Digital Transformation Webinar Series

2022 Outcome Document

Contents

Acknowledgement

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Additional information and material related to this report are available at the Digital Transformation Webinar Series Webpage.

If you would like additional information, please contact digitaltransformation@itu.int

Episode #13:
Architecting the Web of Things

Coordinated with the Web of Things WG of the World Wide Web Consortium (W3C) on the 03 February 2022.

This episode is part of ITU's webinar series on Digital transformation for cities and communities. Episode 13 was organized by the International Telecommunication Union (ITU) and was coordinated with the Web of Things Working Group of the World Wide Web Consortium (W3C).

The Web of Things (WoT) is an emerging concept that aims to enable interoperability among Internet of Thing (IoT) platforms and applications. By using standardized web technologies and architecture, WoT has significant potential to boost the effectiveness of IoT platforms and applications across sectors. This webinar examined the nature of WoT and its potential in smart city applications. It looked at the building blocks and architectural aspects that describe key features and functions of WoT. This unique webinar highlighted the work of WoT experts who shared their experience in implementing WoT and its use cases, demonstrating the applicability of the WoT concept in the smart city and IoT contexts.

1500 – 1505	**Opening remarks** Chaesub Lee, Director, Telecommunication Standardization Bureau, ITU.
1505 – 1655	**Session 1: The Web of Things for Smart Sustainable Cities** Interoperability is the foundation of a smart sustainable city. It enables the seamless integration of IoT and other digital applications and services. This session will explore the unique features of the Web of Things, discuss how WoT may solve the interoperability challenges, and discuss their potential to contribute to adopting a standard-based approach to smart sustainable cities. Moderator: Ramy Ahmed Fathy, Vice-chairman, ITU-T Study Group 20, ITU, Director, Digital Services Planning and Risk Assessment, National Telecom Regulatory Authority, Egypt. • Gyu Myoung Lee, Professor, Liverpool John Moores University (LJMU) and Q4/20 Rapporteur [Presentation]. Michael McCool, Co-chairman, W3C Web of Things [Presentation]. • Kazuyuki Ashimura, Project Professor, Keio University and W3C Web of Things Team Contact [Presentation]. • Sebastian Kaebisch, Co-chairman, W3C Web of Things [Presentation]. • Long Rong, China Mobile [Presentation].
1655 – 1700	Closing remarks Nasser Al Marzouqi, Chairman of ITU-T Study Group 20.

Episode #13:
Architecting the Web of Things

Opening remarks

Chaesub Lee, Director,
Telecommunication Standardization Bureau,
ITU

In his opening remarks, Chaesub Lee, spoke about the importance of the Web of Things (WoT) in enabling scalable, interoperable and efficient Internet of Things (IoT) architecture. He mentioned that he had learned about WoT more than 10 years ago and was pleased to be able to gather with experts to discuss this important topic.

He emphasized the importance of standards in meeting the technical and architectural requirements of IoT, particularly regarding wearable technology, and ensuring that users have a shared understanding of the approach. He noted that ITU standardization work for IoT in smart cities and communities is led by Study Group 20 (SG20), which has developed a series of standards in this area, including Recommendation ITU-T Y4400, which provides a practical framework for implementing the WoT. He expressed his appreciation for the progress made in collaboration with the World Wide Web Consortium (W3C) and looked forward to expanding this partnership.

Chaesub Lee stressed that global learning and meaningful collaboration are key to enhancing knowledge and understanding of the latest trends in digital transformation. He stated that this was the aim of the webinar, which would provide expert insight on the key features and functions of the WoT, as well as some use cases highlighting its applicability in smart cities. Additionally, he encouraged participation in the upcoming Global Standards Symposium (GSS), followed by the World Telecommunication Standardization Assembly (WTSA). He invited everyone to join the discussion on the role of international standards in achieving Sustainable Development Goals (SDGs) through digital transformation.

Session 1: The Web of Things for Smart Sustainable Cities

Gyu Myoung Lee, Professor,
Liverpool John Moores University (LJMU)
and Q4/20 Rapporteur

In his presentation, Gyu Myoung Lee defined the Web of Things (WoT) as a means of achieving the Internet of Things (IoT) by connecting physical and virtual objects through the World Wide Web. He explained that WoT is an extension of IoT technology, which interconnects various types of services via web technologies. During his presentation, he noted that the International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) was currently working on several work items related to WoT such as Recommendation ITU Y.4400 for the framework of the WoT, which describes how users can interact with critical services and components like brokers to interact with different devices.

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Gyu Myoung Lee also discussed ITU Standard Y.4414 for the WoT service architecture, which can serve as a service control function, resource management, and functionality for interacting with the web. Additionally, he highlighted ITU's work on Standard Y.4452, which provides guidance on building WoT architectures, and Y.4415, which outlines the architecture of a web of objects-based virtual home network. Furthermore, he discussed potential work items in the smart cities context, highlighting that in June 2021, IEEE and ITU launched a joint collaboration to develop the "Global Observatory for Urban Intelligence" (GOUI).

In closing, he acknowledged that the WoT was facing challenges, particularly with new applications and evolving web technologies. Gyu Myoung Lee called for stronger collaboration between ITU-T and the World Wide Web Consortium (W3C). He stressed the importance of creating a new smart cities ontology as a common language and identifying the need for concrete semantics to provide information as two essential aspects of GOUI. Finally, he noted that digital twins are an important consideration for WoT's application in simulation model monitoring and alerting predictions.

Michael McCool,
Co-chairman,
W3C Web of Things

In his presentation, Michael McCool discussed the standardization activities of the World Wide Web Consortium on the Web of Things, and emphasized the need for a consistent way to describe the interface and abstraction for IoT devices or services. The primary goal of W3C is to fill the gaps in existing standards and make everything work well together, rather than creating a vertical silo, he said. To achieve this, W3C aims to adapt web technologies, which are highly successful standards, to the IoT to achieve similar abilities and scalability.

One of the major gaps identified by W3C was the absence of a consistent abstraction layer. To address this, W3C published a metadata format called Thing Description (TD), which serves as a common abstraction. W3C aims to achieve interoperability by filling in this abstraction based on entities like properties, actions and events that are common across protocols. By using TD, applications can be written against this abstraction layer, and the abstractions can then map the data to the concrete implementation of a particular protocol.

Mr McCool said that W3C was also working on security standards such as data payload standards, data schemas and security requirements for devices. Additionally, W3C is exploring ways to automate the building of new services by integrating existing things and having them interoperate in certain ways. He said that W3C was experimenting with scripting languages and visual languages to achieve automation.

W3C is looking into two gaps for the future. The first is tying the discovery process into geolocation to enable users to discover things in a location. The second is supporting a query language to elaborate on the mechanism to query large sets of things descriptions and devices, which is also essential for smart cities.

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Finally, Mr McCool mentioned that W3C has a set of normative documents in progress and published, including a general architecture document, the Thing Description, and documents related to particular applications or their categories. W3C provides templates that talk about how to connect to a specific protocol, and a large document describing various use cases is used to extract requirements.

Kazuyuki Ashimura,
Project Professor,
Keio University and W3C Web of Things Team Contact

Discussing the Web of Things (WoT), Kazuyuki Ashimura described it as a technology that aims to increase interoperability between web connected IoT devices with different protocols. He noted that web technology has expanded rapidly to be available on all web-connected devices, from smartphones and TVs to eBook readers and game consoles. The challenge, however, is that different device manufacturers often use different IoT protocols for their devices. WoT helps to address this challenge by enabling communication between devices with different protocols.

Mr Ashimura spoke about the work of the World Wide Web Consortium (W3C), which was established in 1994 by Tim Berners-Lee to promote web interoperability. Today, W3C is the only Standards Developing Organization focused on web standards development that has global membership across governments and industry. The organization's work is divided among 43 Working Groups, nine Interest Groups, three Business Groups and 366 Community Groups. In the Smart Cities area, W3C is working on identifying key stakeholders who can work together on identifying and documenting use cases and requirements.

One of the key challenges that the W3C is addressing is breaking down silos between the many different IoT implementations to promote interoperability. Another set of challenges that are relevant to smart cities inhabitants are the high levels of big data collection and analytics, and their uses in predictive policing. Mr Ashimura stressed the need to shift the discussion from technology implementation to what is best for city inhabitants and how they, as the users and most important stakeholders, can be involved in the process.

To integrate various IoT standards using the web, the W3C is collaborating with organizations like ITU and different industries to extract requirements from different use cases. Looking ahead, the W3C is working on WoT 2.0, which will combine WoT with decentralized identifiers (DID) and Verifiable Credentials (VC).

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Sebastian Kaebisch,
Co-chairman,
W3C Web of Things

In his presentation, Sebastian Kaebisch, spoke of the interoperability issues when connecting many IoT devices due to various protocols and semantics. To address this, the W3C has developed the Thing Description, which is an open information model with a JSON-based representation format for the Internet of Things. The Thing Description promotes interoperability by re-using existing domain knowledge. In the context of smart cities, the Thing Description enables different IoT data sources to communicate with each other at the WoT layer.

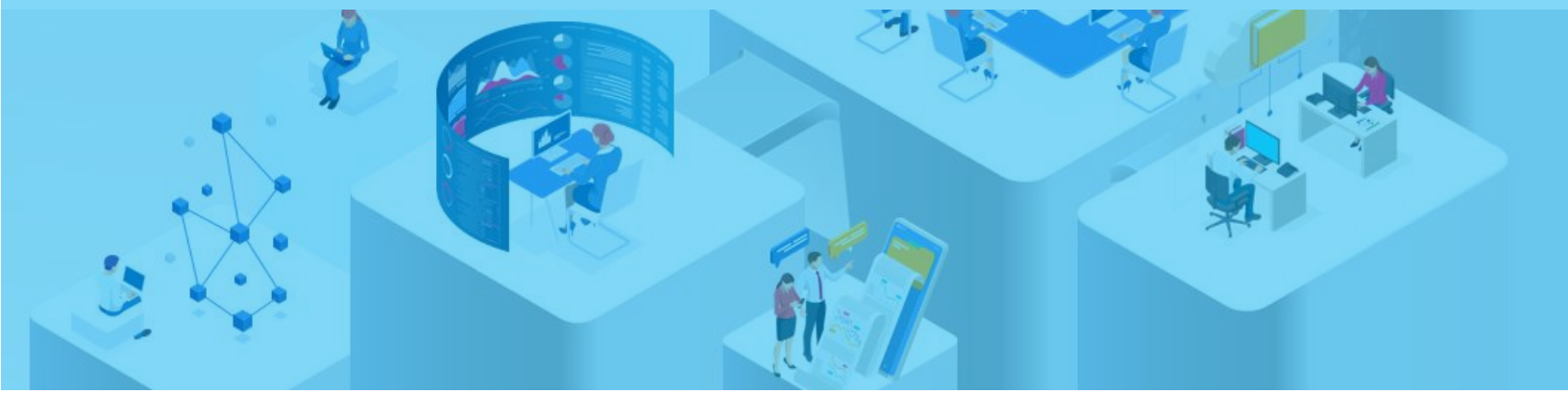
To facilitate the creation of a Thing Description, the W3C has developed various tools such as the https://eclipse.github.io/editdor/ tool. Interested parties can find additional information and resources on https://w3c.github.io/wot-marketing/developers/. Mr Kaebisch suggested that the Thing Description can help to address interoperability problems arising from the use of various protocols and semantics in the IoT. He described how the W3C has developed several tools to support the creation of a Thing Description, which can be useful in the smart city context.

The Thing Description is an open information model that re-uses existing domain knowledge to promote interoperability. As such, it enables different IoT data sources to communicate with each other at the WoT layer. Those interested in learning more about the Thing Description can find additional information and resources on: https://w3c.github.io/wot-marketing/developers/.

Long Rong,
China Mobile

Introducing China Mobile's Thing Model, Long Rong described how it can be implemented to address the interoperability challenges arising from many IoT device connections. The Thing Model is a proposed interconnection solution that offers a data and functionality abstraction method independent of the host protocol. The principles of Thing Model for unified IoT Connection Service are abstraction and modularity, flexibility, and JSON encoding. She also explained the process of generating the Thing Model, which includes model abstract, model description and model instantiation. By utilizing a Thing Model-based platform, data-value added services can be provided.

Long Rong discussed how users can adopt the Thing Model in real-world scenarios such as firefighting. The unified data format and interface defined by Thing Model provide a unified presentation and interaction of data from multiple sources, enabling the integrated management of firefighting systems between various departments and systems. Additionally, she emphasized the advantages of Thing Model such as its ability to decouple software and hardware development processes, resulting in improved development and deployment efficiency. Another advantage is the flexible data flow, with horizontal transfer between devices and platforms.



China Mobile plans to update the Thing Model standards application tools and promote its wider use to derive more data-valued applications and services. From an ecological perspective, China Mobile aims to provide more device model templates and improve the certification and operation capabilities of the Thing Model.

Conclusions and next steps

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

In his closing remarks, Nasser Al Marzouqi spoke of interoperability as the key to building smart and sustainable cities, as well as enabling the integration of IoT and digital services. He discussed the unique features of the Web of Things and how it can address the interoperability challenge and contribute to the adoption of a standard-based approach to building smart sustainable cities.

Mr Al Marzouqi emphasized the importance of collaboration between organizations and the implementation of standards. He also highlighted the various challenges faced by smart cities, which present an opportunity to address urgent issues through the adoption of innovative technologies.

The Web of Things has the potential to create a unified platform for IoT devices to communicate with each other, independent of the device manufacturer or the protocol used. This would greatly simplify the process of integrating IoT devices into smart city infrastructure, which is essential for building a sustainable future.

In conclusion, Mr Al Marzouqi stressed that the adoption of a standard-based approach is crucial for building smart sustainable cities, and that collaboration between organizations is essential for achieving interoperability. The Web of Things is a promising solution to the interoperability challenge and has the potential to transform the way we build and operate smart cities.

Episode #14:
Accelerating agricultural digital transformation through AI and IoT

Coordinated with Food and Agriculture Organization (FAO) and International Organization for Standardization (ISO) (29 March 2022)

This episode is part of ITU's webinar series on Digital transformation for cities and communities.

Episode 14 was co-organized by the International Telecommunication Union (ITU), Food and Agriculture Organization (FAO) and International Organization for Standardization (ISO).

The agricultural sector is one of the largest in the world, with an estimated global value of USD 2.4 trillion. Farming provides jobs for 1.3 billion people – 19 per cent of the world's population. However, to meet the needs of a rising global population that is expected to reach 9.7 billion people by the year 2050, global food production will need to be expedited by an estimated 70 per cent.

