ITUPublications

International Telecommunication Union

Standardization Sector

Digital Transformation for Cities and Communities

Outcome Document

ITU

Acknowledgements

The authors extend their gratitude to the contributing organizations, along with their representatives.

The Outcome Document was developed by Victoria Papp, Chris Ip, Yining Zhao and Cristina Bueti (ITU). The technical coordination of the report was conducted by Cristina Bueti (ITU).

Additional information and material related to this report are available at the Digital Transformation for Cities and Communities Webinar Series Webpage. If you would like to provide any additional information, please contact Cristina Bueti (ITU) at u4ssc@itu.int.

Legal Notice

Third-party sources are quoted as appropriate. The International Telecommunication Union (ITU) and the contributing organizations are not responsible for the content found in external sources including external websites referenced in this publication.

Disclaimer

The views expressed in this publication are those of the authors and do not necessarily reflect the views of ITU and the contributing organizations. Any references made to specific countries, companies, products, initiatives, or guidelines do not in any way imply that they are endorsed or recommended by ITU, the authors, or any other organization that the authors are affiliated with, in preference to others of similar nature that are not mentioned. Requests to reproduce extracts of this publication may be submitted to jur@itu.int.

This document is intended for informational purposes only. Information provided is correct as of December 2021.

ISBN:

Please consider the environment before printing this report.

Executive Summary

The International Telecommunication Union (ITU), together with other organizations and UN agencies, organized a series of webinars on "Digital transformation for cities and communities". With the objectives of investigating the expanding the role of digital transformation in driving innovation, sustainable growth and inclusion, as well as responding to crisis situations in cities and communities. With the pandemic accelerating the adoption of digital technologies in public and private sectors, cities and communities need to re-evaluate their smart strategies in order to connect to the new priorities while limiting their exposure to recurring global challenges.

These webinars discussed topics related to Digital transformation for cities and communities and the role of standardization. The goal of this initiative was to increase the collaboration with city stakeholders and it also aimed to bring new knowledge which may contribute to ITU-T Study Group 20 standardization activities. This also was a channel to present to the community, the outcomes of ITU-T Study Group 20 "Internet of things (IoT) and Smart Cities and Communities (SC&C)".

This report provides an overview of the key highlights and suggested actions discussed during the webinar series on digital transformation for cities and communities, which comprised of 12 webinars held from September 2021 to December 2021.

For additional information and a copy of the presentations, please visit the webinar series homepage here.

Table of Contents

Episode #1:
Digital Twins in Cities

8 September 2021

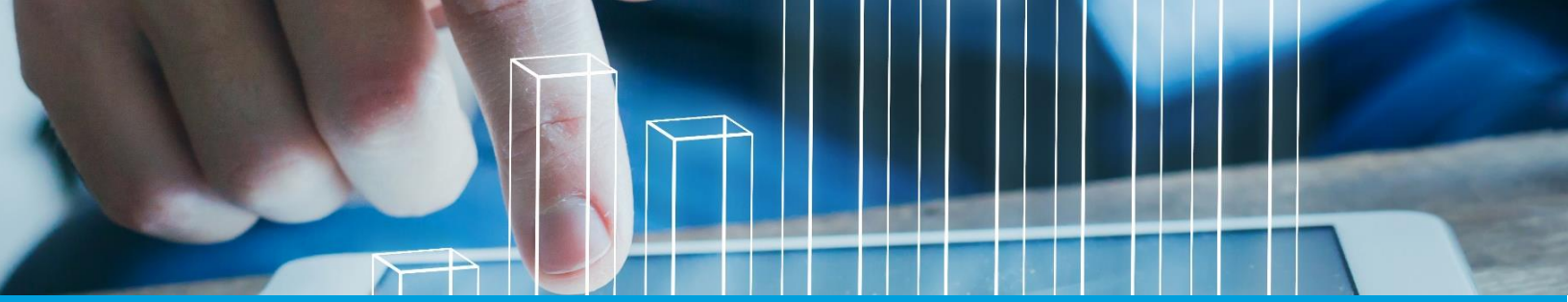
Webinar Introduction

Digital twin is a powerful tool for supporting cities' journey towards digitalization. Through data collection and simulation, digital twin can optimize energy consumption, enhance disaster preparation, improve mobility and transportation, visualize operation processes and outcomes and more.

Digital twin is not without its challenges. A vibrant, integrated and interoperable IoT ecosystem is crucial for effective data compilation and contextualization, capturing physical properties accurately and maximizing the overall capability of digital twin.

This episode was jointly organized by the International Telecommunication Union (ITU), the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO). It looked at the impacts of digital twin in cities and examined the enabling role that standards play in accelerating the deployment of digital twin. The episode brought together panelists who shared their experience in using digital twin in cities and the latest standards in this emerging field.

For additional information and to access the presentations, please click here.



Key Highlights – Opening Remarks

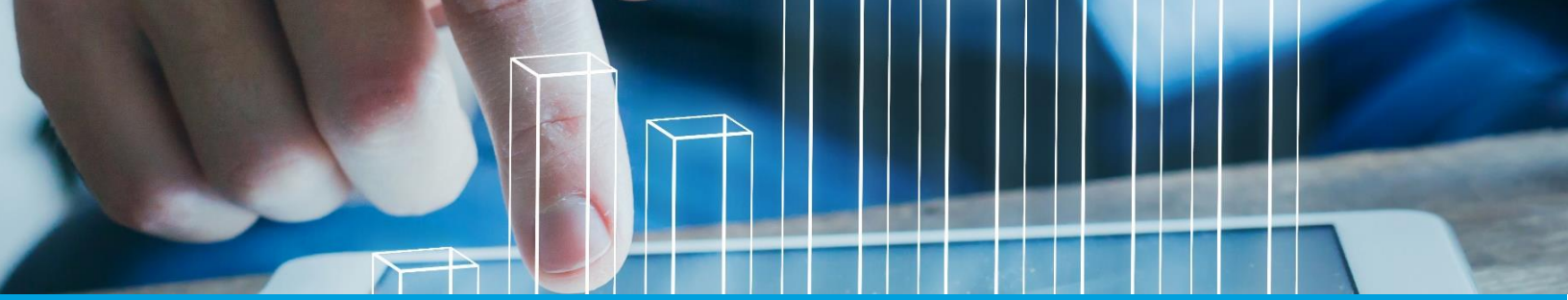
Sergio Mujica, Secretary-General, ISO

By the year of 2050, 70 per cent of the world population, roughly 6.7 billion, will live in cities. As part of the global community, there is a great responsibility to ensure safety, resiliency and sustainability in cities. The topic on city is also identified as one of Sustainable Development Goals of the United Nations, SDG 11. ISO, IEC and ITU have a long-standing collaboration in this area. While there are different organizations and create different standards, with combining our talent, it will be more effective. That is why ISO launched the Joint Smart City Task Force in 2020. That is also why there is alignment of our three organizations to celebrate together the world's standards day and renewed our commitment to support the SDGs, including smart cities.

When it comes to digital twins, it is important to highlight that it is a huge market, which is growing by 38 per cent annually. Digital twins are exact replica of a physical entity, process or services. The power of digital twins lies in its ability to allow us to better understand the past, better monitor the present in real time, and predict and prevent some possible scenarios in the future. This is particularly relevant to cities because cities involve a complex ecosystem. With digital twins, cities can enhance predictability, urban planning, and the management aspects. It is also important to highlight that digital twins allows us to explore "what-if" scenarios, enabling us to make better decisions. International standards have a significant role to play in this regard. Standards can define a common understanding on digital twins. They can create technical specifications that enable interoperability and interconnectivity. Standards are also crucial for the identifying and sharing of best practices.

Chaesub Lee, Director, Telecommunication Standardization Bureau, ITU

For many years, ITU has played a significant role in supporting the development of smart sustainable cities and coordinating the deployment of information and communication technologies and digital technologies. Digital twin is the latest digital technology that is reshaping the design and planning process of smart cities and communities. With its exceptional capability to monitor physical assets and simulate outcomes, many cities are looking to adopt digital twins to improve resiliency and sustainability. This is especially important if cities are to get back on track and make steady progress to achieving the United Nations 2030 Agenda and the 17 Sustainable Development Goals, in addition to the ITU Connect 2030 Agenda and its targets for digital transformation. International standards and guidelines will be vital to support the adoption of digital twin in cities. They contain technical and policy recommendations that cities can use to ensure the interoperability requirements of IoT systems and other performance expectation are met. It is known that digital twin is still an emerging area when it comes to research and standardization. ITU-T Study Group 20 on "Internet of Things and Smart Cities and Communities", which is the lead ITU standards group, has already taken the initiative to develop new standards that will define the interoperability and capability framework of digital twin systems in smart cities and communities. The smart city and digital technology standards developed by ITU-T Study Group 20 have already made a significant contribution to helping cities to coordinate and evaluate their smart city strategies. ITU is also pleased to be able to continue to collaborate with IEC and ISO under the framework of the Joint Smart City Task Force.



Key Highlights – Opening Remarks

Gilles Thonet, Deputy to the General Secretary & CEO, IEC

For several years, IEC, ISO and ITU have been collaborating on smart city. This collaboration started formally with the creation of the IEC-ISO-ITU Joint Task Force on Smart Cities. It is undeniable that achieving international consensus in broad fields such as smart city requires the complementary strengths of the three organizations to be combined.

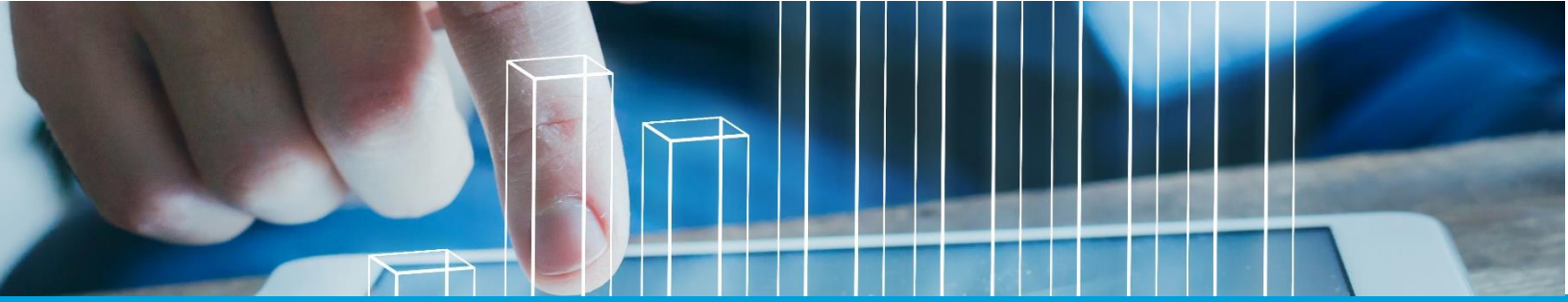
The webinar noted with appreciation that the three organizations are working together towards a common objective. With the advance of the Internet of Things and the massive amount of data that is available today, the implementation of digital twins in many industries has gained popularity. For instance, in the IEC, considerable interest has been seen from the industrial domain such as smart manufacturing applications to deploy digital twins. It is expected that this technology will be able to be deployed in other fields and industries, including smart cities. Using digital twins in cities provides many opportunities, whether for enhancing urban planning, improving mobility or optimizing energy consumption. It goes without saying that international standards are needed to accelerate the deployment of digital twins in an effective, consistent and interoperable way. By collecting a huge amount of data and leveraging the power of simulation, digital twins not only support the digital transformation journey but also contribute to the future of standardization. IEC sees a lot of potential in standards that will not only be read or interpreted by machines, but will also update machines directly. The concept of smart standards is something on which IEC is already working with ISO. The topic of digitalization is of great relevance to standardization.

Key Highlights – Keynote Speeches

Moderator: Nasser Al Marzouqi, Co-Chairman of the IEC-ISO-ITU Joint Task Force on Smart Cities and Chairman of ITU-T Study Group 20

Ulrich Ahle, CEO, Fiware Foundation

Digital twins will influence our future. Digital life will gravitate towards this development. Digital twins describe the when, where and why around us by capturing the necessary data and representing them in the digital world. Digital twins utilize functionalities such as Big Data analytics and artificial intelligence, to process, analyse and monitor these data and upload them to the digital twins. In turn, the digital twins actuate the results in the real world. This process is seen in the case of the self-driving car. And yet, many digital twin applications are currently organized in silos.



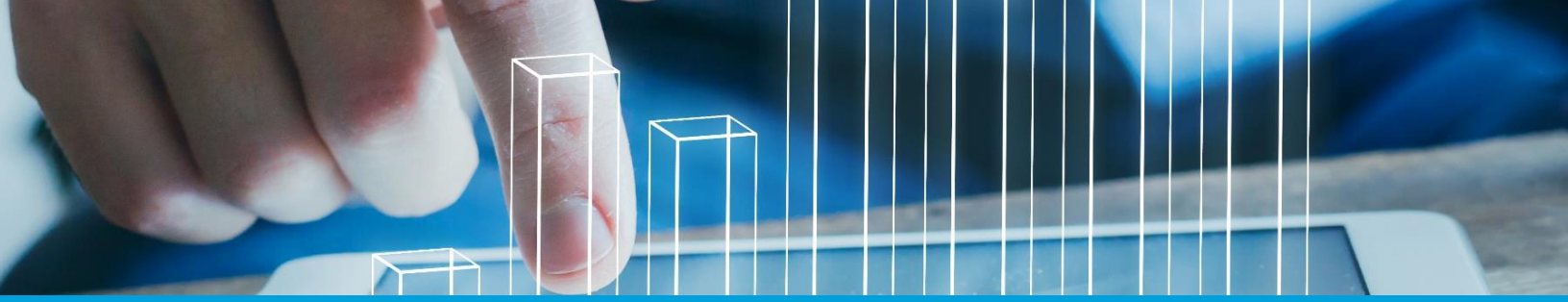
Key Highlights – Keynote Speeches

This means that data models and interface often do not fit with each other. The walls of silos are especially thick in key smart city domains such as water and energy. The mission of FIWARE is to break down these silos, make data available across platforms, improve the quality of life of citizens, reduce the cost of operations, and make the transition to smart city more environmentally friendly. FIWARE provides a framework for open-source software components to access and manage heterogeneous context information through open APIs. One of the most important components of this framework is the FIWARE context broker, which is the foundation for accessing data from sensors, IoT networks, as well as from social media. Together, FIWARE supports digital transformation: firstly, by breaking down the data silo with the use of common platforms APIs; secondly, by establishing common data models; thirdly, with support innovation and by making real-time data accessible; and lastly, by connecting smart city platforms with third party platforms, enabling the data economy. India is among the countries that have used these smart city platforms and APIs.

Sarah Hayes, Climate Resilience Demonstrator Project Lead, National Digital Twin Programme, Centre for Digital Built Britain

Connected digital twin is an essential enabler of net zero in cities. Smart cities are not only about cities but also about places, including regions, towns and villages. Smart cities are also a net-zero city, or a net zero in the future and connected digital twins can help us get to net zero.

In the Data for Public Good Report, it was found that there are recognized benefits of sharing data across organizations and sectors, but that it is difficult to do so. The report concluded that there is a need for a common framework for enabling the sharing of data, and it set out a vision for a national digital twin. National digital twin is an ecosystem of connected digital twins to enable better outcomes from our built-up environment. The development of standards for sharing data can draw comparisons to the evolution of GSM in the sense that it needs to be driven by political will. Collaboration among industries, governments, academia and across all interested parties is also essential to produce and adopt an information management framework for data sharing. Connected digital twins can cut across silos and solve the interoperability challenge. Digital twin is also part of the cyber-physical fabric, and is closely connected to other technologies such as IoT, AI and robotics. Cities need to adopt a people-focused approach to this technology to ensure better social, economic and environmental outcomes. Digital twin can be described as a digital representation of something physical, which can be in the past, present and future. While it is important to have use cases on digital twin, such as in the case of the smart city, it is often more effective first to decide on the problem it is trying to solve and then to design a digital twin solution around that problem. The future vision of digital twin is about having different forms of connected digital twins operating together, one that enables seamless data sharing across sectors. Information management frameworks such as the one developed by the United Kingdom's National Digital Twin Programme, are crucial for setting up a common language (i.e., including a foundational data model, a reference data library and integrational architecture) for sharing data across sectors and organizations. Security should also be at the heart of this process. The National Digital Twin Programme has carried out a pilot project, the Climate Resilient Demonstrator Project, which shows the use of digital twin and data sharing to help achieve net zero and improve climate resilience. The project looked at how connected digital twin and sensor technologies can improve the level of climate resilience with respect to flooding. The project has also shown how the information management framework was applied in practice, and demonstrated the scalability and replicability of such framework.



Key Highlights – Session 1 – Can digital twins change our cities?

Moderator: Barbara Kolm, Director, Austrian Economics Center & Vice-President, Austrian National Bank

Michael Mulquin, Chairman, Smart Cities Systems Committee, International Electrotechnical Commission (IEC)

City digital twins are becoming increasingly important to help with planning and managing the city. They can be at every level of scale. They can cover the city as a whole, including a city district, the electrical infrastructure, a railway station or even a particular traffic light. And all of these levels can be linked, providing in-depth analysis that offers an overview of the whole city and enabling city planners to obtain information about any part of the city. Digital twins are more than just a mirror of places or physical assets of the city. They can also be used to provide key insights on the organizations and processes woven within that are supporting cities to meet the needs and requirements of the different types of citizens or residents in the city. In fact, the greatest value of digital twins is when these different aspects are being brought together to understand not only how the built environment is performing, but also how city organizations are working together to manage city infrastructure and services, and how different types of people are interacting with these elements. IEC is collecting and analysing use cases of how digital twins can be used in the city to identify the requirements for standardization. IEC is also keen to collaborate with partners to make sure that the standards developed will make it easy for cities to benefit from this important new tool.

Ramy Ahmed Fathy, Vice-Chairman, ITU-T Study Group 20, ITU

Digital twins are defined as a pairing of virtual and physical worlds that allows analysis of data and monitoring of systems to head off problems before they occur, prevent downtime, and even to plan using simulation. Digital twins act as a bridge between the physical and digital worlds by using sensors to collect real-time data about a physical item.

Smart cities can utilize this technology for planning and management, identifying problems before they become a reality and finding the best strategies to achieve their target goals. Digital twins have significant potential to improve the overall performance and efficiency of urban operations and enhance the resiliency of a city.

This presentation explored the benefits of digital twins and how cities can take advantage of this technology for improving operational efficiency, resiliency, sustainability, reducing maintenance issues, optimizing production outputs, and much more. The growing trend of utilizing digital twin is evident across the world; this presentation reviewed how cities have used this technology to advance urban solutions.

ITU's Study Group 20 is responsible for the development of standards and guidelines on the Internet of Things (IoT) and Smart Cities and Communities (SC&C). ITU-T SG20 is also working to develop a series of standards and supplements on digital twins in cities. By working together with various organizations, ITU collectively supports cities' journeys towards digitalization and the implementation of powerful tools such as digital twins.

Key Highlights – Session 1 – Can digital twins change our cities?

Bernard Gindroz, Chairman, ISO/TC 268: Sustainable cities and communities, International Organization for Standardization (ISO)

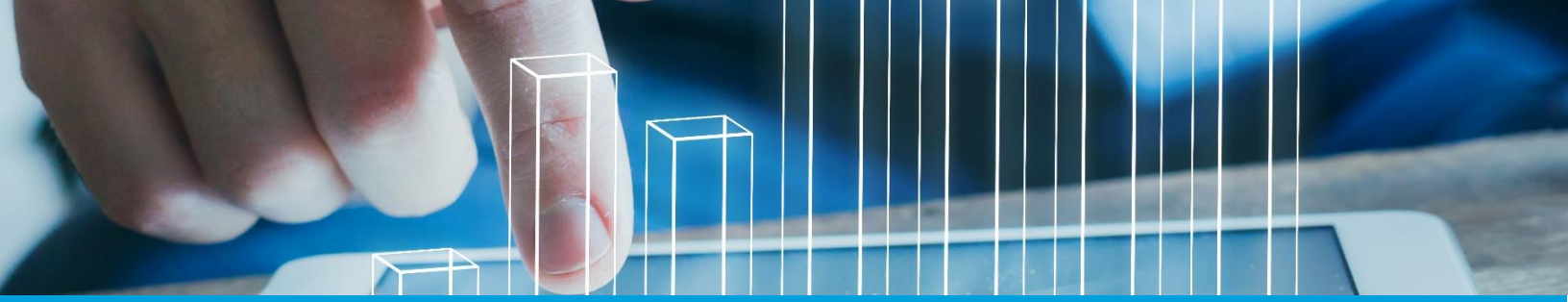
The digital twin concept is being applied increasingly to different domains, including urban planning. The presentation addressed the main considerations around digital twin applications for integrated urban planning, with a focus on its potential for improving collaborative aspects and supporting a more consensual decision-making process towards cities' and communities' transformation.

The presentation visited the various main advantages of the digital twin concept such as evaluating the time evolution and long-term perspective on the life cycle of different infrastructures, connecting different sectors and disciplines for a fully integrated approach, evaluating the performance at system level, supporting co-designing and co-creation, and integrating financial aspects and co-benefits. ISO TC 268 collects the expression of needs from cities and communities to help them in their journey towards sustainable development. Meeting the expectations and needs of cities and communities is the main driver behind ISO TC 268 activities. In this context, the digital twin concept enters the support scheme towards decision making at the city and community level and thus can support the implementation of the standard ISO 37101 sustainable development in communities' management systems.

Cristina Martinez, Deputy Head for Smart Technologies for Communities, European Commission

The European Commission's approach to digital twin and technologies shares many commonalities with the rest of the world. Digital twin needs a purpose. From the EU perspective, one of the purposes is to address the environmental and climate challenges.

Europe's Digital Decade provides a robust framework for maintaining the region's core values and addressing the social impacts of technology. It ensures that the data collection process is transparent, and that citizens' privacy, freedom and democracy are respected in the process. Standards are instruments to serve a policy purpose. From the Commission's point of view, it is crucial to implement standards to ensure that technology serves a social purpose, including protecting citizens, and that the system and social impacts of technology are taken into consideration. Europe already has many existing digital twin use cases. But it is important that these cases start to connect with one another, and that best practices are shared to address common challenges including the decarbonization of buildings. The European Commission is looking to deliver a smart and sustainable digital twin in Europe. The Commission is also working to incentivize data sharing between public organizations and to define the problem statement that needs to be analysed by digital twins. Lastly, it is also important to take into consideration the cultural impacts of digital twin. The development of standards, supported by public scientific/citizen oversights, and Key Performance Indicators are needed to measure the impacts of all decisions. In Europe, it is looking to launch a local digital toolbox for implementing digital twins in a cost-efficient manner in 2022.



Wrap Up and Closing Remarks

Bilel Jamoussi, Chief of Study Groups, TSB, ITU

Today, it is understood that the quest for quality and interoperable data is among the most important components when deploying digital twins. Therefore, standards are crucial in accelerating the deployment of digital twins. ITU's technical standards have already provided guidance for defining the framework of open data for smart cities. ITU is also working to develop new digital twin standards that will define the requirements and interoperability framework of digital twin systems in cities under ITU-T Study Group 20.

The increasing availability of data, coupled with artificial intelligence and other digital technologies, means that there is no doubt that digital twins will have a significant impact on city development in the future. At the same time, it is important to keep in mind that the use of digital twins in cities is still at an early stage. The United for Smart Sustainable Cities has explored some of the principles relating to the application of "digital twins" through its Report on "Accelerating city transformation using frontier technologies". This report highlighted how the digital twin concept could be leveraged for risk assessment, situational analysis and cost-benefit analysis.

Conclusions and Next Steps

The evidence is clear. Digital twin is a powerful tool that enables cities to transcend the cyber-physical ecosystem, and optimize design and planning.

As was highlighted during the webinar, smart cities encapsulate two important aspects of urban operations – planning and management. City planners can use the digital models to test new systems, emulate the delivery of urban services prior to their implementation, simulate responses to crises and optimize resource management. From an operational management perspective, digital twin can be applied across various domains, including transport, accessibility, environmental monitoring, spatial planning, energy efficiency and asset management.

Active collaboration remains key to a successful digital transformation. A joint task force to foster collaboration in the development of standards in the area of smart cities has been created by IEC, ISO and ITU. The webinar also emphasized the need to work closely with the European Commission, FiWARE and other relevant stakeholders in the common interest of building people-focused, smart cities.

Episode #2:
IoT-Based Automotive Emergency Response System

14 September 2021

Webinar Introduction

The Internet of Things (IoT) is playing an increasingly important role in transforming the automotive industry. IoT devices and capabilities are enabling emergency vehicles to respond to an emergency quickly and efficiently. Crucial information, including dispatch coordination, current traffic, driving conditions, and route to destination, can be obtained in nearly real time.

This episode looked at the IoT ecosystem required to facilitate effective automotive emergency response and preparation. It brought together experts to discuss the latest development of IoT and its application in the automotive and emergency service industries. The episode placed a unique emphasis on the role of international standards in fostering the IoT environment for public safety and emergency responses.

For additional information and to access the presentations, please click here.

Key Highlights - Opening Remarks

Bilel Jamoussi, Chief of Study Groups, TSB, ITU

For years, ITU has been working actively to support the development of smart sustainable cities and coordinate the deployment of information and communication technologies and digital technologies. It is not surprising that the automobile industry is one of the largest sectors for IoT use cases. Connected cars are using IoT devices to collect data to inform drivers on road conditions, receive traffic alerts and optimize route planning based on real-time conditions. This is important for the simple reason that an effective automotive emergency response system can save lives. An IoT-based automotive emergency response system reports automobile accidents to an automotive emergency response centre by an automotive emergency detection device. These three elements –the system, the response centre and the devices –need to be able to communicate seamlessly with one another to deliver rapid responses in case of serious accidents in which every second counts. International standards and guidelines are vital in this regard as they contain technical guidance and authentic guidelines that ensure that the interoperability requirements of these systems are met. ITU-T Study Group 20 on "Internet of Things and Smart Cities and Communities", which is the lead ITU standards group on IoTs and smart cities, has developed standards that define the requirements and capability framework for IoT-based automotive emergency response systems. ITU technical standards are also helping to set the minimum data structure and data transfer protocol. Together, these standards can help to implement automotive emergency response systems that can deliver swift emergency responses in times of need.

