparations for Horizon Europe to become part of the next Multiannual Financial Framework of the EU are progressing. The NetWorld2020 European Technology Platform (ETP), an organization representing more than 1000 entities and 5 % of European GDP, is contributing to the definition of research areas especially in the domain of communication systems and networks, developing the Strategic Research and Innovation Agenda (SRIA). This effort has also benefited from the notable help of the 5G Infrastructure Association (5G-IA), and from contributions from the Alliance for Internet of Things Innovation (AIoTI) and from the Networked European Software and Services Initiative (NESSI). Other external organizations provided input in different stages of the development of this reference document -which was open for worldwide public consultation for two months.

The SRIA provides a summary of the key areas that the European R&D Community believes relevant for the future of communications technology in Europe and in the World. This analysis has been anchored in the challenges identified by the United Nations, the Sustainable Development Goals, and in the current policies inside the European Union, notably the European Green Deal. It identifies research and development directions for the communications technologies, in order to realize these

high-level societal objectives. The document is structured along major technology challenges: overall system architecture, including edge computing; human centric and vertical services; technology domains, covering radio, optical and satellite; transversal aspects, such as security and device technology; and finally, emerging technologies and trends. The upcoming networks will apply intelligent software (Artificial Intelligence and Machine Learning – AI/ML) for secure decentralized and automated network management, data analytics and shared contexts and knowledge.

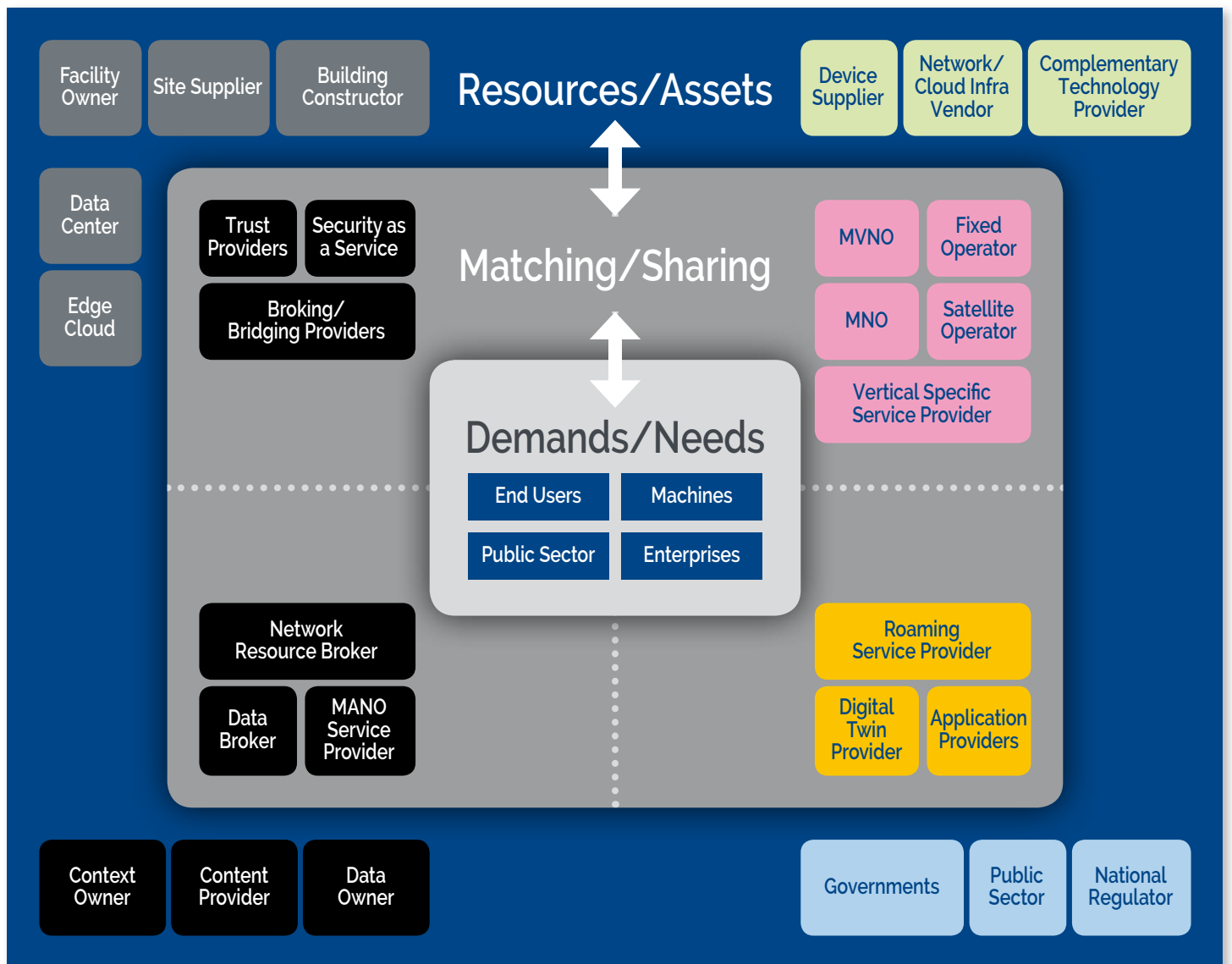
A major conclusion clear from the European view is that the communications technology field is an increasingly multidisciplinary challenge, with a multitude of stakeholders (Figure).

Future communications technology will engage new sets of actors and will be tightly coupled to society in general, with end users and enterprises driving a new set of requirements. We also identified the development of future communications will increasingly depend on evolution in devices, software developments, cyber security and artificial intelligence (AI). In many aspects, future communications infrastructures will be the outcome of the intersection of developments in these fields, and an analysis of critical research areas in these domains. What will be needed for the future communications system is present in different chapters

of the SRIA. Cybersecurity presents interesting challenges even at hardware level, with research needed at the different levels of compromises required for system and device security (e.g. quantification of security, green security or security as a service).

The more traditional areas of communications research have been exhaustively covered, from service and system architecture, to radio and optical communications. It comes as no surprise that at system level, most of the challenges identified are somewhat at the intersection of different skill sets, such as extreme virtualization and green ICT, with reliance on AI in highly distributed environments. By virtualization and strict policies, new networks will foster a free and fair flow of data, which can be shared whilst at the same time protecting the integrity and privacy of data, which may be confidential or private.

At radio level, terahertz and massive random access are expected challenges, while integration (at different dimensions) dominates optical challenges, and satellite technologies are moving towards hybrid structures, achieved by integrating multiple technologies. The R&D analysis presented aims to lead for a sustainable evolution of communications, presenting a realizable path that may incrementally lead towards 2030 to future 6G systems. The SRIA aims to identify both short-term challenges, to be built as evolutions of



5G systems, and longer-term challenges, laying the path of fundamental research needed for the next generation of mobile systems. Europe has the opportunity to again drive worldwide innovation in communications.

Several reference metrics were identified for most of these technologies, considering values to be achieved at different reference times for the upcoming years, until 2030. These metrics can provide guidance of future system performance, and what communications can provide to society over the coming years.

Furthermore, the SRIA identifies some disruptive areas for the future (and some more challenging views on existing areas) in the last chapter. These areas include radical new media (e.g. nano- and bio-networks, quantum networks, or air mobility networks), novel concepts potentially explored to their limits (such as those exploring AI, blockchain, smart environments) and new applications challenges and features (and how these will become entangled in the network).