This necessitates the adoption of emerging technologies including: Artificial Intelligence (AI); Internet of Things (IoT); robotics; big data; augmented reality; sensors; and drones for the control and optimization of agricultural production processes, supply chains and food systems. The incorporation and subsequent combination of these technologies have already started to transform the agricultural domain radically and have resulted in the unfolding of a new concept known as "digital agriculture".

The application of "digital agriculture" is on the rise, with its global market estimated to reach more than USD 23 billion by 2022 – accounting for an average annual growth of nearly 20 per cent. This concept leverages disruptive technologies to increase crop yield, maximize resource efficiency and strengthen the overall supply chains. Digital agriculture encompasses precision agriculture or precision farming and incorporates techniques such as controlled-environment agriculture, vertical farming, and smart greenhouses.

In this context of digital agriculture, this webinar episode delved into the various aspects of leveraging AI and IoT in accelerating digital transformation for agricultural production processes and examined the current standardization terrain related to the agricultural sphere.

Participation was open to ITU Member States, Sector Members, Associates and Academic Institutions, as well as to any individual from a country that is a member of ITU and who wished to contribute to the work. This included individuals who were also members of international, regional and national organizations. Registration for the event was mandatory.

Episode #14:
Accelerating agricultural digital transformation through AI and IoT

1400 – 1415	**Opening Remarks** Chaesub Lee, Director, Telecommunication Standardization Bureau, ITU. Johannes Lehmann, Head of Business Development Smart Farming, German Institute for Standardization, ISO Strategic Advisory Group on Smart Farming Convenor. Dejan Jakovljevic, CIO and Director, Digitalization and Informatics Division, Food and Agriculture Organization (FAO).
1415 – 1420	**Keynote Speech** R. Andres Ferreyra, Data Asset Manager, Syngenta Digital, ISO Strategic Advisory Group on Smart Farming Convenor: [Presentation].
1420 – 1500	**Session 1: Digital Agriculture and Sustainable Food Systems: Trends and Opportunities** Moderator: Ramy Ahmed Fathy, Director, Digital Services Planning and Risk Assessment, National Telecom Regulatory Authority, Egypt. Sushil Kumar, Deputy Director General (IoT), Telecommunication Engineering Centre, Department of Telecommunications, Government of India: [Presentation]. Kenneth Irons, Chairman, AgriTech New Zealand, New Zealand: [Presentation]. Robert Stefanski, Head of the Applied Climate Services Division, World Meteorological Organization (WMO): [Presentation]. **Questions & Answers**
1500 – 1555	**Session 2: Bridging the Divide in Data-Driven Agriculture: Leveraging International Standards for Digital Transformation** **Moderator:** Sebastian Bosse, Head of Interactive & Cognitive Systems Group, Fraunhofer HHI. Jörg Dörr, Professor for Digital Farming at Technical University of Kaiserslautern, Germany | Extended Institute Management and Program Manager Smart Farming at Fraunhofer IESE, Germany: [Presentation]. Drake Patrick Mirembe, ICT& Management Consultant, Innovations & Cyber Security Specialist, Data Scientist, Business & Technology Entrepreneur, Uganda: [Presentation]. Jim Wilson, Chief Technology Officer, AgGateway: [Presentation]. **Questions & Answers**
1555 – 1600	**Wrap-up and closing remarks** Bilel Jamoussi, Chief of Study Groups, TSB, ITU.

Episode #14:
Accelerating agricultural digital transformation through AI and IoT

Opening remarks

Chaesub Lee, Director,
Telecommunication Standardization Bureau,
ITU

In his opening remarks, Chaesub Lee emphasized the importance of technological progress to sustainably support the expected global population growth to 9.7 billion people by 2050. In this regard, advancements in Artificial Intelligence (AI) and Internet of Things (IoT) will play a key role, and ITU is committed to ensuring that their benefits are accessible to everyone worldwide. ITU has demonstrated this commitment by partnering with the UN Food and Agriculture Organization (FAO) to establish a new Focus Group on AI and IoT for Digital Agriculture (FG-AI4A).

The FG-AI4A aims to explore the potential of emerging technologies such as AI and IoT to address the core challenges and opportunities within the agricultural sector. Specifically, it will focus on supporting data acquisition and handling, improving modelling from a growing volume of agricultural and geospatial data, and providing effective communication for interventions related to the optimization of agricultural production processes. The group will also examine key concepts and relevant gaps in the current standardization landscape related to agriculture, and highlight the best practices and barriers related to the use of AI and IoT-based technologies in this domain.

The Focus Group will be open to all interested parties, and Chaesub Lee encouraged likeminded experts to join the group's meetings. He stressed that new technologies have the potential to improve the precision and sustainability of farming techniques. Chaesub Lee concluded his remarks by saying that through its partnership with the FAO and establishment of the FG-AI4A, ITU is demonstrating its commitment to using AI and IoT to support sustainable agriculture and improve global food security.

Johannes Lehmann,
Head of Business Development Smart Farming,
German Institute for Standardization,
ISO Strategic Advisory Group on Smart Farming Convenor

Climate change is affecting the planet at a faster pace than humans can adapt, and the ongoing war in Ukraine is exacerbating the already strained global supply chains, leading to food supply and security concerns, said Johannes Lehmann in his presentation. Therefore, the resilience of food production is of utmost importance. Mr Lehmann spoke of the importance of modern information technology such as Artificial Intelligence (AI) and the Internet of Things (IoT), in helping to promote sustainability in food production methods such as vertical farming, in vitro meat, and autonomy. However, he stressed that these technologies should not be used for digitalization's sake, but rather as means to promote sustainability.

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Mr Lehmann emphasized that market penetration and adoption of modern information technologies require technical standards. Lack of standards and data interoperability are the primary obstacles in smart technology's day-to-day work. To ensure the success of sustainable agriculture and food production, he stressed that the work of ITU and the International Organization for Standardization (ISO) is essential.

He went on to highlight that the ISO Strategic Advisory Group (SAG) on smart farming has already recognized this need and has more than 200 experts working to identify gaps in the current standardization landscape. The goal is to establish standards that promote the adoption of modern information technologies, increase resilience of food production, and help achieve sustainable development goals. In conclusion, Johannes Lehmann underlined that by adopting modern information technologies and establishing standards, the world can improve food production's precision, sustainability, and overall resilience.

Dejan Jakovljevic,
CIO and Director, Digitalization and Informatics Division,
Food and Agriculture Organization (FAO)

In his presentation, Dejan Jakovljevic stated that the pandemic, along with natural disasters, wars, conflicts and other challenges, have severely impacted agriculture food systems. As a result, the prevalence of undernourishment has increased from 4.4 per cent to around 9.9 per cent in 2020 alone. By 2022, one in ten, or possibly one in nine, people globally may be affected and the situation is deteriorating. This underscores the significance of creating more sustainable food systems and taking prompt action.

He emphasized that digital technologies are key transformational accelerators that impact economies and societies, including agriculture and food systems. The digitalization and use of data and artificial intelligence in agriculture each play an essential role in supporting evidence-based policy, planning and implementation. This would lead to improved efficiency, reduced negative environmental impacts, and make agriculture more productive, profitable and sustainable. He informed those present that the Food and Agriculture Organization (FAO) is leading efforts to promote the ethical use of artificial intelligence, which is also an important aspect to consider.

Concluding his presentation, Dejan Jakovljevic said that the Focus Group is working to advance collaboration in digital transformation. It is important to work together to mitigate the negative impacts of the shocks on agriculture and food systems.

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Keynote speech

R. Andres Ferreyra,
Data Asset Manager, Syngenta Digital,
ISO Strategic Advisory Group on Smart Farming Convenor

In his keynote speech, R. Andres Ferreyra highlighted the complexities of modern farming with a dwindling resource base, and the challenge of preserving biodiversity while also optimizing the use of resources. Climate change adds an additional layer of complexity, making sustainability even more crucial. He stressed the need for standardized interfaces and data formats to enable interoperability among the different machinery and manufacturers involved in agriculture.

Mr Ferreyra recognized the fragmentation in standardization efforts and emphasized the importance of collaboration and partnerships for sustainable development. He discussed the importance of the establishment of a Focus Group to explore smart farming standardization, including representatives from different countries, national advisory groups, and technical committees and subcommittees.

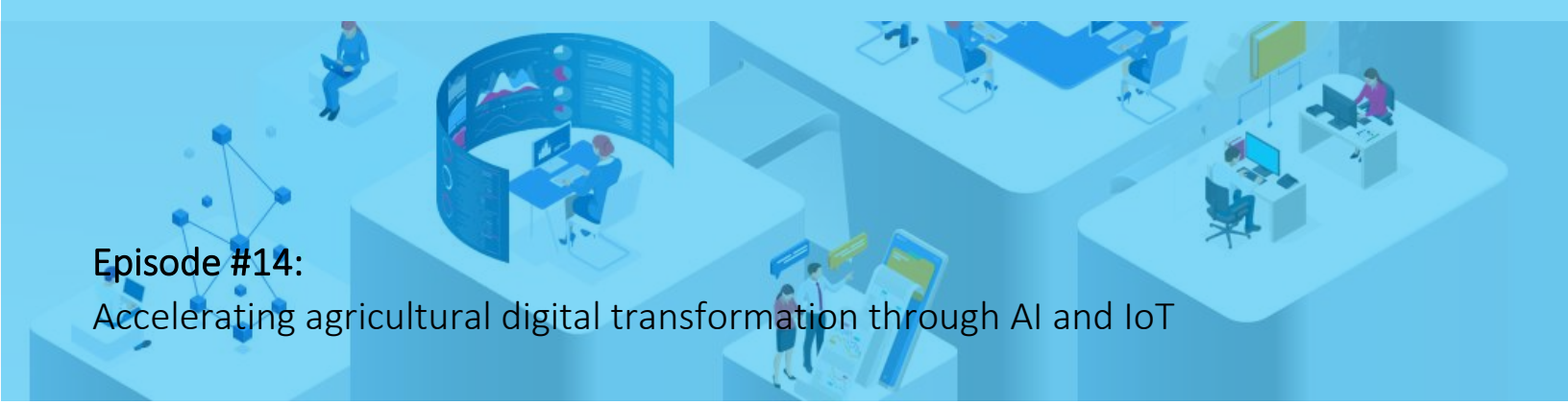
He also underscored the importance of ethical considerations in the use of technology in agriculture. He mentioned the need for a framework to address issues such as data privacy and security, as well as the responsible use of artificial intelligence in farming. The new Focus Group aims to promote sustainable and profitable farming while ensuring freedom of operation for producers.

In conclusion, Mr Ferreyra emphasized the urgent need for standardization efforts and collaboration to address the challenges facing modern agriculture. He called for partnerships between agriculture-related organizations and standards organizations such as ISO and ITU to ensure the success of smart farming initiatives and the achievement of sustainable development goals.

Session 1: Digital Agriculture and Sustainable Food Systems: Trends and Opportunities

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

Using IoT technologies in agriculture has immense potential to increase efficiency and sustainability, stressed Sushil Kumar in his remarks. He emphasized that IoT can help manage water resources and monitor soil, which is particularly important for rural areas. However, he noted that challenges remain in implementing IoT in agriculture such as connectivity issues and low investment. He commended the Indian Government's efforts to create digital infrastructure in rural areas.



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Mr Kumar went on to discuss IoT use cases in India, including nutrient monitoring and livestock farming. As an example, he discussed the use of SMS technology to remotely control pumps and irrigation systems, a beneficial technology for farmers who must otherwise travel long distances. Soil testing devices and smart irrigation management systems can help farmers make informed decisions about fertilization and crop selection while conserving water. Connected tractors and harvesting machines can help streamline work and reduce downtime, leading to increased profits.

While IoT has many potential benefits, Sushil Kumar acknowledged that cost can be a barrier for some farmers in adopting modern technologies. To make IoT devices more affordable, he suggests providing them at the community level or offering government subsidies. He is encouraged that the Government of India is working to make IoT and other agricultural technologies more accessible to farmers. With continued investment and support, Mr Kumar expects more farmers to benefit from these innovations in the future.

Kenneth Irons,
Chairman, AgriTech New Zealand,
New Zealand

In his presentation, Kenneth Irons highlighted the challenges faced by farmers in transitioning from traditional and manual methods of record keeping to using modern Farm Management Information Systems (FMIS). Drawing on examples from his family and the New Zealand farming industry, he emphasized the importance of taking a human perspective when considering the challenges of digital adoption in small businesses. He suggested that delegating farm information management tasks to experts can enable rapid technology adoption in the agriculture industry and called for further discussion on this approach to promoting digital transformation in farming.

Mr Irons spoke of one potential solution, to share expertise across many farms, like how electricians or other skilled professionals collaborate on projects. This approach could help standardize the use of technologies across different farms and ensure that farmers can extract the maximum value from these tools. He emphasized the importance of focusing on outcome delivery rather than just input or process delivery when it comes to agricultural technologies. Providing farmers with the tools and resources they need to maximize their productivity and profitability will support a sustainable and thriving agricultural sector.

In conclusion, Kenneth Irons suggests that a delegation approach to experts could be a good method to promote adoption of technology in the agriculture industry. However, it is important to consider the challenges faced by farmers and to provide them with the necessary support and resources to make the most of the available technologies.

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Robert Stefanski,
Head of the Applied Climate Services Division,
World Meteorological Organization (WMO)

Speaking on behalf of the World Meteorological Organization (WMO), Robert Stefanski, discussed his organization's focus on digital advisory services for agriculture meteorology and climatology, with the goal of leveraging digital technological innovations to target communities and ensure equitable access to digital services for women. He went on to say that while the WMO has a website that provides reliable weather and climate information from member services and other partners, the agency also has a network of global and regional centres that provide weather forecasts and seasonal forecasts and can develop tailored climate forecast products for stakeholders. He highlighted the progress made in linking global, regional, and national climate forecasts, but noted that the challenge now is getting this information to farmers and stakeholders on the ground.