Key Highlights – Session 1

Moderator: Hyoung Jun Kim, WP1/20 Co-Chairman, ITU-T Study Group 20, ITU | Senior Vice-President, Intelligent Convergence Research Lab, ETRI

Taehyoung Shim, Senior Researcher, Electronics and Telecommunications Research Institute (ETRI)

Every year, more than 1 million people die as a result of automobile accidents. To reduce mortality, automobile industries have developed technologies to reduce the number and/or severity of accidents. However, when a serious accident cannot be avoided, the best way to reduce the mortality rate is to have proper and efficient accident response-rescue procedures in place. This is necessary for victims to be transferred to a hospital within the critical "golden hour" time-frame. An IoT-based automotive emergency response system (AERS) reports automobile accidents to an automotive emergency response centre (AERC) through an automotive emergency detection device (AEDD) using vehicle sensors of the automobile and/or internal sensors installed on after-market devices such as the navigation system, dash cam or smartphone. This presentation provided an overview of Recommendations ITU-T Y.4119, Y.4467, and Y.4468. Recommendation ITU-T Y.4119 includes the overview, requirements and capability framework of the AERS. Recommendation ITU-T Y.4467 specifies the minimum set of data (MSD) structure for the AERS. Recommendation ITU-T Y.4468 specifies a minimum set of data (MSD) transfer protocol for the AERS.

Key Highlights – Session 1

Daewon Kim, Director of VC Dept., Thinkware

While non-standard-based emergency call (eCall) in vehicles is available, a high operating cost, and the resulting low penetration rates, have limited eCall effectiveness and potentially delayed the responses from a rescue agency. ITU-T Y.4119-based emergency call (eCall) can reduce an operation's cost and promote competition. Moreover, because it is practically only a single applicable standard for new cars and existing cars, it can be adopted widely. In 2020, in Korea, the number of traffic accidents injuriesdropped significantly through ADAS-wide adoption. This statistic implies eCall-wide adoption will reduce traffic accident fatality dramatically. THINKWARE has combined ITU-T Y.4119-based AEDD, dashcam and Advanced Driver Assistant System (ADAS) in one device and is looking forward to seeing the broad adoption of ITU-T e-Call around the globe.

Junwook Lee, Research fellow, AIBLab Inc

This presentation presented the implementation case of AIBLab Inc., a Korean software company, in relation to the ITU-T Recommendations: ITU-T Y.4119, Y.4468 and Y.4467 for automotive emergency response centre (AERC). Firstly, along with a brief introduction to the AIBLab company, the structure and function of AERC developed based on the standard was presented, along with a brief demonstration. In addition, using this AERC, two business application cases in Korea (Republic of) were explained together. One is in connection with a rental car service platform, and the other is in connection with a Korean insurance company.

Jaemin Jang, Senior Researcher, Telecommunications Technology Association (TTA)

An IoT-based automotive emergency system (AES) contained automotive emergency detection devices that can communicate with the Public Safety Answering Point (PSAP). The process of e-call generally comprises four steps: detecting an accident; transmitting a minimum set of data (MSD); analysing and notifying the accident; and emergency response. Performing a conformance test was necessary to test the performance of AES. The test needs to be performed on the AEDD and on the PSAP based on a specific set of protocol. ITU standards such as ITU-T Y.4119, ITU-T Y.4467 and ITU-T Y.4468 have provided guidance to set these protocols along with other relevant standards such as IETF RFC7049.

Wrap Up and Closing Remarks

Toru Yamada, Vice chairman of ITU-T Study Group 20

ITU's technical standards are already providing guidance for setting the minimum data structure and data transfer protocol. ITU is also actively working to develop standards that will further coordinate the deployment of automotive emergency response systems, response centres and other connected devices.

Digital transformation and the transition to smart city should focus on people not the technology. That is why ITU put "sustainable" in smart city and work to ensure that no one is being left behind. Meaningful collaboration and partnerships are key. ITU will continue to work with experts to strengthen its standardization efforts and promote the use of IoTs in enhancing road safety and other city features.

Conclusions and Next Steps

IoTs play a vital role in enhancing the emergency response system of motor vehicles, from sending emergency calls to delivering an automated emergency response. However, implementing an IoT-based automotive emergency response system is an intricate process that involves meeting the complex and demanding requirements of different IoT components. International standards are crucial for providing the guidance and recommendations needed to ensure that these components are working well together and aligning implementation with expectation.

ITU and ITU-T Study Group 20 on "Internet of Things and smart cities and communities" will continue to reinforce its standardization efforts by bringing together field experts, setting the IoT specifications for emergency response systems based on best practices, and collaborating with other standards development organizations. ITU technical standards are developed through an inclusive and participatory process. To learn more about ITU's technical standards for smart cities and communities, please click here.

Episode #3:
Smart Sustainable City Architectures: Challenges and Opportunities

16 September 2021

Webinar Introduction

The digital architecture of a smart sustainable city lays the foundation for all IoT-based city applications, services and networks. Multivendor interoperability is among the most prominent challenges for smart sustainable cities to realize the full values of IoTs and other data applications. Global standards play a significant role in facilitating the interoperability in IoT systems and enabling communication among multiple platforms.

This episode was organized jointly with oneM2M. This episode provided an overview on the architectural requirements of a smart sustainable city from the service layer to other technical aspects. It highlighted the global standards that are available to boost the development of interoperability and accelerate the take up of IoT services and platforms.

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Bilel Jamoussi, Chief of Study Groups, TSB, ITU

For years, ITU has worked to coordinate the deployment of information and communication technologies and digital technologies in cities through standardization. Smart sustainable city architectures serve as the foundation for digital transformation. They consist of a set of digital platforms and systems that enable cities to leverage data insights to implement IoT solutions, improve management efficiency and the accessibility of public services, and more. At the same time, we know that the the lack of interoperability in these architectures remains one of the biggest challenges for smart sustainable cities. This impacts directly on digital platforms and systems' ability to exchange information, manage data and scale up IoT solutions. International standards play a crucial role in solving this challenge and helping cities to fulfil the promises of digital transformation and smart sustainable cities. ITU-T Study Group 20 "Internet of Things and Smart Cities and Communities", which is the lead ITU standards group on IoTs and smart cities, has developed smart city standards that coordinate the deployment of smart sustainable city architectures. For example, ITU worked with OneM2M to bring together the ITU-T Y.4500 series that defines the frameworks and protocol of interoperable IoT architectures. ITU technical standards are also helping to set the requirements of functional and reference architectures for smart sustainable cities.

Key Highlights – Session 1

Moderator: Cristina Bueti, Counsellor, ITU-T Study Group 20, ITU

Enrico Scarrone, Chairman of the oneM2M Steering Committee, oneM2M

The speed of development of the IoT market is far below expectations. Most of the companies are focalized on the platform aspects, leading to an incredible fragmentation of the solution with in the different business sectors. Most of the companies start on the IoT platform aspects *de facto* duplicating the same effort, with a hard learning curve (apart from data transmission, it is necessary to cope with data management, security, system management, access control, semantic and data analysis, AI aspects, and so on). The main effort is on platform development component integration, while IoT is information elaboration and sharing, and the effort should be concentrated on new services and information integration. Fragmentation is the showstopper, and it is necessary on the one hand to mitigate the duplication of efforts, and on the other hand to leverage on the different ecosystems integrating their data, solutions and information into a common framework. This is the role of standardization, and oneM2M has developed a unique standard dedicated to the integration of the diversity and the ecosystem, enabling the sharing of information among the different solutions and the creation of integrated services, providing, at the same time, the possibility to relay on a solid framework that allows the service users and developers to concentrate on the service developments in a very simple and reliable way. The oneM2M standard is multiservice and complete thanks to a huge joint effort of a multitude of companies. The use of solutions based on oneM2M is easy and friendly to the users and the service developers. As a *de jure* standard, it offers full interoperability across system providers, independently from any specific provider. Moreover, it also offers a solid adoption in the different regions, certification programmes, commercial products and opensource options.

Key Highlights – Session 1

Shane He, Q3/20 Rapporteur, ITU-T Study Group 20, ITU

"Smart Cities" is not only a concept but has already begun to link the digital world with social issues in reality, e.g., resource management, public warning, transportation, education, as well as health care. During the COVID pandemic, digitalization has been a central component for connecting different systems and platforms to maintain daily life. Global standards play a significant role in facilitating the interoperability of different aspects and in enabling communication between humans and machines.

This presentation explored the benefits of standardized architectures for smart cities and IoT, and how cities can apply these technologies to resolve deployment issues, and improve operational efficiency and sustainability. ITU-T SG20 is responsible for the development of standards and guidelines on Internet of Things (IoT) and Smart Cities and Communities (SC&C). Question 3 of ITU-T SG20 is focusing on "Architectures, management, protocols and Quality of Service for IoT and SC&C". This presentation described the latest achievements, and ongoing activities in ITU-T SG20 especially from an architectural perspective. This presentation presented an IoT reference model as a main architectural concept as contained in Recommendation ITU-T Y.4000, and provided a series of examples to explain how artificial intelligence can be applied to improve common services.

ITU-T SG20 is working closely with many organizations to boost the development of interoperability among different systems and accelerate the digitalization of cities. This presentation provided an overview of the fruitful collaboration with oneM2M, highlighting some of the oneM2M technical specifications that have been transposed into ITU-T Recommendations.

Jiayu Bi, Q3/20 Associate Rapporteur, Editor, ITU-T Study Group 20, ITU

The presentation presented a series of new ideas of how IoT and other technologies can be utilized in traditional vertical industries to help build smarter and more sustainable cities by introducing two ongoing work items that are being developed in Question 3 of ITU-T SG20. These work items specify the requirements, and propose a functional or reference architecture of smart construction site and smart education. Some use cases were also introduced to show what could be done in these industries.

Closing Remarks

Bako Wakil, Director of Technical Standards and Network Integrity (DTSNI), Nigerian Communications Commission (NCC), Nigeria

Interoperability is a crucial element that enables smart sustainable city architectures to scale up IoT solutions and realize the full potential of digital transformation. The technical standards developed by ITU-T Study Group 20 and oneM2M are already providing guidance for defining the frameworks and protocol of interoperable IoT architectures.

In the future, cities will be looking to deploy more digital technologies and innovative solutions. ITU and ITU-T Study Group 20 are committed to supporting all cities and city stakeholders to create a vibrant IoT ecosystem and accelerate progress towards important global targets such as the Sustainable Development Goals (SDGs).

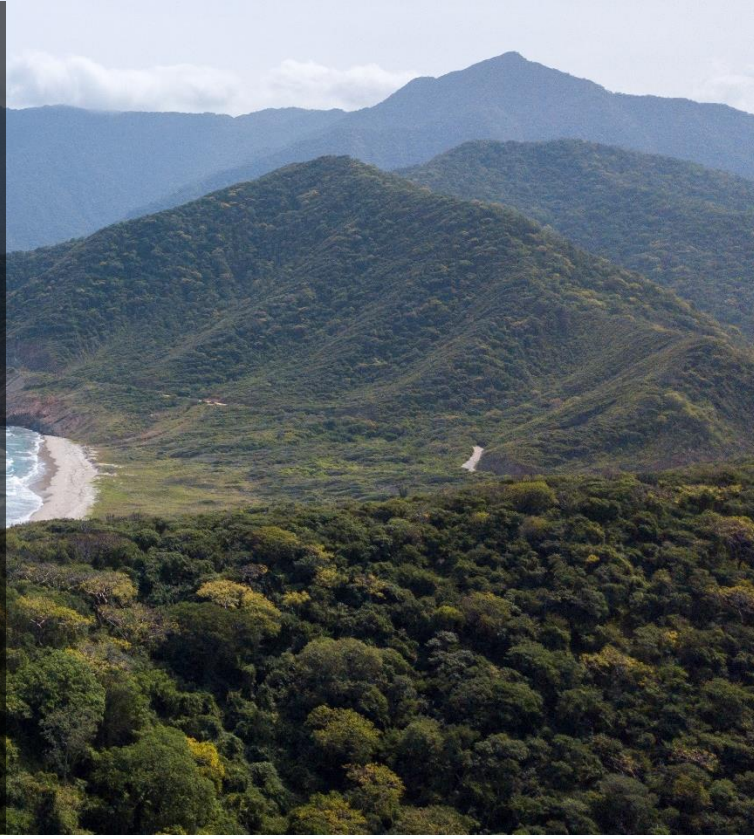
Conclusions and Next Steps

Smart sustainable city architectures are the digital fabric that underpins the development of smart sustainable cities. The webinar has highlighted the importance of interoperable smart sustainable city architectures in enabling the management and functioning of a city. Meeting the interoperability challenge would contribute directly to enhancing operational efficiency, scaling up IoT use cases, enabling vertical integration, and thus unlocking the full potential of digital transformation.

International standards, including those developed by ITU-T SG20 and oneM2M, are helping to define the IoT specification and requirements for implementing smart sustainable city architectures that are interoperable and scalable. ITU technical standards are developed through an inclusive and participatory process. To learn more about ITU's smart city standards and its work on IoTs, please click here.

Episode #4:
Smart Cities: A Step Towards Digital Transformation in Latin America

20 September 2021



Webinar Introduction

This episode was organized jointly with COMTELCA and discussed the steps towards digital transformation in Latin America. It analysed the impacts of digital transformation in the cities of Latin America, as well as the challenges facing the region.

Latin American countries face similar challenges in addressing the digital transformations of their cities. They share socio-economic and cultural characteristics such as the youth of their populations and the high population density in their capitals. But above all, they use the Spanish language: an intangible asset of enormous value, with specific weight within ITU, which facilitates trade and the implementation of digital solutions.

Panelists from the region, including city leaders and industry specialists, shared their experiences in implementing digital solutions and identifying any obstacles that need to be overcome.

Key Highlights – Opening Remarks

Jorge Torres, Deputy Secretary

The episode on "Smart Cities: a step towards digital transformation in Latin America" aimed to highlight the progress and experiences of Latin American cities in moving towards becoming smart and resilient cities.

The current situation and the actions aimed at accumulating knowledge of how smart cities are developing and evolving around the world, mainly in Latin America, were illustrated in this episode. The presentations were valuable lessons that have recognized the challenges that lie ahead for the region. It was noted that it is imperative that smart cities start creating alliances and working together to overcome these challenges.

Alejandro Herrera, National Director of Telecommunications, ASEP, Panama

This fourth episode of the webinar series titled: "Episode 4: Smart cities, a step towards digital transformation in Latin America" examined the impacts of digital transformation in Latin American cities and the region's challenges. Smart and sustainable cities need a stable, secure, reliable and interoperable telecommunications infrastructure to support a large volume of ICT-based applications and services. Guaranteeing the investment of telecommunication companies and technological innovation, accompanied by public policies, are ultimately the key challenges that prospective smart cities in Latin America must consider in order to close the digital gap with the development of cities.

The United for Smart and Sustainable Cities (U4SSC) initiative provides a global platform for supporting cities to achieve sustainable development using a people-centric approach. The Presidency of the Regional Telecommunications Technical Commission of Panama confirmed its willingness to keep working actively and effectively to maximize the benefits of digital technologies in collaboration with the International Telecommunication Union and U4SCC.

Héctor Mario Carril, Vice-Chairman of ITU-T Study Group 20

The Latin American region is undertaking significant steps towards digital transformation. The region is seeking to implement emerging technologies, including AI, IoT and 5G, and is developing applications and equipment to make the region more efficient. Digital transformation is considered an important step to increasing productivity and, consequently, generating sustainable growth and development in the region.

Smart cities have a key role to play in meeting the growing expectation and daily needs of citizens. It was noted that many IoT projects have been implemented in the region, resulting in the gradual transformation of the cities.

It is important to highlight that it is possible to implement smart city applications in every city or town in Latin America. They could generate technological shifts that would allow for greater efficiency in management and an increase in the production of resources for the surrounding countries. Investment, development and technology are the tools needed to bring about equality, guarantee access to new technologies and create smart sustainable cites for all. This is a historic opportunity to reduce the significant levels of poverty in the region.

In this sense, it is important for experts from the region to participate in the ITU-T SG20 meetings where all these topics and issues related to the IoT and smart cities are being discussed. This is an excellent opportunity for experts around the world to exchange views and promote the development of digital transformation in the region.

Chaesub Lee, Director, Telecommunication Standardization Bureau, ITU

Promoting and supporting digital transformation is one of the five strategic priorities of the International Telecommunication Union (ITU). The excellent partnership with COMTELCA has enabled ITU to develop smart city standards that take into consideration the unique context of the Latin American region.

A successful digital transformation brings together stakeholders from every sector of our society to use digital transformation to tackle global challenges and improve lives.

Nowadays, more than half of the world's population lives in cities; the proportion is even higher in the Latin American region. Cities are central hubs for growth, development and innovation. At the same time, cities are also facing some of the biggest social, economic and environmental challenges of our time including inequality, sustainability and climate change.

Latin America has made significant progress in digitalization in the past decade. ITU estimates that more than 68 per cent of the region's population is connected and used the Internet in 2019, an increase of 62 percent since 2017. ITU is dedicated to supporting Latin America to take an integrated approach to digitalization and build people-focused smarter cities and communities. International standards and guidelines contain technical and policy recommendations that smart cities can use to implement. The smart city and digital technology standards developed by ITU-T Study Group 20 have already contributed to helping cities coordinate and evaluate their smart city strategies. Brazil and Ecuador are among the Latin American countries that have already used these standards to assist their smart cities journey.

Cities need to build a digital architecture that promotes trust and cooperation and ensures that digital transformation is inclusive and guided by the target set in the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. U4SSC's key performance indicators provide cities with a self-assessment tool with which to evaluate their smartness and sustainability. More than 150 cities have already partnered with ITU to implement the KPIs for SSC, including Latin American cities such as Esperanza and Santa Fé in Argentina.

Key Highlights – Session 1 – The United Nations and Smart Cities

Moderator: Juan Pablo Martín, SG20RG-LATAM Chairman

Cristina Bueti, Counsellor, International Telecommunication Union

Latin America is the planet's most urbanized region, with roughly 2 000 cities driving its economy today. Buenos Aires, Mexico City, Rio de Janeiro and São Paulo are among the Latin American cities that have more than 10 million inhabitants. And by 2050, it is estimated that 90 per cent of Latin Americans will live in cities.

While urbanization has delivered a number of social and economic benefits to Latin American cities, they also face several challenges. One of the principal challenges in the region is dealing with the massive infrastructure gaps. Cities often suffer from low physical, social and digital connectivity, and high fragmentation.

Effective stakeholder collaboration is necessary to promote engagement among citizens, governments, private stakeholders and other interested parties in the designing and planning process for cities. This helps to ensure informed participation, create knowledge sharing for urban governance and foster collaboration with international platforms that facilitate urban simulation. This is crucial for informing the future designs of economic, social and environmental development in Latin America.

The International Telecommunication Union (ITU) has an important role to play in establishing the trajectory and standardizing the use of ICTs and digital technologies as part of its efforts to support smart and sustainable development in Latin American cities and educate on the opportunities and challenges associated with their intake.

ITU-T's work contributes significantly to the implementation of multiple smartness and sustainability-related international commitments, including the 2030 Agenda and its Sustainable Development Goals, and ITU's Connect 2030 Agenda for Global Telecommunication/ICT Development.

For example, ITU’s smart city standards are providing authentic guidance on ensuring Interoperability between smart city platforms (SCPs), which enables the provision of better services to citizens and at the same time, ensures maximum efficiency, scalability and simple integration.

The maturity model for smart sustainable cities developed by ITU Study Group 20 also helps to identify the goals, levels and key measures recommended for cities to examine their current situation effectively and determine critical capabilities needed to progress toward the long-term goal of becoming smart sustainable cities.

Tania Marcos, Head of Smart Sustainable Cities, Spanish Association for Standardization (UNE), Vice-Chairman, U4SSC Spain

The U4SSC is coordinated by ITU, UNECE and UN-Habitat, and supported by UNECA, UNESCO, UNEP, FAO, UNEP-FI, CBD, ECLAC, UNDP, UNFCCC, UNIDO, UNOP, UNU-EGOV, UN-Women and WMO to achieve Sustainable Development Goal 11: “Make cities and human settlements inclusive, safe, resilient and sustainable”. The U4SSC initiative acts as the global platform to encourage the use of ICTs to facilitate and ease the transition to smart sustainable cities and advocate for public policy.

Key Highlights – Session 1 – The United Nations and Smart Cities

The U4SSC has a global approach towards smart cities and is working on five thematic groups: City Platforms; Economic recovery in cities and urban resilience building in the time of COVID-19; Innovative Financing Instruments for Smart Sustainable Cities; Guiding principles for artificial intelligence in cities; and Procurement Guidelines for Smart Sustainable Cities.

The U4SSC has created and developed a series of useful and innovative products and resources related to the transition to smart sustainable cities and digital transformation, such as reports and case studies, all of which are available on the U4SSC website. Recent publications include *Blockchain for smart sustainable cities,* which helps to explain and evaluate the contribution of blockchain technology in the development of smart cities, and *Simple Ways to Be Smart*, which attempts to identify smart interventions that do not require excessive materials or capabilities and yet can help cities and populations become more inclusive, safe, resilient and sustainable.

The Guidelines on Tools and Financing Mechanisms for Sustainable and Smart City Projects contains practical recommendations for local governments on how to develop low-risk investment projects for smart and sustainable urban development.

To improve the smartness and sustainability of cities, the U4SSC has developed a set of international Key Performance Indicators (KPIs) for Smart Sustainable Cities. This KPIs establish the criteria to assess ICT´s contributions in making cities smarter and more sustainable and provide cities with the means for self-assessments to achieve the Sustainable Development Goals. Currently, more than 150 cities around the world are implementing these KPIs.

Key Highlights – Session 2 – Experiences in the Development of Smart Cities

Moderator: Lizania Pérez Rodríguez, Executive Secretary of COMTELCA

Pere Fuset, Counsellor for Digital Agenda and Electronic Administration, Valencia, Spain

A smart city is an innovative city that takes advantage of ICT and other means to improve the quality of life for citizens and future generations regarding social, environmental and cultural aspects.

The strategy for Smart City VLC started in 2013. Since then, Valencia has instituted a series of smart sustainable city projects and was one of the first European cities to have a city platform based on open and interoperable standards. The strategy of Smart City VLC consists of two major projects: Connecta VLCi and Impulse VLCi. They aim to provide digital intelligence to 194 local buildings with the goal of improving sustainability and efficiency, as well as providing citizens with new services. Impulse VLCi proposes a project to improve local public services and resource management and enhance its citizen experience.

Key Highlights – Session 2 – Experiences in the Development of Smart Cities

One of the main objectives of Smart City VLC is to achieve a more sustainable, technologically connected, social and inclusive Valencia. So far, the city has created the Ciutat Intelligent Office, the Impulse VLCi, and Connecta VLCi initiatives.

Smart city planning requires the participation and collaboration of a broad range of local services, as well as medium-to long-term planning. The most important challenge in the implementation of these strategies has been the need to have a utility for citizens and for it to be truly visible and effective over time, as well as ensuring a return on investment.

Sergio Martínez Medina, Executive Director, Communications Regulation Commission, Colombia

Regulatory entities can work to enhance the development of smart cities. The communications regulator plays an active role in ensuring, for example, the quality of services. Regulators must work hand in hand with ICT companies to protect the conservation of the planet and improve people's quality of life. There is no better tool to achieve equality and equity than technology.

In many Latin American cities, the deployment of antennas is not allowed in urban areas or in heritage protected areas, which has affected the quality of digital services.

It is essential to work with cities to promote digital transformation at the local level. In Colombia, for example, the country had begun to certify municipalities that are free of technological barriers. In two years, it went from one accredited municipality to 494, which represents 49.8 per cent of the country's municipalities. In this way, ICT companies will be able to make investment plans and provide the best communications services.

Digitalizing the processes between the client and the communication operators contributes significantly to developing smart cities. It was noted that it would be beneficial for cities to start working on public innovation to help close the gaps between market needs and regulations.

Gustavo Giannattasio, Vice-President | IEEE Uruguay, and Smart cities, Uruguay

The Latin American region is ranked in the fourth group of the evolution index for smart cities. It is important to recognize that there is a significant difference between North America and the rest of the Americas region when it comes to investing in digital technologies and broadband usage.

Therefore, different solutions should be implemented according to the cities' needs. The webinar highlighted the importance of creating an open platform that is able to leverage, and generates open data and applications to support digital solutions in different cities.

Montevideo, for example, is one of the cities in the region that has implemented an open platform with open data and applications. It has made significant progress in integrating academia and industry to review different solutions for cities.

The key to a successful digital transformation is underpinned by seamless telecommunications infrastructure and supported by regulations from governments. It requires a long-term strategic vision, regulations and effective leadership. Additionally, training plans are needed to equip people with the right skills to adopt digital technologies.

Key Highlights – Closing Remarks

Juan Pablo Martín, Chairman of the SG20RG-LATAM, International Telecommunication Union

International standards can help the Latin American region to harness these global lessons and unlock its digital potential. Countries such as Ecuador, Argentina and Uruguay have made notable progress towards the creation of smart cities and the digital transformation. Moreover, during this episode, it was noted that the city of Valencia, in Spain, is an example where many initiatives regarding the development of smart cities have been implemented and can serve as a guide for other cities to learn.

Smart City standards developed by ITU-T SG20 provide technical guidance to ensure the interoperability of smart city platforms and provide the means for cities to assess their progress towards becoming smart and sustainable. The cooperation and collaboration at the regional level will continue to be one of the most important instruments with which to accelerate the digital transformation in Latin America.

As progress is made, ITU will continue to work along with regional stakeholders to ensure that the region's priorities are addressed and its evolution towards digital transformation is facilitated.

Lizania Pérez Rodríguez, Executive Secretary, COMTELCA

It is important to encourage collaborative development in the region.

There is no doubt that digital transformation in cities requires the participation of stakeholders. The participation and contribution of best practices by the experts and panelists in this meeting showed the collaborative work that needs to be done to unite all these efforts to achieve the desired outcome. "Digital transformation is not only achieved through the adoption of technological tools, but it must also break down the barriers that are in people's minds."

Conclusions and Next Steps

Latin America has remarkable potential to leapfrog development and create a more prosperous, inclusive and sustainable economy by embracing digital transformation. This webinar has highlighted the fact that many Latin American cities have already undertaken the first step in their journey to becoming a smart sustainable city. At the same time, they are also facing a unique set of challenges that are preventing them from realizing the full potential of digital transformation, including the digital infrastructural gap, the interoperability challenge in IoTs, the lack of assessment tools and more.