Overall, the document provides the technology foundations for the upcoming Smart Networks and Services The Smart

Networks of the future will be the nervous system of the Next Generation Internet and other commercial networks, and will be the platform for driving the digital transformation of society. Users should be able to control their environment in the digital society and not to be controlled by the Internet. The SRIA provides the identification of the technologies which will make this vision realizable, and will drive the research in Europe for the upcoming years.

■ Rui Luis Aguiar, Steering Board Chair, Network2020.

New IoT ontology for automotive, eHealth, wearables and water distribution

The ETSI SmartM2M technical committee has extended its IoT SAREF ontology with four new sectors addressing the automotive, eHealth/Ageing-well, wearable and water domains. The Smart Applications REFerence (SAREF) ontology is intended to enable interoperability between solutions from different providers and within various activity sectors in the Internet of Things (IoT), thus contributing to the development of the global digital market. SmartM2M has already developed six extensions, now supplemented with these four new specifications.



The six extensions already released address the following sectors: Energy, Environment, Building, Smart Cities, Industry and Manufacturing, and Smart Agriculture and Food Chain. ETSI SAREF extensions are structured into two parts, with the first describing the ontology and semantics of the sector and the second focusing on specific use cases as examples. These are designed to evolve with new use cases to meet industry needs and requirements.



Safely migrate to quantum-safe cryptography

The ETSI Quantum-Safe Cryptography (QSC) working group has released the Technical Report TR 103 619 defining migration strategies and recommendations for Quantum-Safe schemes, and enhancing cryptography awareness across all business sectors.

The threat of quantum computing to asymmetric cryptography has been extensively reported in ETSI's work and elsewhere, and has been recognized as an existential threat to the many business sectors that rely on asymmetric cryptography for their day-to-day existence. However, recognizing the threat is not sufficient, nor is knowing that a quantum-safe cryptographic algorithm exists to enable encrypted assets in a business to be protected. The entire business must now be ready to migrate to a new Fully Quantum-Safe Cryptographic State (FQSCS). In anticipation of this, ETSI has developed a new technical report defining a framework of actions that an organization should take to enable migration to a Fully Quantum-Safe Cryptographic State.

OSM Release EIGHT now available

OSM Release EIGHT adds ultra-scalable service assurance capabilities, support for new resilience schemes, and facilitates the visual operation for large-scale network deployments from Cloud to Edge. It brings a new framework for the real-time gathering of metrics and alerts, designed to manage service assurance in large production deployments. Release EIGHT makes the use of SNMP (Simple Network Management Protocol) monitoring particularly easy, considering its vast popularity in commercial VNFs (Virtual Network Functions). For this Release, OSM's VNF configuration layer (VCA) has introduced a new scheme for high-availability setups that greatly improves its resiliency to potential outage events. This Release also extends the support and flexibility of configuration tasks for the various components within a Network Service or Network Slice. These processes can now be launched from Kubernetes clusters in addition to Linux Containers, making the management of these critical processes more convenient for their operation at scale. In addition, Release EIGHT incorporates a new graphical user interface (GUI) based on Angular, with a renewed and more intuitive look and feel.



TECHNOLOGY ON THE R.I.S.E.

Standardized commercial products and services substantially contribute to the overall global economy and quality of life of citizens around the world and ETSI plays a key role there. 5G related investments by EU member states will be likely to create 2.3 million jobs in Europe alone. The global Information and Communications Technology (ICT) industry has established a highly successful framework for driving state-of-the-art research results into commercial products and services. This framework is based on three key pillars: research and innovation, standardization and industrialization.

At ETSI we understand that research and innovation are key to drive the future technologies which will at one point be brought into standardization bodies to enable global interoperability. In the following article, Markus Mueck, ETSI Board Vice-Chairman, leads us through the ETSI tools and ecosystem that are in place to welcome the research community. To complement this helicopter view, our show case this time features the ID Quantique quantum solution and describes how they successfully implemented the first quantum encrypted data centre interconnection in a Geneva-based utility company.

The ETSI approach to Research, Innovation and Standards

The global Information and Communications Technology (ICT) industry has established a highly successful framework for driving state-of-the-art research results into commercial products and services. This framework is based on three key pillars: research & innovation, standardization and industrialization. ETSI plays a key role in this ecosystem.

Setting the scene

Standardized commercial products and services substantially contribute to the overall global economy and quality of life of citizens around the world. A recent GSMA study shows that the latest 5th Generation (5G) Mobile Network technology will add \$2.2 trillion to the global economy over the next 15 Years. A study conducted for the European Commission anticipates 5G related investments by EU member states of approximately €56.6 billion in 2020 and €58 billion in 2025 which will be likely to create 2.3 million jobs in Europe alone. Furthermore, the contribution of ICT to

5G related investments by EU member states should create 2.3 M jobs in Europe.

the management of the global COVID-19 pandemic has proven to be invaluable.

ETSI, as a global standardization organization and in its role of an officially recognized European Standards Organization (ESO) supporting European strategic policy decisions, sees research and innovation as the lifeblood to support its work and to serve the global community. ETSI, together with its partnership projects 3GPP and oneM2M, can be seen as an enabling platform where industry experts and research scientists join forces and develop consensus-based standards to define the next generation of technologies and ICT enabled services. The resulting deliverables are finally adopted by the

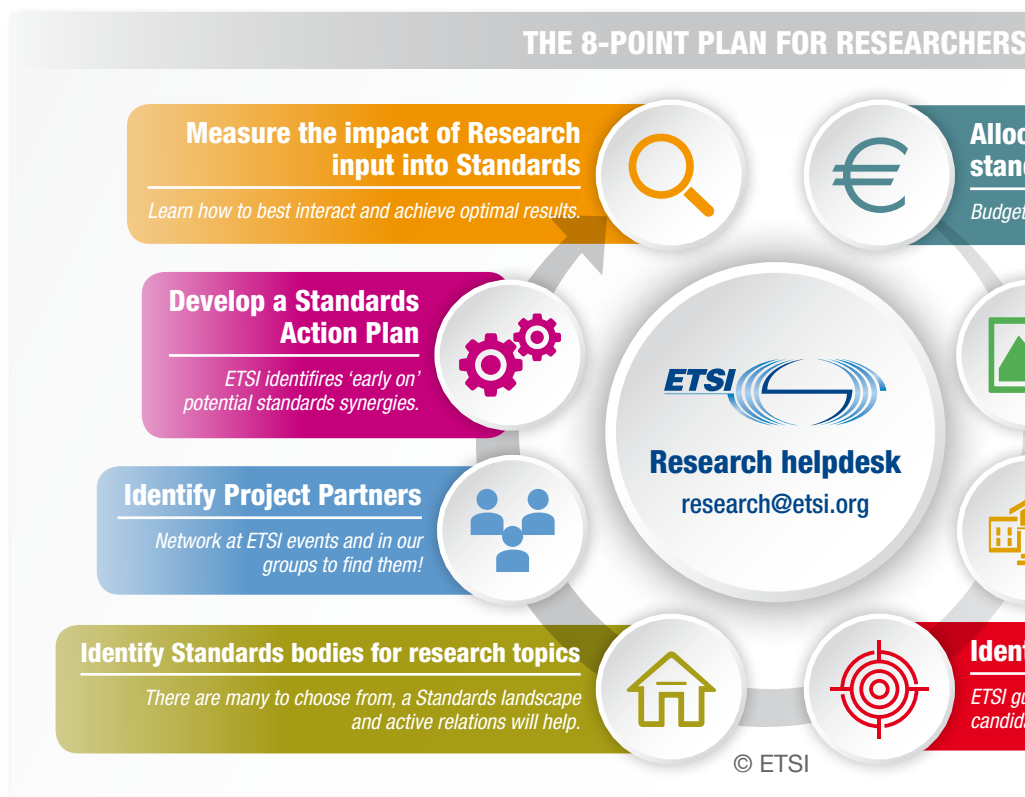
industry to drive innovative and fully interoperable products into the global marketplace.