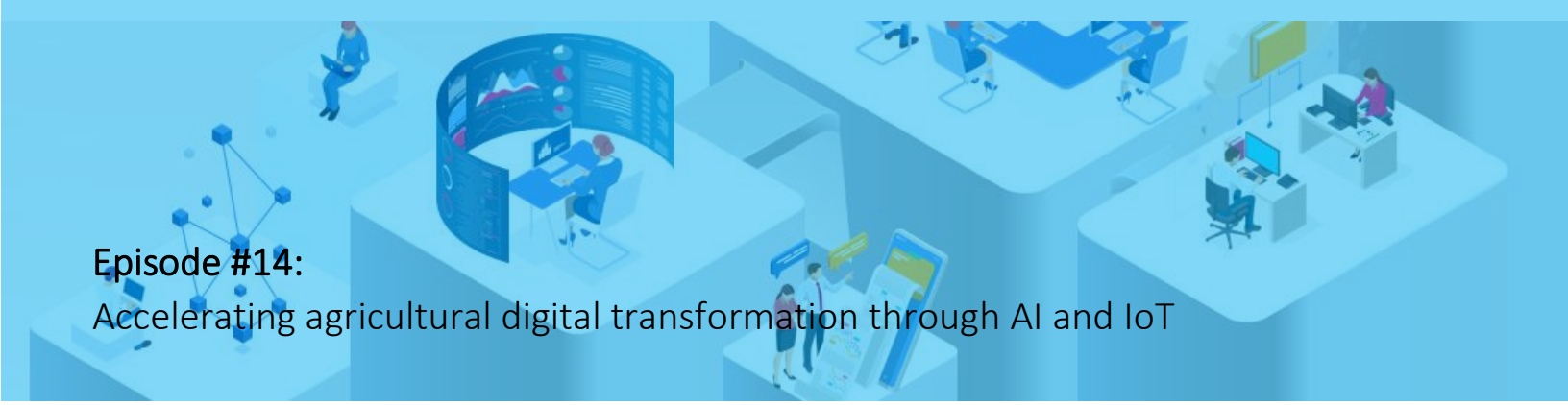
Robert Stefanski mentioned the WMO's project in Uganda, which provides daily weather updates to fishermen via text message and the high levels of trust that fisher people have in the accuracy of the weather forecasts. The agency plans to refocus their activities on taking existing weather and climate products and making them available on mobile phones for farmers and NGO websites. To achieve this goal, the WMO is working with the Food and Agriculture Organization (FAO) and technical committees. He stressed the importance of expertise in making this happen and acknowledged that different models may be needed depending on the region and country.

In conclusion, Robert Stefanski emphasized that providing smallholder farmers with access to reliable weather information is crucial for improving their agricultural productivity and resilience in the face of climate variability and change. He stressed the importance of providing high-quality information to decision makers who can then disseminate the information to farmers based on the local context and the risk profiles of individual farmers.

Session 2: Bridging the Divide in Data-Driven Agriculture: Leveraging International Standards for Digital Transformation

Jörg Dörr,
Professor for Digital Farming at Technical University of Kaiserslautern, Germany
Extended Institute Management and Program Manager Smart Farming at Fraunhofer IESE, Germany

Discussing the challenges and approaches in the digital agricultural ecosystem, Jörg Dörr emphasized the fragmented ecosystem as the main issue, which makes it difficult to access and manage data from different sources. This results in data availability, accessibility, and security issues. To tackle these challenges, he suggested several approaches, including decentralized data stores, data routers, and data hubs.



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Furthermore, he proposed frameworks to help address scalability problems. He also highlighted how digital technologies could optimize and automate agricultural work processes, and the importance of exploring innovative solutions to improve the efficiency and sustainability of farming practices. He stressed that standardization is crucial for making the vision of agricultural data spaces a reality and having a greater impact. This includes the need for standardized approaches to vocabulary and ontology, IoT and cloud connectors, service registers, data usage control, cognitive services, and digital twins.

He concluded by acknowledging that there is still a long way to go to have standardization enable these concepts and approaches to better support the agriculture industry. Addressing challenges in the digital agricultural ecosystem requires collaboration and cooperation among stakeholders. With concerted efforts, these challenges can be overcome to harness the potential of digital technologies to drive sustainable development in agriculture.

Drake Patrick Mirembe,
ICT& Management Consultant, Innovations & Cyber Security Specialist, Data Scientist, Business & Technology Entrepreneur, Uganda

Outlining the challenges and opportunities in Uganda's agriculture sector, Drake Patrick Mirembe highlighted the transformative potential of digital technologies. He emphasized that agriculture is a crucial sector in Uganda, contributing significantly to the country's GDP and employing much of its population. However, the sector faces several challenges such as limited access to inputs, markets, financial services and information.

Drake Patrick Mirembe emphasized the potential of digital technologies in addressing these challenges, particularly in terms of providing information management systems, improving visualization, and enhancing decision-making. He further explained that there are specific ICT initiatives in Uganda such as the City for Farmers, the Virtual Service Centre, and the Mobile Application for Market Access, which have been launched to facilitate the development of the agriculture sector.

He also discussed the status of IoT and AI technologies in the agriculture sector in Uganda and mentioned that their uptake is still in the early stages, possibly due to limited sources of energy. He noted that the level of education and motivation of farmers, particularly those engaged in subsistence farming, needs to be considered when introducing new technologies.

Drake Patrick Mirembe explained that with a growing higher education sector, Internet penetration in Uganda is around 47 per cent, and access to communication services is about 70 per cent. However, most of the population, approximately 75 per cent, still relies on agriculture. Thus, ICTs can play a significant role in improving the productivity, efficiency, and sustainability of the agriculture sector in Uganda.

Episode #14:
Accelerating agricultural digital transformation through AI and IoT

Jim Wilson,
Chief Technology Officer,
AgGateway

Highlighting the challenges of achieving interoperability between different technologies and standards in the agriculture sector, Mr Wilson emphasized the need for a process to identify requirements, standards landscape, available tools, and resources to ensure interoperability. He noted the need for a comprehensive platform or tool to manage and make sense of the vast landscape of IoT solutions and platforms in agriculture. A more sophisticated approach is needed such as a graph representation of data, to visualize the interrelationships between standards, technologies, business and social concerns, and UN sustainable development goals. Reports can help people understand the standards landscape, and developers can use these resources to implement interoperability by getting APIs, schemas and supporting documentation.

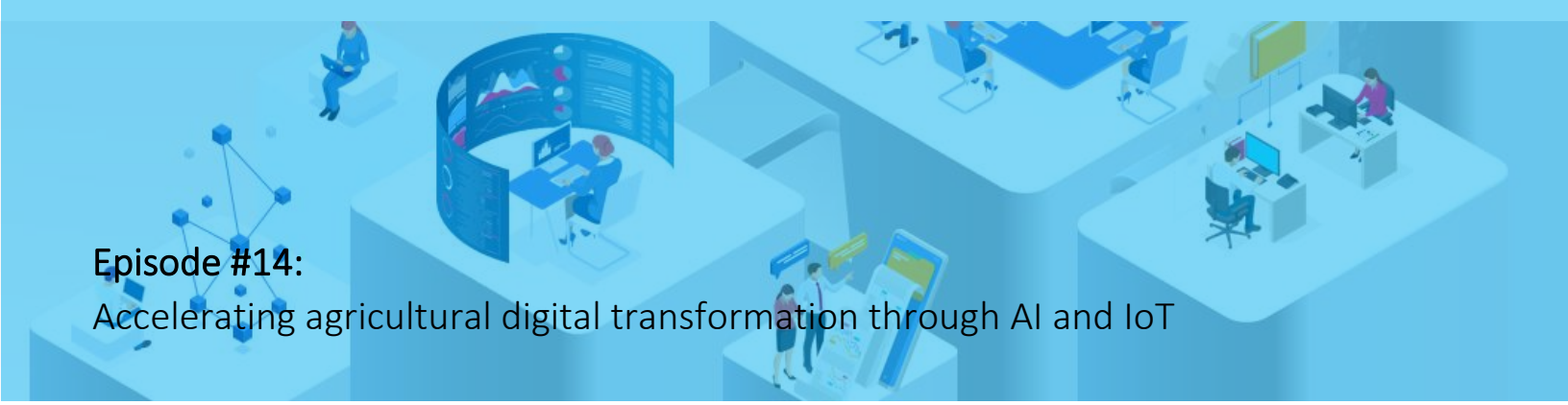
Jim Wilson highlighted the fact that speeding up the process of achieving interoperability is crucial in accelerating digital transformation in agriculture due to the changing world, in particular climate change and the need to feed more people with fewer resources. He gave an example of ISO 15000-5 developed and implemented by ISO/TC 154 and working with the Open Application Group on web API design guidelines and the National Institute of Standards and Technology to show that interoperability can be achieved in a matter of days or weeks.

In conclusion, he stressed the importance of having a comprehensive approach and collaboration among stakeholders in achieving interoperability in agriculture. Such collaboration can help achieve the UN sustainable development goals and facilitate digital transformation in agriculture.

Q&A session

During the Q&A session, concerns were raised regarding the ownership and usage of public and private data in agriculture. It was highlighted that a framework is needed to manage the ownership and usage of the data, ensuring that benefits are brought to all stakeholders involved. Farmers and other stakeholders should have control over their data and be able to decide what should be done with it. To achieve this, an organizational/legal framework and a technical framework should be put in place, including mechanisms such as data usage control and data sovereignty mechanisms.

In addition, there is a unique challenge of data management in agriculture, where data are often recorded on paper or whiteboards, resulting in a loss of control for the farmer. Addressing this issue requires a multi-disciplinary approach that considers the technological, financial, social and environmental challenges faced by farmers.



Episode #14:
Accelerating agricultural digital transformation through AI and IoT

It was noted that standardization and creating a framework for data management in the agricultural sector can help ensure interoperability between different systems, making it easier for farmers to share and use data, and facilitate the development of new technologies and services that can easily be integrated into existing systems. The lack of a global framework was highlighted, and it was suggested that creating such a framework would be a great step forward. Developing a global framework would require collaboration between different stakeholders, including governments, industry players and farmers themselves.

Lastly, the importance of education and training programmes to help farmers learn how to use new technologies and benefit from data management systems was emphasized. Overall, creating a standardized framework for data management in agriculture could bring numerous benefits to farmers, the environment, and the economy.

Wrap-up and closing remarks

Bilel Jamoussi,
Chief of Study Groups,
TSB, ITU

In his closing remarks, Bilel Jamoussi expressed his gratitude to the Food and Agriculture Organization (FAO), the World Meteorological Organization (WMO), and the International Organization for Standardization (ISO) for their commitment to promoting digital agriculture. He emphasized the importance of ensuring that the benefits of digital transformation are shared across all sectors of the smart city ecosystem, including the agriculture sector. Through digital transformation farmers and other stakeholders can be connected to the digital economy, creating a smarter and more sustainable future for food distribution and farming.

Digital agriculture builds on precision farming by utilizing frontier technologies such as artificial intelligence and digital twin. Interconnected databases on seed characteristics, climate and weather patterns, and soil conditions can also help improve agriculture processes. Access to such databases enables farmers and other stakeholders to make proactive decisions, boosting productivity and improving margins in agricultural production.

To further expand understanding of this field and bring together relevant expertise, ITU Study Group 20 on IoT Smart Cities and Communities established the Focus Group on Artificial Intelligence and Internet of Things for Digital Agriculture. This group will examine how to leverage emerging technologies to support data collection and handling, improve modeling, and provide communication channels for effective agricultural production processes.

Episode #15:
Smart city platforms for an integrated management in smart sustainable cities

This episode is part of ITU's webinar series on Digital transformation for cities and communities on 9 April 2022.

Smart city platforms are a critical digital infrastructure that enables the implementation of digital solutions and smart city strategies. Smart city platforms provide cities with the necessary infrastructure to coordinate data management and facilitate interoperability between different verticals. They are crucial for solving the challenges posited by fragmented operations and moving towards an integrated approach to management with data as the main asset.

This webinar provided a comprehensive overview on the role of city platforms in facilitating smart city strategies. The webinar also provided the opportunity to present the latest U4SSC deliverables – "Digital solutions for integrated city management and use cases" and "Compendium of survey results on integrated digital solutions". These deliverables demonstrate cities' experiences in implementing smart city platforms and the transformation they have experienced as a result.

1300 – 1305	**Opening Remarks** Bilel Jamoussi, Chief of Study Groups, TSB, ITU.
1305 – 1340	**Session 1** **Moderator:** Tania Marcos, Vice-chairman, U4SSC. Ramon Ferri, U4SSC Thematic Group Leader on City platforms: [Presentation]. Michael Mulquin, Chair, Smart Cities Systems Committee, International Electrotechnical Commission (IEC): [Presentation]. Alberto Bernal, Leader of Working Group 4 of the Thematic Group on City Platforms: [Presentation]. **Questions & Answers**
1340 – 1345	**Wrap-up and closing remarks** Tania Marcos, Vice-chairman, U4SSC.

Episode #15:
Smart city platforms for an integrated management in smart sustainable cities

Opening remarks

Bilel Jamoussi,
Chief of Study Groups,
TSB, ITU

In his opening remarks, Bilel Jamoussi discussed the important role of smart city platforms in facilitating the integration of digital services and devices in smart and sustainable cities. These digital technologies, including computers, smartphones, and the Internet, are increasingly pervasive in our daily lives, and they can have a significant impact on the experiences of city residents.

He noted that digital technologies are being embraced across all sectors in the urban domain, particularly in response to the challenges posed by the COVID-19 pandemic. For example, smart technologies have been used for contact tracing and vaccination drives. Additionally, all sectors, from transport to manufacturing to health and education, are seeking to become more sustainable and resilient through digital transformation. He pointed out that ITU Study Group 20 on the Internet of Things, Smart Cities, and Communities has already developed technical standards to support cities in implementing smart city platforms.

These standards include setting the requirements for an interoperable, smart and secure platform, as well as providing a reference framework for effective smart city platforms. The group has been working closely with cities and digital technology experts to implement smart city platforms under the UN-led initiative for smart, sustainable cities, known as U4SSC. In closing, Bilel Jamoussi expressed excitement about the opportunity to showcase these deliverables during the webinar as well as hearing from different speakers about the evolving topic of smart city platforms, highlighting the critical role that they play in promoting sustainability and resilience in urban areas.

Session 1

Ramon Ferri,
U4SSC Thematic Group Leader on City platforms

Discussing the work of the U4SSC Thematic Group on City Platforms, Ramon Ferri spoke about the importance of integrating city management from a city perspective to provide good solutions for citizens and city development. The Thematic Group identifies current best city practices, unresolved challenges, and requirements that must be tackled via integrated city management.

He introduced the latest U4SSC report titled "Compendium of survey results on integrated digital solutions for city platforms around the world, which presents the experience of cities, communities, and municipalities participating in the U4SSC initiative in developing their smart city strategies, the governance of smart projects, and the principal role of a smart city platform in contributing to improving the lives of their citizens.

Episode #15:
Smart city platforms for an integrated management in smart sustainable cities

He then shared a global perspective of how city platforms facilitate more efficient and effective control of public infrastructure and services, improve economic efficiencies, enable rapid development of new or complex services and play a critical role in the overall digital transformation of urban areas.

Ramon Ferri concluded by highlighting how the use of city platforms is changing the organization of services from silos to a more integrated approach. He emphasized the need for multidisciplinary teams to drive the digital transformation of municipal services.