The smart city standards developed by ITU-T Study Group 20 are already providing guidance to tackle some of these challenges. Coordination and collaboration should also be at the centre of Latin America's digital transformation process. Global initiatives such as the U4SSC can provide an important platform for knowledge sharing, global learning and aligning smart strategies with global targets such as the SDGs.

To learn more about ITU's work on smart sustainable cities, please click here.

To learn more about the U4SSC initiative, please click here.

Episode #5:
Smart Sustainable Cities Maturity Model and Impact Assessment

24 September 2021

Webinar Introduction

As more cities are embarking on the journey to becoming a smart sustainable city, there is an increasing need to benchmark progress and assess the impacts of cities' smart strategy.

This episode was organized jointly with the Austrian Economics Center and provided an overview on how to use international standards to determine the maturity level of a smart city/community.

The episode was particularly useful to city planners or related stakeholders who were looking to improve their smart strategy and pursuing smart sustainable city objectives in line with the Sustainable Development Goals.

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Nasser Al Marzouqi, Chairman, ITU-T Study Group 20: Internet of Things (IoT) and smart cities and communities (SC&C)

For years, ITU has worked actively with its diverse membership to support the development of smart sustainable cities and coordinate the deployment of ICTs and digital technologies through standardization.

Many cities understand that the transition to smart sustainable cities is no longer an option but is now a necessity. A successful smart strategy and digital transformation enables cities to cope with the sustainability pressure from rapid urbanization, deliver strong responses to global emergencies such as COVID-19, and ensure a better quality of life for all citizens. At the same time, they are also looking for self-assessment tools that would help them to determine the best approach to becoming a smart sustainable city and ensuring that the long-term visions of their smart strategies are realized. International standards can be immensely helpful this regard.

ITU-T Study Group 20 is the lead study group on the Internet of Things and Smart Cities and Communities, and has developed technical standards that contain guidance and methodologies for using these tools. For example, Recommendation ITU-T Y.4904 describes a smart city maturity model that helps to identify the levels, key measures, goals and actions that are recommended for cities to progress effectively towards their long-term goals of becoming a smart sustainable city. On the other hand, Recommendation ITU-T Y.4905 provides cities with a holistic framework to carry out a smart city impact assessment, which allows for better planning, expectation setting, and improvement of the overall quality of a city's smart strategy.

Key Highlights – Session 1

Moderator: Barbara Kolm, Director, Austrian Economics Center & Vice-President, Austrian National Bank

Okan Geray, Q7/20 Rapporteur, ITU-T Study Group 20, ITU

An impact assessment can be defined as "the process of identifying the future consequences of a current or proposed action". Recommendation ITU-T Y.4905 provides a forward-looking impact assessment tool that cities can use to evaluate their SSC initiatives. The impact assessment is a framework that enables cities to understand how these initiatives will impact the city from different perspectives (i.e., social, economic and environmental). Cities and municipal administrations can use it to inform decision-making and enhance policy-making. Residents and non-profit organizations can gain a better understanding of the consequences of SSC initiatives. City administrators can determine the trade-off between options. The private sector can also be better aligned with the intended goals of SSC initiatives and contribute to them accordingly.

In terms of social impact, Recommendation ITU-T Y.4905 looks at communal (e.g., lifestyle, culture, participation, engagement) and individual aspects (e.g., health and wellbeing, freedom) of a society. It should be emphasized that there is a need to identify the perception of SSC initiatives of citizens in order to understand their social impacts. In terms of economic impacts, the framework looks at the potential business and economic output of SSC initiatives. It also looks at the direct, indirect and induced impacts (the three types of impacts identified in ITU-T Y.4905) on a city's GDP, wages and salaries, job and labours, and tax revenues. In terms of environmental impact, it looks at water management, energy consumption, waste management, GHG emissions and others. Once the impacts have been identified, cities can decide on the actions that need to be taken in response (i.e., accept potential impacts, reduce adverse impacts, monitor impacts, and avoid impacts). It is also noted that impact assessments should be carried out with the appropriate scope in mind; that is, to determine the boundaries for the assessment (e.g., whether it is for the whole city or just part of it; determining the SSC initiatives that need to be evaluated, and so on).

Yun Li, Director, Technical and Industry Standard Department, Tencent, China

The SSC maturity model provides a straightforward outcome summary for the decision makers on where they were, what they want to achieve and how well they have progressed. Recommendation ITU-T Y.4904 smart sustainable city maturity model is developed with the aim of walking cities through the process of becoming a smart sustainable city. This maturity model helps to identify the goals, levels and key measures that are recommended for cities to examine their current situation effectively and determine the critical capabilities needed to progress toward the long-term goal of becoming an SSC. Moreover, the maturity model considers the three dimensions of sustainable development, namely environment, economic and social. Each dimension has five maturity levels. The key aspects and characteristics for each dimension and maturity level were explored further during the presentation. A method of assessing and evaluating the performance of various dimensions at the current and target maturity levels was also presented. Together, this standard can help to plan and execute and continuously improve and evolve smart strategy. A five-step guide on how to use the maturity model for smart sustainable city was also introduced, together with the explanation for measurement tools provided in ITU-T Y.4904. The Recommendation is available in six languages.

Luísa Amélia Paseto, Intelligent Platform Coordinator Researcher, Maturity Model, Telecommunications Infrastructure Projects of the Ministry of Communications (MCOM), Brazil

The Brazilian intelli.gente platform was developed to perform a diagnosis and recommendations system for evaluating the level of maturity of Brazilian cities under the various themes of smart sustainable cities. The platform is an initiative for federal state managers and municipal public managers to manage sustainable development, digital transformation, and public management for the 5 570 Brazilian municipalities. It will be made available in a digital and open environment from October 2021, allowing municipalities to improve planning and municipal management actions, enhance the quality of life of its citizens and accelerate the use of technological solutions and applications in services for the population.

Key Highlights – Session 1

The main objective of the platform is to transform the information and data of the latest Brazilian SSC initiatives into analysis tools for adapting to market trends, informing public policy management, provisioning public services in multiple arrangements and facilitating collaborations among actors. The platform consolidates the strategic objective 8.3 of the "Maturity for Smart Cities guideline of the Brazilian Charter of Smart Cities", which directs the mission to "develop and make available a mature Brazilian system for smart cities in a proprietary digital platform to be created and maintained by the federal government". The inteli.gente platform comprises a set of 114 indicators, of which 80 indicators are used to diagnose the dimensions of sustainable development and ICTs and 34 indicators to diagnose the dimension of institutional capacity in municipal public management.

Key Highlights – Closing Remarks

Cristina Bueti, Counsellor, International Telecommunication Union

The smart sustainable cities maturity model and impact assessment developed by ITU-T Study Group 20 are crucial for determining the best approach to becoming a smart sustainable city. This is particularly important because many cities are looking to adopt smart technologies to bounce back from the impacts brought on by the global pandemic and make progress towards important global targets such as the Sustainable Development Goals. The smart sustainable cities maturity model and impact assessment are a key instrument that enables cities to align their smart city strategy and vision to these global targets. ITU-T Study Group 20 has also developed standards that enable smart cities to measure their performance using Key Performance Indicators and provide technical guidance on other key aspects, including security, vertical integration and more.

Conclusions and Next Steps

Recommendation ITU-T Y.4904 and Y.4905 provide the guidance for cities to carry out an impact assessment and use the smart sustainable city maturity model. These are key components that can support prospective smart sustainable cities to benchmark progress and align development with expectation. To further support the transition to smart sustainable cities, U4SSC is also collaborating proactively with countries (e.g., Brazil and Ecuador), cities, and other city stakeholders to evaluate the contribution of smart technologies in enhancing city functions.

Moving forward, ITU-T Study Group 20 will continue to reinforce its standardization efforts in collaboration with other stakeholders, and work towards supporting cities and communities to become smarter and more sustainable and to reach the Sustainable Development Goals.

To learn more about ITU's work on smart sustainable cities and smart city standards, please click here.

Episode #6:
Smart City Platforms

1 November 2021

Webinar Introduction

Smart city platforms provide the foundation for digitalization. An interoperable smart city platform enables cities to increase the number of services and their quality, provide citizens with better services, and at the same time ensure maximum efficiency, scalability and simple integration.

This webinar highlighted the international standards that can help city leaders to implement interoperable smart city platforms and support improve their overall smart strategy and services.

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Bilel Jamoussi, Chief of Study Groups, TSB, ITU

For years, ITU has worked to support the development of smart sustainable cities and coordinate the deployment of ICTs and digital technologies through standardization. Smart city platforms are crucial for integrating digital platforms, data interfaces and other third-party systems. They are the key component that enables the exchange of information between different vertical platforms, allows cities to scale up digital solutions and IoT services and improve the overall performance of smart sustainable cities.

However, many smart city platforms are developed independently. As a result, these platforms often do not have the same functions and are unable to exchange and share data collected by the data sensors or even between platforms. This lack of interoperability has severely limited the effectiveness of many IoT-based applications and services.

To fully realize the potential of smart sustainable cities, it is important to ensure that the interoperability requirements of smart city platforms are properly met and that they are also developed with scalability, security and performance in mind.

ITU-T Study Group 20 is the lead study group on the Internet of Things, and Smart Cities and Communities. The group has developed technical standards that help to build interoperability into smart city platforms and systems.

For example, Recommendation ITU-T Y.4200 defines the interoperability requirements of smart city platforms, helping to ensure the correct functioning of city services. Meanwhile, Recommendation ITU- T Y.4201 defines the high-level requirements and reference framework of the Smart City Platform. These high-level requirements include a comprehensive and updated repository of city information, infrastructure life cycle management, inter-system communication, security support, and more.

In addition, U4SSC is a UN initiative coordinated by ITU, UNECE and UN-Habitat and supported by other 13 United Nations agencies and programmes to achieve the SDGs. U4SSC is also working on a deliverable that highlights the importance of smart city platforms in address global challenges.

Session 1 – Overview of Q1/20 Activities on Smart City Platforms

Moderator: Hyoung Jun Kim, WP1/20 Co-Chairman, ITU-T Study Group 20, ITU

Junseob Lee, Director, Intelligent Convergence Research Laboratory, Electronics and Telecommunications Research Institute (ETRI), Q1/20 Rapporteur, ITU-T Study Group 20, ITU

This presentation provided an overview of ITU-T Q1/20 activities on smart city platforms. Q1/20 is responsible for studying the interoperability requirements and inter-working of IoT and SC&C applications and services. The standardization activities of Q1/20 directly involve the development of use cases, requirements, architectures and data sets and formats that support the interworking and ensure interoperability between IoT and smart city applications and services, not only within a silo but also between various silos in cities and communities.

Session 1 – Overview of Q1/20 Activities on Smart City Platforms

Q1/20 has published a series of Recommendations under its responsibility. In particular, Recommendation ITU-T Y.4200 "Requirements for the interoperability of smart city platforms" and Y.4201 "High-level requirements and reference framework of smart city platforms" provide the foundation for a functional and interoperable smart city platform. The webinar also highlighted a list of ongoing work items within Q1/20, including draft Recommendation ITU-T Y.DT-interop, Y.infra, Y.IoT-sd-arch, Y.isms, Y.nmm-isms and Y.dtf-reqts. Among them, draft Recommendation ITU-T Y.infra "Requirements of sensing and data collection system for city infrastructure", Y.isms "Functional framework and requirements for disaster monitoring system" and Y.nmm-isms "Metadata model of sensing capability for disaster monitoring system" are related to smart city platforms.

Together, these work items enable cities to take a holistic approach to implementing a smart city platform. The relation of the two published Recommendations and three ongoing draft Recommendations related to smart city platforms were clarified by speakers who followed.

Ziqin Sang, Technical Director, China Information Communication Technologies Group (CICT) and WP2/20 Co-Chairmen and Vice-Chairmen, ITU-T Study Group 20, ITU

In 2015, the ITU Focus Group on Smart Sustainable Cities developed a standardization roadmap for smart sustainable cities. One of the key features of this roadmap is to develop ICT standards that set the framework for the ICT infrastructure and architecture of a smart sustainable city. Smart city platforms are the ICT hub for smart cities and a crucial of component of this architecture. Recommendation ITU-T Y.4201 contains the high-level requirements and reference framework of smart city platforms. It details the key technical features of a smart city platforms, including its service support, interfacing, data/knowledge functions, and acquisitions functions. It also highlights how these features are connected to services and application providers, sensing and infrastructure providers, as well as data and computation providers. L.4200, on the other hand, highlights how vertical systems can be integrated into a smart city platform and details the interfaces requirements (i.e., the services interfaces, interoperability interface and acquisition interface) for connecting the SCP to other digital platforms.

The specifications and frameworks detailed in L.4201 and L.4200 were implemented in various use cases. For example, a "Sharing Application Platform for Government Information System" was developed in Hubei, China in 2015. This platform was developed in accordance with the frameworks in L.4201 and L.4200. The platform has successfully eliminated many data islands and is providing more than 700 digital applications from more than 70 government departments in the province. Similarly, Benidorm, Spain, has also implemented a "Smart Destination Platform for Tourism" based on the frameworks and specifications contained in L.4201 and L.4200. The platform enables tourists to receive a wide range of external communication sources, including TripAdvisor, Twitter, Airbnb and so on. More than 24 other tourist destinations have implemented a similar SCP in Spain.

Session 1 – Overview of Q1/20 Activities on Smart City Platforms

Yuguang Chang, Senior Director, FiberHome Telecommunication Technologies Co., Ltd, China Information Communication Technologies Group (CICT) and Editor, ITU-T Study Group 20, ITU

SCP is a core component that supports the eight basic infrastructures of smart sustainable cities: energy, water supply and drainage, transportation, post and communication, disaster prevention, culture sport and education, health, and social welfare. SCP provides the central platform for managing sensing and infrastructure data, and other IoT functionalities and applications via the acquisition interface. However, the SCP could experience difficulty when processing all of available data from different city infrastructures particularly in the case of a larger SSC. In this case, a sensing and data collection system (SDCS) would be necessary to manage these data. ITU standards detail the specifications of each component. Recommendation ITU-T Y.4201 defines the high-level framework for SCP. Y.4200 details the acquisition interface needed to manage data from different verticals. Meanwhile, the upcoming standard, draft Recommendation Y.infra, will provide the specification for SDCS.

SDCS is a system that monitors the status of, and collects information on, different kinds of city infrastructures, controls and manages the sensing devices attached to those city infrastructures, and provides corresponding information to SCP. SDCS focuses on direct interaction with sensors and control terminal equipment, and supports data sharing and exchange among different verticals and industries. SDCS has four key functions: device control; linkage management; data collection; and sensing and networking. Each SDCS may be responsible for a specific city infrastructure (e.g., water, transportation). When there is a large deployment of sensing devices among city infrastructures, the SCP would be unable to manage all the sensing devices. In this case, the SDCS needs to be used as an agent to control and acquire data for the SCP and it is working on agent transmission mode and transmits data via acquisition interface. More details will be provided in the upcoming standard draft Recommendation Y.infra.

Wenying Du, Associate Researcher, Wuhan University and Editor, ITU-T Study Group 20, ITU

With the rapid development of sensing technologies such as earth observation systems, Internet of Things, and sensor web, thousands of global satellites, and tens of thousands of sensors, were deployed in cities. However, due to the very large number and heterogeneity of sensing resources, there are at least two needs faced with the monitoring of specific disaster: (1) to efficiently discover the suitable sensor(s) from a huge number of sensors for specific disaster event monitoring; and (2) to collaborate with multiple sensors for disaster event monitoring. In other words, there is gap between the SCP defined in IUT-T Y.4201 and the sensing and data collection system in cases of disaster monitoring. The disaster-monitoring system (DMS) is designed to solve these problems.

This presentation shows the definition, concept relationship, workflow, functional framework and requirements of DMS. DMS is within the domain of sensing and infrastructure providers. It interoperates with SCP through acquisition interface in ITU-T Y.4201, receives the disaster event sensing request from SCP and discovers the appropriate sensor list from the sensor description information database in accordance with specific disaster monitoring demands.

Session 1 – Overview of Q1/20 Activities on Smart City Platforms

DMS meets the two aforementioned needs by: (1) collecting the sensing capability information of sensors according to the predefined template, registering the sensing capability information, and forming a database of sensor capability information; (2) collecting the disaster information according to the predefined template when a specific disaster event has occurred; (3) matching between the sensing capabilities of sensors and monitoring the demand information of target disasters to obtain the sensor list. DMS has the functional requirements of the management of sensor representations and disaster representations, disaster collaborative sensing and security. DMS could improve the efficiency of disaster response and management in smart sustainable cities.

Key Highlights – Closing Remarks

Tania Marcos, Vice-Chairman, ITU-T Study Group 20, ITU

Standards are key to providing the necessary technical guidance for implementing different types of smart city platforms and helping cities achieve the sustainable development goals (SDGs). Standards provide the knowledge, consensus and collaboration required to tackle this global challenge. They provide a set of common languages and measurable criteria that reflect best practices in key aspects for the competitiveness of organizations. They can also provide an effective response to the major challenges facing cities, companies and public administrations.

ITU-T Study Group 20 will continue to work with ITU's diverse membership to develop standards that help cities and related stakeholders to meet the technical requirements of IoT systems and smart city platforms.

Conclusions and Next Steps

This webinar detailed the role of ITU standards in implementing an interoperable smart city platform and the overall infrastructure required to support SCP and its functionalities. Recommendations ITU-T Y.4200 and Y.4201 are the key standards that enable cities to deploy IoT applications and devices in a seamless and effective manner. The panelists have demonstrated that SCP and SDCS, the interfaces that support them are all key components for supporting the basic infrastructure of SSCs.

ITU-T Study Group 20 on "Internet of Things and Smart Cities and Communities" will continue to work to support the deployment of smart city platforms through its standardization activities. ITU technical standards are developed through an inclusive and participatory process.

To learn more about ITU's technical standards for smart cities and communities, please click here.

To learn more about ITU-T SG20's upcoming standards and work programme, please click here.

Episode #7: Crowdsourced Systems: A People-led Paradigm

2 November 2021

Webinar Introduction

Crowdsourcing is increasingly becoming a popular method when it comes to digital innovation and transformation. Interested stakeholders participated and contributed to the urban planning process by providing input, data and devices.

This webinar discussed the underlying principles of crowdsourcing, the requirements for crowdsourced systems, as well as highly innovative applications in smart cities and communities. It brought together experts to discuss the role of crowdsourcing and crowdsourced systems in the verticals of Smart Manufacturing and Digital Health. The webinar also placed a unique emphasis on the role of ITU international standards in facilitating IoT-related based crowdsourced systems in smart cities.

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Chaesub Lee, Director, Telecommunication Standardization Bureau, ITU

Smart sustainable cities are constantly looking to carry out innovative projects and facilitate urban planning that aims to improve the quality of life of all citizens. Crowdsourcing enables citizens to participate directly in the urban planning process.

By adapting a bottom-up approach to design and focusing on co-creation, crowdsourcing is driving public engagement in cities and enabling urban planners to design new services with citizen input and deliver services that are more likely to meet citizens' needs. Openness and interoperability are crucial for an IoT-based crowdsourced platform to connect with "the crowd".

ITU-T Study Group 20 is the lead study group on the Internet of Things and Smart Cities and Communities. The group has developed technical standards that provide authentic guidance for implementing an IoT-based crowdsourced system. For example, Recommendation ITU-T Y.4205 defines the high-level requirements and reference model for implementing a crowdsourcing system. This standard provides a foundational understanding on how cities can design a secured and interoperable IoT-based crowdsourcing platform.

This webinar explored the concept of crowdsourcing and how it can be applied to city planning and the benefits of using this bottom-up approach to urban development.

Key Highlights – Session 1 – Crowdsensing and Smart Cities applications

Moderator: Anna Brékine, Project Manager, Mandat International

Constantinos Marios Angelopoulos, Associate Professor, Bournemouth University, United Kingdom

Following the emergence of smart personal devices (e.g., smartphones, smart fitness bands) and single board computers (e.g., Raspberry Pi, Arduino), there is an abundance of smart assets in urban environments owned by citizens today. In the context of the digitalization of smart cities and communities, this abundance can be leveraged to allow smart cities and IoT systems to augment their infrastructure opportunistically towards more scalable and sustainable networked systems, giving rise to the new paradigm of mobile crowdsensing systems. They are sensing systems that employ crowdsourcing methodology to augment SSC infrastructure. They enable crowdsourcing of the sensing functionality in SSC instead of deploying fixed infrastructure. This provides a scalable and financially viable way to cover a large area with an open set of participants (i.e., the crowd) who would provide sensor data using their smart assets and receive different incentives for doing so.

The presentation pointed out that taking into consideration individual bias and other context, to leverage the wisdom of the crowd, certain conditions would need to be met.

1) A diverse crowd.
2) Individuals who are independent in their responses
3) A decentralized approach to local knowledge
4) An aggregation mechanism that allows for collective decisions. Each condition is also associated with a different set of requirements for ICT systems.

Recommendation ITU-T Y.4205 "Requirements and functional architecture of IoT-related crowdsourcing system" contains the details of these requirements, and identifies other risks and challenges that a crowdsourced system should take into consideration. ITU-T SG20 is also working on two new work items related to crowdsourcing systems: draft Recommendation ITU-T Y.CS-framework "Service requirements and capability framework for IoT-related crowdsourced systems" and ITU-T YSTR.P2P-CC "Current state of P2P crowd charging platforms and corresponding market needs".

Theofanis Raptis, Research Scientist, National Research Council (CNR), Italy

Industry 5.0 provides a vision of industry that aims beyond efficiency and productivity as the sole goal and reinforces the role and the contribution of industry to society. This concept places the well-being of workers at the center of production process, setting the pace for transition to a sustainable, human centric and resilient industry. The pandemic has further highlighted the potential of automated and digital solutions for fast recovery and demonstrated the need for resiliency in the manufacturing sector. Techniques such as safe distancing and the adoption of enabling technologies were put in place to tackle the impacts of the pandemic. However, they could lead to unintended trade offs, including suboptimal production performance due to strict safe distancing rules or elevated risks of viral contagions due to loose safe distancing rules. To enhance resiliency in the manufacturing sector, it is important to consider introducing the crowd wisdom in the system through pervasive computing technologies. Such technologies can enable functions that support safe distancing modelling and enhance production efficiency, from real time-tracking to worker schedule formulation, contact tracing, predictive computation, incentive mechanisms implementation and more. It is therefore considered important to adjust the existing performance KPIs and include the mobile crowd elements and other Industry 5.0 features.

Key Highlights – Session 1 – Crowdsensing and Smart Cities applications

Pantelis Tzamalis, Research and Development Engineer, University of Patras and Computer Technology Institute (CTI), Greece

Novel methods should be found to further capitalize on the challenges for spatial, large-scale monitoring and cost-effective treatments for diseases, especially chronic ones like allergic diseases, or communicable ones, like COVID-19, as well as ameliorating the overall quality of life. Among the allergic diseases is allergic rhinitis, which causes considerable impairment of daily activities. Specifically, the time of the season onset and the patients' adherence to treatment constitute some of the major issues of the related research.

This presentation is related to the development of an eHealth/mHealth hybrid platform that ingrates crowdsensing and crowdsourcing into Healthcare 4.0. Specifically, it holistically approaches a comprehensive way to address all the aforementioned challenges, in real time. The platform highly exploits the power of the crowd and is divided into two parts.

The first part employs a novel human-computer interaction method that collects and analyses hybrid data from users' attitudes regarding their symptoms, social media allergy-related posts, as well as pollen sensor measurements. Artificial Intelligence and statistical methods are also incorporated into the analysis part, resulting in successful mining.

Furthermore, close monitoring and early recognition of symptoms worsening are considered essential. For this reason, the second part is based on machine intelligence, and is responsible for efficiently and automatically detecting the disease symptoms' gestures by exploiting the sensor data collected from users' smart watches in a non-invasive way. Thus, the users are transformed into the sentinels of the allergic season as they passively participate in the early detection and prevention of the disease.

Additionally, the use of the platform is beneficial, as individuals, authorities and organizations can access valuable data to prevent the excacerbation of epidemic diseases. Finally, patients' stratification, empowerment, and innovation in clinical trials are provided when individuals become members of it.

Key Highlights – Closing Remarks

Bilel Jamoussi, Chief of Study Groups, TSB, ITU

Innovative crowdsourcing systems can help cities to facilitate public engagement and improve citizen participation in the urban development process. Implementing an IoT-based crowdsourcing system can further provide a shared platform that enables cities to leverage the talents and expertise of citizens and design services and policies that meet their needs.

The webinar has demonstrated that ITU-T Study Group 20 technical standards are already helping cities to design and implement an IoT-based crowdsourcing system. As mentioned by our panelists, the group is also working on new standards that will define the service requirements and capability framework for IoT-related crowdsourced systems.

ITU is committed to continuing to support smart city and community their journey to achieve a successful digital transformation.

Conclusions and Next Steps

This webinar highlighted the potential of crowdsourcing in enhancing crucial smart sustainable city sectors such as manufacturing and health care. It has also demonstrated that ITU standards such as Recommendation ITU-T Y.4205 “Requirements and functional architecture of IoT related crowdsourcing system”, can provide the foundation for implementing IoT-based crowdsourcing systems.

ITU-T Study Group 20 on “Internet of Things and smart cities and communities” will continue to work on supporting the deployment of IoT-based crowdsourcing platforms through its standardization activities. ITU technical standards are developed through an inclusive and participatory process.

To learn more about ITU’s technical standards for smart cities and communities, please click here.

To learn more about ITU-T SG20’s upcoming standards and work programme, please click here.

Episode #8:

Network Capabilities and Emerging Technologies to Support IoT-enabled Verticals

18 November 2021

Webinar Introduction

This webinar was organized jointly by the International Telecommunication Union (ITU), China Information and Communication Technologies Group (CICT), China Mobile, China Unicom, National Company for Support of Digital Development/Transformation (EADN), Huawei, Oki Electric Industry Co., Ltd and Tencent.

As the application of IoT-enabled verticals continues to expand and diversify, so do the network functions and capabilities required to support them. This episode examined how emerging technologies are enhancing network architecture and providing new capabilities to ensure reliability, security and interoperability for IoT-enabled verticals. The episode also placed a special focus on the role of international standards in capturing these developments and elevating best practices that would benefit cities and communities that are looking to scale up different IoT use cases and accelerate digital transformation.