Research & Innovation in ETSI: a priority

ETSI has identified the importance of supporting a constant flow of world-class research and innovation into its technical work programme. This has made the realisation of the ETSI research action

plan one of the highest priorities of the organization. For example: ETSI's Long Term Strategy (LTS) states that *ETSI works at the forefront of emerging technologies, having close relationships with research communities*. This is further supported by a specific action on the level of ETSI's Board on Strengthening the link between R&D and standardization. The latter activity includes the following objectives:

- Increase contributions by (European) research programmes and projects to ETSI Technical Committees and Industry Specification Groups;



- Downstream: Make ETSI members aware of new technological trends;
- Upstream: Make (European) research communities aware of ongoing work and needs within ETSI.

A facilitator to the research community

Since the world of standards may be perceived as a complex community of its own and sometimes may seem hard to gain access to by research scientists, ETSI provides a number of tools and services to facilitate future contributions embracing research and innovation:

- ETSI events and workshops may be used as a vehicle to gain access to the standards community and to discuss the need and timeliness for starting new work and activities.
- A dedicated research web area has been established to enable researchers and innovators to get the information they need about ETSI standards opportunities;

ETSI offers tools to facilitate contributions embracing research and innovation.

- ETSI leaflets, guides and FAQs answer initial questions and provide guidance on next steps;
- An ETSI dedicated helpdesk for researchers addresses all relevant questions and gives recommendations on how to set up future projects;
- Dedicated social media activities support the creation of a research and standardization 'community'.

Research Organizations: shaping the future

ETSI actively engages with external research organizations, establishing close ties with experts on future trends in the ICT space. Interactions have been especially fruitful between ETSI and Network 2020, one of the European Technology Platforms, which has published a Strategic Research and Innovation Agenda 2021-2027 (SRIA) that provides a consensus view on future technological trends and corresponding research topics in the field of communications and digitization.

ETSI has worked with Network 2020 and mapped the ~100 identified SRIA technology directions to ongoing and potential standards activities and groups in ETSI and provided guidance to researchers to identify potential landing zones in ETSI for specific research activities. This work enables researchers to easily identify target Technical Committees or Industry Specification Groups where their projects related to a specific technology may be started after consultation with the related Chairmen and Committee members. The process is simple and straightforward: ETSI requires a minimum of 4 supporting companies out of its 900+ member organizations in order to propose a new Working Item to an existing technical group or indeed

make a proposal for a brand new Industry Specification Group.

A Success Story: Reconfigurable Radio Systems

To name just one recent success story, the past European Research Projects IST-E2R (End-to-End Reconfigurability) and IST-E3 (End-to-End Efficiency) on Cognitive Radio and Software Reconfiguration lead to the creation of a new ETSI Technical Committee: TC RRS (Reconfigurable Radio Systems). TC RRS has taken a vital role supporting the European initiative of invoking new articles of the Radio Equipment Directive (RED), including RED Article 3(3)(i) on Software Reconfigurability, which governs the access of radio products to the single European market. A series of European Norms has been published related to a generalized Software Reconfiguration Architecture and related Interface specifications (EN 303 641, EN 303 648, EN 303 681-1/2/3/4).

In a nutshell: ETSI's doors are wide open to discuss new standards projects supporting future technology trends. A tight collaboration between the European Commission, researchers, innovators, industry and standards experts is essential to facilitate the rapid development and uptake of technology specifications and to advance European strategic policy. Industry is involved from the outset and is therefore well prepared to adopt the resulting ETSI deliverables that drive the related products and services to the marketplace for the benefit of all.

ETSI is ideally positioned for this task: having over 120 research and academia members organizations who are actively working to provide dedicated standards services for the research and innovation communities. Furthermore, ETSI is also a partner in several EU FP7/FP8/FP9 funded projects and thus takes advantage of its direct access to the research community.

■ Markus Dominik Mueck,
ETSI Board Vice-Chairman.

Create budget for standardization

Helps to estimate budget for Standards activities in the project proposal.

Develop a Standards landscape

Map all standards activities that are relevant for the research technical domain.

Compare workplans

Seek to build synergies and links between the Research and Standards workplans.

Identify research topics for Standards

Provides you on what type of results can be expected for standards.

Geneva's utility company implements its first quantum encrypted data centre interconnection

ID Quantique's quantum-cryptography solution, based on an ETSI standard, has been successfully deployed over the summer to secure the links between data centres at Les Services Industriels de Genève (SIG), Geneva's utility company.

Preventing attacks in the quantum era

Quantum technologies are creating a world of opportunities across almost every aspect of modern life. A quantum computer's ability to solve complex problems like factorization means that it will also have the power to break keys - the same keys that we rely on to protect our cryptographic systems. Fortunately, where a challenge lies, there is also a solution: quantum communications - the quantum counterpart - which will be able to protect the integrity, security and authenticity of data in the quantum era. This is even more important in a world where businesses embrace digitization. We should also consider the fact that with an expanded business digital surface comes an equally increased risk. It is therefore crucial, as organizations build their own growth strategy through digitization, to include an equivalent cybersecurity component.

Offering an innovative technical solution

Although network encryption was already in place between their two data centres, SIG wants to protect critical information when quantum computers are powerful enough to break current public key encryption standards.



The security of exchanging secret keys over a public network can be guaranteed thanks to Quantum Key Distribution (QKD). QKD is a piece of technology for exchanging cryptographic keys over fibre optic networks with optimal security. A Quantum Random Number Generator (QRNG) embedded in the QKD system is used to provide a high degree of entropy (randomness) for key generation. SIG has implemented quantum cryptography to reduce the attack surface of the fibre-optic network. To best address this need, SIG combined ADVA's FSP 3000 product running AES-256 encryption with ID Quantique's Cerberis³ Quantum Key Distribution (QKD), securing the symmetric key exchange between their two data centres.

Based on the ETSI standard

The latest versions of IDQ and ADVA products support the ETSI standard

interface for the quantum key exchange (ETSI GS QKD 014) between QKD and encryptors. This ETSI standard now allows any network and encryption vendors supporting it to use secure quantum keys when encrypting data, instead of classical keys, which are vulnerable when transported over the internet or even private networks. If this first implementation proves successful, long-term data security for SIG will be made possible, thanks to innovative standard encryption and quantum key distribution solutions from ADVA and IDQ.

Data is an organization's most precious asset: it's the root of almost all business decisions and often represents a company's competitive advantage. It can't be outsourced. Making data secure is therefore paramount. To prepare themselves, organizations should assess their existing infrastructure. Adding quantum puts them a step ahead in this race.

■ Jean-Sébastien Pegon, Head of telecom market, ID Quantique.



SMEs and start-ups use standardization to market their innovative technologies

ETSI provides opportunities to small businesses that develop innovative technologies to market their products and earn royalties.