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

During his presentation, Michael Mulquin unveiled a new deliverable aimed at providing guidance for cities in building and implementing smart city platforms. He spoke of various systems in a city that collect valuable data such as shopping, health, education, transport, and utility use. However, if each of these applications is handled separately, it becomes very complicated to combine the data from different applications to gain greater insights. Therefore, he emphasized the need for cities to develop integrated data platforms that take the common functionalities of different applications and make that into a platform to allow for many different solutions to be linked together to provide greater insights.

In his presentation, Michael Mulquin outlined three main areas: how to store and use data effectively; what sort of architectures are needed; and how to manage all the issues that need to be looked at in a minimal but sufficient way. He highlighted how cities are bringing together different layers to combine data and gain insights from them.

Michael Mulquin concluded his presentation by emphasizing that the development of a smart city platform requires a multidisciplinary approach and the collaboration of different stakeholders from the public and private sectors. He believes that cities can make the most of the data they collect by building integrated platforms that can provide a more holistic view of their operations, leading to better decision-making and improved quality of life for their inhabitants.

Alberto Bernal,
U4SSC Leader of Working Group 4
of the Thematic Group on City Platforms

Presenting a report on Smart Tourism: a path to more secure and resilient destinations, Alberto Bernal outlined its objective as being to guide tourist destinations and responsible parties on how technology, particularly smart platforms, can improve the management of the tourism sector. The tourism sector is an important contributor to the global economy, generating more than 10 per cent of the global GDP and one out of every four jobs in the world.

Episode #15:
Smart city platforms for an integrated management in smart sustainable cities

Alberto Bernal highlighted the importance of developing standards and norms, improving the methodology framework, and enhancing governance in the sector. Given the increasing frequency and severity of crises, it is critical to the development and sustainability of tourist destinations that they be able to cope with these challenges. The report identifies technology as a key contributor to resilience in the tourism sector. He described a tourist destination as an ideal case for Smart City platforms because it is a complex environment where private companies and public administration interact, and if well-orchestrated, they can provide interesting and attractive services to visitors. The report describes the Smart Tourism Destination framework based on five pillars: governance, innovation, technology, sustainability, and accessibility. This framework currently has more than 400 destinations, including destination management organizations, institutions, and collaborative members such as associations, businesses, and academic institutions, serving as an excellent example of knowledge and good practice sharing.

The report includes a large portfolio of solutions that are well-described in four main groups, including the management of tourism space, interaction and promotional channels, local touristic offer development, and competitive intelligence in the touristic sector. Lastly, he explained that the report also includes various success cases in different segments such as smart heritage, sun and beach, museum and culture, sustainable tourism, and sports and leisure.

Closing remarks

Tania Marcos,
Vice-chairman,
U4SSC

In her closing remarks, Tania Marcos highlighted the significance of seamless digital integration of technologies predicated on smart city platforms for successful digital transformation. Smart city platforms provide a central platform for managing data and facilitating communication across systems, which can boost interoperability. She added that leveraging big data can improve the delivery of city food services and meet the needs of citizens and visitors, while ensuring a higher quality of life. Tania Marcos explained that the U4SSC initiative is a global platform that is open to all interested stakeholders.

She encouraged everyone to stay connected and join one of these working groups to contribute to the discussion on smart city platforms at the global level. In conclusion, Tania Marcos emphasized the importance of collaboration and partnership to ensure the successful integration of smart city platforms, which will lead to more sustainable and resilient cities.

Episode #16:
Procurement for Smart and Sustainable Cities: Innovative mechanisms for Digital Transformation

This episode forms part of ITU's webinar series on Digital transformation for cities and communities on 9 September 2022

In the quest for driving digital transformation in the urban domain, the concept of smart and sustainable cities is being embraced as a means of facilitating innovation in designing urban futures in an increasingly data-centric urban ecosystem. To make this execution a reality, strategic procurement practices need to be employed in a fair, open, and transparent manner to secure digital products and services across sectors such that the benefits of digital transformation percolate to all sections of society.

This webinar delved into key smart city procurement mechanisms and measures along with the core challenges. The webinar provided a unique opportunity to showcase the ongoing work on the U4SSC deliverable – "Procurement Guidelines for Smart Sustainable Cities", which aims to underscore the importance of public spending life cycle for smart and sustainable cities - from planning, informing the market, evaluation, award, and managing delivery of services.

1500 – 1505	**Opening Remarks** Tania Marcos, Vice-chairman, U4SSC.
1505 – 1625	**Session 1 – Designing the future with Sustainable Procurement: Solutions and Challenges for Smart Sustainable Cities** **Moderator:** John Davies, Thematic Group Co-Leader, U4SSC. Warren Smith, Thematic Group Co-Leader, U4SSC [Presentation]. James Thurston, Vice-President, Global Strategy & Development, G3ict [Presentation]. Deniz Susar, Governance and Public Administration Officer, UN DESA [Presentation]. Mark Hidson, Director on Sustainable Procurement, ICLEI. Javier Orozco-Messana, National expert seconded to the European Commission [Presentation]. **Questions & Answers**
1625 – 1630	**Closing Remarks** Cristina Bueti, U4SSC Focal Point and ITU-T Study Group 20 Counsellor.

Episode #16:
Procurement for Smart and Sustainable Cities: Innovative mechanisms for Digital Transformation

Opening remarks

Tania Marcos,
Vice-chairman,
U4SSC

In her opening remarks, Tania Marcos spoke about the important role of sustainable and inclusive procurement policies for successful digital transformation. With the global population projected to reach approximately 70 per cent by 2050, there is a pressing need to establish technology transfer channels that can provide access to basic services and products.

She emphasized the role the U4SSC thematic group on procurement for smart, sustainable cities in providing guidance to cities and communities on how to handle limited resources, understand the needs of future generations, improve accessibility, and avoid investing in outdated technologies. In closing, Tania Marcos encouraged all stakeholders to engage with the U4SSC initiative and to join the thematic group on procurement for smart, sustainable cities.

Session 1: Designing the future with Sustainable Procurement: Solutions and Challenges for Smart Sustainable Cities

Warren Smith,
Thematic Group Co-Leader,
U4SSC

In his remarks, Warren Smith emphasized that the COVID-19 pandemic has exposed the weaknesses and gaps in the digital resilience of governments, as well as the already weakened governance and accountability systems due to corruption and bribery. The pandemic has revealed positive and negative practices in public procurement, leading to inequalities and vulnerabilities that have significantly affected smart and sustainable approaches. Corruption, fraud and bribery remain widespread, with an estimated global cost of 2.6 trillion USD annually.

He highlighted the role of cities in addressing the complex global crises of the pandemic and climate change. He also stressed the importance of scaling up efforts to improve smart and sustainable public procurement, as this is a critical but underutilized area of public policy, governance, transparency and accountability. Improvements in this area would bring substantial benefits to citizens, civil servants and governments worldwide.

Warren Smith provided an update on the development of U4SSC procurement guidelines for smart and sustainable cities. These guidelines are expected to assist cities in transitioning from traditional procurement approaches to strategically improving their supply chain performance, ultimately contributing to the successful achievement of the sustainable development goals. He underscored the need for public procurement approaches that are suitable for the 21st century and capable of achieving inclusive, equitable and sustainable policy outcomes with positive impacts on the economy, society, culture and the environment.

Episode #16:
Procurement for Smart and Sustainable Cities: Innovative mechanisms for Digital Transformation

James Thurston,
Vice-President,
Global Strategy & Development, G3ict

Outlining the mission of the Global Initiative for Inclusive ICTs or G3ict, James Thurston spoke of its work as a nonprofit organization dedicated to promoting the rights and inclusion of more than one billion people with disabilities worldwide, particularly in the context of technology and the digital transformation of society. A significant aspect of the organization's work focuses on technology procurement and its potential to enhance the inclusion and rights of people with disabilities.

He introduced G3ict's Smart Cities for All global initiative, which aims to advocate for the inclusive use of technology and data in cities. He also shared findings of a global study, which revealed that the current implementation of technology in smart cities exacerbates the challenges faced by people with disabilities, widening the digital divide rather than narrowing it. He emphasized the significance of accessibility and inclusion in cities, particularly in essential services such as public safety, justice systems, transportation, education and health care. The impact of using inaccessible technology in these services is profound. For instance, transportation apps that feature unreadable graphics, schedules, and maps hinder the usability of blind individuals who rely on screen readers.

James Thurston stressed the importance of prioritizing accessibility and inclusion in technology procurement within cities to uphold the rights and inclusion of people with disabilities. Many cities are currently failing to adhere to established global accessibility standards, which further perpetuates barriers. G3ict's Smart Cities for All global initiative encourages cities to adopt technology and data in an inclusive manner that champions the rights of people with disabilities.

Deniz Susar,
Governance and Public Administration Officer,
UNDESA

In his remarks, Deniz Susar discussed the findings of the Local Online Service Index (LOSI) survey conducted by the Department of Economic and Social Affairs of the United Nations, UNDESA. The survey, which takes place biennially, aims to evaluate online services of cities, providing a government assessment methodology for accurate comparisons and measurement of progress. The survey examines 88 indicators across five criteria, including technical content, services, participation, and the institutional framework. One indicator focuses on procurement-related initiatives on city portals such as forthcoming procurement processes and the publication of procurement results.

The survey initially began as a pilot programme in 2018, covering 40 cities, and expanded to include 100 cities in 2020. The upcoming 2022 edition looks at the most populous city from each UN Member State. However, out of the 193 member states, only 144 had an online presence on their portals. The average implementation rate for online services was 43 per cent, indicating that cities only implemented 43 per cent of the 86 indicators.

Episode #16:
Procurement for Smart and Sustainable Cities: Innovative mechanisms for Digital Transformation

Deniz Susar noted the significant room for improvement in city portals, particularly in procurement initiatives and platforms, with most of the studied cities lacking any online presence. Furthermore, services related to life events scored the lowest, and many cities lacked technology standards and guidelines. However, most city portals were accessible via mobile devices and utilized social media to engage with the public.

In conclusion, Deniz Susar summarized how the LOSI Network seeks to collaborate with research institutions and universities to apply the UN survey methodology in their respective countries. Recent studies were completed in Jordan, ongoing projects are taking place in Brazil and Palestine, and additional projects are in the pipeline. The survey also compared city portals with national portals, with national portals generally demonstrating better performance.

Mark Hidson,
Director on Sustainable Procurement,
ICLEI

Speaking on behalf of ICLEI - Local Governments for Sustainability organization that supports cities in implementing sustainable development programmes, Mark Hidson emphasized the role of procurement to achieve the goals and targets of public authorities, especially in times of crisis. He discussed how procurement can bring innovative, circular and sustainable technologies and solutions to the market, and support business access to valuable public sector clients. However, small cities face several key barriers when it comes to procurement such as requiring integrated and holistic approaches that are not standard in many cities, upfront capital costs, longer payback periods, and a lack of time, resources and skills for procurement.

To address these challenges, he recommended several key steps that cities should follow when implementing sustainable procurement programmes. These include identifying the real need or problem and thinking in terms of outcomes rather than technical solutions, engaging the market early to gather information about what products or services are available, and using different procurement procedures that vary at national levels and in different regions of the world. He emphasized that success in procurement relies on a level of political support, risk management, planning and early market engagement.

In conclusion, Mark Hidson highlighted that procurement can play a key role in accelerating the scale of transformation towards sustainable development. By implementing sustainable procurement programmes, cities can overcome barriers and achieve their goals and targets while contributing to a more sustainable future.

Javier Orozco-Messana,
National expert seconded to the European Commission

Discussing the value of innovation partnerships for smart cities and communities, Javier Orozco-Messana highlighted the scientific procedures employed by the European Commission to establish such partnerships. He emphasized the importance of evaluating the probability of success in the research and innovation process and how it affects the final

value of the product or service. He introduced the idea that the probability of success could be calculated using a statistical probability process, and he explained the detailed research method.

He identified three cases that could affect the final value of the product or service: the production process, the product or service itself, and the economic benefits of its use. Orozco-Messana acknowledged that each approach had its limitations and benefits and emphasized the need to consider these when evaluating the value of the final product or service.

In conclusion, Javier Orozco-Messana underscored the importance of evaluating the probability of success in research and innovation endeavors within the context of smart cities and communities. He noted that this assessment was crucial in promoting effective innovation partnerships and facilitating the development of sustainable and impactful solutions for smart cities and communities.

Closing remarks

Cristina Bueti,
U4SSC Focal Point and
ITU-T Study Group 20 Counsellor

In her closing remarks, Cristina Bueti emphasized the significance of moving away from conventional approaches and embracing the advantages offered by digital transformation. Providing an overview of the webinar, she highlighted the importance of accessibility and sustainability as key considerations in procurement processes. The United for Smart Sustainable Cities (U4SSC) initiative and the development of guidelines for small procurement activities were presented as collaborative efforts. She encouraged all participants to contribute to this important work actively and to provide their feedback.

She described how the webinar proved to be an informative platform, shedding light on the advantages of digital transformation in procurement. Of note was the focus on sustainability, which was deemed to be crucial in ensuring the long-term viability and impact of procurement practices. The U4SSC initiative and the guidelines for small businesses were recognized as instrumental tools in promoting sustainable procurement practices.

In conclusion, Cristina Bueti reiterated the significance of embracing digital transformation and incorporating accessibility and sustainability into procurement processes. She highlighted the collaborative nature of the U4SSC initiative and the guidelines for small procurement activities. The webinar served as a valuable source of insights, emphasizing the potential of digital transformation and sustainable practices to drive positive change in procurement and contribute to the overarching goal of sustainable development.

Episode #17:
Emergency responses in smart cities: Driving resilience in the post-pandemic era

Introduction

Cities worldwide are seeking to adopt strategies to rebound from the COVID crisis. Digital technologies were implemented during the peak of the COVID outbreak to support the development of models to predict the spread of the virus, coordinate lockdowns, report symptoms, trace vaccination patterns, and provide remote assistance. Driving digital transformation in smart cities can serve as a vehicle for the implementation of emergency communications and public health frameworks, coupled with surveillance mechanisms supported by technologies like Internet of Things (IoT) and Artificial Intelligence (AI) to provide timely responses to future epidemics and pandemics, thereby enhancing the resilience of the overall urban ecosystem.

Scope

This Webinar explored how digital technologies can be leveraged to manage future health-related disasters to make smart cities more resilient to pandemics and epidemics. It also showcased use-cases relating to the application of emerging technologies like AI and IoT in dealing with the COVID pandemic. The webinar also featured standout use-cases of smart city technologies that helped during the COVID crisis and can also help in potential futures public heath crises.