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Bilel Jamoussi, Chief of Study Groups, TSB, ITU

For years, ITU has worked to support the development of smart, sustainable cities and coordinate the deployment of ICTs and digital technologies through standardization. As IoT applications and digital services continue to increase, new additional interoperability and compatibility requirements on existing networks are needed. In response, ITU has been working to support smart cities in maximizing the usage of common capabilities of architectural frameworks and expanding their capabilities to meet the requirements of new city and community services and applications. ITU-T Study Group 20 has developed technical standards that define architectural frameworks for vertical integration and guides cities and communities to integrate digital technologies into their IoT network. This webinar gathered network architects, IoT experts, researchers and other experts from SG20 to discuss the importance of network capabilities in supporting the integration of digital technologies and IoT-enabled verticals.

Key Highlights - Introductions

Moderator: Ramy Ahmed Fathy, Vice-Chairman, ITU-T Study Group 20, ITU

This webinar explored the opportunities and challenges of network capabilities and emerging technologies to support IoT-enabled verticals. International standards play an increasingly significant role in supporting the development and applications of IoT and other emerging technologies. As more and more devices are expected to be connected through IoT in different verticals, it is crucial to share recent advances on IoT-related network capabilities and the different emerging technologies that support them. This webinar aimed to provide a bird's-eye view of how ITU-T Study Group 20 contributed to this crucial area.

Marco Carugi, Q2/20 Rapporteur, ITU-T Study Group 20, ITU

In 2012, the ITU-T defined IoT in Recommendation Y.4000 as "a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on, existing and evolving, interoperable information and communication technologies."

The IoT is expected to benefit from the integration and convergence of ICTs and a number of emerging technologies including, but not limited to, machine-to-machine communications, advanced sensing and actuation, cloud and edge computing, softwarization, advanced networking, data management, artificial intelligence/machine learning, digital twin, distributed ledgers, semantics and ontologies, and advanced technologies for security, privacy and trust.
IoT and Smart Cities standardization will reuse as much as possible the standards developed in the different technology areas, but needs also to address lacks and issues coming from their integration in IoT systems and from the - common and application domain specific – requirements of IoT and Smart Cities ecosystems' stakeholders.

Key Highlights - Introductions

The IoT reference model in Recommendation Y.4000 - a capability view of the IoT – specifies the four layers of application capabilities, service support and application support capabilities, network capabilities, and device and gateway capabilities, and the two cross-layer capability groups of management and security. Key is the differentiation between common capabilities and application-specific capabilities. In the past vertical-specific platforms were used in most application domains (per silo integration, which does not scale and limits the evolution possibilities), but more and more deployments are nowadays moving to horizontal platforms supporting multiple verticals, with common components and vertical-specific components (platform-based integration).

ITU-T SG20 Q2 aims to maximize the common capabilities and architectural frameworks to support a broad range of IoT and SC&C services and applications in different verticals. Requirements, capabilities and architectural frameworks are specified from both common (not vertical dependent) and vertical specific viewpoints.

Session 1: Emerging Technologies for IoT Network Capabilities

Moderator: Ali Abbassene, Q2/20 Associate Rapporteur, ITU-T Study Group 20, ITU

As IoT-enabled verticals continue to expand and evolve, so do the network capabilities and requirements needed to support them. Specifically, edge computing, digital twins and data technologies provide operators with new options and opportunities to meet the network requirements for digital innovations. This session looked at how emerging technologies are sparking innovation in enhancing network functions and capabilities.

Xueqin Jia, Associated Rapporteur, ITU-T Q.2/20 I Senior Engineer, China Unicom

There are two development phases of edge computing. Edge computing 1.0 is driven by the cloud provider and IoT drives 2.0. In 2017, edge computing broke out and kept evolving, and many SDOs are involved in the study of edge computing. Edge computing is deployed between local devices and data centres. It could be used in many scenarios with low latency, high throughput, high security and super bandwidth requirements. Edge computing could provide an information technology environment and cloud computing capability near mobile users, better support the service requirements of low delay and high bandwidth, push the content distribution to the user, and deploy services and content in a flexible and scalable way.

An example of EC-enabled IoT gateway usage included in ITU-T Y.4122 Appendix is crane control. Compared with traditional crane control, the EC-enabled IoT gateway can provide resources such as computation, storage and network. It can support collaborative decision making of multiple PLCs and also support interworking between the servers deployed at the central control room the PLCs deployed on the field. EC-enabled IoT has been applied in many other scenarios such as new media, manufacturing and transportation.

IoT Edge computing-related standards in ITU-T SG20 include ITU-T Y.4208, ITU-T Y.4122, ITU-T Y.AI-DECCS, and ITU-T Y.IoT-DES-fr.

Session 1: Emerging Technologies for IoT Network Capabilities

Yizheng Li, Project Manager, China Mobile

A digital twin can be defined as an evolving digital profile of the historical and current behavior of a physical object or process that helps optimize business performance. It can create an evolving profile of the object or process in a digital world that may provide critical insight and lead to actions in the physical world such as optimization and process change. It is a tool for capturing the past, understanding the present and predicting the future. It could provide a real-time linkage between the physical and digital world and lead to low-cost trial and error, intelligent decisions and efficient innovation.

Digital twin allows users to have a complete digital footprint of their product from design and development to the end of the product life cycle. In the past, most industries developed and maintained products based on experience knowledge, and some of them did not know the mechanism behind it.

However, digital twin could realize system automation and knowledge inheritance. With digital twin, decision-makers can gain a deeper understanding, and even optimize performance. Digital twin has been utilized in many industries to enhance IoT infrastructure and verticals. It is not limited to manufacturing industries, and has been applied in smart cities, tourism and other areas.

Digital twin requires the support of proper networks. Since networks are becoming more and more complex, there is an increasing demand for efficient network management. Digital twin could improve the openness and flexibility of IoT networks. China Mobile has built a Network Management Reference Model to break down the IoT network into three aspects. This includes life cycle, managed object and function hierarchy, and has been practiced on digital twin-based network life cycle management. It includes digital twin basics, digital twin-based network life cycle management capability and application to ensure that the network is visible, manageable and controllable. The model could improve IoT network service through the interface that enhances communication with users in the planning and design stage, the simulation tool and reference that improves network construction in the implementation stage, and the intelligent engine that enables autonomous optimization in the operation stage.

Several recommendations related to digital twin have been developed or are currently being developed by SG20. These include ITU-T Y.DT-intero, ITU-T Y.SCDT-rqts, ITU-T Y. DT-firefighting, ITU-T Y. DT-ITS, ITU-T Y.supp.DTw-concept-usecase.

Looking into the future, the network gateway will be the key to solving the “last 100 meters” connectivity. Sensing and communication integration, such as Wi-Fi sensing and 5G sensing, will be the future of IoT networks, and passive communication and sensing will remove the limitation of power consumption.

Session 1: Emerging Technologies for IoT Network Capabilities

Yun Li, Director, Technical and Industry Standard Department, Tencent, China

Since the introduction of IBM's smart planet initiative, smart cities have been developed over the years. For now, there is a clear approach to realizing it. Data have become a vital driver to deliver smart education, smart community and other smart applications to the government, organizations and the public. IoT has enhanced the data capability in enriching source, format and volume. It is important to handle data processing to contribute to daily life. Data processing is aligned with strategy, governance and architecture, and it supports analysis and services.

However, digital silos still exist. The duplication of ICT system developments to support data collection and processing from various data sources has led to explosive data volume, repeated system maintenance and high operational costs. Independent deployment with complicated and non-unified data collaboration strategies and processing requirements, less standard data formats or schemas has led to low-data interoperability and process efficiency for cross-department or cross-domain scenarios. Non-reusable data service with inflexible interaction and less management transparency has led to a low level of public cooperation and a lagging reaction to business innovation and requirements.

To solve these silos, the middle platform has been deployed in more than 200 cities in China. It is between the front office platform, which interacts directly with users, and the back-office platform, which provides technical support. From a data-processing viewpoint, it could improve data-processing efficiency, explore data value, promote data openness and sharing to deliver high-quality data services.

ITU-T Y.data-MP introduces the concept of the data middle platform in IoT and smart sustainable cities. It also identifies high-level requirements, brings a capability framework of the data middle-platform in IoT and SSCs, and provides use cases of DM in IoT and SSCs.

Session 2: IoT-Enabled Verticals and Related IoT Network Capabilities

Moderator: Juan Pablo Martin, Q2/20 Associate Rapporteur, ITU-T Study Group 20, ITU

This session explored the network requirements and capabilities of different IoT-enabled verticals and how these elements are changing over time.

Session 2: IoT-Enabled Verticals and Related IoT Network Capabilities

Sushil Kumar, Deputy Director General (IoT), Telecommunication Engineering Centre, Department of Telecommunications, Ministry of Communication, Government of India

Rural communities have faced many issues in developing countries. These areas lack adequate infrastructure such as electricity, communication/Internet facilities, health care and education, and have an urban-rural digital divide. Significant work has been done in this field; however, more is required. The majority of the population in rural areas depends on agriculture, animal husbandry, fisheries and dairies to earn their livelihood. The income of rural households need to be increased. The dominance of the English language over the Internet limits the access of the non-English speaking population.

Smart cities are being developed across the globe to address the various challenges being faced by urban population. In addition to smart cities, smart infrastructure needs to be created in the rural areas to provide Internet facilities, as well as smart services, which will open up new opportunities for the rural population in diverse fields. Expected smart services in various verticals in rural communities include smart health, smart education, smart agriculture, animal husbandry, e-governance. This requires high-speed communication networks, sharing of passive/active infrastructure, energy efficient telecom equipment, low-cost IoT devices, smart phones with minimum features etc. These devices may preferably be connected with concerned smart city platform. An eco-system created for the research & development on IoT devices as well as indigenous manufacturing will help in proliferation of IoT services in the rural communities in developing countries.

The related standards in ITU-T include L.1700, ITU-T L Suppl. 22, ITU-T L Suppl. 23, ITU-T L Suppl. 29, ITU-T L Suppl. 30, ITU-T L Suppl. 31, Y.4450, Y. 4408, Y. 4110, Y. 4101, Y. 4418, Y. 4553, Y.4103, Y.4117, and Y Suppl. 53. Y.SRC are expected to provide technical guidelines to bridge the digital divide by establishing the requirements for the deployment of smart services in rural communities.

Gustavo Marques Mostaço, PhD Researcher, Escola Politécnica of the University of São Paulo, Brazil and Juyoung Park, Principal Member of Engineering Staff, Electronics and Telecommunications Research Institute, Rep. of Korea

Smart agriculture refers to using IoT, sensors, location systems, robots and artificial intelligence for agricultural purposes. The goal is to increase the quality and quantity of the crops while optimizing the human labour used. Six domains considered in smart agriculture are: greenhouse, open field, livestock barn, aquaculture, distribution, and data service. Smart agriculture uses comprehensive IoT (sensors and actuators), AI (data aggregation, analytics, recommendation and prediction), network, and robot technologies. Developing smart agriculture is a critical driver in meeting Goal Two of the Sustainable Development Goals, zero hunger, and achieving global food security.

Recommendations related to smart agriculture developed or currently under development by SG20 include ITU-T Y.4450/2238, ITU-T Y.4466, ITU-T Y.IoT-SLF, ITU-T Y.SRC, and ITU-T Y.Sup.SmartAgri-usecases. During the last October 2021 meeting, the ITU-T SG20 agreed to establish a new Focus Group on “Artificial Intelligence (AI) and Internet of

Session 2: IoT-Enabled Verticals and Related IoT Network Capabilities

Ziqin Sang, WP2/20 Co-Chairman and ITU-T SG20 Vice-Chairman, ITU-T Study Group 20, ITU

Study Group 20 has developed a standardization framework of smart cities in the ITU-T FG-SSC report: “Standardization roadmap for smart sustainable cities”. The roadmap covers smart city management and assessment standards, smart city service standards, ICT standards, and buildings and physical infrastructure standards. ICTs have been used in smart cities to meet the needs of citizens with respect to economic, social, environmental and cultural aspects. Multitier smart cities ICT architecture is, from a communications view: sensing layer, network layer, data and support layer, and application layer.

The document Y.SCC-reqts highlights Smart Cities and Communities' common requirements and capabilities from IoT and ICT perspectives. SC&C has information space, physical space and social space, which are linked with each other. The ongoing work item focuses on the information space, which divides the capabilities into sensing and infrastructure capabilities, smart city platform capabilities, service and application capabilities, and security and management capabilities.

Related recommendations include Y.4201, Y.4200, Y.4209, Y.4461, Y.4472, Y.4560, Y.4561, Y.4470, and Y.4805.

Takashi Harada, Marketing Engineer, IoT Platform Division, Oki Electric Industry Co., Ltd

There are significant differences in the way countries maintain their infrastructure, with an increasing number of civil engineering infrastructures being operated for 30 to 50 years. For example, in Japan, 43 per cent of bridges and 34 per cent of tunnels will be more than 50 years old by 2023. Issues in shortages of civil engineers and financial problems in operators have been raised in infrastructure maintenance. As a result, new maintenance methods using IoT technologies are highly expected.

Traditional inspection and health monitoring have the same purpose for maintaining the safety and integrity of the civil engineering infrastructure. Inspection measures the condition of civil engineering infrastructure at a particular point in time, and evaluates it against criteria, while health monitoring measures the condition of a civil engineering infrastructure constantly or multiple times and compares them, in order to find changes.

IoT-based civil engineering infrastructure health monitoring systems could collect data via networks, store data for the long term, and use data when needed. It could support the long-term operation. However, studies on sensing methods and data analysis are still progressing, and data storage for long-term, inter-system cooperation, and data sharing are necessary. As a result, cooperation with the construction and civil engineering and telecommunication fields is more important to promote systemization.

Related recommendations include ITU-T Y.Supplement 56 on use cases of smart cities and communities has been issued, and ITU-T Y.4214(draft)-Requirements of IoT-based civil engineering infrastructure health monitoring system has been determined.

Key Highlights – Closing Remarks

Hyoung Jun Kim, WP1/20 Co-Chairman, ITU-T Study Group 20, ITU

There is no doubt that advanced digital technologies and vertical integration capabilities are crucial for scaling up smart city solutions. The digital infrastructure in smart cities needs to continue to evolve to accommodate new capabilities and support new requirements from services and applications.

ITU-T Study Group 20 has developed technical standards that help cities and communities to expand their network capabilities and enable the support of services and applications in different verticals. ITU continues to work to support Smart Cities and Communities in their digital transformation journey. Looking forward, SG20 is already working to develop new standards that address these key areas.

Conclusions and Next Steps

This webinar highlighted how emerging technologies are enhancing network architecture and providing new capabilities to ensure reliability, security and interoperability for IoT-enabled verticals. It has also demonstrated a variety of ITU Standards that can provide the foundation of capturing these developments and elevating best practices that would benefit cities and communities that are looking to scale up different IoT use cases and accelerate digital transformation.

ITU-T Study Group 20 on “Internet of Things and Smart Cities and Communities” continues to work on supporting the international standards specifically focused on network capabilities and emerging technologies to support IoT-enabled verticals. ITU technical standards are developed through an inclusive and participatory process.

To learn more about ITU’s technical standards for smart cities and communities, please click here.

To learn more about ITU-T SG20’s upcoming standards and work programme, please click here.

Episode #9:
Addressing the Security Risks of Digital Transformation on IoT

6 December 2021

Webinar Introduction

The accelerated digital transformation has increased the risks to cybersecurity in parallel. As IoT deployment becomes more frequent and sophisticated, Smart Cities and Communities are also becoming more vulnerable to data breach and other exploits. City leaders must be prepared to respond to increased cybersecurity risks and prioritize privacy, security and trust as the key components of digital transformation, particularly in developing countries.

This webinar examined the security implication of digital transformation and looked at the global development on managing security risks in Smart Cities and Communities. It also shed light on the latest international standards that were available to enhance security capability of IoTs and other related systems and applications.

The webinar was organized jointly by ITU-T Study Group 20 “Internet of Things (IoT) and Smart Cities and Communities (SC&C)” and ITU-T Study Group 17 “Security”.

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Ramy Ahmed Fathy, Vice-Chairman, ITU-T Study Group 20, ITU, Executive Director, Digital Services & QoE, National Telecom Regulatory Authority, Egypt

This webinar was dedicated to the theme of addressing the security risks of digital transformation of IoT. This webinar was jointly organized by ITU-T Study Group 20 "Internet of Things (IoT) and Smart Cities and Communities" (SC&C) and ITU-T Study Group 17 "Security".

ITU has worked to support the development of smart, sustainable cities and coordinate the deployment of ICT and digital technologies through standardization. Security is a top priority for planning digital transformation as cities adopt more digital technologies to pursue new business models for their industries. Cities are also becoming increasingly vulnerable to potential security risks. Artificial intelligence, cloud computing, Big Data, and IoT contribute to accelerating digital transformation in cities. However, at the same time, each of these technologies is also expanding the threat service surface across the sectors, providing more and more entry points for cyberattacks.

Over the past several years, there has been an increase in IoT attacks, specifically with increasing global digital transformation initiatives. In addition to the rise of industrial IoT, this risk increases with the connectivity of industrial control systems and devices and ICS networks. Security has become a significant consideration when it comes to digital transformation. ITU-T Study Groups 20 and 17 have developed technical standards that drive guidance for improving the security and stability of IoT systems. The webinar presented standards considered important pillars for aligning security to digital transformation strategies.

Session 1: How to secure IoTs and manage IoT risks in cities and communities using standards?

Moderator: Katrina Destrée, Director of Privacy, KUMA LLC

Securing ICTs should be a top priority for cities and communities that are looking to take advantage of digital transformation. International standardization is becoming increasingly critical when it comes to recognizing best practices to help address security risk of digital transformation. This session reviewed the vital standards available and the recent developments in security IoTs.

Session 1: How to secure IoTs and manage IoT risks in cities and communities using standards?

Amin Hasbini, Head of Research Center, Middle East, Turkey and Africa (META)

Without security and trust, the fans of IoT today will not be adopters of IoT tomorrow. IoT is projected to have an important role in the future of human civilization. However, in order for this to happen, all IoT devices and services must be secured unequivocally. Organizations must take responsibility for implanting security requirements into every stage of a service or product development life cycle. Authorities and governments must also take responsibility for demanding and enforcing the right security requirements and making sure that these are implemented and restricted properly, and are continuously compliant.

This session discussed the different aspects and priorities that everyone needs to consider for an enhanced IoT security standing. The presentation also looked at the different stakeholders that should be involved and that are responsible for the future of IoT security. The goal is to have a better holistic view on the current situation, in order to gain a better understanding of the challenges and what is needed to overcome them.

Nathalie Feingold, Director and Strategic Advisor, NPBA

Digital transformation and IoT generate a variety of risks. Breaches of privacy and security represent significant threats. But other risks are also of concern: systemic risk, concentration risk, risk of bias in decision making, which stem from the new paradigm of “hyper-connection” and should be addressed without delay. A clear and effective risk-management process, distinguishing between operational and strategic objectives, is required. To this end, existing standards and methodologies can be adapted to the specific needs, contexts and complexities of cities, communities and projects in order to identify and manage risks and ensure the safe and sustainable development of so-called smart cities.

This session explored how taking a risk-management approach can help support data processing and management to support IoT and Smart Cities and Communities. The session explained in detail four areas of risk generated by data processing and management, and highlighted the best practices for risk management, at a micro, operational level as well as at a macro, strategic level, to ensure the safe development of cities and communities. Existing standards and methodologies can be adapted to the specific needs, contexts and complexities of cities and communities in order to ensure a safe, smart and sustainable city.

Abdulhadi AbouAlmal, WP2/20 Vice-Chairman and Q6/20 Rapporteur, ITU-T Study Group 20, ITU

The acceleration of digital transformation in cities and communities has increased the risk to cybersecurity correspondingly. As IoT deployment becomes more frequent and sophisticated, Smart Cities and Communities are also becoming more vulnerable to data breaches and other cybersecurity exploits. This presentation focused on managing the risks of IoT in cities and communities through standards.

Session 1: How to secure IoTs and manage IoT risks in cities and communities using standards?

With the increasing concerns about security and data with regards to IoT and digital transformation for cities and communities, there is a critical need to have proper standards in place. This presentation highlighted how cyber-security standards enhance security and contribute to risk management in several important ways. International standards can help cities and communities implement the necessary measures, processes and policies for improved security. International standards lay the foundations for best practices, provide specific guidelines and offer a way for cities and communities to measure themselves and improve practices.

This presentation explored the work of Study Group 20 Question 6, which is responsible for tackling security, privacy, trust and identification for IoT and Smart Cities and Communities. Study Group 20 has published several key recommendations on security, privacy, and trust: ITU-T Y.4805, ITU-T Y.4808, ITU-T Y.4809, ITU-T Y.4806, and ITU-T Y.4807. By working together with various organizations, ITU collectively supports cities' journeys towards digitalization and managing IoT risks.

Erik Andersen, Independent Consultant, Andersen's L-Service, Denmark

This webinar introduced the vital standard required for security, ITU-T X.509. This was initially released in 1988 but has had many editions since then, the most recent being edition 9 in 2019. This standard highlights the critical framework for public-key infrastructure (PKI), which lays the necessary foundations for e-banking, e-government, e-health and similar applications. The webinar highlighted that there are two opposite emerging trends in ICTs. One is that computers are becoming faster, especially given the future of quantum computers. However, there are noticeable constraints on devices entering the network. For example, devices with limited processing power, storage limitations, battery-driven constraints and stringent response-time requirements. At the same time, cyber attackers are becoming stronger. There is, therefore, a need for more robust cryptographic algorithms, lean secure communication protocols, scalable specifications and the adaption of PKIs to the new environments.

ITU-T X.509 adapts to new environments like IoT and smart grid, by relieving some of the burdens for constrained devices by a more powerful unit, called the authorizer. The session emphasized that the authorizer maintains a list of all public-key certificates belonging to the communication partners of the constrained entities it supports. The authorizer then acts as an intermediate between the certification authorities (CAs) having issued these certificates and the constrained entities. The session concluded that this is only the beginning of dealing with constrained devices, and further work is currently being done on refining the AVL concept. The future of IoT must certainly consider PKI requirements, and that failing to do so will result in a lack of security for IoT devices

Session 1: How to secure IoTs and manage IoT risks in cities and communities using standards?

Matej Kovačič, Expert, International Research Centre on Artificial Intelligence, Jožef Stefan Institute, Republic of Slovenia

Cybersecurity is a multifaced topic that often over-emphasizes the aspect of technologies. However, human and social aspects play a vital role in security. Security is not a product that can be bought, installed and forgotten; it is a process, and security culture should be developed and maintained continuously. Specifically, security and cybersecurity is a combination of people, processes and technology that needs to be renewed, updated and used regularly.

The webinar highlighted various technological security concerns, such as hardware security, weak password protection, insecure interfaces, insufficient data protection, lack of strong encryption and authentication mechanisms, and lack of integrity measures. These all lead to the possibility of the hijacking of devices and their abuse for other attacks. However, these problems can be solved with better technology, better processing power and better manufacturing. And this is not the only problem; users' and operators' knowledge, and the IoT skills gap are also of concern. Humans are prone to making mistakes, falling for social engineering and scams. Technology is often deployed without reflection on the needs of people and the long-term social consequences. The session concluded by reiterating that cybersecurity must consider the human and social aspects of security and not just technology. People and processes come first in addressing cybersecurity; technology should follow.

Giacomo Assenza, Cybersecurity Research Officer, ITU

The growing complexity and interdependence of digital development outpace existing cybersecurity risk management capabilities. Cybersecurity is a crucial enabler of digital transformation. A rapidly increasing number of new cybersecurity risks are emerging, stressing strengthening cyberresilience on multiple fronts. This includes compromising physical security, service disruptions, personal data, production downtimes, damaging equipment, financial loss and reputational losses. To reap the benefits and manage the challenges of digitalization, countries need to frame the proliferation of ICT-enabled infrastructures and services within their comprehensive cybersecurity policing effort.

This presentation focused on a policy perspective of the challenges and opportunities of addressing cybersecurity when dealing with the digital transformation at the national level. In particular, the presentation illustrated a methodology outlining the steps to be taken by a nation in order to draft meaningful policies and the possible mechanisms for their implementation according to the nation's specific needs and requirements. At the country level, strategies, policies and standards are the main tools to frame digitalization and cybersecurity efforts more comprehensively. However, dealing with cybersecurity at the national level is particularly complex because governments have a unique and expansive role. The session presented an essential resource, the Guide to Developing a National Cybersecurity Strategy, created by ITU in collaboration with other key organizations and agencies. The session explored the five steps needed to improve policies in cybersecurity at the national level. This included initiation, stocktaking and analysis, production of the National Cybersecurity Strategy, implementation and monitoring and evaluation. The session concluded that taking these steps and establishing a formal process can tailor policies to address countries' real cybersecurity priorities.

Key Highlights – Closing Remarks

Heung Youl Youm, Chairman, ITU-T Study Group 17, Security | Professor, Department of Information Security Engineering, Soonchunhyang University, South Korea

ITU-T Study Group 17 has worked collaboratively with Study Group 20 to develop recommendations in IoT security and privacy. Study Group 17 was mandated by the WTSA-16 to build confidence and security in the use of ICTs. The mission is to set comprehensive technical intelligence standards to address ICT environments' emerging challenges and threats. Collaboration across these efforts is key to maximizing resources and minimizing duplication. The presentation concluded that security by design/privacy by design should be applied for all IoT devices, and network-connected devices. A general risk-based approach should define controls or measures for IoT devices and applications based on threats and risks. International standards developed by ITU-T should be used when there is a need for security certification for IoT devices and applications. IoT certification should be expanded to include all IoT consumer devices, equipment, and systems moving into the future. Global mutual recognition for IoT devices certification is needed.

Ramy Ahmed Fathy, Vice-Chairman, ITU-T Study Group 20, ITU, Executive Director, Digital Services & QoE, National Telecom Regulatory Authority, Egypt

Helping cities to address the security risks of digital transformation has been a top priority for ITU since day one. ITU-T Study Group 20 has developed technical standards that aim to expand the security capabilities of IoT systems. Looking ahead, the group is also working to develop new standards that will define a common framework for improving the anti-unification protocol of IoT devices. This will, in turn, help cities manage security risks and other aspects today and in the future.

Conclusions and Next Steps

This webinar examined the security implication of digital transformation and looked at the global development on managing security risks in smart cities in communities. It also demonstrated a variety of ITU Standards which can provide the foundation of capturing these developments and elevating best practices that would benefit cities and communities that are looking to enhance security capability of IoTs and other related systems and applications.