Thanks to their dynamics, resilience, and agility, SMEs and start-ups are known to be a good source of innovation, especially in the ICT sector. However, SMEs and start-ups are resource-constrained, which affects their ability to engage in research and development. In many cases, this results in a trade-off between pursuing innovative ideas and concentrating on daily operations to ensure business continuity. At the same time, SMEs need to be innovative in order to attract investment and stay competitive on the market.

Pioneering SMEs view participation in the standardization process as a strategic tool towards achieving and maintaining innovation. EU Regulation 1025/2012 has laid the foundation for a more inclusive standardization process leading to increased SME participation. Small Business Standards and the European DIGITAL SME Alliance are organizations that offer dedicated support to SMEs in standardization, including funding for their participation.

Many successful SMEs consider standardization as an extension of research and development and as an efficient means of acquiring the external knowledge required to support their innovation. One area where SMEs can leverage standardization to their advantage is the ability to patent their innovative technologies and make them available as ETSI standards. Patented contributions, also referred to as Standard-Essential Patents, benefit from the global userbase of ETSI standards. This allows SMEs to generate substantial licensing income. Royalties received

from patented technologies through ETSI standards can be a lucrative business model for SMEs that invest in R&D and contribute to standardization.

Recent studies highlight the positive engagement of SMEs and start-ups in standardization thanks to intellectual property rights (IPRs) such as patents. For example, a study on SME participation in the 3GPP mobile broadband standard shows that around 35% of SMEs' contributions were accepted versus 29% of those by other contributors, including large companies. These figures are a positive indicator of SMEs' active role in innovation through standard setting.

Greater awareness among SMEs and start-ups of the potential of ETSI standards as a marketing tool for patented technologies could result in higher SME participation in ETSI.

SMEs in the ICT sector often have good ideas but limited resources for R&D. However, financial support is available through EU programs such as Horizon 2020 or its successor Horizon Europe. ETSI, as a European Standardization Organisation (ESO), works closely with the European Commission to ensure that funded research and innovation projects contribute to standardization.

In addition, ETSI can serve as a platform for innovative SMEs that want to network with larger companies and

research organizations to participate in EU-funded R&D programs. The SABINA project, for example, works with standards developed by ESOs (CEN, CENELEC, and ETSI) for power management, photovoltaic energy systems, the thermal performance of buildings, smart appliances, and IoT devices. In order to support its IoT dimension, SABINA has identified the oneM2M standard for machine communication as a solid framework for secure and reliable data transfers between the energy infrastructure and the appliances of smart buildings.

■ *Sebastiano Toffaletti, Secretary General at the European DIGITAL SME Alliance, ETSI Board Member on behalf of Small Business Standards - SBS.*



Teleportation: Science fiction or fact?

Teleportation, as a means for near-instant travel, has, for decades, been a vision for many science fiction writers and film makers. In this field, one can look to the now famous episodes and films of Star Trek which coined the well-known phrases “To boldly go...” and “Beam me up, Scotty”, along with many others. But is teleportation only a fictional idea, or can elements of this be realised?

I initially addressed this question at a TEDx event in 2015, as part of my talk on the “Future Wireless World”, where I first presented the idea of using wireless technology as a means for realising a type of teleportation.

In this short article, I lay out some key ideas; teleportation is in fact possible if we fully develop our ideas in engineering and science. But we need first to carefully and laterally consider what we mean and what our goal is. Clearly, science is not at the point where complex matter itself can be instantly transported.

Defining the vision

Considering that giant steps have taken place over the past 30 years technology-wise, we may ask ourselves why teleportation has not yet happened, and whether it will ever become a reality.

With technology advancements, why has teleportation not happened yet?

First of all, what do we actually mean by teleportation? A clear definition will enable us to address the question of what technologies will be required to realise the vision, and whether we have these at hand, or if new ones will be required.

In the science-fiction writers’ world, the concept was of course based on the transportation of physical objects and living

beings from one place to another at the speed of light. But another interpretation is possible; if sensors are located in one location and an observer is in another, a form of teleportation can be realised.

So let’s apply some lateral thinking, and develop this idea further, looking at which elements are important. For living beings, the five major senses are essential to forming a view of the surrounding world, namely: touch, smell, hearing, sight, and taste. There is also spatial awareness, involving balance, reach, and physical awareness. Physical teleportation, without the five senses and spatial elements is meaningless if these cannot be accurately represented in any other place. It is also fair to say that some of these elements are what make us “us”, and perhaps not all are equally important. If the spatial element is removed, but key senses remain, the vision is effectively realised to some degree. We need to think differently about teleportation. Instead of the physical body, it is our key senses that need to be transported, so that we can touch, smell, hear, see and, in general, feel any other place, as if we were there in person. Spatial awareness, where this might be required, could conceivably be added with avatars or robotic units – with sensors fitted to them.

Physical teleportation, without the five senses and spatial elements is meaningless.

In our current world, digital technologies have mainly been developed to focus on the transmission and reception of audio and visual sensory information, with telephony video services, as with 3G mobile images, 4G video clips, and more recently 5G 3D video and virtual reality. The natural next step in communications is the transmission of a wider range of information, including the representation of other senses, leading to 4D video, where the fourth dimension represents other human senses. 4D media is a realistic way of realising teleportation in the real world.

4D media is a realistic way of realising teleportation in the real world.

Teleportation in the form explained above will enable many new services that range from entertainment and gaming, to telecare and co-operative and remote working, enabling the fusion of virtual and physical worlds for many types of social and professional activities.

Taking into account these ideas, teleportation can therefore take many forms. For example, one case could be where sensory information is transmitted from one location to another, where the human recipient may be. Another case could be via a virtual “middle”, where all physical participants in different locations “meet” in a virtual place, as shown in the film Kingsman: The Secret Service.



Technical requirements

Teleportation, as described above, will require close integration between communications and sensing.

Teleportation will require close integration between communications and sensing.

Below, we briefly present some of the technical specifications for the transmission and reception of the key human senses, with the implications for end-to-end communications.

The transmission of what we can hear is a well-established technology, and the transmission of 3D and binaural audio requires a data rate of around 1-2 megabits per second (Mbps) per person, with minimal delay for interactive telephony of less than 400 milliseconds (ms).

The transmission of what we can see with full colour, full parallax (FP) and 30 frames per second through 3D video or high-quality virtual reality (VR) will require around 30 Gbps (gigabits per second) for a tile measuring 4 square inches, with this rising to around 4.62 Tbps (terabits per second) for an object the size of a human body, based on current 3D-video and holographic technology. This technology is expected to progress in the next five years to enable rates of around 1 Tbps for the scale image of a whole person.

Touch sensors will require around 20 to 30 Mbps for a tile measuring 2 square inches, with latency of less than 100 ms.

Smell and taste are related to chemical reactions, and the estimated bit rates required are modest, in the order of tens of kilobits per second.

Summary and way forward

The transmission and reception of all human senses between people will require sufficient bandwidth, accurate

synchronisation, and low latency levels of around 10 ms for natural interactions in real time. These measures can also be applied to robotic interactions. 5G was originally designed with low and reliable latency in mind, together with higher data rates than with 4G, and its specifications can achieve end-to-end latency of around 16 ms in a dedicated slice for one flow.

To enable future applications such as those discussed, future systems will need to be designed with consideration given to reliable and high-accuracy synchronisation between different data flows carrying various forms of sensual information between human or machine users.