Target Audience

Participation was open to ITU Member States, Sector Members, Associates, ITU Academia, and to any individual from a country that is a member of ITU and who wishes to contribute to its work. This includes individuals who are also members of international, regional and national organizations. Participation in the webinar was free of charge.

1400 – 1415	**Welcome Remarks** Bilel Jamoussi, Chief Study Groups, ITU.
1415 – 1525	**Session 1: Smart public health emergency management** **Moderator:** Bastiaan Quast, Consultant, ITU. Leonidas Anthopoulos, WG3 Leader, U4SSC Thematic Group on City Platforms [Presentation]. Ana Riviere-Cinnamond, PAHO/WHO representative in Panama, PAHO [Presentation]. Maxim Interbrick, COO, SPARROW [Presentation]. **Questions & Answers**
1525 – 1530	**Concluding Remarks** Simao Campos, Counsellor, ITU-T SG16 and ITU/WHO FG-AI4H.

Episode #17:
Emergency responses in smart cities: Driving resilience in the post-pandemic era

Opening remarks

Bilel Jamoussi,
Chief of Study Groups,
TSB, ITU

In his opening remarks, Bilel Jamoussi spoke of the significance of digital health technologies in emergency response and management during public health crises in smart cities. He emphasized how the COVID-19 pandemic has accelerated the adoption of digital health technologies, including telehealth, to address challenges such as contact tracing and vaccination campaigns effectively. These technologies have played a vital role in responding to the pandemic and ensuring public safety.

He highlighted the efforts of the United for Smart Sustainable Cities (U4SSC) initiative in developing a report on Smart public health emergency management and ICT implementations. The report focuses on the utilization of artificial intelligence (AI) and the Internet of Things (IoT) to support rapid response to epidemics and pandemics. He added that the International Telecommunication Union (ITU) is actively engaged in the field of digital health through its study groups.

These groups are working on various aspects of digital health, including the development of guidelines for personal health systems, and collaborating with the World Health Organization (WHO) on AI for health (AI4health) initiatives. Bilel Jamoussi underscored the importance of digital health technologies in emergency response and management and encouraged broad participation in these important initiatives.

Session 1: Smart public health emergency management

Leonidas Anthopoulos,
WG3 Leader,
U4SSC Thematic Group on City Platforms

Speaking about the U4SSC Smart Public Health Emergency Management and IC deliverable, Leonidas Anthopoulos examined two key observations made during the COVID-19 pandemic. The first observation highlighted that the smart city infrastructure did not fulfil its promises in full, particularly in terms of early alert systems. The potential of the smart city infrastructure to provide timely alerts before the emergence of health crises was not fully utilized. The second observation focused on the experience of mass surveillance systems based on ICT technologies, shedding light on their implications and effectiveness.

Episode #17:
Emergency responses in smart cities: Driving resilience in the post-pandemic era

He discussed the framework for smart public health management, emphasizing the utilization of smart city infrastructure, emergency management systems, and other advanced applications. He introduced the architecture of a smart and sustainable city, highlighting how Internet of Things (IoT) sensing can collect and disseminate information through different phases. These data would then be used to deliver alerts to the relevant agencies through smart health care and smart safety and emergency systems.

Leonidas Anthopoulos emphasized the need to leverage the potential of smart city infrastructure and advanced technologies in public health emergency management, paving the way for more effective responses to crises and the protection of public well-being.

Ana Riviere-Cinnamond,
PAHO/WHO representative in Panama,
PAHO

The World Health Organization (WHO) representative in Panama, Ana Riviere-Cinnamond, spoke about the role of data and technology in addressing the COVID-19 emergency and its impact on the work of the WHO in terms of epidemiological data. With her previous experience in the Health Emergency Department, she highlighted the transformation in the WHO data collection process due to the pandemic.

She explained that prior to COVID-19, their data collection process was primarily manual. However, during the pandemic, they recognized the potential of digital technologies and AI-powered applications in obtaining information at various stages of the COVID-19 response. To explore this further, they gathered 27 cases from their network and conducted a literature review based on specific criteria. The technologies identified were classified according to their contributions in prevention, preparedness, response and recovery. Ana Riviere-Cinnamond emphasized that these technologies were primarily employed for COVID-19 screening, contact tracing, data sourcing, reporting, and medical imaging purposes.

Looking ahead, she highlighted the importance of leveraging the knowledge and experiences gained from the COVID-19 response to make emerging technologies more accessible. She expressed the intention to explore three key areas in the next phase: technical enablement, digital governance and outcome evaluation. She underscored the significant role of data and technology in the COVID-19 emergency response, emphasizing the need to harness this potential to drive advancements in health care and public health.

Episode #17:
Emergency responses in smart cities: Driving resilience in the post-pandemic era

Maxim Interbrick,
COO, SPARROW

In his remarks Maxim Interbrick introduced the main activities of Sparrow, a company specializing in smart cities by utilizing IoT devices to collect data on street-level environmental factors such as air pollution, noise and road quality. This information is then used to assist municipalities in effectively managing environmental factors in their cities.

He explained that Sparrow's approach involves the deployment of low-cost sensors on public transport vehicles, enabling the collection of data and the creation of hotspot maps within the city. This approach has been piloted in various cities around the world, including Geneva, Antwerp and London. The unique opportunity presented by the COVID-19 pandemic allowed Sparrow to implement its approach more effectively due to reduced traffic in cities. The pandemic also highlighted the importance of addressing air pollution and other environmental factors. Sparrow's innovative use of IoT devices and public transport for data collection has proven crucial for municipalities in making informed decisions regarding air pollution management and other environmental concerns.

Furthermore, Sparrow's standardization process ensures that their approach can be implemented flexibly, irrespective of a city's location. Their innovative methodology equips municipalities with the necessary tools to make informed decisions that directly impact public health and environmental well-being.

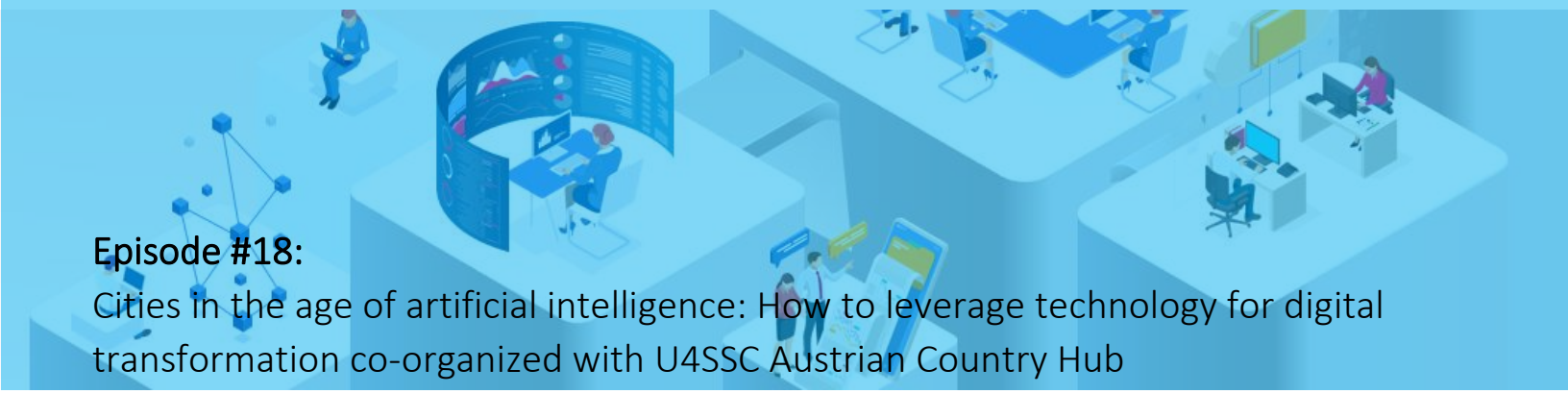
Closing remarks

Simao Campos,
Counsellor, ITU-T SG16 and
ITU/WHO FG-AI4H

Highlighting the challenges and opportunities associated with utilizing technology for the benefit of public health and emergency management, Simao Campos emphasized the importance of asking pertinent questions to address the underutilization of cities during crises. He identified three critical elements for effective crisis and emergency management: available technologies, digital governance, and outcome evaluation.

He provided examples of how technology has been harnessed during the COVID-19 pandemic such as the detection of COVID-19 in sewage and contact tracing efforts. However, he acknowledged that privacy concerns and governance issues have hindered the effectiveness of certain technological solutions. He stressed the necessity for technology to be accompanied by sound governance to yield optimal results.

Simao Campos emphasized the need to address challenges and seize opportunities in leveraging technology for the betterment of public health and emergency management. He stressed the importance of asking relevant questions, and identified available technologies, digital governance, and outcome evaluation as crucial elements. Lastly, he acknowledged the potential and limitations of technology, advocating for its implementation alongside effective governance and comprehensive outcome assessments.



Episode #18:
Cities in the age of artificial intelligence: How to leverage technology for digital transformation co-organized with U4SSC Austrian Country Hub

Introduction

This episode was part of ITU's webinar series on Digital transformation for cities and communities. The episode was co-organized by ITU and the United for Smart Sustainable Cities (U4SSC) Country Hub in Austria on 23 November 2022.

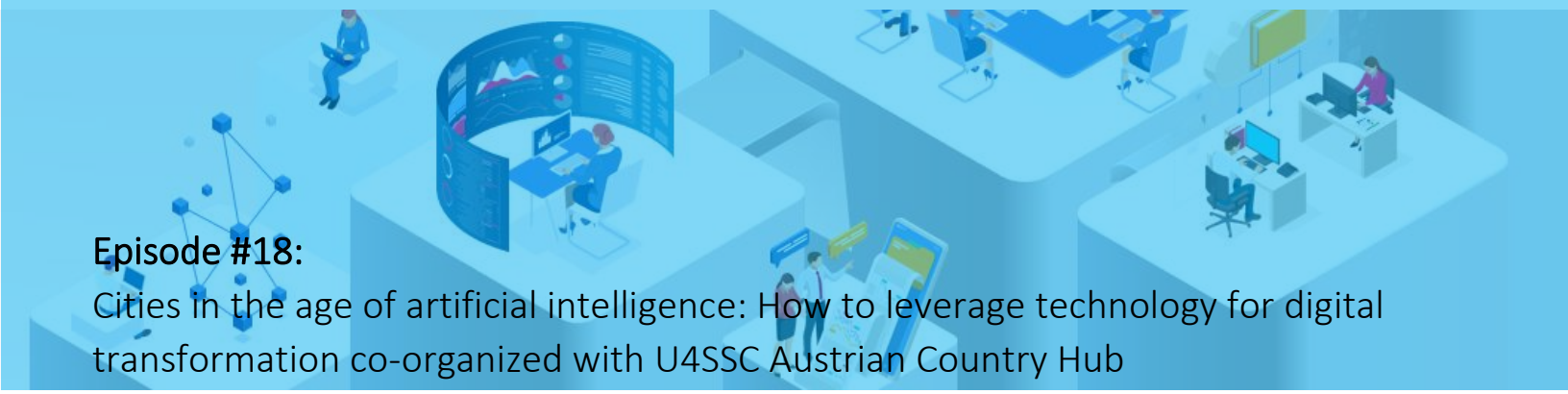
Digital transformation offers a unique opportunity to advance global goals. With the continued innovation and development of technology it has accelerated the shift towards digitalization worldwide. Technologies such as AI are quickly transforming cities, economies and organizations. Cities have an important role to play when it comes to supporting the integration of digital technologies, and in particular the adoption of AI technology.

AI has a significant potential to elevate cities and it raises the question of how cities can leverage this type of technology. This session highlighted the benefits and advantages of cities adopting AI to improve their services and enhance efficiency. The episode included city leaders and organizations with real-world examples of successful AI implementation.

Target Audience

Participation was open to ITU Member States, Sector Members, Associates, ITU Academia, and to any individual from a country that is a member of ITU and who wishes to contribute to the work. This includes individuals who are also members of international, regional and national organizations. Participation to the webinar was free of charge.

1400 – 1410	**Welcome Remarks** • Bilel Jamoussi, Chief of Study Groups, TSB, ITU. • Barbara Kolm, U4SSC Country Hub Leader and Vice President, Austrian Central Bank.
1410 – 1455	**Session 1: How to leverage technology for digital transformation?** **Moderator:** Tania Marcos, Vice-chairman, U4SSC. • Shazade Jameson, Author of the Report “AI & Cities” and AI Governance Consultant. • Okan Geray, Leader, U4SSC Thematic Group on Guiding Principles for Artificial Intelligence in Cities: "Guiding Principles for AI in Cities"[Presentation]. • Cristina Martinez, European Commission: "How cities can adopt AI: an EC view" [Presentation]. **Questions & Answers**
1455 – 1500	**Concluding Remarks** • Cristina Bueti, ITU Focal Point on Environment & Smart Sustainable Cities.



Episode #18:
Cities in the age of artificial intelligence: How to leverage technology for digital transformation co-organized with U4SSC Austrian Country Hub

Welcome Remarks

Bilel Jamoussi,
Chief of Study Groups,
TSB, ITU

In his opening remarks, Bilel Jamoussi highlighted recent developments in artificial intelligence (AI) and its potential for automating urban operations. Despite the potential benefits of AI in urban contexts, discussions surrounding AI-centred digital transformation have raised concerns related to privacy, large-scale application and deployment.

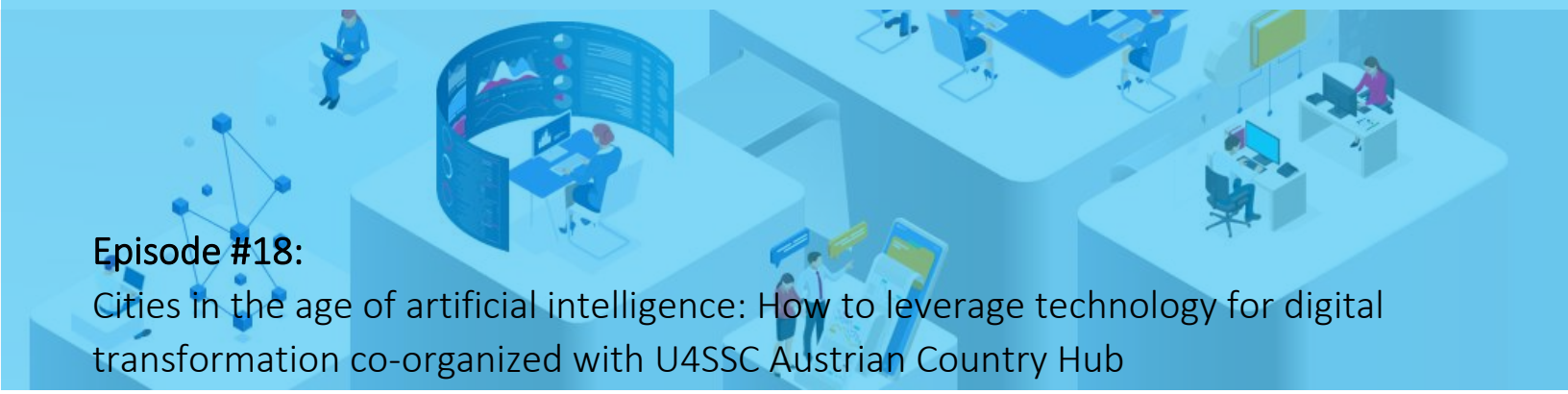
Recognizing the complexity of implementing AI in smart sustainable cities, the U4SSC (United for Smart Sustainable Cities) initiative plays a pivotal role in unlocking the potential of emerging technologies across different protocols within urban spaces. Through its various thematic groups, U4SSC explores the use of disruptive technologies to support efficient data collection, decision-making processes, resource allocation, objective situation evaluation, and infrastructure enhancement.