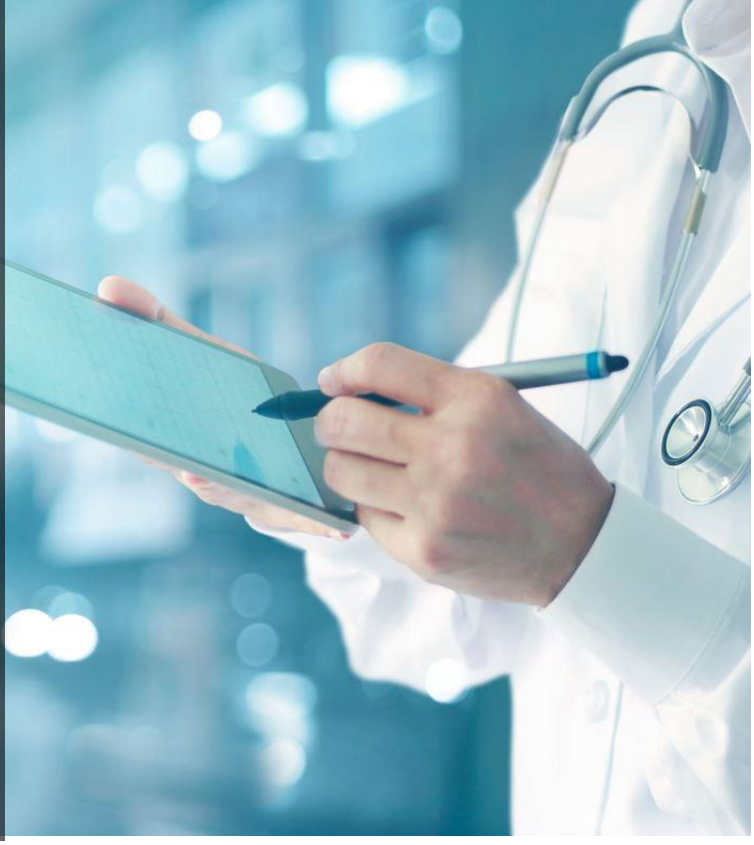
ITU-T Study Group 20 on “Internet of Things and smart cities and communities” continues to work on supporting the international standards specifically focused on cybersecurity and IoT. ITU technical standards are developed through an inclusive and participatory process.

To learn more about ITU’s technical standards for smart cities and communities, please click here.

To learn more about ITU-T SG20’s upcoming standards and work programme, please click here.

Episode #10:
The Role of Digital Technologies on Aging and Health

7 December 2021



Webinar Introduction

In 2020, there were 737 million people, approximately 9.3 per cent of the world's population, aged 65 or over. Digital technologies are poised to lead the transformation in the healthcare sector and play a significant role in meeting the healthcare needs of an aging population. This webinar explored the opportunities and challenges digital technologies are bringing to the healthcare field. It brought together experts to discuss the importance of digital health, innovation and inclusion.

Episode 10 was jointly organized by the International Telecommunication Union (ITU) and Pan American Health Organization (PAHO).

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Nasser Al Marzouqi, Chairman, ITU-T Study Group 20, ITU

A recent United Nations report states that there were 737 million people, approximately 9.3 per cent of the world's population, aged 65 or over in 2020. The proportion is expected to increase to around 16.0 per cent in 2050.

With the impacts of COVID-19 still looming, healthcare systems need to continue to evolve in order to meet the healthcare needs of an aging population and more. In response, digital technologies are augmenting healthcare systems with emerging capabilities to help improve health monitoring services, boosting older adults' health literacy, and provide better overall cares for all.

For years, ITU has played a significant role in supporting the widespread deployment of digital health and e-health applications in cities and communities. For instance, ITU-T Study Group 20 is the lead study group on the Internet of Things, and Smart Cities and Communities. The group has developed technical standards that provide technical guidance for defining the requirements and capability framework of e-health monitoring services. ITU standards have also described the IoT requirements for wearable device-related services, including the smart watches and VR headset that are used for elderly care.

Session 1: Connecting digital transformation with aging and health

Moderator: Cristina Bueti, Counsellor, ITU

Patricia Morsch, Technical Officer, Healthy Aging, PAHO

In the context of a rapid aging of population, the United Nations Decade of Healthy Ageing is being launched worldwide, led by the World Health Organization. The Americas Region has one of the fastest-ageing populations, which demands immediate action. The Decade of Healthy Ageing is an opportunity to work towards healthy ageing in the region in a collaborative and inclusive manner. The main areas of action of the Decade are: combat ageism; promote environments that enable older adults' capacities; deliver integrated person-centered care; and provide long-term care to older adults who need it. This presentation focused on the first two areas of action of the Decade and their relation to technology. Concerning ageism, the digital divide between older and younger generations increases ageism and barriers in technology use by older individuals. Older adults who internalized the stereotype that they cannot master technology may not even try to adopt new technologies. Additionally, older adults are less included in focus groups dedicated to improving the design of new digital technologies. Regarding the environments, there have been many opportunities in technology use to make the environment more age-friendly, including app for development and geocoding. In the Americas Region, especially in Latin America and the Caribbean, there is a huge gap in access to technology among older people, including access to the Internet. The Decade of Healthy Ageing is an opportunity to advance technological, scientific, medical (including new treatments), assistive technologies and digital innovations that can foster healthy ageing.

Session 1: Connecting digital transformation with aging and health

Roxana Widmer-Iliescu, Senior Coordinator, Digital Inclusion, ITU

Population aging continues to be a major global development trend. More than 21 per cent of the world's population is expected to be aged 60 or older by 2050. At the same time, ICT usage is rising in parallel, with over half the world´s population using the Internet by the end of 2019.

The global pandemic has added to the surge of Internet use and the proliferation of digital technologies. Global Internet traffic surged by nearly 40 per cent between February and April 2020. To achieve the goals of the UN Decade of Healthy Ageing, it is imperative to ensure that older persons are empowered by new technologies and are digitally included. Digital inclusion is fundamental for the development of inclusive, accessible and age-friendly environments that leave no one behind.

ITU has been working to facilitate digital inclusion for older persons and support the implementation of the UN Decade of Healthy Ageing. ITU's activities include raising awareness of the potential of ICTs as a scalable means to encourage and enable healthy ageing. ITU standards provide policy and strategy recommendations for adopting concrete strategies to achieve digital inclusion globally and contribute to the United Nations Decade of Healthy Ageing. ITU has also worked to identify best practices and solutions through standardization for accelerating the digital inclusion process for all people, including the ageing population. In addition, ITU has designed and developed tools and capacity-building resources that aim to support all stakeholders' efforts to build digitally inclusive, accessible and age-friendly environments that enable social inclusion and economic development.

Looking ahead, there are tangible steps that can be taken by all stakeholders to improve inclusivity of digital technologies. Governments and stakeholders can implement policies and strategies that take advantage of the digital opportunities for supporting the better livelihood and socio-economic development of older persons and ensuring that the environments for digitalization are inclusive and accessible for everyone regardless gender, age, ability or location. The private sector can also take advantage of the new business opportunities that ageism has to offer as older persons have been an untapped market for technology and yet make up an important sector of the population. Civil society should also be involved in all related processes where possible and encourage inter-generational support to facilitate the digital inclusion of older adults.

Vitalija Gaucaite Wittich, Chief, Population Unit, UNECE

Digitalization holds significant promise for societies with ageing populations, as well as for older persons themselves. Older persons represent a growing market for digital technologies tailored to their needs, ranging from assistive devices, smart living and health-monitoring devices to improve the quality and accessibility of caring services. The value of digital communications in reducing loneliness and enhancing social connections became very prominent during the COVID-19 pandemic, where the social distancing and confinement measures are affecting all age groups, exacerbating the social isolation and loneliness experienced by many older persons.

Session 1: Connecting digital transformation with aging and health

Digital skills training to enhance digital literacy for all age groups, and especially among older persons, is, therefore, a key policy priority as societies advance digitalization. The challenge though is not only to empower older individuals by providing access to digital technologies and enhancing digital literacy. Age-friendly design, and relevance of digital services, as well as ageism-free, ethical and safe digital environments that embrace the diversity of ageing populations need to be ensured.

Yuka Sumi, Acting Unit Head, Ageing and Health, WHO

The Covid-19 pandemic has highlighted the advantage of tele-health/medicine to facilitate healthcare delivery to older people and monitor and follow-up their health and well-being. Technology can help to maintain older people's dignity and autonomy, sense of self-worth and right to self-determination, all of which contribute to their well-being. However, there is a lack of access to the Internet and communication technologies for older people and lower digital literacy that prevents older people from seeking health information online and receiving medical services remotely, leading to feelings of social exclusion and exacerbating health disparity among older adults.

Integrated care for older people reflects a continuum of care that will help to reorient health and social services towards a more person-centred and coordinated model of care that supports optimizing intrinsic capacity and functional ability for older people. The implementation tools including ICOPE handbook app offers a step-by-step approach that guides health and social care workers to detect and manage declines in older people's physical and mental capacities (intrinsic capacity), as well as social care needs. There are many examples from countries using an ICOPE Handbook app as a training tool, as well as other digital tools to implement ICOPE approach.

Inga Caesar, Head of Health, Citibeats

According to WHO, by 2030, 1 in 6 people in the world will be aged 60 years or over. At this time, the share of the population aged 60 years and over will increase from 1 billion in 2020 to 1.4 billion. By 2050, the world's population of people aged 60 years and older will double (2.1 billion). The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million.

During the last three years, global entities, private companies, NGOs, and local national governments have implemented Citibeats' AI to help address social issues, understand citizens' perceptions and concerns and include people's needs in their decision-making process. Examples of projects using Citibeats' AI for a positive social impact include CivicLytics, the citizens' Observatory for Latin America and the Caribbean in collaboration with IDB; EARS, the WHO's social listening platform to show real-time information about how people are talking about COVID-19 online; and the 'Accessibility Map' of Spain, developed together with Fundación ONCE. These initiatives showcase how AI solutions can positively impact citizens and how a dynamic AI platform can be applied to a wide range of health and social contexts. Health and ageing are two topics that are central in contemporary society, and decision-makers need to be constantly monitoring and anticipating the potential healthcare needs of an ageing population.

Key Highlights – Closing Remarks

Tania Marcos, Vice-Chairman, ITU-T Study Group 20, ITU

Participating experts discussed the remarkable potential of digital technologies for healthy ageing and independent living, as well as for enhancing the quality of healthcare for older adults. ITU-T Study Group 20 has already developed technical standards that help to implement e-health monitoring systems services and to promote accessibility of IoT applications and services. Looking forward, the group is also working to develop new standards that will ensure semantic interoperability between e-health services and other IoT platforms. These standards will enable the integration of data across verticals and sectors, greatly improving the physical and syntactic levels of healthcare services and the provision of better urban services for older population.

Conclusions and Next Steps

This webinar discussed the importance of building digital inclusivity for older people. Ageing is a global trend that comes with a unique set of economic and social challenges. Digital technologies hold great potential to tackle many of these challenges from making healthcare services more accessible to staying connected with friends and family during the global pandemic. Yet, the lack of access to technology and digital literacy remains to be a key barrier for the older population to take advantage of the benefits digital technologies have to offer. These barriers are perpetuated by different stereotypes, for example that older people cannot learn new technologies. The webinar has made it clear that digital inclusion for older people represents an inclusive growth potential not only for the older population but also for businesses, civil society, state actors and other global stakeholders.

Episode #11:

Blockchain-based Data Management for Supporting Internet of Things and Smart Cities and Communities

8 December 2021

OPEN & AGILE SMART CITIES

UNITED NATIONS UNIVERSITY

Webinar Introduction

The application of blockchain is broadening to include data management. The immutability nature of blockchain has provided cities with a new way to improve data quality, traceability, real-time data analysis, data sharing and more. This webinar explored the growing role of blockchain in accelerating smart cities and communities. It placed a special focus on the role of international standards in accelerating the adoption of blockchain in cities. City planners, industry specialists and other relevant stakeholders gathered to share their experiences and challenges in integrating blockchain to city applications.

Episode 11 was co-organized by the International Telecommunication Union (ITU), Open & Agile Smart Cities (OASC) and United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV).

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Fabio Bigi, Vice-Chairman, ITU-T Study Group 20, ITU

The immutability nature of blockchain has provided cities with a new way to improve data quality, traceability, real-time data analysis, data sharing and more. Blockchain technology possesses the characteristics of trust, transparency and accountability. The session examined how these characteristics have significant potential in boosting the capacities of cities to tackle the main challenges associated with data management. International standards are the key to unlocking this potential.

For years, ITU has worked to support the development of smart, sustainable cities and coordinate the ICT and digital technology programme through standardization. Data management has long been one of the critical aspects of smart cities and communities. Affective data collection, storage and sharing enable cities to support digital applications across multiple verticals and countless city functions.

ITU-T Study Group 20 is the lead study group on IoT and Smart Cities and Communities. The group has developed technical standards that provide technical guidance for defining blockchain and data-management requirements and standard capabilities. The webinar highlighted how best to use these standards to support the city, leverage blockchain technology for data management, and accelerate the deployment of new IoT solutions.

Session 1: More than cryptocurrency – How blockchain is transforming in cities and communities

Moderator: Martin Brynskov, Chair, Open & Agile Smart Cities

Blockchain has remarkable potential for developing local ecosystems and cities, and communities. The immutability of blockchain technologies has enabled communities to manage better and support a broad range of services and, in particular, streaming IoT services more securely and transparently. The session explored these challenges related to the different intricacies of these emerging technologies. The session highlighted how blockchain was powering cities and communities and discussed the requirements of standards and recommendations that can help accelerate the development of blockchain technology.

Soumaya Ben Dhaou, Research Coordinator, United Nations University (UNU)

Blockchain technology is increasingly seen as a tool for boosting data transparency and traceability in smart cities. Blockchain technology can serve as a suitable means to manage the growing networks emanating from smart, sustainable cities as a decentralized IT infrastructure. Blockchain can help cities and communities monitor supply chains, execute and validate data trails and ensure authenticity and integrity of data.

Session 1: More than cryptocurrency – How blockchain is transforming in cities and communities?

This presentation summarized the report developed by the U4SSC titled "Blockchain for smart, sustainable cities", which sheds light on the utility of blockchain across verticals within the smart city ecosystem. Leveraging on blockchain's properties of transparency, privacy, immutability, security and decentralization, the report presents an array of use cases highlighting the adoption of state-of-the-art blockchain technologies for age verification, energy systems, online voting systems and land registry, to give just a few examples.

While underpinning future research directions, the complexity of blockchain in cities is further examined through the 4S framework (Situation, Sustainability, Smartness and Suitability), based on an extensive literature review and the key findings derived from the use cases. The presentation detailed the use case from various cities, including Amsterdam, Barcelona, Moscow. To further promulgate blockchain technologies and facilitate technology transfer to low- and middle-income countries, research-driven policy recommendations have been catalogued to enable the use of blockchain in the urban context in congruence with the Sustainable Development Goals (SDGs).

Zhicheng Qu, Standardization Engineer, ZTE corporation

Blockchain has been considered an effective way to provide an efficient approach to managing various data since its characteristics are tamper-resistance, trustworthiness and decentralization. Meanwhile, numerous kinds of blockchain-based solutions and projects have been implemented or explored to facilitate data management in IoT and smart sustainable city and community environments. This presentation examined the value of data and efficient management, and stressed that efficiency is key to enhancing data value.

Blockchain has the potential to be regarded as a trustworthy infrastructure applicable for all kinds of data-related, upper-layer applications. Consequently, this presentation focused on analysing current blockchain practices, as well as the standardization progress in Study Group 20. There are typically three cases of blockchain in IoT and smart sustainable cities and communities. The first is the supply chain, which includes life cycle tractability, timely logistics, secure efficiency finance and smart warehouses. The second is smart government, including areas surrounding affairs coordination and smart-data collection and visualization. The third is resource sharing in 5G network with use cases in data attestation, go-governance automation and confirmation process.

Further optimization of blockchain-based solutions, future blockchain trends were also introduced in this presentation. The presentation stressed that scalability and interoperability are two main challenges for the implementations of blockchain applications that should be solved. In addition, data privacy preservation is an important and promising technology for future blockchain practices.

Session 1: More than cryptocurrency – How blockchain is transforming in cities and communities?

Gyu Myoung Lee, Professor, Liverpool John Moores University (LJMU), Adjunct Professor, KAIST Institute for IT convergence

Along with the development of the Internet of Things and Smart Cities and Communities, different applications have different kinds of requirements for data management, and there are many challenges, especially in data representing data processing, data service provisioning and other aspects securely and effectively. Meanwhile, blockchain as an emerging technology possesses the characteristics of trust, transparency, traceability and accountability, and it has the potential capabilities to resolve the existing issues in data management.

The presentation discussed trustworthy data ecosystems with blockchain for cities and communities. It highlighted the need for international standardization to help implement the necessary measures, processes and policies for blockchain in cities and communities related to data management and data ecosystems.

This presentation explored the work of Study Group 20, which has developed vital resources and recommendations for blockchain-based data management. These include Y.Suppl.62, which provides an overview of blockchain related to data processing and management for supporting the Internet of Things and Smart Sustainable Cities and communities. ITU-T Y.4560 details the blockchain-based data exchange and sharing of supporting Internet of Things and Smart Cities and Communities. Lastly, ITU-T Y.4561 highlights blockchain-based data management for supporting the Internet of Things and Smart Cities and Communities. Study Group 20 has also begun relevant work on Artificial Intelligence of Things (AIoT), continuing the critical work related to blockchain and Smart, Sustainable Cities.

Catherine Mulligan, Professor, Instituto Superior Técnico and Director, DCentral Lab

Cities and communities are at the start of the digital economy. What is known today about data is nothing compared to what is coming. Blockchain does not merely challenge the notion of money, it can also allow cities and communities to redefine structure that has defined society not just today but also in the future.

The presentation discussed the future of blockchain in cities, the role that blockchain can play in their evolution, and the critical role blockchain plays in the climate crisis. Like many others before it, blockchain is the latest in a series of technologies that have promised to solve the problems that cities face in the 21st century. Significant attention is being placed on concepts such as creating efficiencies for local authorities or concepts like “bitcoin cities”. However, there is still a long way to go to truly deliver the potential of blockchain. The presentation placed particular emphasis on the importance of communities in addition to cities as they play a significant role in digital transformation and blockchain.

The presentation also highlighted the challenges of standardization related to blockchain for cities and communities and recommended that standards should move beyond technology-driven aspects. New forms of standardizations are needed that link economic, social and technology together.

Moreover, decentralization provides a unique opportunity to recreate human civilization that is currently being overlooked. This presentation presented a unique overview of how decentralization can assist cities and their hinterlands to combat climate change.

Key Highlights - Closing Remarks

Nasser Al Marzouqi, Chairman, ITU-T Study Group 20: Internet of Things (IoT) and smart cities and communities (SC&C)

The webinar discussed how blockchain technology can be applied to enhance data management and Smart Cities and Communities. The importance of Bitcoin was introduced and its application in various cities was explored. National initiatives such as the U4SSC contributed to this discussion by releasing the new report on "Blockchain for Smart, Sustainable Cities".

ITU-T Study Group 20 has developed a set of technical standards that help define the requirements and functional models of blockchain-based data exchange and sharing systems for supporting IoT and Smart Cities and Communities. Study Group 20 will continue to explore the potential of leveraging blockchain for sustainable development and the role of standards in the process. The group is already developing new standards that help define a set of common vocabulary related to blockchain in the context of data management.

Conclusions and Next Steps

This webinar examined and explored the growing role of blockchain in accelerating smart cities and communities. It placed a special focus on the role of international standards in accelerating the adoption of blockchain in cities. It also demonstrated a variety of ITU Standards that can provide the foundation for capturing these developments and elevating best practices that would benefit cities and communities that are looking for standards to accelerate the adoption of blockchain

ITU-T Study Group 20 on "Internet of Things and Smart Cities and Communities" continues to work on supporting the international standards specifically focused on cybersecurity and IoT. ITU technical standards are developed through an inclusive and participatory process.

To learn more about ITU's technical standards for Smart Cities and Communities, please click here.

To learn more about ITU-T SG20's upcoming standards and work programme, please click here.

Episode #12:

Interoperability of IoT and Satellite Data for Earth Observation Supporting Sustainable Development

14 December 2021

Webinar Introduction

The emergence of technologies for Earth Observation (EO) such as Internet-of-Things (IoT) promises to provide new advances in data collection for the Sustainable Development Goals, including in the fields of climate change mitigation, biodiversity monitoring, poverty alleviation or smart agriculture.

The ITU, together with Mandat International and World Meteorological Organization (WMO), organized this episode. This episode brought together international experts from ITU, WMO, ECMWF, UNEP, OGC and Mandat International, and provided a platform to present the results from the NGIOT research project and to discuss existing perspectives and challenges in the field.

Currently, one of the challenges is to set global standards for interoperability of data coming from very different sources to facilitate their use for information services in above mentioned fields. Indeed, the lack of interoperable integration of different Earth observation data and applications remains an important barrier to be addressed in this domain. With over 50 billion IoT devices deployed, there is a need to facilitate the integration of existing IoT data with more standard Earth observation data. While Earth observation - in situ and satellite - benefits more and more from common data models and standards, it is still difficult to combine those datasets with other data sources such as smart city open data, IoT, and smartphone sensor data.

Throughout the different presentations, the speakers discussed the latest considerations, current work, and future considerations for IoT and satellite observation. We will try to identify the challenges to be addressed from IoT research and IoT standardization perspectives. The presentations were followed by a panel discussion and interactions with the audience.

For additional information and to access the presentations, please click here.

Key Highlights – Opening Remarks

Anthony Rea, Director of the Infrastructure Department, WMO

With the development of technologies for Earth Observation and the Internet of Things, there is significant potential to increase the amount of data collected and shared globally. However, the main challenge has been the standardization of that data and the ability to use this data interoperability. A standardization approach is needed moving forward with IoT and satellite data to ensure that this data can be used to its full potential globally.

The WMO facilitates the exchange of large amounts of earth observation data globally and actively works to provide this data in an interoperable and standardized way.

Nasser Al Marzouqi, Chairman of ITU-T Study Group 20, ITU

Interoperability is crucial when integrating sensors and satellite data into different platforms. Interoperability is crucial for enabling IoT networks to deliver real-time information and analysis for facilitating productive responses to different situations. For years, ITU has played a significant role in supporting the development of smart, sustainable cities and coordinating the development and deployment of ICTs and digital technologies through standardization.

ITU-T Study Group 20 is the lead study group on the internet of things (IoT) and smart, sustainable cities and communities. This episode highlighted the various technical standards that define IoT networks' key features and requirements dedicated to monitoring global processes such as earthquake, wildfires, and heatwaves. The ITU believes that facilitating global learning and meaningful collaboration is key for enhancing knowledge and understanding of futurizing IoT and monitoring for sustainable development.

This episode explored the opportunities and challenges in satellite data to support sustainable development. The session also discussed the standardization gap in this area and explored the next steps for closing this gap.

Session 1: International Research and Innovation Challenges and Opportunities

Moderator: Vadim Nozdrin, Counsellor, ITU

Kenneth Holmlund, Head of Space Systems and Utilization, World Meteorological Organization (WMO)

WMO calls for enhancing Earth System Observations which is reflected in the recently published WIGOS (WMO Integrated Global Observing System) Vision 2040. For the space-based component of the Vision 2040 WMO works closely with the space agencies and notes with great appreciation the strong contributions made by the Coordination Group for Meteorological Satellites (CGMS) and the Committee on Earth Observation Satellites (CEOS). However, critical gaps remain for several application areas ocean and WMO works closely with the space agencies in advancing the implementation of the WIGOS, enhancing the whole Earth System observation capabilities.

An important part in the future global observing system is the provision of data from public-private and commercial enterprises. This is also true for the space-based component and already today important data are provided by the commercial sector. Overall, a main challenge for the future will be the significant increase in data volume from multiple sources and it will be critical to alleviate the related technical issues on data standardization and access.

In order to have an open and level discussion with all data providers, WMO has recently updated its data policy. The new WMO Unified data Policy addresses the needs of data across all WMO domains in a single policy statement, extending beyond the traditional areas of weather, climate and water data to incorporate also the areas of atmospheric composition, oceans, cryosphere and space weather. In addition, the data policy resolution expands from addressing just national meteorological and hydrological services to endorsing relevant data exchange among all partners, including agencies beyond meteorological and hydrological services, the rapidly growing private sector and academia.

This presentation gave an update of the WMO Vision 2040 and discussed the implications of the new WMO Unified Data Policy for the space-based component of the WIGOS. It also emphasized the need for an honest and balanced discussion on radio-frequency protection for Earth-system and space-weather observations. Particularly it was noted that due to the nature of the atmosphere some frequencies are unique in how they can be used for monitoring the earth system. Furthermore, for climate monitoring, there is a requirement to provide consistent measurements of decades and hence stability of protected frequencies is essential.

Session 1: International Research and Innovation Challenges and Opportunities

Erik Andersson, National Expert to the EC, European Centre for Medium-Range Weather Forecasts (ECMWF)

Observations are vital for the success of WMO programs. Vital monitoring of weather and climate is based on the interoperability of observational data obtained from all available sources. By combining data from a variety of sources, synergies are explored and realized, most prominently perhaps between satellite-based and ground-based observing systems. Merging of information (data assimilation) is done consistently and continuously in order to derive the most pertinent information required for sustained operational weather and climate services by nations to their citizens.

The presentation focused on WMO's effort to systematically assess the strengths and weaknesses of the global observing systems, and the identification of gaps with respect to stated needs for weather and climate monitoring.

Knowledge of operational data needs is collected from the agencies and scientists that operate and further develop the weather and climate monitoring services. The gaps are identified by comparing the current capabilities of the available observing systems against the stated data needs by key user groups. Based on knowledge of the data gaps, WMO makes recommendations for priority actions for the improvement of observation infrastructure and their operation, for both satellite and ground-based systems to all nations. The concepts outlined above, apply equally to all Earth domains, and concerns the observing systems of the atmosphere, the oceans, land, lakes and rivers, as well as snow and ice covered surfaces.

Gregory Giuliani, Head of the Digital Earth Unit and Swiss Data Cube Project Leader, GRID-Geneva of the United Nations Environment Programme (UNEP) and a Senior Lecturer, University of Geneva's Institute for Environmental Sciences

The key to sustainable development is achieving a balance between the exploitation of natural resources for socioeconomic development and maintaining ecosystem services that are critical to human's wellbeing and livelihoods. Some of these environmental issues can be monitored using remotely sensed Earth Observations (EO) data that are increasingly available from freely and openly accessible repositories. However, the full information potential of EO data has not been yet realized. They remain still underutilized mainly because of their complexity, increasing volume, and the lack of efficient processing capabilities. The EODC a new paradigm revolutionizing the way users can interact with EO data. It lowers the barrier caused by Big Data challenges for example, volume, velocity and variety, and provides access to large spatiotemporal data in an analysis ready format. It significantly reduces the time and scientific knowledge required to access and prepare EO data having consistent and spatially aligned calibrated surface reflectance observations. This session presented how the EODC can be used to monitor environmental changes across countries and can enable more effective responses to problems of national and regional significance.