In addition, high-accuracy (sub-centimetre) geo-location will be essential to maintain natural and dynamic interactions between people or robots in both virtual and physical worlds.

In view of all these points, a key objective and differentiator for 6G mobile and wireless systems beyond 2030 will be high-accuracy synchronisation, with location sensing and low latency between multiple flows from multiple sources for end-to-end communications.

A key objective for 6G mobile and wireless systems will be high accuracy time synchronisation.

This objective will necessitate future research challenges focused on integrated communication and sensing (ICS). ICS will render communications smarter by capturing ambient contextual information and intelligently integrating it into communication networks to enable the fusion of the virtual and physical worlds.

■ *Rahim Tafazolli, Regius Professor, Director of ICS/5GIC, University of Surrey.*

An initiative to accelerate Telecom Innovation

The COVID-19 pandemic proved that telecommunications infrastructure could shift much of our work and social life online. It is a strange paradox then, that the very innovation engine that enabled this transformation is now running out of steam.

To understand why is to understand the tenets on which these networks were built:

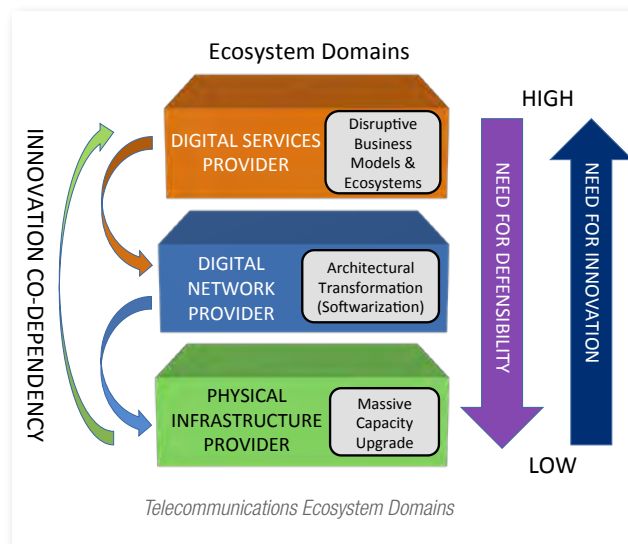
- Ubiquitous service availability commensurate with the demands of government and business.
- Very high availability to support law enforcement and public safety.
- Resistance to attack by malevolent parties including nation-states and criminal networks.
- Interoperability across national and trans-national networks.
- Service persistence through successive waves of technology obsolescence.

In the face of such onerous expectations, infrastructure providers evolved a conservative mindset and necessarily behave differently to those in the highly competitive digital services domain. This behaviour has created significant barriers to innovation, and has radically shrunk telecom vendor diversity. Consequentially, infrastructure providers are over-reliant on a shrinking set of vendors, with a corresponding reduction in innovation.

To address these issues, a few industry veterans representing telecom operators, start-ups and analysts have published a white paper describing the problems, and are inviting feedback from the wider industry.

Ecosystem Co-dependency

You can visualize the telecommunications ecosystem as consisting of three domains, each with different but co-dependent characteristics:



Telecommunications Ecosystem Domains

Each domain is co-dependent because each influences the capability and economics of the other domains. For example, low bandwidth in the physical network would make many applications we take for granted unfeasible. Correspondingly if not enough people are connected to the network, economies of scale for mass-market services do not arise. Large vendors benefit from the vast scale of telecommunications networks because investment cycles are measured in decades. Interoperability between networks and between suppliers places a strong emphasis on standardization which, in turn, slows innovation. These barriers are a serious deterrent for smaller, more innovative suppliers and start-ups. If start-ups are involved at all, partnership with a large vendor is often demanded. Consequentially, large suppliers wield immense influence on the innovation cycle, and continually find opportunities to lock-in customers and seek rent from their incumbency. Start-ups rarely get the

opportunity to break this hegemony and, for the most part, stay out of the infrastructure domains completely. Those that do enter struggle to receive funding over the extended timeframes required to succeed.

The Way Forward

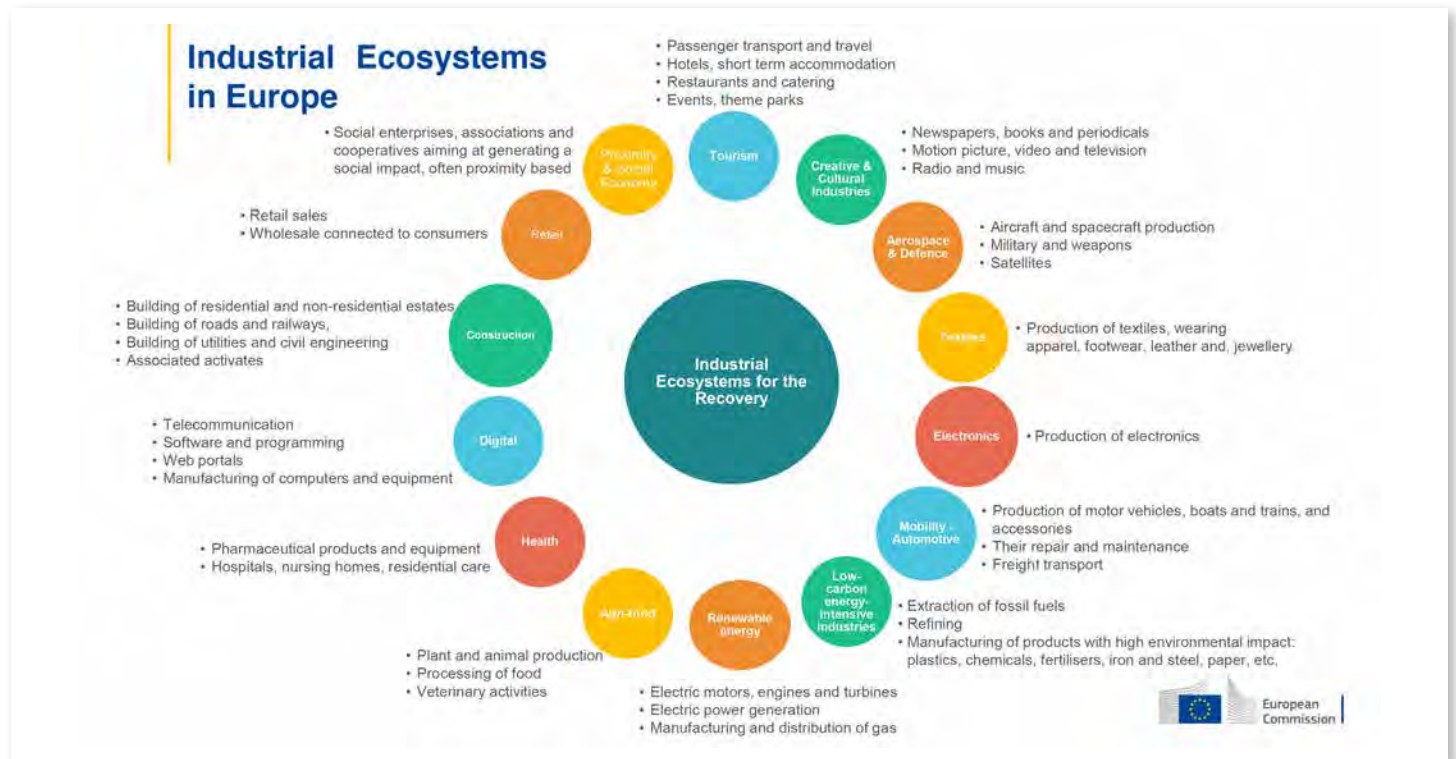
An online colloquium is being organized with key influencers invited from stakeholder industries to review and critique

the rationale and approaches outlined in this introductory paper. The outcome of this colloquium will be documented in a follow-up “call to action” paper, with specific targets and timescales. Questions to be addressed include the following:

- What does innovation mean in the context of telecommunications infrastructure?
- What are the barriers to innovation, and how can they be overcome?
- How can investment risk be reduced?
- In what ways can end-to-end supply chain innovation be encouraged, supported and de-risked?
- To what extent can innovation tools and techniques be made common to all telcos to create scale for tool and technology suppliers?