Bilel Jamoussi took the opportunity to acknowledge the work of the U4SSC country hubs, which serve as ideal platforms for promoting digital transformation activities and fostering innovation in their respective countries or regions. These collaborations pave the way for new partnerships necessary to address the growing challenges faced in the public space.

Barbara Kolm,
U4SSC Country Hub Leader and Vice-President,
Austrian Central Bank

Describing the work of the U4SSC Austrian Country Hub, Barbara Kolm emphasized the vast opportunities presented by emerging technologies such as artificial intelligence (AI) and the Internet of Things (IoT) for cities and communities. The interconnected network of IoT devices holds immense potential for efficient data collection, while AI provides the means to make informed decisions based on the data gathered from these devices. However, she acknowledged that the path to digital transformation is not without challenges and requires collective thinking, cooperation and the necessary expertise.

The U4SSC initiative serves as an open platform for discussions on envisioning smart cities and leveraging emerging technologies like blockchain, digital twin, and virtual reality to support digital transformation. Austria has taken a significant step in this direction by establishing the first-ever Country Hub at the Austrian Economic Centre. This hub serves as a platform for public-private sector cooperation and knowledge transfer to drive digital transformation across sectors in smart cities and communities. In conclusion, Barbara Kolm stressed the need for increased collaboration and knowledge exchange, highlighting the crucial role of the country hub in driving digital transformation in Austria.



Episode #18:
Cities in the age of artificial intelligence: How to leverage technology for digital transformation co-organized with U4SSC Austrian Country Hub

Session 1: How to leverage technology for digital transformation?

Shazade Jameson,
Author of the Report "AI & Cities" and AI Governance Consultant

Emphasizing the significant impact of artificial intelligence (AI) on cities and urban development, Shazade Jameson, stressed the importance of using AI in a transparent, accountable and public-interest-aligned manner. She went on to identify two broad categories of AI applications in cities: automation and data-driven predictive modelling. Automation involves using AI to streamline bureaucratic processes or urban services, while data-driven predictive modeling entails extracting insights from data and designing new processes based on those insights.

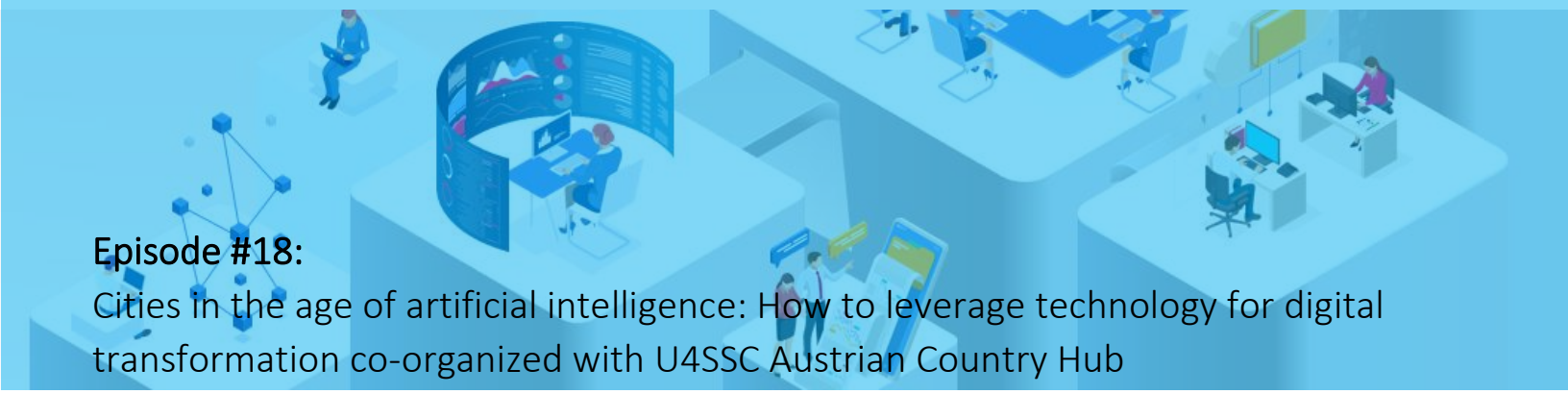
She shared two examples: from Barcelona, where a machine learning algorithm was developed to support social service caseworkers; and from Montreal, where a predictive algorithm was created to assess fire risks in wooden houses. Highlighting the importance of accountability and transparency in the use of AI in cities, she discussed the work carried out by the Global Observatory of Urban Artificial Intelligence, which focuses on accountability and transparency measures such as algorithm registers and algorithmic auditing. It is crucial for cities to align their use of technology with the public interest and operationalize the concept of the public interest through data governance structures and architectures.

Furthermore, Shazade Jameson introduced the Data Governance Clinics, a workshop-style approach she has developed to assist cities in implementing technology in a manner that aligns with the public interest at the local level. The clinics aim to empower cities to navigate the complexities of data governance and ensure that technology serves the best interests of the public.

Okan Geray,
Leader, U4SSC Thematic Group on Guiding Principles for Artificial Intelligence in Cities: "Guiding Principles for AI in Cities"

Introducing the work of the U4SSC Thematic Group on Guiding Principles for AI in Cities, Okan Geray outlined its objective as not to provide an exhaustive list of AI solutions but to offer guidance on how to implement AI effectively in smart and sustainable cities. The work of the group centred around four key areas: principles, enablers, governance, and implementation methodology.

The principles, enablers, governance and implementation methodology presented in the framework are designed to be adaptable to the specific contexts of different cities. The framework is technology agnostic, allowing cities to customize and select the elements that align with their needs. The group has compiled a comprehensive list of enablers, offering cities the flexibility to mix and match them according to their requirements.



Episode #18:

Cities in the age of artificial intelligence: How to leverage technology for digital transformation co-organized with U4SSC Austrian Country Hub

The framework serves as a guideline for cities to implement AI principles in urban contexts and helps them determine the most suitable approach for their unique situations. It allows cities to decide whether to adopt a centralized or decentralized implementation and provides options for varying levels of enforcement.

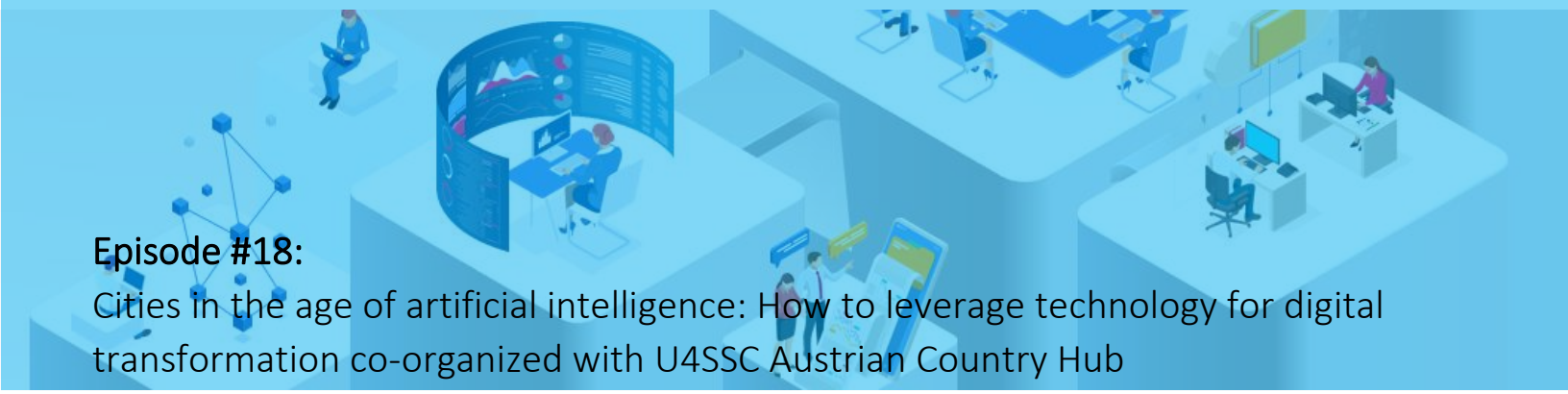
The implementation process involves several steps. Firstly, cities need to assess their existing baseline and identify any enablers, policies, or governance mechanisms already in place. Secondly, they can choose the guiding principles that align with their objectives. Finally, the results of the implementation should be evaluated, and the cycle can be repeated to ensure continuous improvement.

Cristina Martinez,
European Commission:
"How cities can adopt AI: an EC view

Discussing the European Commission's perspective on how AI could be used to assist urban and regional communities in achieving their goals while addressing their challenges, Cristina Martinez emphasized the importance of ensuring that AI works for society and was developed within legal, ethical and cultural boundaries. She cited the McKinsey Global Institute report as an example of how AI could bring numerous benefits to cities, including improved infrastructure management and enhanced mobility.

The European Commission has published three important documents: a communication on fostering a European approach to AI; an action plan on artificial intelligence; and a proposal for a regulation to establish harmonized rules on AI, known as the AI Act. Furthermore, three initiatives have been introduced by the European Commission to ensure trustworthy AI for public administrations, including citizen communities, and to facilitate the procurement process. These initiatives involved the development of a set of minimal algorithmic capabilities for contractual conditions, the establishment of an algorithm registry to enhance citizen trust, and the promotion of catalogues of AI-enabled applications.

She emphasized the importance of procedural transparency, technical transparency, and explainability in the AI decision-making process. Cristina Martinez concluded her remarks by reiterating the European Commission's commitment to fostering responsible AI practices, promoting transparency, and ensuring that AI served the best interests of urban and regional communities, thus contributing to the overall well-being of society.



Episode #18:
Cities in the age of artificial intelligence: How to leverage technology for digital transformation co-organized with U4SSC Austrian Country Hub

Closing remarks

Cristina Bueti,
U4SSC Focal Point and
ITU-T Study Group 20 Counsellor

Reflecting on the insights and important considerations shared during the webinar, Cristina Bueti highlighted the potential of AI in driving digital transformation, improving urban efficiency, and promoting environmental protection to enhance the overall quality of life in cities and communities. She spoke about the valuable work of the U4SSC Thematic Group on Guiding Principles for Artificial Intelligence in Cities and the framework it developed by analysing AI-based governance policies and regulations, incorporating successful case studies of AI applications.

Cristina Bueti also acknowledged the efforts of the European Commission in advocating for AI procurement in transportation and the establishment of the AI for Europe platform and AI for Cities initiative to facilitate knowledge exchange. The AI legislative package presented by Christina Martinez was recognized as a valuable guide for AI deployment in cities from the implementation perspective. The work of the U4SSC country hub in Austria, as a centre for coordinating digital transformation and proposing key performance indicators, was also commended. More such hubs are expected to emerge globally to drive implementation activities.

Episode #19:
Tourism in smart cities: Reimagining the road to digital tourism co-organized with UNWTO and UNE

Introduction

This webinar was part of ITU's webinar series on Digital transformation for cities and communities. The webinar was organized jointly by ITU, UNWTO and UNE on 07 December 2022.

The concept of "smart tourism" is understood as a tourism development model based on technology, innovation, governance, sustainability, and accessibility. It aims to ensure an inclusive and resilient long-term vision of tourism that can be leveraged through the adoption of information and communication technologies (ICTs), to better plan, measure and manage tourism allowing evidence-based decision-making in destinations on key issues such as infrastructure, carrying capacity and mobility. The adoption of this Spanish model contributes to enhancing the overall visitor experience of a destination, while allowing the management of natural and cultural resources and fostering the engagement of the community in the tourism sector.

Scope

This webinar explored the concept of smart tourism, while delving into best practices for the adoption of emerging technologies like AI and IoT to drive digital transformation of tourism management in cities according to the current context, facing present and future challenges. This webinar presented the latest U4SSC deliverable on "Smart tourism: A path to more secure and resilient destinations".

Target Audience

Participation was open to ITU Member States, Sector Members, Associates, ITU Academia, and to any individual from a country that is a member of ITU and who wishes to contribute to the work. This includes individuals who are also members of international, regional, and national organizations. Participation in the webinar was free of charge.

Episode #19:

Tourism in smart cities: Reimagining the road to digital tourism co-organized with UNWTO and UNE

1300 – 1310	**Welcome Remarks** Bilel Jamoussi, Chief Study Groups, ITU. Sandra Carvao, Chief of Tourism Market Intelligence and Competitiveness, UNWTO.
1310 – 1355	**Session 1: Reimagining the road to digital tourism** **Moderator:** Tania Marcos, Vice-chairman, U4SSC. Ramon Ferri, Leader, U4SSC Thematic Group on City Platforms and Director of Institucional Relations, SEGITTUR: "Smart Destination Platform" [Presentation]. David Giner, Project Coordinator, Instituto Valenciano de Tecnologías Turísticas: "The pathway towards smart destinations: the experience of the Region of Valencia" [Presentation]. Sergio Guerreiro, Director, Knowledge Management and Innovation, Turismo de Portugal: "Towards data-driven tourism management" [Presentation]. Ahmed Ali Alsohaily, Group Head of Technology, Red Sea Global: "Red Sea Global: Sustainable Development for Future Generations" [Presentation]. **Questions & Answers**
1355 – 1400	**Concluding Remarks** Sandra Carvao, Chief of Tourism Market Intelligence and Competitiveness, UNWTO. Cristina Bueti, Counsellor, ITU.

Episode #19:
Tourism in smart cities: Reimagining the road to digital tourism co-organized with UNWTO and UNE

Welcome Remarks

Bilel Jamoussi,
Chief of Study Groups,
TSB, ITU

In his opening remarks, Bilel Jamoussi provided an overview of the smart tourism concept, as the use of frontier technologies to deliver better experiences for tourists without interfering with the city's operation. In 2019, 1.5 billion international tourist arrivals were recorded, and technology has made it easier for tourists to book flights and hotels, and access mobility services.