Session 2: Solving the Interoperability and Standardization Gaps

Moderator: Sébastien Ziegler, Director General, Mandat International

Nadine Alameh, CEO, Open Geospatial Consortium (OGC)

One of the key challenges facing geospatial data is setting global standards for data interoperability from very different sources to facilitate their use for information services. Standards can help turn data into actionable insights. With data sources multiplying, the existing standards that are available today are not sufficient. Standards need to be written for a broader community to make data accessible. There is a significant opportunity to do good with geospatial data and turn it into insights. However, there is work ahead in areas such as APIs, cloud-native, data models, Ai and analytics, domains and best practices, ethics and more. Taking geospatial data and applying it to disaster planning, climate change, smart cities and digital twin, health etc. However, standardization is needed on many fronts, including data quality, interoperability, and trust.

This presentation explored the need for standardization from an IoT and geospatial perspective and highlighted the current research being conducted in this field and future considerations for IoT and satellite observations.

Dominique Berod, Head, Earth System Monitoring Division, World Meteorological Organization (WMO)

Natural phenomena related to the atmosphere, ocean, hydrosphere and cryosphere are complex and interconnected, and can produce dramatic impact on population, such as coastal inundation, glacial lake outburst floods, extended drought, and so on. In order to better capture this complexity, a holistic approach of the Earth System monitoring is required, and has been adopted by WMO. The approach has been formalized into three historical decisions of the WMO Congress in October 2021, related to the establishment of a global basic observing network GBON, a unified data policy and a new funding mechanism SOFF (Systematic Observations Financing Facility). These decisions will improve the sharing of data among users, contributing to better numerical weather prediction and more accurate flood and drought forecasts thanks to interoperable data systems. Considering the costs related to high quality monitoring systems, it is important to benefit from emerging approaches in order to combine different data sources: satellite, citizen observation, low-cost devices, Internet of Things, Big Data. A drawback of this multi-source approach is the discrepancies in data quality and the multiplication of different data format, which can hamper a quick transmission of information in case of crisis. WMO is developing technical solution to solve this issue, by adopting standard data and metadata description and format, and brokering approaches to ease the life to both data providers and users. Examples are the new generation of the WMO Information System WIS 2.0 and the Observing Systems Capability Analysis and Review Tool (OSCAR) for making metadata accessible to users.

In conclusion, making data interoperable enable their sharing and use in different applications, ensuring a higher quality of information, and in some cases avoids building new monitoring stations. And if data are used multiple times by multiple communities with multiple benefits (disaster reduction, hydropower, agriculture, ecosystems, etc.), monitoring systems will have a much better return of investment. In addition, data providers, having a larger audience, will become more visible and identified as a trusted partner.

Key Highlights – Closing Remarks

Sébastien Ziegler, Director General, Mandat International

The emergence of technologies for Earth Observation (EO) such as Internet-of-Things (IoT) promises to provide new advances in data collection for the Sustainable Development Goals, including in the fields of climate change mitigation, biodiversity monitoring, poverty alleviation or smart agriculture. Interoperability and standardized data are key for utilizing this data most effectively. The ITU and other organizations collectively play an important role in helping the international community converge on common open standards, data, APIs and bridging the interoperability and standardization gap.

Conclusions and Next Steps

This webinar examined explored the growing role of interoperability of IoT and satellite data for earth observation supporting sustainable development. It placed a special focus on the role of international standards in supporting the interoperability of IoT and satellite data. It also demonstrated the valuable work conducted by ITU and other organization that provide the foundation of capturing these developments and elevating best practices.

ITU-T Study Group 20 on "Internet of Things and smart cities and communities" continues to work on supporting the international standards specifically focused on cybersecurity and IoT. ITU technical standards are developed through an inclusive and participatory process.

To learn more about ITU's technical standards for smart cities and communities, please click here.

To learn more about ITU-T SG20's upcoming standards and work programme, please click here.

Biographies

Ali Abbassense| Chief Technology Officer, EADN, Ministry of Post and Telecommunications, Algeria

Mr Ali Abbassense is the CTO of EADN, a publicly owned digitalization service company leading large-scale projects to modernize Algerian governmental entities and administrations. He is Associate Rapporteur of Q2 and Vice-Chairman of the African & Arab Regional Groups of ITU-T Study Group 20, and Liaison Rapporteur to the JCA on IMT2020 (5G). He also participates in the work of the Arab Standardization Team, and has formerly participated in the work of ITU-T SG13. He has been a Senior Researcher and Information System expert, serving as Director of Telecom Division at the Center for Development of Advanced Technologies (CDTA), and worked as CIO of CDTA. Ali took the lead of various R&D groups and managed many projects in the field of information systems, healthcare informatics and telemedicine. He worked on B2B collaboration in the context of Web and semantic technologies, and on interorganizational workflow integration. Formerly, Ali worked on Complex Systems and Emergent Approaches for solving combinatory problems in image processing.

Abdulhadi Aboualmal| Etisalat

Dr Abdulhadi is the Head of Technology Standardization, Spectrum Management, IoT & Smart City Development and Radio Access Transformation (e.g., NB-IoT, 5G). He has held various leadership roles at the Emirates Telecommunications Group Company (ETISALAT) and UAE since 2008. He is a leading expert with more than 10 years of international experience in the strategy, design, development and implementation of next-generation networks technologies and related infrastructure. He has also been heavily involved in the work of many international organizations (e.g., ITU, 3GPP, GSMA, SAMENA), in which he has chaired various technical groups. He has also been leading several national and international projects, including propagation modelling for the Gulf region, cost modelling of telecom services, analysis of business challenges/opportunities, and modelling/optimization of wireless systems/networks. In addition, he is the representative of the Arab Group for relevant agenda of mobile spectrum, IoT & Smart City, OTT, etc., under the ITU World Conferences, including WRCs, WTSA, Plenipotentiary and WCIT-12. Before 2008, he was working in three UAE universities and research centres. He obtained his Ph.D. degree in wireless and mobile communication from the University of Bradford, UK. He is the author and co-author of many journal and conference papers.

Ulrich Ahle | CEO, Fiware Foundation

Ulrich is a reputed executive in the IT sector, formerly Vice-President and leader of the Manufacturing and Industrie 4.0 System Integration Business at Atos in Germany. He is also founder and member of the Board of the International Data Spaces Association in Germany and served 16 years on the Board of the prostep IVIP organization until April 2018. After an apprenticeship as a toolmaker at Hella KG, he studied Mechanical Engineering at the University of Paderborn. During his career, Mr Ahle held several positions as Development Engineer, Director of PLM Services, Sales Director and Vice-President. He has been part of Nixdorf Computer AG, Siemens and Atos. Since January 2017, Ulrich Ahle has been Chief Executive Officer of the FIWARE Foundation headquartered in Berlin, Germany.

Biographies

Nadine Alameh | CEO, Open Geospatial Consortium (OGC)

Dr. Nadine Alameh is the CEO of the Open Geospatial Consortium (OGC) – a collective problem-solving body convening the global community of geospatial experts and users to make Location information Findable, Accessible, Interoperable, and Reusable (FAIR) via open consensus-based standards, collaborative innovation projects, and industry partnerships. Dr. Alameh is a recognized leader in creating and applying open geospatial/mapping standards in a multiple of domains including Aviation, Intelligent Transportation Systems, Earth Observations, Public Safety and Defense. Prior to OGC, she held various roles in industry from the Chief Architect for Innovation in Northrop Grumman's Civil Solutions Unit; to CEO of an Aviation data exchange startup; to senior technical advisor to NASA's Applied Science Program. Nadine graduated from MIT with a Ph.D. in Information Systems Engineering, and 2 Master's Degrees in Civil Engineering and Urban Planning with a concentration in Geospatial Information Systems. She holds a BS degree in Computer Engineering from the American University of Beirut.

Erik Andersen | Independent Consultant, Andersen's L-Service, Denmark

Erik Andersen was employed by IBM for 27 years and in the early 1980s was appointed by IBM to be the IBM representative in Danish Standards (OSI). He became Chair of the Danish Committee for Open Systems Interconnection Standardization and participated in numerous international meetings within ISO/IEC where he was quite active. After leaving IBM, Mr Anderson continued to work for international standardization in the European standardization arena. During four study periods, he was Rapporteur for the question, currently Question 11, that is responsible for the ITU.T X.500 series, which is collaborative work with ISO/IEC, which has published the series as ISO/IEC 9594-all parts. For more than 12 years, he has been the project editor for the ITU-T X.500 series, also on the ISO/IEC side. Rec. ITU-T X.509, alias ISO/IEC 9594-8, is part of ITU-T X.500 series X.509, as the framework for public-key infrastructure, is an extremely important specification.

Erik Andersson | National Expert to the EC, European Centre for Medium-Range Weather Forecasts (ECMWF)

Erik Andersson is seconded by ECMWF (the European Centre for Medium-Range Weather Forecasts with HQ in Reading, UK) to the European Commission (Brussels) where he works for DG-DEFIS within the Copernicus earth-observation program. Erik has a scientific background with a PhD in Atmospheric Physics from Stockholm University. He has many years of experience working on data assimilation, the global observing systems, and the value of observations for earth monitoring for climate and weather forecasting. At the European Commission, Erik is working on developing Copernicus Services for the monitoring of CO2 emissions, focusing on anthropogenic fossil fuel emissions in the context of the Paris Agreement. The CO2 monitoring and validation service will be based on satellite and in-situ measurements. For WMO (Geneva), Erik is leading the expert team on the Earth observing system design and evolution (as its chair).

Biographies

Constantinos Marios Angelopoulos | Associate Professor, Bournemouth University, United Kingdom

Dr Constantinos Marios Angelopoulos is Associate Professor in Computing at Bournemouth University (UK). His interests are in the area of computer networks, with a focus on emerging paradigms such as Internet of Things, Crowdsensing and Sensor Networks. At BU, he established, and leads, the BU IoT Lab and is a founding member of the Future & Complex Networks (FlexNet) Research Group. He is also the founding Programme Leader of three Master's degree courses in the area of Internet of Things. Since 2018, Marios has been serving at the International Telecommunication Union (ITU-T) as Associate Rapporteur of Question 5 "Research and emerging technologies, terminology and definitions" in Study Group 20: Internet of Things (IoT) and Smart Cities and Communities (SC&C). He also serves as the Liaison Co-Rapporteur of SG20 to the Standardization Committee for Vocabulary (SCV). His research on Crowdsourced Systems has led to the ITU-T Recommendation Y.4205 "Requirements and Functional Architecture of IoT-related Crowdsourced Systems". He has co-authored more than 50 academic publications and has served on the committees of several highly esteemed international journals and conferences in his area of expertise (such as IEEE ToN, Elsevier's ComNet, ComCom, Ad-Hoc Nets, IEEE ICDCS, IEEE DCOSS, IEEE ICC, ACM MSWiM). He has also been involved in several R&D projects at the European and national levels.

Giacomo Assenza| Cybersecurity Research Officer International Telecommunications Union, Geneva

Assenza is a Cybersecurity Research Officer at the International Telecommunication Union and a PhD candidate in Engineering for Humans and Environment at the University Campus Biomedico, where he is also tutor for the Cybersecurity module. His research interests cover the development of cybersecurity strategies for the protection of critical sectors. Giacomo has a background in consulting and academia, and has authored several publications in academic, technical and educational journals.

Dominique Berod| Head, Earth System Monitoring Division, World Meteorological Organization (WMO)

Dominique Berod is the Head of the Earth System monitoring Division at the World Meteorological Organization (WMO). He is responsible for WMO activities on water, cryosphere and ocean monitoring and information systems. Before joining WMO in June 2016, Dominique Berod was in 2015 the senior expert for the Water, Cold Regions and Disasters activities at the intergovernmental Group on Earth Observations (GEO) Secretariat. From 2008 to 2014, he served as the Head of the Swiss National Hydrological Service, in charge of water monitoring, flow forecast, water information systems and applied research. He was also the President of the Swiss commission of Hydrology and was the Regional Hydrological Advisor of the World Meteorological Organization for Europe, Middle East and the Caucasus. Until 2008, he was the Head of the flood protection unit in the canton of Wallis, Switzerland, responsible for flood mitigation and river restoration projects, including flood forecast and warning as well as hazard mapping. Dominique Berod holds a Master's degree in Environmental Engineering from the Swiss Institute of Technology at Lausanne (EPFL, 1989) and a PhD in Hydrology from the same university, in collaboration with the Louisiana State University at Baton Rouge, USA (1994).

Biographies

Jiayu Bi | Q3/20 Associate Rapporteur, Editor, ITU-T Study Group 20, ITU

Jiayu Bi is the Associate Rapporteur of ITU-T SG20 Q3 on IoT and SC&C architectures, protocols and QoS/QoE, as well as an Editor of several Recommendations and on-going work items in ITU-T. She was the Vice-Chairman of ITU-T Focus Group on Data Processing and Management to support IoT and Smart Cities & Communities (FG DPM). She has worked for China Telecommunications Corporation for more than 10 years, and is currently working for E-surfing Internet of Things Technology Corporation established by China Telecom. She has professional experience in domains including Internet of Things and Smart Cites. She has also been working actively for standardization in ITU-T, IETF, oneM2M, GSMA, OMA, CCSA, and other areas.

Fabio Bigi | Vice-Chairman, ITU-T Study Group 20, ITU

Dr Fabio Bigi holds a Doctorate degree in Electronic Engineering from the University of Rome. He began his career as a researcher at the Fondazione Ugo Bordoni in 1967. In November 1968, he became an ITU staff member with increasing responsibilities in the areas of standardization. He ended his career at ITU as Deputy Director of the Telecommunication Standardization Bureau. He then became a consultant for the Italian administration in 2001. Dr Bigi continued to be extensively involved in the work of ITU as a representative of the Italian administration. He was Chairman of the ITU Council in 2011. During PP-14, he was Chairman of the group in charge with the resolution on the Internet. He was Chairman of the group charged with the strategic planning and the working methods of the sector and of the declaration of Hyderabad in WTDC-10. He was also involved in numerous other key ITU events and activities including WRC, WTSA and WSIS. Currently, he is Vice- Chairman of ITU-T Study Group 20 “IoT and Smart Cities & Communities” and Chairman of the Informal Experts Group on WTPF-21 (IEG-WTPF-21).

Anna Brékine | Project Manager, Mandat International

Anna Brékine is a project manager at Mandat International, where she works on a variety of projects in sustainable development, EU policy, communication and standardization. Anna is a multidisciplinary specialist in international relations, business management and environmental science. She has previously worked for the European Commission and Maxwell Technologies, specializing in industrial marketing. Anna holds Master’s degrees in International Relations (Université Catholique de Louvain), Business Management (Louvain School of Management) and in Environmental Science (University of Geneva).

Biographies

Martin Brynskov | Chair, Open & Agile Smart Cities

Martin Brynskov, PhD, is Chair of the global Open & Agile Smart Cities network (OASC), which encompasses more than 150 cities from 30 countries. OASC is a Brussels-based non-profit association, which aims to develop so-called Minimal Interoperability Mechanisms (MIMs) for public and private sector use, based on the needs of cities and communities. Dr Brynskov is Associate Professor in Interaction Technologies at Aarhus University in Denmark, where he leads the Centre for Digital Transformation in Cities and Communities (AU DITCOM) and is a fellow at the Centre for Advanced Visualization and Interaction (CAVI). With regard to the development of technical standards, Dr Brynskov is a contributor to ITU-T SG20 and related focus groups, co-leads the United Nations "United for Smart and Sustainable Cities and Communities" (U4SSC) new architecture for digital, sustainable development. He also leads the Living-in.EU Technical Subgroup overseeing the MIMs Plus specifications for Europe, and chairs the Danish Standards Committee for smart and sustainable cities and communities. He was the coordinator, and lead, of the large-scale pilots OrganiCity and SynchroniCity and is also leading the Next Generation Internet of Things (NGIoT) European roadmap for IoT research, innovation and deployment. He is a global expert, speaker and advisor on digital transformation with a human-centric focus.

Cristina Bueti | Counsellor, ITU-T Study Group 20

Cristina Bueti is the ITU Focal Point on Environment and Smart Sustainable Cities. She is also the Counsellor of ITU-T Study Group 20 "Internet of things (IoT) and Smart Cities and Communities (SC&C)" at the International Telecommunication Union (ITU). She also serves as TSB/ITU focal point for Latin America. Cristina Bueti graduated from the Faculty of Political Science, Law and International Cooperation and Development of the University of Florence, where she completed postgraduate studies in International Cooperation and Telecommunications Law in Europe. She also holds a specialization in Environmental Law, with a special focus on Telecommunications. In 2003, Ms Bueti built on her academic credentials by completing a specialized course in peacekeeping and international cooperation, with special focus on telecommunications at the Faculty of Laws, University of Malta, before joining the International Telecommunication Union in Geneva in January 2004. As part of the International Women's Day 2016, she was named as one of the twenty Geneva-based inspirational women working to protect the environment. She has authored over 40 reports on telecommunication issues. A native Italian speaker, Cristina is also fluent in English, French and Spanish.

Inga Caesar| Key Account Manager and Head of Health, Citibeats

With more than 10 years of cross-sectoral experience in international business, Inga has built strategic relationships with stakeholders across different cultures, languages, and countries. With an Executive Master's in Business Analytics, Inga has worked in various sectors and industries, such as B2B2C insurtech, and healthcare solutions, with a focus on emerging tech solutions and business development. An experienced, data-driven business leader in the DACH region, LATAM, and APAC markets, Inga joined Citibeats in 2021 as Head of Health and, specifically, is in charge of the World Health Organization projects.

Biographies

Héctor Mario Carril | Vice-Chairman of Study Group 20 of the International Telecommunication Union.
Héctor Carril is a Vice-Chairman of ITU-T Study Group 20 on Internet of Things (IoT) and Smart Cities and Communities (SC&C). He is also a Telecommunication Engineer from the National University of La Plata (Argentina). He has acquired experience at mobile and fixed line network telecommunication service companies, hardware suppliers, national and international regulations organizations and in Chambers of Commerce. His work experience has given him a vast knowledge of the telecommunication business and its regulations. Mr Carril has, over the years, established a strong network with the private sector and governmental entities in Latin America and provincial and municipal governmental entities in Argentina. He has extensive experience in International standardization organizations.

Marco Carugi | Q2/20 Rapporteur and Mentor of ITU-T SG20, Huawei Research Europe
Marco's current technical areas of involvement include IoT and Smart Cites, Future Networks incl. IMT-2020/5G and Network 2030, AI/ML and Autonomous Networks. He has professional experience in R&D and technology strategy, and has worked in different market roles in Solvay Group, Orange Labs, Nortel Networks CTO division, ZTE R&D Technology Strategy. He has been engaged in consultancy activities with various customers, including NEC (2015–2018), and is presently consultant for Huawei Research Europe (since October 2018). Marco has been active in standardization for a long time, leading standards specifications in different domains (NGN, IoT/M2M, Big Data, IMT2020) and holding leadership positions. In the current 2017–2020 ITU-T study period, he has served as Rapporteur for Q2/20 ("Requirements, capabilities and architectural frameworks across verticals enhanced by emerging digital technologies") and Co-Rapporteur for Q20/13 ("Networks beyond IMT-2020 and Machine Learning: Requirements and Architecture"), and has been Champion of the Use Case Analysis and Requirements deliverable within the Focus Group on Data Processing and Management to support IoT and Smart Cities and Communities. He has also served as Editor of the Use Cases and Requirements deliverable within the ITU-T Focus Group on Technologies for Network 2030. Mr Carugi is one of the expert team members of the IEC-ISO-ITU Joint Smart Cities Task Force and serves as leader of the WG Standardization High Level Architecture Subgroup in the Alliance for IoT Innovation (AIOTI).

In 2018, he acted as Rapporteur for the European Commission in the joint MSP/DEI WG on Standardization in support of Digitizing European Industry and Editor of the Final Report of the WG (Dec 2018). He holds an Electronic Engineering degree in Telecommunications from University of Pisa (Pisa, Italy), an M.S. in Engineering and Management of Telecommunication Networks from the National Institute of Telecommunications (Evry, France) and a Master's degree in International Business Development from ESSEC Business School (Paris, France).

Yuguang Chang | Senior Director, FiberHome Telecommunication Technologies Co., Ltd, China Information Communication Technologies Group (CICT) and Editor, ITU-T Study Group 20, ITU
Dr Yuguang Chang is a Senior Director at FiberHome Telecommunication Technologies Co., Ltd, China Information Communication Technologies Group (CICT). He has worked for CICT for more than 10 years. He is editor of several Recommendations and ongoing work items in ITU-T. He is concentrating on domains including Smart Cites, Internet of Things, fibre access network. Currently he is working actively for standardization in ITU-T, IEEE, BBF, ETSI, CCSA, among other things.

Biographies

Lisa D'Ambrosi| Research Scientist, MIT AgeLab, Massachusetts Institute of Technology

Dr Lisa D'Ambrosio is currently working on research with Dr Joe Coughlin on the social aspects of ageing. The questions focus what an ageing population will need to enhance and improve the quality of life, and to enable elders to live independently for longer. The focus is not on which products and services will be technologically feasible over the coming decades, but rather on what will be socially and personally acceptable to this population, with its changing demands for transportation, need for re-design of physical spaces (including the home and workplace), and power in the consumer and employment markets. Dr Coughlin and Dr D'Ambrosio are in the process of designing a Delphi study to explore some of these questions.

Katrina Destrée | Director of Privacy, KUMA LLC

Katrina Destrée is Director of Privacy at KUMA LLC, a global privacy and security consulting company to public and private sector organizations. She is a Certified Information Privacy Professional/Europe (CIPP/E), with sector expertise in telecoms and financial services in the US and in Europe. She advises a major financial institution in Silicon Valley on operationalizing privacy through Privacy Impact Assessments of new services, systems and vendors. She also champions Privacy by Design through internal and external stakeholder engagement. Katrina is a member of the NIST GCTC Cybersecurity and Privacy Advisory Committee, a key partner for GCTC's annual Smart Secure Cities and Community Challenge. Previously, Katrina lived in Belgium for 18 years where she held management positions in regulatory affairs and sustainability, including as Director of Sustainability and Stakeholder Engagement at Nokia and board member of the Global Enabling Sustainability Initiative, responsible for sector-level sustainability communications with UN agencies, multilateral organizations, EU Institutions and media outlets. She holds a Master of Arts degree from the Fletcher School of Law and Diplomacy at Tufts University in Boston and a Bachelor of Arts degree from the California Polytechnic State University in San Luis Obispo. Katrina is based in California.

Soumaya Ben Dhaou | Research Coordinator, United Nations University (UNU)

Soumaya Ben Dhaou is currently Research Coordinator at UNU-EGOV, the United Nations University Operating Unit on Policy-driven Electronic Government, a think-tank devoted to multidisciplinary research on how digital transformation may contribute to empowered democratic citizenship, trustworthy public infrastructures, more inclusive societies and, in broad terms, to sustainable development. She is also International Consultant for UNDP in Uzbekistan and Invited Professor of e-governance and ICT for Government and Public service at the University of Minho in Portugal. She coordinates the research project on "Digital transformation strategy", as well as the research line on the "Emerging technologies for digital transformation in the public sector." Her research includes potential benefits and challenges of new technologies such as blockchain, Internet of Things, Artificial Intelligence, data analytics, and their impact on transforming urban centres and settlements into Smart Cities and Communities, and more broadly government and public service. She also led the "Blockchain4Cities" research project in "United for Smart Sustainable Cities" (U4SSC) joint Global initiative managed by ITU and UNECE. The scope of her research projects encompasses countries, regions, urban and rural areas, as well as municipalities, interorganizational and single organizations.

Biographies

Wenying Du| Associate Researcher, Wuhan University and Editor, ITU-T Study Group 20, ITU

She got her PhD majoring in photogrammetry and remote sensing from Wuhan University, Wuhan, China, in 2017, and is now the associate researcher of the State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing (LIESMARS), Wuhan University. She is also a Master's degree supervisor. Her research interests include sensor web and integrated sensing for smart sustainable cities, especially for full life cycle flood monitoring. She hosted five projects, including the sub-project of the National Key Research and Development Program. She has published twenty-four academic papers, has had four invention patents authorized, has registered three software copyrights, and has participated in writing two academic monographs titled “Models and Methods for Information Service of Geospatial Sensor Web” and “Integrated Management for Smart Sustainable Cities”. She participated in the release of the ITU-T technical report “Integrated management for smart sustainable cities” in the Focus Group on Smart Sustainable Cities. Currently, she is acting as the contact between ITU-T and Wuhan University, and serves as the editor of multiple ITU-T work items.

Ramy Ahmed Fathy | Director, Digital Services Planning and Risk Assessment, National Telecom Regulatory Authority, Egypt

Ramy Ahmed Fathy is the Director of Digital Services Planning and Risk Assessment at the Egyptian National Telecom Regulatory Authority (NTRA). As the Director of Digital Services, he seeks the development and implementation of sustainable and effective digital services in the Egyptian market. His role at NTRA includes the development of guidelines, regulatory frameworks, viable business models, and effective specifications and technical operating parameters, which ensure the efficient and effective operation of services. He is leading the design and specifications development of intelligent and digital services; addressing interoperability, risk, regulatory impact assessment and services’ market adoption while employing a wide set of tools related to radio network planning, transport design, market modeling and optimization. Fathy has been actively involved at the different stages of development of various intelligent ICT systems and services, in addition to numerous ICT-for-development and digital transformation initiatives, including national broadband networks, smart cities, m2m and IoT enabling regulatory frameworks, smart utilities, eGov, water management, and next generation access planning. His 15 years of experience include project design, budgeting and planning of smart cities, enterprise automation, DTV transformation, and Intelligent Transportation Systems (ITS). Over the past 10 years, Fathy has served in key roles in the international standardization arena. In 2012, he served as Vice-Chairman of the ITU-T Focus Group of Bridging the Gap between Innovations and Standardization (Focus Group Innovation). One year later, he was elected Chairman of the ITU-T Focus Group on Smart Water Management for a period of two years. Since 2015, he has been serving as Vice-Chairman of ITU-T Study Group 20 (SG20) on IoT and its applications including Smart Cities and Communities, and is leading activities related to the standardization of end-to-end architectures for IoT and smart cities, intelligence, mechanisms for the interoperability of IoT applications, security, and identification aspects of IoT systems. Fathy has a PhD in Electronics and Communications. He has led R&D projects in radio network planning and optimization, cognitive radio systems, video coding, cryptography, DSP/FPGA/GPP-based implementations of consumer electronics products and satellite communication systems. He has numerous publications in esteemed journals and conferences, and he is the author of a book on electronics.