For more information: <https://www.linkedin.com/company/telecom-ecosystem-group/>

The 14 ecosystems coordinating efforts for the recovery of the European economy



The global industrial landscape has undergone major changes in past years. Green and digital transitions are essential and inevitable. Due to the health crisis, efforts taken by the European Union in the upcoming months and years will accelerate. Economic recovery is an immediate priority. Strengthening resilience and leading the European economy through the green and digital transitions will be central to this recovery.

Adding to this, the COVID-19 crisis has put exceptional pressure on the European economy, its industry and social systems. In addition to confronting Europe and the world with an extraordinary public health challenge, it has brought about immense economic hardship, with an impact on demand for sales and trade in goods and services, and seriously affecting supply chains, investment and employment.

Through recently-adopted policy initiatives such as the European Industrial Strategy,

the European Digital Strategy and the European Data Strategy, the European Commission aims to provide a robust response to the structural challenges facing the European economy and how the Single Market functions. To address the critical issues central to recovering from the COVID-19 crisis, the Commission has taken a set of measures to help all companies, large and small, to make it through the worst of the crisis while pursuing the objective of maintaining a level playing field within the Single Market and globally.

This will take place through the industrial ecosystems – an approach initially defined by the European Commission in its Industrial Strategy as a new means of gearing the European economy towards green, digital and resilience goals.

On that basis, the Commission identified 14 key ecosystems, including tourism, cultural industries, space and defence, textiles,

electronics, smart and sustainable mobility, low-carbon energy intensive industries, renewable energy, agri-food, smart health, digital industries, construction, retail, and local life. The Commission will work towards devising a tailor-made approach for each of them based on the Industrial Strategy goals strengthened with the recovery and resilience policies.

Building on the successful public-private partnership model between the Commission and the European Standardization Organizations, the Commission will closely coordinate its standardization strategy with the strategic planning of the ESOs.

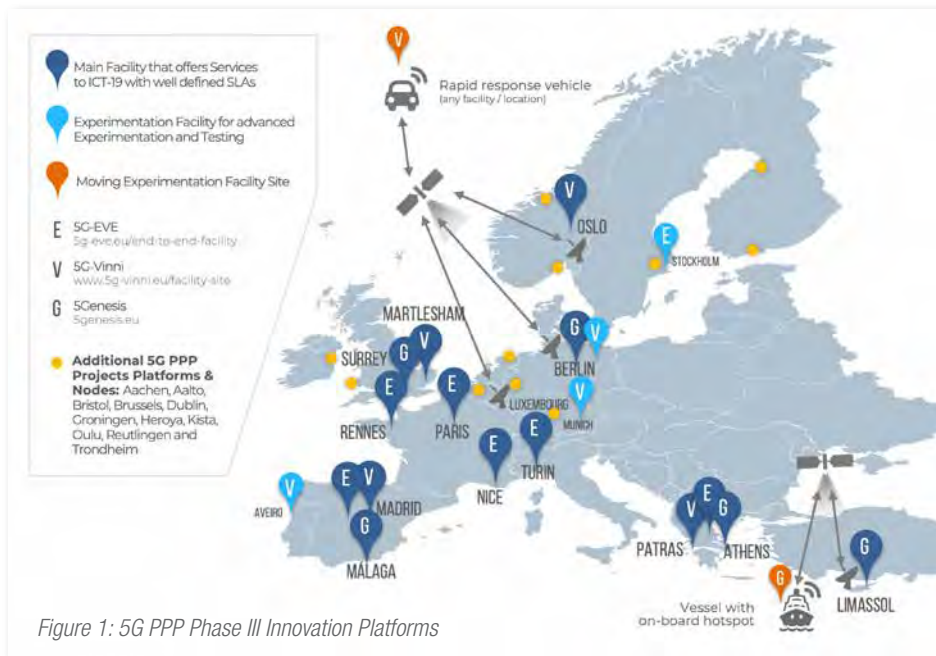
■ Information compiled by Margot Dor,
Director government affairs, ETSI.

5G PPP

A Success for Europe



Launched in December 2013, the 5G Public-Private Partnership (5G PPP)¹ is a 7-year research initiative which aims to secure Europe's influence and leadership in the critical area of mobile communications.



5G PPP & 3GPP

Standardization has been one of the key focus areas for the 5G PPP initiative and foremost amongst the standardization bodies has naturally been the 3GPP organization. Over the lifetime of the 5G PPP, the projects have submitted hundreds of contributions to the various 3GPP working groups. But possibly of even more significance has been the creation of pre-standardization consensus among global key telecommunication players. Due to the key role of 3GPP, the 5G IA which is responsible for the 5G PPP initiative from the industry side has become an MRP in 3GPP. This has enabled visibility into the standardization status and activities and also allowed the 5G IA to disseminate the 5G PPP activities to other relevant and interested organizations. Lastly in the area of standards, the 5G PPP had an active engagement in the IMT-R IMT 2020 evaluation process, being the only European actor in this process.

The 5G PPP is a joint initiative between the European Commission and the European ICT industry, where the 5G IA represents the Industry side. The 5G PPP initiative can be divided into three distinct phases. The first phase which focused on fundamental research for 5G and created many of the key concepts and use cases. The second phase, where the focus was on demonstrating and validating the developed 5G technologies for industries beyond telecoms. The key issue was to work together with the key players from domains such as automotive, smart cities, eHealth and industry 4.0 to convince them to invest in 5G technology. In the final phase, phase 3, the focus is on the

development and rollout of 5G innovation platforms across Europe. The aim is to create a 5G infrastructure which can be used to try-out and prove new innovative 5G ideas and services.

Although the 5G PPP still has several years to run, the success and influence of the initiative is already visible. Since 2013 over 60 research and innovation projects have been launched and have provided many significant results^{2,3} delivered more than 800 contributions to standardization and in Phases II & III published their results in over 1300 scientific journals and conferences.

Beyond 5G

As the end of 5G PPP comes in sight, Europe is already preparing for the next steps. The European communication networking and services sector has proposed a new initiative, the Smart Networks and Services Partnership (SNS)⁴ to secure European leadership in the development and deployment of next generation network technologies and services, while accelerating European's industry digitization.

■ Colin Willcock, Chairman of the 5G IA Board.

1. More information is available at <https://5g-ppp.eu/>
 2. Available at: <https://5g-ppp.eu/annual-progress-monitoring-reports/>
 3. Available at: <https://5g-ppp.eu/phase-2-key-achievements/> and <https://5g-ppp.eu/key-achievements-v3/>
 4. https://ec.europa.eu/info/files/european-partnership-smart-networks-and-services_en

SMEs set the standard for digital transformation

In this article, oneM2M looks at how SMEs in Europe are driving digital transformation and the important role standardization plays in their success.