The data generated from IoT and AI systems can help integrate, analyse, and ultimately optimize decision making, which in turn, enhances the tourist experience, offers new business opportunities, and improves destination governance. Social media and travel sites also generate data that can be leveraged to predict travel behaviour, customer preferences, and in-demand services. While the COVID-19 pandemic has severely impacted the tourism sector, it has also presented an opportunity for the sector to bounce back by enabling the digital ecosystem to deliver facilitated check-ins, QR codes for restaurants, and enhanced virtual reality experiences for specific destinations.

The recently published U4SSC report on Smart Tourism, a Path to More Secure and Resilient Destinations, provides practical recommendations for establishing a destination framework to support cities in developing smart tourism destination platforms. Bilel Jamoussi encouraged further collaboration to support the tourism sector's evolution in the post-pandemic era.

Sandra Carvao,
Chief of Tourism Market Intelligence and Competitiveness,
UNWTO

Sharing the experience of the UNWTO, Sandra Carvao acknowledged the significant increase in the application of technologies within the global tourism industry over the past few decades. According to UNWTO estimates, tourist arrivals rose from 528 million in 2005 to 1.56 billion in 2019. The adoption of various technological advancements aimed to improve convenience, operational efficiency, and prioritize the comfort and safety of tourists, has led to the emergence of smart tourist destinations.

However, due to the complex nature of this concept, further analysis and studies are necessary. The October 2022 report "Smart Tourism, a Path to More Secure and Resilient Destinations" provides this initial analysis. The report examined case studies on the adoption of mobile applications, artificial intelligence, IoT, and virtual reality. It also emphasized the unprecedented global crisis caused by the COVID-19 pandemic, which severely impacted the global tourism sector.

Episode #19:
Tourism in smart cities: Reimagining the road to digital tourism co-organized with UNWTO and UNE

The UNWTO provided valuable inputs and insights in the report, showcasing their experience in supporting the industry following the crisis, particularly through the utilization of innovative technologies. The role of digital technologies was highlighted in enhancing the resilience and sustainability of the tourism sector while ensuring the comfort and safety of tourists.

Session 1: Reimagining the road to digital tourism

Ramon Ferri, Leader,
U4SSC Thematic Group on City Platforms and Director of Institutional Relations,
SEGITTUR: "Smart Destination Platform"

Introducing the Smart Destination Platform in Spain, Ramon Ferri described its aim of digitally transforming tourist destinations in the country. Its objectives include resolving issues for connected tourists, enhancing their experiences, offering external solutions for tourist destinations, and ensuring inclusivity for all enterprises. The plan is to extend this unique platform to more than 50 destinations in Spain, with funding provided by the European Commission through the Recovery and Resilience Plans.

The idea is of a platform which gathers data from various destinations and creates a meta-platform that provides a unified service for all tourist destinations in Spain. The platform will foster open innovation, enabling comprehensive searches and provide digital ecosystem solutions to marketers and companies. The platform aims to offer 20 common services by gathering information from different destinations in Spain and provide value-added services beneficial to the destinations. This platform is expected to facilitate a digital transformation of the tourism sector and provide a comprehensive solution for tourist destinations in Spain.

David Giner,
Project Coordinator, Instituto Valenciano de Tecnologías Turísticas:
"The pathway towards smart destinations: the experience of the Region of Valencia"

Describing the important role of smart tourism in Valencia, Spain, David Giner introduced Invat-tur as a specialized centre dedicated to generating and transferring tourism knowledge through research, development, and innovation activities. Invat-tur focuses on generating and transferring tourism knowledge for research and development projects, as well as addressing the housing needs in various aspects of the tourist market. The centre placed particular emphasis on smart destinations, R&D, and AI, and had recently launched their Smart Data Office.

David Giner discussed the Tourism Communitat Valenciana, which served as the region's tourist board, focusing on governance and the involvement of the local private sector prior to implementing technological solutions. The aim was to organize the foundation of destination management by involving relevant areas, with a strong emphasis on the cross-cutting nature of tourism activities and the role of the local private sector.

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David Giner also discussed three main tools facilitating the transition towards smart decision models. The first tool was the smart destination regional network, which formed an ecosystem consisting of companies, technology firms, universities, and destinations. The second tool was the model selection office, an operational tool managing information generated by the strategy and procedures developed by the destinations, while monitoring their progress based on smart destination system indicators. The third tool was the Smart Data Office, which provided destination demand information to support marketing decisions.

Sergio Guerreiro,
Director, Knowledge Management and Innovation,
Turismo de Portugal: "Towards data-driven tourism management"

Providing an overview of Portugal's experience with data-driven tourism management, Sergio Guerreiro discussed the role of the National Tourism Authority in Portugal, or Turismo de Portugal, in overseeing all aspects of the value chain, including marketing and promotion, sector funding, and regulation. The institute also prioritized knowledge and innovation, leading to a focus on smart destinations and data-related challenges.

Turismo de Portugal positions itself as a data hub for the Portuguese tourism industry, consolidating data from various sources to support decision-making at the firm and the destination levels. Developing a strategy to collect and deliver data from these sources through a single publicly accessible platform, facilitated better decision-making in the tourism industry. The COVID-19 pandemic accelerated the utilization of data in decision-making processes, and Turismo de Portugal recognized the challenges faced by small and medium-sized enterprises (SMEs) in data collection.

The pandemic necessitated new data requirements, including understanding mobility patterns, satellite data analysis, market-specific searches for Portugal, and consumption trends. Turismo de Portugal found that 85 per cent of companies in Portugal were SMEs that often lacked the necessary resources, time and funds to collect data from multiple sources. Satellite data emerged as a critical information source for understanding future tourism trends in Portugal, enabling the anticipation of future scenarios, and addressing challenges faced by the private sector tourism industry.

Ahmed Ali Alsohaily,
Group Head of Technology,
Red Sea Global: "Red Sea Global: Sustainable Development for Future Generations"

In his remarks, Ahmed Ali Alsohaily emphasized the commitment of Red Sea Global, a company owned by the Public Investment Fund of Saudi Arabia, to sustainable development initiatives. The primary objective of responsible and regenerative tourism destinations was to enhance Saudi Arabia's luxury tourism offerings while ensuring sustainability and the preservation of the natural environment for future generations.

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Red Sea Global focused on three key pillars: preserving the pristine nature of the region; providing unique guest experiences driven by technology; and aligning with the 17 Sustainable Development Goals (SDGs) set by the United Nations. To achieve sustainability, the company is implementing a smart platform that integrates all aspects of the ecosystem to optimize services, leading to unprecedented synergies and efficiencies. The company plans to harness the power of smart technologies, including robust applications for online registrations, visa applications and bookings so facilitating a seamless and hassle-free entry experience for tourists.

Concluding Remarks

Sandra Carvao,
Chief of Tourism Market Intelligence and Competitiveness,
UNWTO

In her concluding remarks, Sandra Carvao acknowledged the numerous insightful points raised during the webinar. She highlighted the significance of digitalization and the democratization of data at all levels of the tourism value chain, emphasizing their crucial role in effective planning and management of the tourism ecosystem. She identified integration and processing of data through digital platforms as key drivers for enhancing the competitiveness and sustainability of tourism destinations. Furthermore, she stressed the importance of a robust and inclusive governance model based on public-private-community management and cooperation to ensure the implementation of smart solutions that benefit all stakeholders.

Cristina Bueti,
U4SSC Focal Point and
ITU-T Study Group 20 Counsellor

At the conclusion of the webinar, Cristina Bueti highlighted the rapid growth of the tourism industry and the crucial role played by technology in its development. The webinar underscored the significance of smart cities in enhancing the tourism ecosystem through the utilization of smart technology to collect and analyse data from physical infrastructures and portable devices. The adoption of shared services platforms with a range of digital solutions was emphasized as a key element in bolstering the tourism ecosystem and creating a highly interconnected network.

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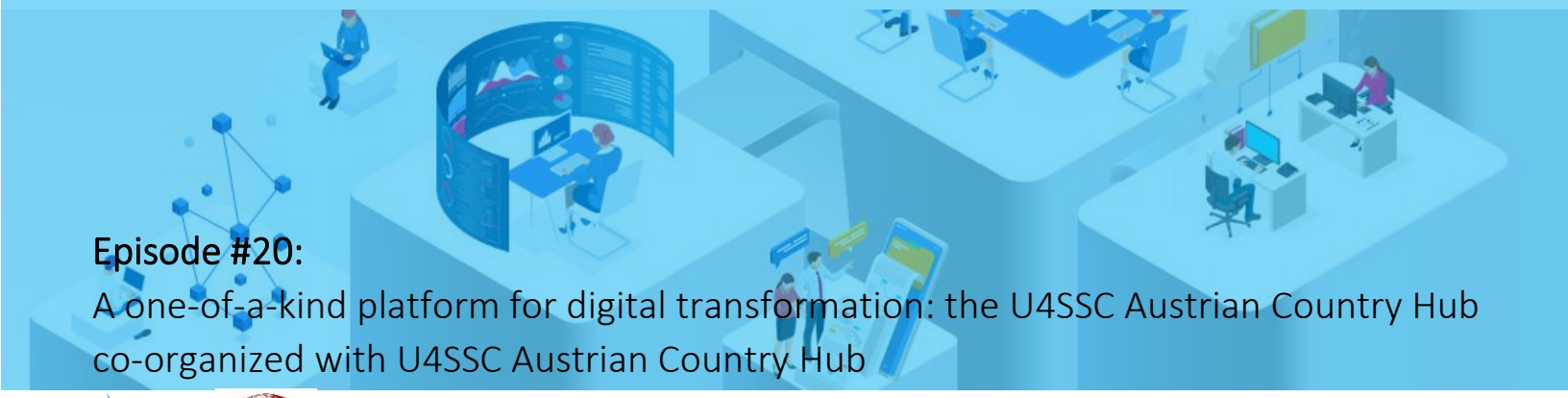
She cited Valencia as an exemplary city that has embraced smart buildings through strong collaboration between the central and regional levels, while also aligning with the smart city mandate. The ongoing challenge lies in sustaining the use of these technologies to cater to the increasing number of tourists, especially in the post-pandemic era. In another example, Portugal has leveraged the COVID-19 crisis to accelerate the incorporation of emergency response measures into its smart tourism strategies. Similarly, the vision of Red Sea Global to position Saudi Arabia as a prominent destination on the global tourism map is underpinned by the smart tourism concept. The importance of defining Smart Destination Key Performance Indicators (KPIs) to continuously monitor the performance of destinations was also highlighted.

Cristina Bueti recommended the "Smart Tourism, a Path to More Secure and Resilient Destinations" report as a valuable reference for understanding the potential of technology and digitization in ensuring the resilience, competitiveness and sustainability of the tourism industry.



Episode #20:
A one-of-a-kind platform for digital transformation: the U4SSC Austrian Country Hub co-organized with U4SSC Austrian Country Hub

Introduction

This episode was part of ITU's webinar series on Digital transformation for cities and communities. The episode was co-organized by ITU and the United for Smart Sustainable Cities (U4SSC) Country Hub in Austria on 7 December 2022.

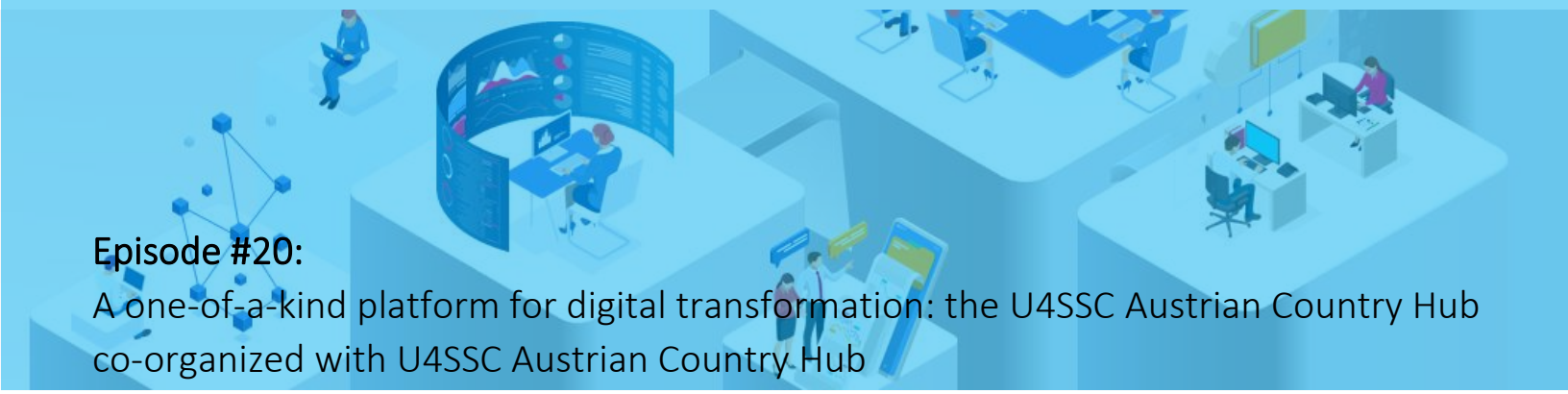
Digital transformation is here to stay and will help make cities and communities smarter, more competitive and more efficient. Digital transformation offers a unique opportunity to advance the Sustainable Development Goals (SDGs), and it is increasingly being embraced to drive urban governance, address socio-spatial disparities, and promote integrated sustainable development. With the right guidance, tools and resources, digital transformation can help cities serve its inhabitants better, enable and empower them in their day-to-day lives, and build inclusive and resilient communities that enhance the human urban experience for all.

To provide a space for cities and communities to leverage digital transformation, the concept of the U4SSC National Austrian Hub was established in Vienna by the Austrian Economic Center. This session presented the many activities of the hub in promoting the U4SSC Key Performance Indicators (KPI) for Smart Sustainable Cities. It also highlighted the benefits and advantage of implementing the U4SSC KPIs in Austrian cities.

Target Audience

Participation was open to ITU Member States, Sector Members, Associates, ITU Academia, and to any individual from a country that is a member of ITU and who wishes to contribute to the work. This includes individuals who are also members of international, regional, and national organizations. Participation to the webinar was free of charge.

1430 – 1440	**Welcome Remarks** Bilel Jamoussi, Chief of Study Groups, TSB, ITU. Barbara Kolm, U4SSC Country Hub Leader and Vice-President, Austrian Central Bank.
1440 – 1525	**Session 1: Overview of the U4SSC Austrian Country Hub** **Moderator:** Victoria Papp, Smart City Consultant, ITU. Andreas Weber, Senior Expert, Federal Ministry of Finance, Austria. Cristina Bueti, Focal Point on Environment & Smart Sustainable Cities, ITU: "Digital Transformation in Cities: Introduction to U4SSC" [Presentation]. John Smiciklas, U4SSC KPIs Verifier: "Digital Transformation in Cities: The Role of the U4SSC KPIs" [Presentation]. **Questions & Answers**
1525 – 1530	**Concluding Remarks** Paolo Gemma, Vice-chairman, U4SSC.



Episode #20:
A one-of-a-kind platform for digital transformation: the U4SSC Austrian Country Hub co-organized with U4SSC Austrian Country Hub

Welcome Remarks

Bilel Jamoussi,
Chief of Study Groups,
TSB, ITU

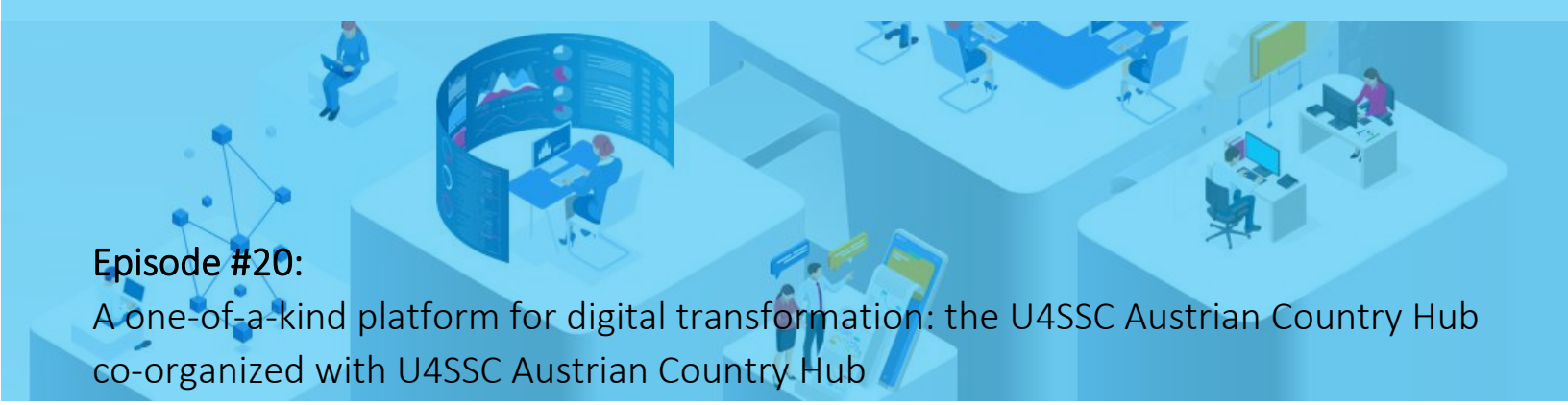
In his welcoming remarks, Bilel Jamoussi focused on the challenges posed by rapid urbanization and the adoption of smart city initiatives worldwide to promote sustainable development aligned with the United Nations Sustainable Development Goals. He also highlighted the United for Smart Sustainable Cities (U4SSC) initiative as a facilitator of dialogue and knowledge exchange for cities seeking to transition into smart and sustainable urban centres.

However, he noted that the implementation and monitoring of smart city projects continues to pose challenges for urban stakeholders. To address this, he shared information about the U4SSC Key Performance Indicators (KPIs) as an ideal tool for cities to assess their progress in alignment with the SDGs. The concept of U4SSC hubs was also discussed, with the first hub established in Austria and hosted by the Austrian Economic Center in Vienna. These hubs serve as valuable resources, offering guidance on digital transformation, promoting the adoption of new U4SSC KPIs, and organizing knowledge-sharing events to drive the transition to smart cities.

The development of smart cities cannot rely on a one-size-fits-all approach. Instead, it should be a collaborative effort involving multiple stakeholders, with cities learning from each other's experiences. The goal is to adopt diverse applications that enhance the efficiency and accessibility of services, ultimately improving the quality of life for citizens. Bilel Jamoussi spoke about the important role of the U4SSC platform as a collaborative space where cities can exchange knowledge and learn from one another about driving digital transformation across different domains using emerging technologies.

Barbara Kolm,
U4SSC Country Hub Leader and Vice-President,
Austrian Central Bank

In her welcoming remarks, Barbara Kolm highlighted the evolution of smart cities over the past decade, where technological advancements have been integrated into urban development. However, she noted a shift from a technocentric approach to a people-centric approach in overall city planning and urban design. Furthermore, there is now a greater recognition of the interconnected systems within the smart city ecosystem and the potential socio-economic impacts arising from the integration of physical and digital layers.



Episode #20:

A one-of-a-kind platform for digital transformation: the U4SSC Austrian Country Hub co-organized with U4SSC Austrian Country Hub

To facilitate the smart cities transition, it is crucial for cities to benchmark best practices and monitor their progress. The U4SSC KPIs serve as an ideal measurement tool for the diverse dimensions within the smart city ecosystem, and more than 150 cities worldwide have implemented them for self-assessment of their smart city journeys. Barbara Kolm also spoke about the important work of the U4SSC country hub in Vienna, Austria, hosted by the Austrian Economic Center. This hub aims to foster collaboration between the public and private sectors in the establishment of smart cities. Vienna, being one of the 150 cities that have implemented the U4SSC KPIs, will continue to contribute to the thematic groups of the U4SSC, she concluded.

Session 1: Overview of the U4SSC Austrian Country Hub

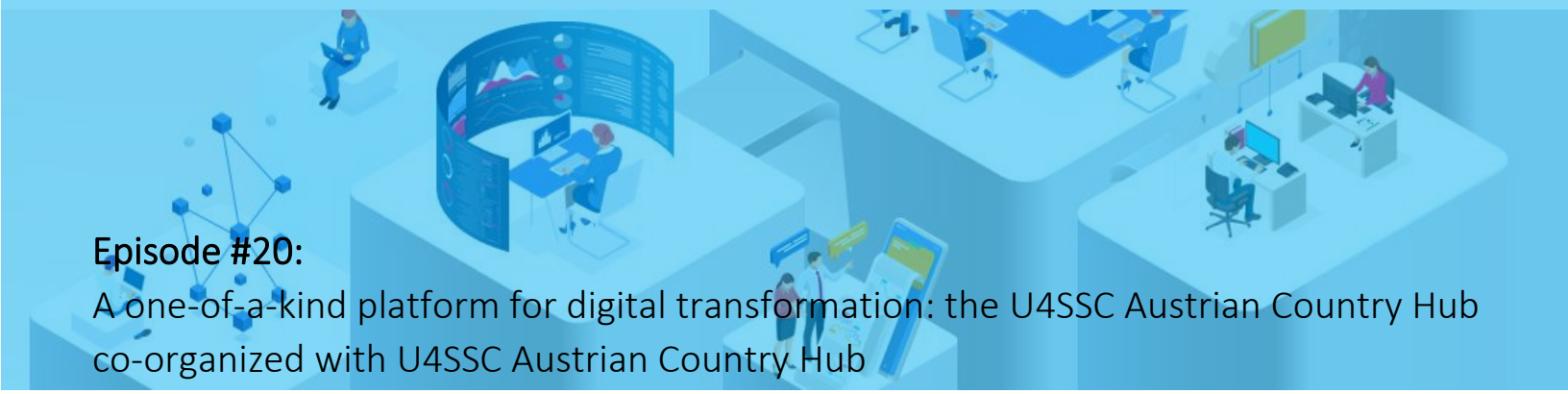
Andreas Weber,
Senior Expert, Federal Ministry of Finance,
Austria

Speaking on behalf of the Federal Ministry of Finance of Austria, Andreas Weber outlined their work in ITU and their commitment to integrating digitalization with the Austrian economy and industry. He noted that raw materials are crucial for the global economy, but acknowledged that their distribution is heterogeneous, and that some experts believe that Europe could improve its performance by utilizing its own mineral resources. He added that it is impossible to have sustainable cities without materials, and the availability of raw materials is a key factor in the manufacturing capability of the industry. However, factors such as climate action, non-wage labour costs, and over-regulation make it challenging for Europe to achieve import independence as quickly as desired.

Andreas Weber further explained that there are various supply chain models for raw materials. He noted that in the future, the transportation of liquefied natural gas (LNG) to terminals, and hydrogen via pipelines, will become increasingly important for cities. To address digital transformation in the raw materials industry, the Austrian Government plans to develop a tool to monitor supply chains. This toll will be developed together with the University College of Teacher Education Styria, Complexity Science Hub Vienna, and the Australian Institute of Economic Research.

Cristina Bueti,
Focal Point on Environment & Smart Sustainable Cities, ITU:
"Digital Transformation in Cities: Introduction to U4SSC"

Introducing latest activities of the ITU U4SSC initiative, Cristina Bueti, emphasized the importance of transitioning from a linear to a circular economy and maximizing the use of raw materials to address challenges faced by cities, including traffic congestion, reducing greenhouse gas emissions, optimizing energy and water usage, and managing financial constraints. She stressed that digital transformation presents an excellent opportunity to tackle these challenges amidst the backdrop of the pandemic.



Episode #20:
A one-of-a-kind platform for digital transformation: the U4SSC Austrian Country Hub co-organized with U4SSC Austrian Country Hub

She went on to describe ITU's role in assisting cities and countries worldwide in their digital transformation journey. As one example, ITU Study Group 20, dedicated to IoT and smart cities, is developing standards and guidelines to ensure interoperability, define requirements, capabilities, and architectures for cities, and address security concerns while upholding privacy and trust.

The U4SSC initiative encompasses six thematic groups that produce reports and guidelines on various topics such as artificial intelligence, procurement, and fostering people-centred cities through digital transformation. Additionally, reports on smart tourism, smart public health, emergency management, and ICT implementation, along with financing guidelines and tools for smart city projects, have been published.

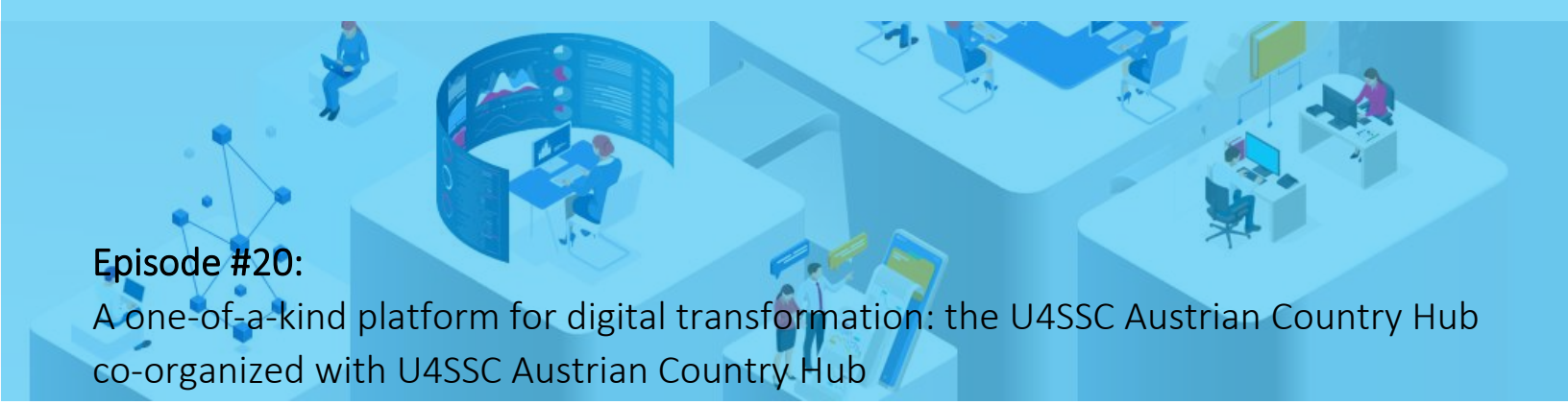
Cristina Bueti emphasized that achieving smartness and sustainability is an ongoing process that requires citizen engagement, partnership development, and impact assessment. The U4SSC has established a set of KPIs based on an ISO standard, which have been implemented in more than 150 cities worldwide. In conclusion, she stressed the need for innovative financing sources to complement public funds and urged cities to integrate climate and environmental policies, as well as mitigation and adaptation measures, to enhance their resilience.

John Smiciklas,
U4SSC KPIs Verifier:
"Digital Transformation in Cities: The Role of the U4SSC KPIs"

Presenting on the U4SSC KPIs, John Smiciklas provided a brief overview of their development, being based on ITU-T standard Y4903, which was initially published in 2016. The Y4903 standard originated from the Focus Group on Smart Sustainable Cities, which commenced its work in 2013. The KPIs were organized into three dimensions: economy, environment, and society and culture. They were further categorized into core indicators, which were essential for every city to report, and advanced indicators, offering a more comprehensive view of a city's performance. With more than 130 data collection points, the KPIs encompassed smart, structural and sustainable indicators.

The primary goal of the U4SSC KPIs is to provide a comprehensive, easily understandable, and collectible framework for tracking progress over time. Visuals were developed through benchmarking to offer cities an overview of their progress. These benchmarks facilitated comparisons of progress towards the Sustainable Development Goals (SDGs), as well as comparisons of performance with other cities globally. A detailed description of the KPIs, including rationale, benchmarking trends, methodology for calculating the KPI value, and potential data sources, is provided in the U4SSC KPIs methodology document.

John Smiciklas concluded by reiterating that the U4SSC KPIs have been successfully utilized by cities across various continents. The U4SSC KPIs contribute to promoting sustainable development and aiding cities in making progress towards their sustainability goals.



Episode #20:

A one-of-a-kind platform for digital transformation: the U4SSC Austrian Country Hub co-organized with U4SSC Austrian Country Hub

Concluding Remarks

Paolo Gemma,
Vice-chairman,
U4SSC

In his concluding remarks, Paolo Gemma summarized the day's discussions by highlighting the significance of smart, sustainable cities and how emerging technology can act as a driver for digital transformation. He acknowledged that smart cities and emerging technologies could help to enhance the overall quality of life of communities while promoting environmental protection. However, he cautioned that merely adapting technology was not enough to drive digital transformation in cities, and that a comprehensive approach was necessary. In this regard, he stressed the role of the UN and its specialized agencies in supporting smart, sustainable city initiatives worldwide. He also highlighted a significant step towards driving digital transformation, with the adoption of the U4SSC KPIs by nearly 150 cities worldwide. Additionally, the establishment of the first-ever country hub in Austria was a crucial development and a great example for others to follow.