Biographies

Nathalie Feingold | Director and Strategic Advisor, NPBA

Nathalie has been working for 20 years on data, risk and finance issues. She is currently Executive Manager of NPBA, a Swiss firm dedicated to data and corporate strategy that she founded in 2016. Nathalie is also Non-Executive Director for a fund management company and Director of an asset management company. She is a member of Cercle Suisse des Administratrices, business angel, business teacher and jury member for several entrepreneurship awards. She was a member of ITU-T Focus Groups "Data Processing and Management to support IoT and Smart Cities & Communities" and "Digital Financial Services". Prior to 2016, Nathalie worked for French banks where she gained extensive hands-on experience in analysing and monitoring Big Data in highly complex and international environments. At Société Générale headquarters, she held several senior positions, working on global retail banking profitability and credit risk monitoring. And at Caisse des Dépôts (CDC), she published her research on emerging market bond spreads and systemic risk, before becoming an Asset-Liability Manager. Nathalie holds a DEA in International Economics and Development from the University of Paris I Panthéon-Sorbonne and a Master's of Economics Applied to Finance from the University of Paris IX Dauphine.

Pere Fuset i Tortosa | Counsellor for Digital Agenda and Electronic Administration of Valencia

Pere Fuset is the Counsellor for Digital Agenda and Electronic Administration in Valencia. He has extensive experience in the field of digital communication and social media management. He also worked as a technician and project manager of different civic entities. Pere Fuset was the General Secretary of the BLOC JOVE (2005–2008) and Vice-President of the Consell de la Joventut of the Valencian Community (2012–2014). In the period of 2015–2019, he was also elected as Councillor and Spokesman of the Municipal Group of Commitments for Valencia. Pere has been involved extensively in promoting and coordinating festivals and popular culture in Valencia. From 2011 to 2013, he was the first representative of the formation to the Governing Board of the Fallera Central Board. He studied sociology at the University of Valencia.

Okan Geray | Q7/20 Rapporteur, ITU-T Study Group 20, ITU

Dr Okan Geray has more than 20 years' experience in management consulting in various industries. He has consulted for several organizations in the Netherlands, France, Italy, South Africa, Turkey and Dubai. He has worked in A.T. Kearney global management consulting firm for six years and was a member of the Global Telecommunications and E-business core team before he joined the Dubai Government in 2002. He has worked in Dubai eGovernment, Dubai Smart Government, Smart Dubai Office and more recently in Dubai Digital Authority after its establishment. His responsibilities include Strategic Planning, Strategic Performance and Impact Management, and Policy Making. He has co-chaired the Enhancing Innovation and Participation Working Group in United for Smart Sustainable Cities (U4SSC) joint global initiative by ITU and UNECE by addressing Smart Governance, Smart Economy and Smart People aspects in smart cities. He has been designated as the Leader for "Guidelines on strategies for circular cities" and also "City Science Application Framework" deliverables during the second phase of the U4SSC initiative. He is also a Co-Rapporteur for ITU Study Group 20 Question 7 regarding "Evaluation and Assessment of Smart Sustainable Cities and Communities". He holds double major B. S. degrees in Industrial and Computer Engineering, an M.S. degree in Electrical Engineering and a PhD in Systems and Control Engineering from the University of Massachusetts in USA.

Biographies

Ing. Gustavo Giannattasio MBA, PMP| IEEE TEMS Board of Governors, IEEE Smart Cities Education committee Vice President

Gustavo Giannattasio is the Vice-Chair of IEEE Smart Cities Education Committee and consultant of Industry 4.0 formed by National Institute of Industrial Technology INTI Argentina. Gustavo is an active member of the IEEE Technology and Engineering Management Society, a member of the Board of Governors 2020–2021 and the Editorial Committee of the P2784 Smart Cities Planning and Technology Standard. He graduated in Telecommunications Engineering at UDLAR University Uruguay, MBA at Catholic University Uruguay, PMP Certified. He has also participated as an invited expert in the United for Smart Sustainable Cities initiative (U4SSC) and as a Chair in the IEEE Communications Society and Technology Management Society Chapter Uruguay.

Bernard Gindroz | Chairman, ISO/TC 268: Sustainable cities and communities, International Organization for Standardization (ISO)

Dr Bernard Gindroz is, since 2014, an independent consultant on Energy, Environment, Climate Change, Smart Cities and Communities and Transport, with a special focus on innovation, policies and standardization. Dr Gindroz is very active in standardization, as Chairman of several bodies, including ISO TC 268 (Sustainable Development of Communities) and CEN/CENELEC/ETSI Sector Forum on Smart and Sustainable Cities and Communities. Dr Gindroz is an EU expert in Adaptation to Climate Change, as well as circular economy. He is a project evaluator of several EU research and innovation programmes and an initiative leader in the EIP SCC (European Innovative Partnership on Smart Cities and Communities). Dr Gindroz has been involved in innovation, policy and competitiveness issues for more than 30 years. He has worked for the French Environment and Energy Management Agency (ADEME) as Regional Director, Head of Industry and Innovative Technologies Department, Deputy Director Sustainable Cities and Territories and Director Energy, Air and Noise. Dr Gindroz has a Master's degree in Mechanical Engineering. He obtained a second Master's degree in Applied/Industrial Mathematics and a PhD in the field of energy. Dr Gindroz has been teaching and leading research programmess as Professor in several technology Institutes, engineering schools and at the French Naval Academy.

Gregory Giuliani | Head of the Digital Earth Unit and Swiss Data Cube Project Leader, GRID-Geneva of the United Nations Environment Programme (UNEP) and a Senior Lecturer,University of Geneva's Institute for Environmental Sciences

Gregory Giuliani is the Head of the Digital Earth Unit and Swiss Data Cube Project Leader at GRID-Geneva of the United Nations Environment Programme (UNEP) and a Senior Lecturer at the University of Geneva's Institute for Environmental Sciences. He holds a BSc in Earth Sciences and an MSc and PhD in Environmental Sciences. Gregory's research focuses on Land Change Science and how Earth observations can be used to monitor and assess environmental changes and support sustainable development. Interdisciplinary is a key element for generating new ideas and innovations in his research.

Biographies

Amin Hasbini| Head of Research Center, Middle East, Turkey and Africa (META)

Dr Amin joined Kaspersky in 2013, and is now Head of Research Center' in the Global Research and Analysis team (GReAT), Middle East Turkey and Africa (META). He is responsible for Kaspersky's threat hunting and tracking, research expansion and expert positioning in META. Amin has a PhD in smart cities information security from Brunel University in London. He is specialized in wide-scale cyberdefence and anti-APT tools and techniques. Amin has worked on numerous large-scale sophisticated defensive infrastructure/industrial/consulting projects for senior national, governmental, financial, telco, and oil and gas entities. He is also a cybersecurity forensics, malware analysis and threat intelligence/hunting trainer. He has a number of publications on advanced malware operations and smart cities security, presented at numerous international conferences worldwide.

Takashi Harada| Marketing Engineer, IoT Platform Division, Oki Electric Industry Co., Ltd.

Takashi is a Marketing Engineer in the ICT/IoT market specializing in wireless solutions such as WiMAX and Sub-GHz LPWA. In recent years, he has worked on the challenge of assessing the health of ageing civil engineering infrastructures by using wireless sensors. Through a number of demonstration experiments conducted in Japan, he realized the problems facing the civil engineering infrastructure health monitoring and the necessity for standardization. In ITU-T SG20, he leads and contributes draft Recommendation Y.IoT-CEIHMon-Reqts "Requirements of IoT-based civil engineering infrastructure health monitoring system" as an editor.

Sarah Hayes | Climate Resilience Demonstrator Project Lead, National Digital Twin Programme, Centre for Digital Built Britain

Sarah is an economist with over 20 years' experience of working across infrastructure sectors in Europe, Africa and the Caribbean. She was the lead author on the National Infrastructure Commission report Data for the Public Good, which recommended the development of a National Digital Twin. She has worked with PricewaterhouseCoopers based in London and Tanzania, with Orange France Telecom and as telecoms regulator in the British Virgin Islands. Whilst based in Tanzania, Sarah worked with telecoms companies, governments and regulators across Africa. She now works as an independent consultant in the UK, specialized in data, digital twins and infrastructure regulation. She is currently working with the Centre for Digital Built Britain's National Digital Twin programme as the project lead for the Climate Resilience Demonstrator project – CReDo.

Shane He| Q3/20 Rapporteur, ITU-T Study Group 20, ITU

Dr Shane He is a standardization professional specialist at Nokia (Strategy & Technology). She is concentrating on IoT standardization and vertical industries, especially network capabilities and new services to enable vertical domains, e.g., Industrial IoT, Smart Cities, Automotive, Energy, Multimedia and Entertainment. Currently, she participates in several M2M/IoT industry standards bodies, including ITU-T, oneM2M and ETSI. She is actively involved in ITU-T SG20 as the Rapporteur of Q3/20, leading the study on IoT Architectures and protocols in ITU-T. She is also serving in the role of Chair of the Requirements & Domain Models (RDM) Working Group of oneM2M.

Biographies

Alejandro Herrera | National Director of Telecommunications, ASEP, Panama

Alejandro Herrera is the National Director of Telecommunications in the National Authority of Public Services of the Republic of Panama, whose objective is to regulate, order, supervise and oversee the operation and administration of telecommunications, radio and television services, as well as the radio spectrum. It is manifested through the resolutions issued in accordance with the legal provisions that regulate the area. The National Telecommunications Directorate is in charge of the Sub-Directorate of Radio, Television and Radioelectric Spectrum Administration made up of: Spectrum Management; Planning and Engineering; Radio and Television. The Network Sub-Directorate is made up of the following departments: Regulatory Strategies; Number Portability; Inspection and Control; Engineering and External Plant; the Economic and Financial Analysis Unit; and the Dealer Service Unit. Mr Herrera graduated from the Universidad Latina de Panamá as a Telecommunications Engineer and with a Master's degree in Senior Management and a Master's degree in Telecommunications Engineering with an emphasis on Networks and Services. He has worked in Telecommunications companies such as Cable & Wireless Panamá, and Digicel (Panamá), and has more than 10 years of experience in the technical and regulatory areas of telecommunications.

Kenneth Holmlund | Head of Space Systems and Utilization, WMO

Dr Kenneth Holmlund started his tenure as the Head of the Space Systems and Utlization Division at WMO (World Meteorological Organization) in October 2020. His key duty is to lead all WMO Space Programme activities, from definition of user requirements for space-based observations to provision of a vision for the space-based observing system. The duties also include outreach and capacity building, in particular coordination of international training events for the utilization of satellite data. Furthermore, the duties cover all aspects of the WMO Space Weather activities and coordination of WMO frequency management issues. Dr Holmlund started his career at the Finnish Meteorological Institute before joining the European Space Operations Centre in 1989 and subsequently the European Organization for the Exploitation of Satellite Data (EUMETSAT) in 1995. At EUMETSAT Dr Holmlund moved into a leading role in 2002 taking charge of operational satellite data algorithm and processing development activities and subsequently the definition of user requirements and the product generation specification for all instruments on the EUMETSAT satellites as well as the scientific commissioning of new satellites. In 2015 Dr Holmlund was appointed Chief Scientist, supporting the EUMETSAT Management Board on scientific matters with strategic implications, particularly in preparation for new missions like carbon monitoring, atmospheric wind lidar and constellations of small microwave satellites. Dr Holmlund has served as a member on several international committees. Dr Holmlund is married and has three sons and a grandson.

Biographies

Bilel Jamoussi | Chief of Study Groups, TSB, ITU

Tunisian born, Dr Bilel Jamoussi is Chief of the Study Groups Department of the ITU Standardization Bureau in Geneva, Switzerland. Since 2010, he has been leading the bureau's standards making activities into a new era characterized by rapid convergence and the need for increased collaboration with vertical sectors and partnership between developed and developing countries. Prior to 2010, Jamoussi worked for a Telecommunication equipment and solutions provider for 15 years in Canada and then in the United States where he held several leadership positions and was granted 22 US patents in diverse areas including packet, optical, wireless and quality of service. He holds a BSc, MSc and PhD degrees in Computer Engineering from the Pennsylvania State University, USA. He is fluent in Arabic, French, and English and speaks some Spanish and German.

Jaemin Jang | Senior Researcher, Telecommunications Technology Association (TTA)

Jaemin Jang received his BS and MS degrees in electronics and information engineering from Korea Aerospace University, Korea. He is currently a senior researcher at Telecommunications Technology Association. His research interests include wireless sensor networks, automotive and testing technologies. He developed domestic standards ITSK-00107-1~3 for testing system of automotive emergency detection device (AEDD).

Xueqin Jia | Associated Rapporteur, ITU-T Q.2/20 I Senior Engineer, China Unicom

Xueqin Jia got her PhD from the Northeastern University of China in 2007, and two years later, after finishing her postdoctoral research, she joined the China Unicom research institute. Her research areas includeIoT technologies and their applications, especially edge computing, blockchain, and deterministic communication technologies. Since 2015, she has been taking on the responsibility of the Associated Rapporteur of Q.2/20 and participates actively in SG20 activities.

Daewon Kim | Director of VC Dept., Thinkware

Daewon Kim is the Director of Vehicle Component Department at Thinkware. He seeks the development of vehicle components such as Head Unit, e-Call, Dash Cam, and ADAS for the automotive business area. His 26 years of experience include planning and developing of ITU-T e-Call, ADAS, connected dash cam, Head Unit, mobile browser, mobile TV, 3gpp transcoder, 3gpp live encoder, and being an HTML WYSIWYG editor.

Biographies

Hyoung Jun Kim | WP1/20 Co-Chairman, ITU-T Study Group 20, ITU | Senior Vice-President, Intelligent Convergence Research Lab, ETRI

Dr Hyoung Jun Kim joined ETRI (Electronics and Telecommunications Research Institute) in 1988, and he is currently in charge of the Intelligent Convergence Research Lab in ETRI as Senior Vice-President. He has around 33 years of research experience in various divisions of ETRI, including the Info-Communications Technology Division, IT Strategy Research Division, Information & Telecommunications Technology Division, and Protocol Engineering Centre. He is currently serving as Vice-Chairman of ITU-T SG20 and Co-Chair of WP1/20 and the Co-Convenor of JCA-IoT/SC&C under SG20. He also served as Vice-Chairman of SG13 and Chairman of WP3/13. In addition, he served as Rapporteur of Q25/16 since 2004, as well as serving as Vice-Chairman of FG on M2M Service Layers and Chairman of WP2 of the FG in ITU-T SG11 and Vice-Chairman of FG on Future Networks in ITU-T SG13. In addition to this, he is now serving as Chair of ASTAP (Apt STAndardization Program) in APT. Regarding his research and academic achievements, he has contributed more than 450 proposals for standards and published more than 150 papers in academic journals and conferences, as well as being granted more than 100 patents and 20 official technologies transfers to the domestic companies. He was awarded the National President's citation in 2003 and 2009, as well as many Certificates of Appreciation from international standard-related organizations, including ITU-T. In particular, he won his second National President's Award at the "World Standards Day 2009 in Korea" honouring his efforts on international standardization.

Barbara Kolm | Director, Austrian Economics Center & Vice-President, Austrian National Bank

Dr Barbara Kolm is Vice-President of the Austrian Central Bank, Director of the Austrian Economics Center (#1 Independent Think-Tank in Austria and #21 in the world), Professor of Austrian Economics at the University of Donja Gorica, Montenegro. Dr Kolm serves on several supervisory boards, including the Vienna Insurance Group and the Supervisory Board of Wiener Städtische Versicherungsverein; Wirtschaftsuniversität Wien. She was appointed Vice-Chairman of the UN ITU Focus Group on Environmental Efficiency for Artificial Intelligence and other Emerging Technologies (AI4EE) and Chairman of the Thematic Group on the United for Smart Sustainable City Index. She has given numerous talks on the most pressing economic issues of our time such as the geopolitical challenges posed by a rising China and the need for serious economic reforms to the bloated welfare states in Europe. She has successfully managed private enterprises and non-profit organizations, and has been engaged in other entrepreneurial activities, for instance building the Austrian Economics Center from scratch to being the leading think-tank in Austria within 12 years. Additionally, she is the founder and organizer of the Free Market Road Show, a forum for discussions and the exchange of ideas, in cooperation with more than 100 leading think-tanks and universities.

Matej Kovačič | Expert, International Research Centre on Artificial Intelligence, Jožef Stefan Institute , Republic of Slovenia

Matej Kovačič, PhD, works at International Research Centre on Artificial Intelligence which is a part of Jožef Stefan Institute in Ljubljana, Republic of Slovenia. He is also a Senior Lecturer of Information Security at the University of Nova Gorica. He is an expert in data analysis and open data, and is also working in the field of cybersecurity and has practical experience in digital forensics and investigation of cybercrime. In the past, he was cooperating with the Geneva Centre For the Democratic Control of Armed Forces with a series of lectures about communication interception for judges, members of parliament and members of intelligence services, and was involved in developing a platform for secure and encrypted exchange of information regarding fight against terrorism within PCC-SEE (Police Cooperation Convention for Southeast Europe). He is the author of three monographs and several other original scientific, professional and other articles and presentations.

Biographies

Sushil Kumar | Deputy Director General (IoT), Telecommunication Engineering Center, Department of Telecommunications, Ministry of Communication, Government of India

Mr Sushil Kumar is an officer of the 1987 batch of Indian Telecommunication services (ITS) and joined the Department of Telecommunications, Ministry of Communications, Government of India in 1989. He completed his Bachelor's degree in Electronics & Communications Engineering in 1987 and his Master's degree in Computer Science & Technology in 1989 from the University of Roorkee (presently known as the Indian Institute of Technology Roorkee). He is currently working as Deputy Director General in the Telecommunication Engineering Centre (TEC) and has been heading the Internet of Things (IoT) Division from 2013. TEC is the national standardization body (NSB) for the telecom and related ICT sector in India. Prior to this, he served in the field units of DoT (from 1989 until September 2000) and BSNL (Bharat Sanchar Nigam Limited) (from Oct 2000 to 2011), as a head of business units and districts for around 22 years and was responsible for the planning, execution, and operation and maintenance of telecom networks with fixed line, cellular and OFC networks. In his current role, he created a framework for finalizing specifications in the M2M/IoT domain with multistakeholder participation, and he has released 14 Technical Reports in the last four or five years, with the outcome intended to be used in policy/standards. He chairs national committees in TEC [National Working Group – 20] to coordinate with ITU-T Study Group-20 on IoT and Smart Cities & Communities; and in the Bureau of Indian Standards (BIS) to coordinate with ISO/IEC JTC1 SC41 on IoT and Digital Twin. He participated as Head of the Indian Delegations in the meetings of these international organizations. ITU-T Recommendation Y Suppl. 53 (12/2018) on IoT Use Cases; and Y Suppl. 56 (12/ 2019) on Smart City Use Cases have had some significant contributions submitted from India under his leadership. He also chairs the TEC Consultative Committee for the adoption of oneM2M specifications transposed by TSDSI, resulting in the adoption of oneM2M Release 2 as national standards. He has participated in around 125 national/international conferences, faculty development programmes and training programmes on IoT, 5G, Smart Cities, Digital Transformations and related topics, as a speaker, moderator and Chair.

Junseob Lee | Director, Intelligent Convergence Research Laboratory, Electronics and Telecommunications Research Institute (ETRI), Q1/20 Rapporteur, ITU-T Study Group 20, ITU

Junseob Lee joined the ETRI in 1999, and is currently the Director of the Intelligent Convergence Research Laboratory. He is also a Rapporteur of Question 1 of ITU-T Study Group 20, which is covering interoperability and interworking of IoT and SC&C applications and services. In addition, he is an editor of the IoT and SC&C Standards Roadmap maintained by JCA-IoT and SC&C. He has participated in ITU-T works as an editor for many ITU-T Recommendations, including Y.2060, which is the first ITU-T Recommendation for Internet of Things.

Junwook Lee | Research fellow, AIBLab Inc

Dr Junwook Lee is currently a Research Fellow at AIBLab and an IoT and AI expert. As a senior researcher in ETRI until 2013, he conducted research in fields such as telematics and IoT. After that, he moved to a software company called Handysoft Co., Ltd. After moving to AIBLab in 2019, he is currently conducting AI-based research projects.

Biographies

Gyu Myoung Lee | Professor, Liverpool John Moores University (LJMU), Adjunct Professor, KAIST Institute for IT convergence

Dr Gyu Myoung Lee is working with the Liverpool John Moores University (LJMU), UK, as a Professor and with KAIST Institute for IT convergence, Korea, as an Adjunct Professor. Prior to joining the LJMU, he has worked with the Institut Mines-Telecom, Telecom SudParis, France, from 2008. Until 2012, he had been invited to work with the Electronics and Telecommunications Research Institute (ETRI), Korea. He also worked as a research professor in KAIST, Korea and as a guest researcher in the National Institute of Standards and Technology (NIST), USA, in 2007. His research interests include Internet of Things, data analytics, computational trust, knowledge-centric networking and services, multimedia services, and energy-saving technologies, including smart grids. He has been working actively for standardization in ITU-T, IETF and oneM2M, and elsewhere, and currently serves as a WP Chair in SG13, a Vice-Chair of the Focus Group on Autonomous Networks (FG-AN), as a Rapporteur of Q16/13 and Q4/20, as well as an Editor in ITU-T. He has also been the Chairman of the ITU-T Focus Group on data processing and management (FG-DPM) to support IoT and Smart Cities & Communities. He was awarded the Vice-Chancellor's Award for excellence in research in 2017 and was also awarded the Best Paper Awards in ICIN'2017, WF-IoT'2014. He is a Senior Member of IEEE. He received his BS degree from Hong Ik University, Seoul, Korea, in 1999, and his MS and PhD degrees from the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, in 2000 and 2007.

Robert Lewis-Lettington| Chief of the Urban Legislation Unit, UN-Habitat

Robert Lewis-Lettington is Chief of the Urban Legislation Unit at UN-Habitat. Robert has twenty years' professional experience, primarily working in multilateral processes and providing technical assistance in policy formulation and legislative processes to a variety of partners. With field experience in more than fifty countries, Robert's specialist areas include legislative drafting, urban development, intellectual property rights and information management, digital governance, environment and natural resources, international trade and human rights. Robert is Secretary to the Drafting Committee of the UN-Habitat Assembly and Vice-Chairman of the International Telecommunication Union's Focus Group on "Data Processing and Management to support the Internet of Things and Smart Cities & Communities." Robert is also a Salzburg Global Fellow in Law and Technology, a member of the International Law Association (and its study group on the Role of Cities in International Law) and a member of the Human Rights Lawyers Association (UK). Robert holds a Juris Doctor degree in Law from the College of William and Mary (USA), an MA (Hons) degree specializing in Architectural History from the University of St. Andrews (Scotland) and an MLitt (Dist) degree in History from the University of the Highlands and Islands (Scotland).

Biographies

Yizheng Li | Project manager, China Mobile

Yizheng Li studied nano-optics and photobiology and has an MSc in Electrical Engineering from the University at Buffalo. He joined China Mobile in 2020, and is the project manager of the IoT Technology and Application Research Department. In his current role, Yizheng focus on the Digital Twin applications and industrial Internet, as well as related sensing technologies such as integrated sensing and communication, and passive IoT.

Yun Li | Director, Technical and Industry Standard Department, Tencent, China

Yun Li is the Director of Technical and Industry Standard Department at Tencent, China. She is also an editor of several ITU-T Recommendations, including ITU-T Y.4904 Smart sustainable cities maturity model. Yun Li has more than 10 years' experience in Information & Communications Technology standardization activities, and is currently working on standardization for smart sustainable cities and digital twin for cites. She has been working actively for standardization in ITU-T, ISO/IEC JTC1, IEC, SAC and CCSA. She is also the project lead of several ISO/IEC international standards and editor of more than 10 Chinese national standards. She holds BSc and PhD degrees in e-Commerce with Law and in Electronic Engineering from Queen Mary University of London, UK, respectively.

Tania Marcos | Vice-chairman, ITU-T Study Group 20, ITU

Tania is Head of the Smart Cities Unit at the Spanish Association for Standardization (UNE), where she serves as Manager of the Standards Committee CTN 178 "Smart cities" and acts as the national focal point for the development of Standards for local governments, which assists their transformation into smart cities/smart tourism destinations. She represented the Spanish Government at the 1st IEC-ISO-ITU World Smart City Forum held in Singapore. She is the Representative of the CEN-CENELEC-ETSI Sector Forum on Smart and Sustainable Cities and Communities, towards the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) of the European Commission. She is also Vice-Chairman of ITU-T Study Group 20 on Internet of things (IoT) and Smart Cities and Communities (SC&C), on behalf of the Spanish Secretary of State for Telecommunications and Digital Infrastructure (formerly Information Society and Digital Agenda), within the Ministry of Economic Affairs and Digital Transformation. Regarding the UN initiative United for Smart Sustainable Cities (U4SSC) to achieve Sustainable Development Goal 11, Tania participates at the Thematic Group on City Platforms, co-leading WG3 for transitioning to a new architecture framework for future city platforms. A Senior Standardization Programme Manager, Tania has acted as secretary, expert or convener to different CEN/CENELEC/ETSI & ISO/IEC structures, dealing with Quality & Sustainability for public and private sectors: performance indicators, evaluation & conformity assessment, energy & environment, transportation, ICT public procurement, health care, accessibility, management systems, eco-design, and more.