Representing 99% of all businesses in the European Union (EU) and providing two thirds of the total private sector employment, Small Medium Enterprises (SMEs) are the backbone of Europe's economy.

As we move to an increasingly connected world, driven by digital transformation and the Internet of Things (IoT), the European Commission (EC) considers SMEs and entrepreneurship as key to ensuring economic growth, innovation, job creation, and social integration.

However, if SME innovations and solutions are to become part of a wider, interoperable IoT ecosystem, standardization is key. With many SMEs lacking the resources to participate in standards activities, the EC launched the European DIGITAL SME Alliance in 2012 to put digital SMEs at the centre of the EU agenda.

A Case Study in SME Innovation

One development that emerged from the initiative was the launch of an Italian branch of the SME Alliance. Its members included a group of lift-service providers who service equipment from several different lift manufacturers. These SMEs saw value in standardizing the collection of lift data through a European norm. This would lead to a platform that brings together different manufacturers' data, as well as help them offer a better quality of service to building managers and tenants.

An open standard to record IoT data is expected to provide investment confidence and enable providers to develop new services for lift equipment from different vendors. The combination of sensor data with historical records about



check-ups and repairs, for example, will help improve the quality of servicing and optimise preventive repair schedules.

How SMEs are influencing standardization

An initial group of participants began their standardization journey through a Special Interest Group within ETSI. There, they built their knowledge base about the main suppliers, users in the eco-system and key maintenance processes and lift monitoring activities.

With its focus on remote monitoring, data management and cross-vendor interoperability, oneM2M is the natural home for IoT standardization activities. The group consolidated its findings in a oneM2M Technical Report. The next step is to draft a technical specification which will lead to the creation of a European norm. This initiative is progressing through oneM2M as work item (WI-0098) on the

topic of IoT for Smart Lifts. It will include information about use cases, requirements for smart lifts, and the inclusion of appropriate solutions in oneM2M.

Innovation Drives Productivity

SME lift service providers recognised the importance of innovation to evolve their business models and drive productivity. In oneM2M, they have a standardization environment that is open to contributions from small, medium, and large organizations alike.

Once a platform to collect and share lift data exists, new ideas under consideration include the semantic aspect of lift data. Once again, a standards-based approach will help in creating a common vocabulary for lift assets, making it easier to share data across boundaries and capture new sources of value from cross-silo applications.

■ Ken Figueredo, oneM2M member, Market Development Consultant for Chordant Inc.

NEW VIDEO: Small chip, big future

Tremendous progress has been made between the early Subscriber Identity Modules, better known as SIMs and still ETSI's one of the most successful standard as of today, and our current smartcards. The highly-connected world we now live in requires technology that is powerful and versatile enough to securely host multiple applications while meeting a wider range of market needs. The ETSI TC SCP has developed the Smart Secure Platform specifications for these ultra-smart chips called Secure Elements (SEs). We have just released a brand-new video that explains the gains generated by the Smart Card Platform in a fun and simple way. Watch it on our YouTube channel.



New White Paper on IPv6

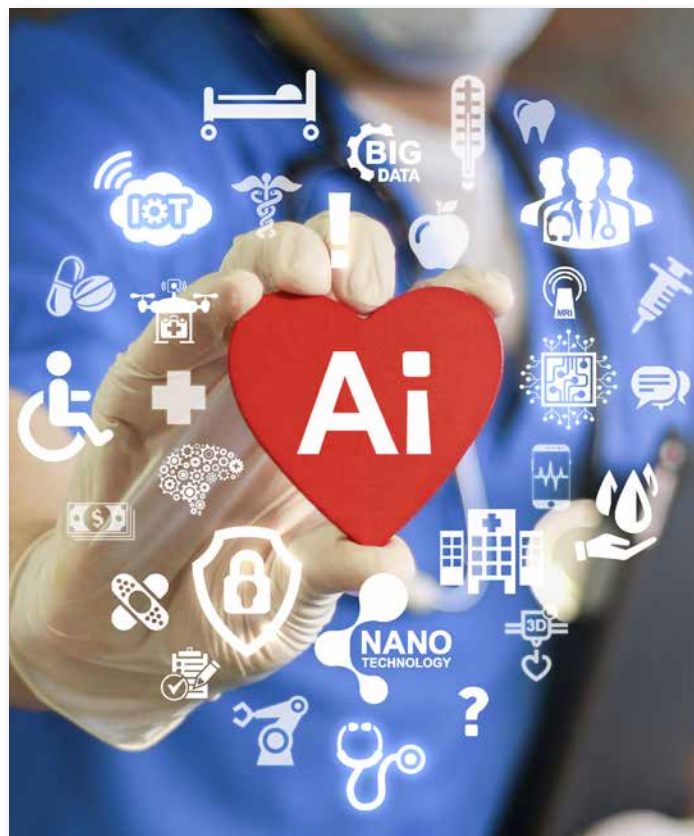
The ETSI IPv6 Industry Specification Group has just released a White Paper on the lessons learned from IPv6 best practices, use cases, benefits and deployment challenges. This White Paper puts forward recommendations to ease the adoption of IPv6 and to motivate the industry for the upcoming large-scale deployment of IoT, 4G/5G and Cloud Computing, benefiting from the restoration of the end to-end model.



The management of the enterprises could look at reducing CAPEX and OPEX by studying the best practices of the top Internet technology enterprises that have already implemented IPv6-Only inhouse with far greater benefits expected by the adoption of IPv6.

New White Paper on Artificial Intelligence

This ETSI White Paper surveys the many technical activities in ETSI that consider AI. This includes 5G systems, network optimization, privacy/security, data management, semantic interoperability and testing across all areas. Each area is considering the use of aspects of AI, including Health and Human Factors scenarios.



During the COVID-19 crisis, AI has helped deliver quality telecom services during traffic peaks. Government decisions have been seen to depend on the quality of information available and, at present, data modelling and processing is barely adequate to the enormous task of coping with the pandemic. The reliability and timeliness of advice must be improved and Big Data, AI and ICT clearly have a significant role to play. The energy and drive to develop AI is likely to continue to grow as society faces great challenges in data management and the care of its citizens.

The increasing use of AI involves both huge opportunities and associated risks. Standardization by ETSI and other SDOs has a major role to play in future implementation of AI. The global trend now forming seeks to establish AI for the future benefit of all, observing the fundamental ethical values as expressed by the European Union and other international, governmental and non-governmental organizations.

Introducing the New Technologies Department

Recognizing the essential role of research and innovation in driving technological advancements through standards, ETSI has recently created the new Department NET (New Technologies) to act as the dedicated interface towards the Research, Innovation and Academic communities and to facilitate the uptake of innovative research work in ETSI's technical groups.



Main missions of the department

- Engage with the research, innovation and academic communities, both inside the ETSI membership and beyond
- Provide the tools, information and guidance that is required to support researchers and innovators when seeking to engage in standardization activities in ETSI
- Work in close collaboration with the various EU Directorates (CONNECT/GROW/RTD) to optimize the impact of EU research projects in ETSI's standards work
- Help identify new and innovative technologies of potential interest to ETSI using technology radars / roadmaps

- Support the ETSI Board in their activities for the ETSI Long Term Technical Roadmap (LTTR) and corresponding research elements of the ETSI Long Term Strategy (LTS)
- Provide guidance and assistance to interested founding members during the creation of new Industry Specification Groups (ISGs) in ETSI

Early results

- Creation of a dedicated webpages and leaflet for research and academia at www.etsi.org/research
- Creation of a dedicated LinkedIn page - an information exchange platform for the research community about Education, Research & Innovation opportunities

in ETSI: <https://www.linkedin.com/showcase/etsi-standardization-research-innovation-education/>

- New Helpdesk for researchers and innovators in ETSI at research@etsi.org
- Participation to a number of external meetings and research focussed events
- Building of the new ETSI event – “Boosting the Impact of Research & Innovation through Standardization” to be held virtually on 24-25 November 2020
- Collaboration with the NetWorld2020 on their Strategic Research and Innovation Agenda (SRIA)
- Collaboration with 5G-IA particularly the group on pre-standards in the area of their research roadmap for BY5G
- Successful creation of several ISGs in ETSI that are now actively contributing to the ETSI work programme.

Although the ETSI NET Department is only in its first year of existence, several initiatives have already been put in place to bring the research and innovation community closer to the world of ETSI standards.

It is expected that this momentum will continue to grow in 2021 particularly with the launch of the next research and innovation framework programme, Horizon Europe, as well as the acceleration of innovative research projects in the area ICT and digitization, particularly in enabling technologies for BY5G / 6G.

■ David Boswarthick, Director of the ETSI New Technologies department.

Join us at our virtual events

Find more information and register on our website at: www.etsi.org/events

October 2020



Edge Computing World *12-15 October, Virtual Event*

This fully virtual event will bring together the entire edge ecosystem with developers and users to drive forward the next evolution of the Internet.



Broadband World Forum *13-15 October, Virtual Event*

ETSI is actively shaping the content of the event via its F5G ISG: learn about the why's and how's of network evolution, get an overview of ETSI's F5G initiative and follow an interactive panel discussion based on use cases.



Edgenomics - DSP Leaders Summit *20-22 October, Virtual Event*

Edgenomics will focus on the edge computing strategies, options, models, technologies and business opportunities relevant to network operators, their partners and suppliers.



NG eCall Plugtests *26 October - 6 November, Virtual Event*

Organized by ETSI, with the support of the European Commission, the remote NG eCall PLUGTESTS 2020 event will have a specific focus on Next Generation eCall (NG eCall) and eCall over Long Term Evolution (LTE).



ETSI / IQC Quantum Safe Cryptography *27-28 October, Virtual Event*

This year's virtual event, organised jointly by ETSI and IQC, is composed of a Virtual Executive Track and of a Virtual Technical Track. The highly interactive Virtual Executive Track, debating on the state of the quantum threat and quantum risk management, is running in partnership with TelecomTV and will be moderated by Guy Daniels; the Virtual Technical Track is composed of a series of deeply technical presentations.

November 2020



2020 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN) *9-12 November, Virtual Event*

ETSI is pleased to endorse and participate in the 6th IEEE Conference on Network Functions Virtualization and Software Defined Networking (IEEE NFV-SDN 2020).



Open RAN - DSP Leaders Summit *11-12 November, Virtual Event*

Open RAN aims to explore the options, dispel some myths and investigate how open RAN will integrate with the existing mobile network.



oneM2M Interop 7 *16-27 November, Virtual Event*

ETSI and TTA, are jointly organizing the 7th oneM2M Interop event. Testing will be based on the latest specifications of the oneM2M releases 1, 2 and 3, as well as some advanced features of the release 4.

'Boosting the Impact of Research & Innovation through Standardization' *24-25 November, Virtual Event*

Organized in partnership with TelecomTV this event will include rich online content, interviews, status presentations and offer multiple opportunities for the audience to interact with the expert speakers and panellists.



Droidcon MEC Hackathon 2020 *25-26 November, Virtual Event*

ETSI is pleased to endorse the Droidcon MEC HACKATHON 2020 - The 5G challenge! which is actively supported by ETSI MEC ISG.



OSM Hackfest Release 10 *30 November- 4 December, Virtual Event*

Participants will be guided through the step by step on-boarding, deployment and end-to-end testing of a hybrid Network Service. Participants will be able to get familiar and experiment the latest OSM features.

December 2020



TelecomTV Great Telco Debate *8 December, Virtual Event*

ETSI is pleased to endorse and actively participate in this well-established, high-level annual event. Save the date.

ETSI SNAPSHOT

933
members

1303
standards
June-August 2020



26%
SMEs

1222
standards
under development

+100
technical groups

15652
standards' downloads
June-August 2020



52 093
online participants
June-August 2020



1653
eMeetings
June-August 2020

23
conferences
& Plugtests
June-August 2020

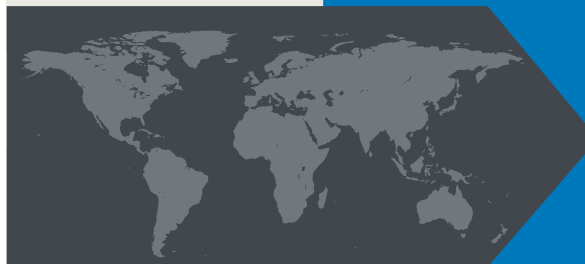
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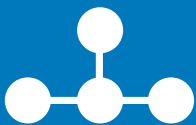
78
partnerships

124
people

19
nationalities



Members
from
65
countries



About ETSI

ETSI provides members with an open and inclusive environment to support the development, ratification and testing of globally applicable standards for ICT systems and services across all sectors of industry and society. We are a not-for-profit body with more than 900 member organizations worldwide, drawn from 65 countries and five continents. Members comprise a diversified pool of large and small private companies, research entities, academia, government and public organizations. ETSI is officially recognized by the EU as a European Standards Organization (ESO).

For more information please visit: www.etsi.org

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FELLOWSHIP PROGRAMME



The Call for Nominations to the ETSI prestigious Fellowship awards is now open!

The ETSI Fellowship Programme was established to honour and reward those individuals who have made an outstanding personal contribution to ETSI, to building the work of ETSI, or raising its reputation in specific sectors of standardization.

This year we have decided to give a bit more relevance to the programme in order to enhance the value and recognition of the award through:

- A wider communication campaign before, during and after the ceremony
- A higher profile ceremony
- A prestigious award

Who is eligible for an ETSI Fellowship?

Individuals of the following categories are eligible for nomination:

- Current or former participants in ETSI work (representatives of current or former members)
- Current or former participants in ETSI's Partnership Projects (not necessarily representatives of members)
- Current or former representatives of Partners or Counsellors
- Former members of the ETSI Secretariat

Nominees do not need to have held an official position at ETSI. An ETSI Fellowship may be awarded posthumously.

Nomination of candidates

Any individual representative of a Member, with the exception of the members of the Awards Committee, may propose a candidate for Fellowship. A candidate shall be nominated by at least two individuals from different ETSI Members in order to be eligible for an award.

Criteria

The award recognizes an outstanding contribution to ETSI and is given to an individual whose dedication to ETSI is well known.

Call for Nomination

Although nominations may be made at any time, ETSI Fellowship awards are announced at the spring General Assembly each year. In order to be considered for an award at GA#77, nominations should be received before 22 January 2021.

Nominations shall be made in writing and shall justify clearly why the nominated candidate should be granted an ETSI Fellowship. Nominations shall be sent to the ETSI Director-General using the application form available on our website.

More information is available on our website:

<https://www.etsi.org/membership/fellows>