Biographies

Juan Pablo Martín | Chairman, ITU-T SG20 Regional Group for Latin America (SG20RG-LATAM), ITU

Juan Pablo Martín is an electronic engineer from the University of Buenos Aires, and is currently pursuing a PhD in Signal and Image Processing. He is also the Director of the "Communications Research Group" and a professor at the "Facultad Regional San Nicolás" of Universidad Tecnológica Nacional from Argentina. Juan Pablo teaches in Communication Systems II and is a former member of the Aviation Cloud Focus Group of ITU-T. He remains an active member of Working Party 5B of ITU-R, fills the role of President of the Regional Group for Latin America of ITU-T Study Group 20 "Internet of Things, Smart Cities and Communities", and Associate Rapporteur for Questions 2/20 for the latter Study Group. In addition to being the author of many scientific papers on telecommunication topics, he has more than 20 years of experience working in the telecommunications field, specializing in project management, radio-frequency systems, data networks and satellite systems. Currently, he is working in the field of digital agriculture.

Sergio Martínez | Executive Director of the Communications Regulatory Commission (CRC)

An Economist from the Universidad de Los Andes (1999) with a Master's degree in Interdisciplinary Studies on Development from the same University (2015), Commissioner Martínez graduated with a Master's Degree in Economics and Regulation of Public Services from the Universitat de Barcelona (Spain), through a scholarship from the Carolina Foundation (2007). In addition, he has two specializations at the Universidad de Los Andes, in Social Evaluation of Projects (2005) and Risk and Information Economics (2006). Commissioner Martínez has 18 years' experience in designing and implementing public and regulatory policies in public network services, starting his work experience in the Telecommunications Regulation Commission. Later, he was an official of the National Planning Department. He also worked in different companies in the private sector. In January 2016, he was appointed High District Counsellor for ICT of the Mayor's Office of Bogotá, responsible for designing and implementing digital public policy for the city. In October 2019, Martínez was ranked first in the public merit contest developed by the Administrative Department of the Public Function for the selection of Commissioner with the profile of economist to form the Communications Commission Session (CRC). On 12 November 2019, he was appointed, by the President of Colombia, Iván Duque Márquez, as Commissioner of the Communications Commission Session.

Cristina Martinez | Head Smart Mobility and Living, European Commission

Cristina Martinez studied Science Philosophy, Communication (Major) and has an MSc in Telematics (Cum Laude) from the Université Libre de Bruxelles. She started her career in the United Nations Office headquarters, working for an IT track and trace software project for Africa, Asia and Latin America. She then joined the Andersen Consulting company in 1998, to work for the eCommerce group of the Technology Department as a Solutions Engineer. She became a member of the staff of the European Commission in 2002, firstly as Communication Officer, then as a senior administrator for research in the Enterprise Networking Unit of the Information Society Directorate-General, where she led the Enterprise Interoperability area. In 2013, Cristina became Head of Sector and then Deputy Head of Unit for various departments: the Knowledge-Managementunit, the eInfrastructure and Open Science Cloud unit and the Smart Mobility and Living unit. Since January this year, she has been responsible for the Smart Cities topic.

Biographies

Nasser Saleh Al Marzouqi | Chairman ITU-T Study Group 20: Internet of things (IoT) and smart cities and communities (SC&C)

Mr Nasser Al Marzouqi is the Chairman of ITU-T Study Group 20 "Internet of Things (IoT) and Smart Cities and Communities (SC&C)", which provides the specialized IoT standardization platform necessary for the convergence to rest on a cohesive set of international standards. The focus of the research conducted by ITU-T Study Group 20 will be on identifying and analyzing emerging applications and global solutions for IoT and Smart Cities, which will contribute to improving the interoperability of various IoT-based technologies, a key factor in ensuring end-user and market acceptance of IoT solutions. Nasser Al Marzouqi is currently working for the Telecommunication Regulatory Authority in the United Arab Emirates, in the International Affairs Division. He also functions as the UAE representative to the International Telecommunication Union (ITU) and has been closely involved in major ITU conferences and events. He received his Master's degree in Telecommunication Engineering from Latrobe University in Australia. The TRA in the UAE has been at the forefront of pioneering developments in the field of ICT and in providing an optimal enabling environment in which the UAE's ICT sector can flourish. Mr Al Marzouqi is a firm proponent of converting existing systems to high-efficiency systems, helping to bridge the digital divide and to increase global communication and the transition to smart sustainable cities.

Patricia Morsch| Technical Officer, Healthy Aging, PAHO

Patricia is a physical therapist and has more than 15 years of combined experience in clinical physical therapy and research on ageing, older adults' health and public health. She holds a graduate certificate in Public Health, a Master of Arts in Gerontology from the University of North Carolina at Charlotte (USA) and a PhD in Biomedical Gerontology from the Pontifical Catholic University of de Rio Grande do Sul (Brazil). She is a member of the Brazilian Society of Geriatrics and Gerontology and a specialist from the Brazilian Association of Physical therapy in Gerontology. Currently, she is serving as the Healthy Aging Advisor at the Department of Family, Health Promotion and Life Course at PAHO headquarters in Washington D.C., Regional WHO office for the Americas.

Gustavo Mostaço | PhD Researcher, Escola Politécnica of the University of São Paulo, Brazil

Gustavo Mostaço completed his Bachelor's degree in Agricultural Engineering at the University of Campinas, Brazil and his MS degree in Precision Livestock Farming and housing control of livestock facilities at the Luiz de Queiroz College of Agriculture, Brazil. He is now a PhD researcher at the Escola Politécnica of the University of São Paulo, Brazil, and takes an interest in Smart Farming, IoT and digital twins applied to agriculture, automated systems for agriculture and sustainable agriculture. He also has experience in standardization activities at ITU-T.

Sergio Mujica | Secretary-General, ISO

Sergio Mujica joined ISO as Secretary-General in July 2017, having spent seven years at the World Customs Organization (WCO) as Deputy Secretary-General. The WCO aims to enhance the effectiveness and efficiency of Customs administrations worldwide, and within this role Mr Mujica was responsible for the design and implementation of the WCO's strategic plan. This included simplification, harmonization and standardization of customs procedures, in addition to capacity-building initiatives aimed at the WCO members. This gave him significant experience in an international setting, building consensus within a large membership-based organization. Prior to working at the World Customs Organization, Mr Mujica spent 15 years working for the Government of Chile with the Ministry of Agriculture, the Ministry of Economic Affairs and as the Director General of Chile Customs. A Chilean national, he has a Law degree from the Pontificia Universidad Catolica de Chile and a Master's degree in International Law from the American University in Washington DC.

Biographies

Cathy Mulligan | Professor, Instituto Superior Técnico and Director, DCentral Lab

Cathy Mulligan is BIG ERA Chair (Professor) & Director of DCentral – the associated lab that investigates blockchain and associated digital technologies for social good and sustainability at Instituto Superior Técnico, University of Lisbon. Cathy is a cross-disciplinary researcher who has worked at the boundaries of economics, sustainable development and emerging technologies since 2006. She has led multiple research projects across the UK, EU, Australia, India and Malaysia. She is a member of the World Economic Forum's Data for Common Purpose Initiative, was a panel member of the United Nations Secretary General's High-level Panel on Digital Cooperation, and has consulted at senior levels for various governments and corporations across the world. She is a Visiting Lecturer at Imperial College, London, and Honorary Senior Research Associate in the Computer Science Department at UCL. Cathy has more than 25 years' experience in senior corporate and research roles and has written seven books on telecommunications technologies. She holds an MPhil in Engineering for Sustainable Development and a PhD from the University of Cambridge.

Michael Mulquin | Chair, Smart Cities Systems Committee, International Electrotechnical Commission (IEC)

Michael has spent 25 years partnering with cities, rural areas and industry on how technology can help neighbourhoods and cities work better. For the last eight years, he has been focusing on the development and implementation of smart and sustainable city standards and has had the opportunity to learn from many experts in different standards development organizations. He is the technical author of two British Standards Institution publications: PD8100 *Smart cities overview – Guide*; and PD8101 *Smart cities – Guide to the role of the planning and development process*. He is Chair of the IEC Smart Cities Systems Committee and is an active member of smart city standards work within ISO and JTC1. He was a member of the ITU-T Smart and Sustainable Cities Focus Group. He is Co-Chair of the IEC-ISO-ITU Joint Smart Cities Task Group. He is Principal Architect of the TM Forum's Smart City Maturity Model and is continuing to support the TM Forum's work related to smart cities. He received the TM Forum's Outstanding Contributor Award in 2017. He is a City Standards Associate with the Connected Places Catapult – the UK Government Innovation Agency for smart transport and smart cities and is a member of the UK Government External Advisory Group on Smart Cities and Connected Communities. More widely, he is MIMs Ambassador for Open and Agile Smart Cities, supporting the development and implementation of their Minimal Interoperability Mechanisms (MIMs). MIMs are simple, standards-based building blocks to enable even smaller cities to get started on using international best practice to become smart and deliver better results for their citizens.

Biographies

Vadim Nozdrin | Counsellor, ITU

Vadim Nozdrin received the Telecommunication engineer degree in 1988 and Ph.D. in spectrum management in 1999 from Moscow Technical University of Telecommunication and Informatization and Dr Habil. degree in telecommunication management from St.Petersburg State University of Economics in 2019. From 1988 to 2000 he has devoted his career to Radio Research & Development Institute (NIIR) in Moscow in positions with increasing responsibility, ultimately attaining the position of Deputy Director on International Spectrum Management Affairs. In 2000 he has joined Space Service Department of Radiocommunication Bureau in ITU, dealing with preparation to World Radiocommunication Conferences, technical and regulatory applications of Radio Regulations and expert support for international radiocommunication worldwide. Since 2010, he is Counsellor for ITU-R Study Group 7, responsible for space science and meteorological radiocommunication system. He has published more than 60 scientific articles on radiocommunication and spectrum management issues as well as co-authoring three monographs.

Juyoung Park| Principal Member of Engineering Staff, Electronics and Telecommunications Research Institute, Rep. of Korea

Dr Juyoung Park joined ETRI (Electronics and Telecommunications Research Institute) as a member of R&D group in 2001, immediately after he was awarded his PhD degree from the Chungnam National University in Korea. His research areas include IoT, multicast, QoS/QoE and WPT technologies and their killer applications. Currently he takes a great interest in Smart-agriculture for the sustainable future. He also has experience in the standardization activities in ITU-T, ISO, IEC, and JTC1. One of noticeable standardization works done he involved includes ITU-T Y.4466 “Framework of smart greenhouse service”.

Luísa Amélia Paseto | Intelligent Platform Coordinator Researcher, Maturity Model

Economist and Administrator specialized in Management Systems for Sustainable Development, with a PhD from UNICAMP. Research coordinator of the project maturity model for smart and sustainable cities for countries in the global south. Areas of expertise include Strategic Planning, Management and Marketing, Business Ethics and Public Policy Management Maturity Models for Smart Cities. Collaborator in the Brazilian Charter for Smart Cities and the Brazilian Chamber of Smart Cities. In the area of climate change, she is a collaborator in the Environment and Climate Change GIEs – AHK/Brazil and in the agricultural area as a collaborator at the Center for Agricultural Engineering and Administration at FEAGRI/UNICAMP and at the Portuguese Society for Rural Studies (SPer-PT).

Zhicheng Qu | Standardization Engineer, ZTE corporation

Dr Zhicheng Qu is a standardization engineer at ZTE (Technology Planning Department). He is concentrating on blockchain standardization, particularly in the network field, for example, IoT, Smart Cities, Future network, Multimedia and Entertainment. Currently, he participates in several study groups in ITU-T. He is actively involved in ITU-T SG20 and SG13 as an editor.

Biographies

Anthony Rea | Research Scientist, National Research Council (CNR), Italy

Dr. Anthony Rea is the Director of the Infrastructure Department at WMO. The Department covers global coordination of observations, data exchange and modelling across the domains of weather, climate, water, oceans and the cryosphere. Dr Rea has a PhD in satellite meteorology from RMIT University and a masters of Public Administration from the Australia and New Zealand School of Government. During his PhD studies he worked on operational satellite applications in the Australian Bureau of Meteorology including sea surface temperatures and atmospheric motion vectors. Subsequent to this, Dr Rea undertook a variety of roles in the Bureau of Meteorology, as national manager of the observations program, where he led a significant organizational change, and in the corporate area where he was responsible for government relations and communications. Immediately prior to

Theofanis Raptis | Research Scientist, National Research Council (CNR), Italy

Theofanis is with the National Research Council (CNR) of Italy. He is currently a Research Scientist at the Institute of Informatics and Telematics of CNR, at Pisa. In his current role, he is conducting research on industrial data distribution, wirelessly powered networks, and Internet of Things platforms. He is serving as Associate Editor for scientific journals such as IEEE Access and IET Networks, and has been involved in numerous EU and national research and innovation projects on Industry 4.0 and Smart Cities. He has been serving as expert evaluator of different national Italian funding programmes on industrial innovation topics. Theofanis received his PhD from the University of Patras in Greece, and has published more than 65 articles in scientific journals, conference proceedings and books.

Lizania Peréz Rodríquez | Executive Secretary, Regional Telecommunications Technical Commission (COMTELCA)

Lizania Pérez is a Telematics Engineer who graduated from the Pontificia Universidad Católica Madre y Maestra, Santiago de los Caballeros campus in the Dominican Republic. She is also a specialist in Management Information Systems, has a degree obtained at the Instituto Tecnológico de Santo Domingo, and a Specialty in Telecommunications Economics and Regulation at the Universidad Internacional Iberoamericana de Puerto Rico. She has completed two Master's degrees: the first in Telecommunications Management and Information Technology at the Escuela de Organización Industrial of Madrid; and the second in Cybersecurity, at the Instituto Tecnológico de Santo Domingo. Lizania has held various positions in the Dominican Institute of Telecommunications (INDOTEL), the regulatory body of the sector in the Dominican Republic, assuming roles as an IT professional in the Directorate of Information and Communication Technologies, Specialist Engineer in the Directorate of Telecommunications Regulation and Defense of Competition. Finally, she assumed the role of Engineer of the Department of Cybersecurity, Electronic Commerce and Digital Signature. She has worked as a Cybersecurity Coordinator in other private sector entities. Currently, she holds the position of Executive Secretary in the Regional Technical Commission for Telecommunications, a specialized organization of the Central American Integration System (SICA).

Biographies

Ziqin Sang | Technical Director, China Information Communication Technologies Group (CICT) and WP2/20 Co-Chairman and Vice-Chairman, ITU-T Study Group 20, ITU

Mr Ziqin SANG joined Wuhan Research Institute of Posts and Telecommunications (WRI) in 1998 after obtaining his PhD in pattern recognition and intelligent systems from Huazhong University of Science and Technology, China. He heads a division of innovative research on smart city in the State Key Laboratory of Optical Communication Technologies and Networks since 2010. He has been active in standardization bodies such as ITU-T SG17, SG13, SG5 and SG20, CCSA TC8 and TC10. He served as a member of the expert board of a Chinese 863 programme of smart city, and as a member of an advisory board of EU-China Collaboration on IoT and 5G Research (programme EXCITING). He was a Vice-Chairman of the ITU-T focus group on smart sustainable cities (FG-SSC) and a Vice-Chairman of a focus group on smart water management (FG-SWM). He is now a Vice-Chairman of ITU-T SG20 and a Vice-Chairman of CCSA TC10. He led and contributed to ITU-T Recommendations Y.4900, Y.4901, Y.4902, Y.4903, Y.4200 and Y.4201.

Enrico Scarrone | Chairman of the oneM2M Steering Committee, oneM2M

His participation and promotion of early studies on the integration of IP and mobile cellular networks in 3G.IP and in 3GPP has allowed him to stimulate the inclusion of all-IP solution and the IMS in 3GPP. He was involved in several projects in technology planning and selection, testing, budget forecasts, RFI, RFQ in the mobile and FMC areas, developing a strong link between real networks and standardization/research. This includes technical consulting on mobile, fixed and IMS technologies in more than 15 countries around the world, specifically in Asia, South America and Europe. He was extensively engaged in 3GPP (including SA and RAN3), and in particular in SA1, dealing with service and operational requirements mobile systems, where he served as Chairman from 2006 to 2011. He was also deeply involved in the foundation of ETSI TC M2M (where he served as Chairman from 2011 and 2012) and he was one of the key people stimulating the creation and perming of oneM2M; he was in charge of developing a global multiservice system for IoT communications and Internet of Things. Enrico Scarrrone is currently the Chairman of the Steering Committee of oneM2M (representing ETSI), and Chairman of ETSI TC smartM2M. He is the Standardization Manager in charge of the coordination for IoT/M2M standardization in the TIM group.

Taehyoung Shim | Senior Researcher, Electronics and Telecommunications Research Institute (ETRI)

Taehyoung Shim received his BS and PhD degrees in electrical and electronic engineering from Yonsei University, Seoul, Korea, in 2008 and 2016 respectively. Since 2016, he has worked for the Electronics and Telecommunications Research Institute (ETRI), where he is currently a senior researcher. He developed international standards, including ITU-T Y.4119 and ITU-T Y.4468, as well as several domestic standards, including ITSK-00106-4, ITSK-00106-6, TTAK.KO-10.0985, and TTAK.KO-10.1043 for automotive emergency response system (AERS). His research interests include automotive and electrical safety technologies.

Yuka Sumi | Acting Unit Head, Ageing and Health, WHO

Yuka Sumi is acting head of the Ageing and Health Unit at WHO. She is responsible for WHO's work on Integrated Care for Older People (ICOPE) approach. She was involved in the publication of the ICOPE guidelines in 2017, and led the development of the ICOPE package of tools such as ICOPE handbook and the digital app: guidance for person-centred assessment and pathways in primary care in 2019. She acts as a secretariat for WHO's Clinical Consortium on Healthy Ageing (CCHA), coordinating the ICOPE pilots and implementation and development of the Intrinsic Capacity Assessment tool. Yuka holds an MD, PhD and MPH.

Biographies

Gilles Thonet | Deputy to the General Secretary & CEO, IEC

Gilles Thonet joined the International Electrotechnical Commission (IEC) in 2015 and is currently the Director of the General Secretary's Office, Deputy to the General Secretary and Secretary of the IEC Standardization Management Board. In his current role, Gilles oversees the IEC technical boards, the IEC strategy, legal and compliance matters, as well as external relationships with partner organizations. A technology executive with international experience in high-tech industrial companies (including ABB, Eaton and Schneider Electric), Gilles has a PhD in Communication Technologies from the Swiss Federal Institute of Technology Lausanne (EPFL), a MSc in Electrical Engineering from Louvain School of Engineering and an MBA from Grenoble Graduate School of Business.

Pantelis Tzamalis | Research and Development Engineer, University of Patras and Computer Technology Institute (CTI), Greece

Dr Pantelis Tzamalis obtained his PhD from the Computer Engineering and Informatics Department at the University of Patras, Greece. During the past few years, he has taken on the roles of Senior Research Engineer, Product/Technical Manager, and Systems Architect in various projects at the Computer Technology Institute "Diophantus" and the University of Patras. His research interests include Artificial Intelligence, the Internet of Things, Crowdsensing platforms, Healthcare 4.0, and Social Media Mining in large-scale scenarios. He has also earned two contracts with Google under the Google Summer of Code 2019 and 2020 calls accordingly, regarding the development of Open-Source software. The first one is in collaboration with JBoss (Red Hat) and is related to an automated software reporting tool. The second one, with MetaBrainz, refers to the deployment of a new machine-learning infrastructure related to music information retrieval and music classification. Afterwards, he has undertaken the maintenance and improvement of these tools. Pantelis has also co-authored various publications in international refereed conferences (IEEE). Additionally, he has participated in European and nationally funded research projects (SAINT, Privacy Flag, Personal Allergy Tracer, IoT-Lab, and Integrated PV Surveillance, Management and Revitalization System).

Toru Yamada | Vice chairman of ITU-T Study Group 20, NEC Corporation

Dr Toru Yamada joined NEC Corporation in 1997 and engaged in research and development of video codecs and video quality metrics. From 2006 to 2009, he was involved in the standardization of video-quality metrics in the VQEG (Video Quality Experts Group) and ITU-T SG9. In the course of these activities, he contributed to the development of ITU-T Recommendation J.249. Since 2011, he has been involved in the standardization of IoT and Smart Cities in some organizations, including oneM2M, ITU-T IoT-GSI, and ITU-T SG20. In April 2019, during the Study Period 2017–2020, he was appointed Vice-Chairman of ITU-T SG20. Since 2017, he has also been leading standardization discussions on IoT and Smart Cities in the Asia-Pacific region as the Chair of EG IOT (Expert Group on Internet of Things Application/Services) in APT ASTAP (Asia-Pacific Telecommunity Standardization Program).

Biographies

Bako Wakil | Director of Technical Standards and Network Integrity (DTSNI), Nigerian Communications Commission (NCC), Nigeria

Engr. Bako Wakil is the Director of Technical Standard and Network Integrity at Nigerian Communications Commission (NCC), an independent regulator of the telecom industry in Nigeria. He has more than 30 years' experience in telecommunications management and regulations. He has diverse experience in satellite, terrestrial and diplomatic communications operations and management. At the Nigerian Communications Commission, he is responsible for developing and monitoring Quality of Service KPIs, management of National Numbering Resources and Equipment Authorization or Type Approval. Engr. Wakil has a Bachelor of Engineering degree in Electrical & Electronic Engineering from the University of Maiduguri and Master of Science degree in Information System Engineering from London South Bank University, United Kingdom. At the ITU level, Engr. Wakil has attended several ITU events such as World Radiocommunications Conferences (WRC), World Telecommunications Standardization Assembly (WTSA) and several ITU Study Group meetings, and is currently serving as Vice-Chairman of ITU-T Study Group 20 (SG20) on Internet of Things (IoT) and Smart Cities and Communities, as well as the Chairman of the Regional Group for Africa of ITU-T SG20.

Roxana Widmer-Iliescu | Senior Coordinator, Digital Inclusion, ITU

Ms Roxana Widmer-Iliescu has been working for more than 22 years in the Development Sector of the International Telecommunication Union (ITU), contributing through her work in achieving the overarching goal of digital inclusion, by promoting all people empowerment through ICTs, regardless of age, gender, ability or location. In her capacity as ITU-D Focal Point for ICT accessibility, she advises the ITU members on developing ICT accessibility policies and on implementing related strategies and lead development of several ITU-D key resources in ICT accessibility aiming at supporting the global efforts in building a digitally inclusive society and ensuring that no one is left behind in the digital age.

Vitalija Gaucaite Wittich| Chief, Population Unit, UNECE

Vitalija Gaucaite Wittich heads the Population Unit of the United Nations Economic Commission for Europe (UNECE) and is responsible for UNECE's work on population ageing and intergenerational relations. She coordinates the activities of the UNECE Standing Working Group on Ageing and oversees the organization of the reviews of national policies and strategies in implementing the Madrid International Plan of Actions on Ageing (MIPAA, 2002) in the UNECE region, capacity development and publication of policy briefs in the area of population ageing. She also acts as the UNECE Coordinator for the Generations and Gender Programme. In addition, she leads UNECE activities related to the review of the implementation of the Programme of Action of International Conference on Population and Development (ICPD, 1994). Prior to joining the Population Unit in October 2010, Ms Gaucaite Wittich worked in the Statistics and Economic Analysis Divisions of UNECE. Ms Gaucaite Wittich has a Doctoral degree in Social Sciences, and before joining UNECE, she was an Associate Professor of Economics at Vilnius University in Lithuania.

Biographies

Heung Youl Youm| Chairman, ITU-T Study Group 17, Security | Professor, Department of Information Security Engineering, Soonchunhyang University, South Korea

Chairman of ITU-T SG17 (Security), he has been working as a professor for the Department of Information Security Engineering of the Soonchunhyang University, Korea since September 1990. He is currently the Director of SCH Cybersecurity Research Centre, a position he has held since December 2013. He began participating in ITU-T SG 17 in 2003, and has contributed actively to the work of SG17 as a core member of security experts. He was an Associate Rapporteur of SG 17 Question 10/17 from 2003 to 2004. For the Study Period (2005–2008), he served as a Rapporteur of Question 9/17. He was a Vice-Chairman of ITU-T Study Group 17 from 2009 to 2016. He was Chairman of Working Party 2 (Application Security) of SG17 for the Study Period (2009–2012) and was Chairman of Working Party 3 (Identity management and cloud computing security) of SG17 for the Study Period (2013–2016). He has been a Project Editor for many approved ITU-T Recommendations or agreed Supplements in DLT security, authentication/application protocols, de-identification techniques, USN/IoT security, 5G security, and cybersecurity. He is a Commissioner for the Korea Personal Information Protection Commission, a member of the Advisory Committee for the Korea National Security Office for the Blue House, a Chairman for the ISMS/PIMS Certification Committee in Korea since 2007, and a Board Director for Korea Information/Security agency. He was a President of KIISC (Korea Institute on information Security and Cryptology) in 2011 and is an Emeritus President of KIISC. He worked for ETRI as a senior research engineer from 1982 until 1990. He was involved in developing a high-speed transmission system. He has been involved in many (advisory or self-performance evaluation) committees for the Korea Communications Commission (KCC) from 2008 to 2016, the Ministry of Science, ICT and Future Planning (MSIP) from 2013 to 2017, the Ministry of Industry and Energy (MoTIE) from 2015 to 2017. He has been involved in self-performance evaluation committees for the Ministry of Science and ICT since 2017. He had been the Chairman of the Committee on Information Security in the PyeongChang Organizing Committee for the 2018 Olympic & Paralympic Winter Games from January 2015 to May 2018. He received a Bachelor's degree in 1981, a Master's degree in 1983, and a PhD degree in 1990, all in Electronics Engineering from Hanyang University, Korea.

Sébastien Ziegler | Director General, Mandat International

Sébastien Ziegler is Director General of Mandat International. He serves as President of the IoT Forum, as Vice Chair of the IEEE ComSoc Subcommittee on the IoT, and as Rapporteur on Research and Emerging Technologies at ITU SG20. He coordinated and/or took part in over 15 international research projects in the area of ICT, with a focus on Internet of Things, data protection, IPv6, multiprotocol interoperability, and cybersecurity. Sébastien has a PhD in Management with a specialization in Information Systems at the Faculty of Economy and Management of the University of Geneva. He graduated in International Relations at the Graduate Institute of International Studies, followed by a Master in Environment, a MBA in international administration (HEC Geneva), and complementary executive courses at Harvard Business School in Boston, Stanford University, UC Berkeley and EPFL. He is also an expert in data protection accredited for EuroPrivacy, EuroPriSe and ISO 27001 certifications. Sébastien founded several foundations, SMEs and organizations.

Contact Us

Have any questions? Please don't hesitate to reach out.

u4ssc@itu.int

Further Links

For more information on smart sustainable cities, please visit:

ITU-T, Smart Sustainable Cities

International Telecommunication Union
Place des Nations
CH-1211 Geneva 20
Switzerland

Photo credits: