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"THE ROLE OF STANDARDS IN ACCELERATING DIGITAL  
TRANSFORMATION FOR CITIES AND COMMUNITIES"

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>> GIFTY AMOAH: Good morning, good afternoon, good evening, Ladies and Gentlemen joining us from all over the world. My name is Gifty Amoah. It is with great pleasure I welcome you all to this virtual Forum on the role of standards in accelerating digital transformation for cities and communities. Recognizing the transformative potential of digital technologies and the urgency to develop a shared vision on digital transformation the objective of this Forum is to explore the role of international standards and good practices for developing driving and accelerating digital transformation in cities and communities.

I see many participants connected today and I look forward to your active participation during today's discussion. I invite you all to drop a quick message in the chat box icon seen at the bottom of the screens stating your name and the country from which you are connecting from. We have an excellent list of panelists for our discussion. We also have Chaesub Lee,

director of Standardization Bureau of ITU as well Nasser Saleh Al Marzouqi Chairman of the ITU-T Study Group 20. Dr. Lee the floor is yours.

>> CHAESUB LEE: Thank you very much. Very good day to you everyone. It is my great pleasure to welcome you to this new ITU virtual Forum on the role of standards in accelerating digital transformation for cities and communities. I wish all of you keeping your health in good spirit. For several years ITU has played a significant role in guiding the development of Smart Cities and the trajectory of ICTs.

So now with the COVID pandemic having impacted several cities and communities, in terms of their socioeconomic balance, so ITU considers it all the more important to encourage and support continuation of their smart development with the human centric approach.

International standards and Guidelines can be vital in helping to restart and also celebrate these efforts by providing expert guidance, rooted in best practice along with the technical and policy recommendations that cities can use to reset or reconfigure their priorities. Identify innovative solutions to the new set of challenges that they face. And ultimately target their digital transformation, potentially to becoming more proactive and prepare objective and inclusive.

So putting cities and communities back on their smart development pathways, and consolidating their progress will be necessary to achieve progress in the United Nations 2030 Agenda called the Sustainable Development Goals. Taxed due to the ongoing pandemic. It is imperative for cities to maximize the return on their investment in to digital solutions in areas of city life. From governance and city services provision, to public transport optimization and tracking management to delivery of health care and emergency services. To establishment of online based screen and more. Implementation of Smart City and digital technology standards such as those developed in the standardization sector by ITU-T Study Group 20 on Internet of Things and Smart Cities and communities, we go a long, long way in helping cities to ensure that any efforts and investments that they have already made towards harnessing digital technologies to implement the Sustainable Development Goals. We are on track to maximize positive outcomes and returns for their cities and business.

So I'd like to take this opportunity to thank everyone, everybody for joining us here today. And I wish you have a very productive and informative sessions. Thank you very much. And floor back to you. Thank you.

>> GIFTY AMOAH: Thank you, Dr. Lee. I would now like to call on Mr. Nasser Saleh Al Marzouqi, the Chairman of the ITU-T Study Group 20 to give us his remarks. Thank you.

>> NASSER SALEH AL MARZOUQUI: Thank you. Thank you very much, Gifty and thank you Dr. Lee for your kind introduction at this Forum. So Ladies and Gentlemen, good morning, good afternoon and good evening,

to you all. It is my great pleasure to welcome you to our virtual Forum today.

We are living in a digital age where broadband connection and digital connectivity are critical for cities and communities to meet different sustainability challenges. The global pandemic has further accelerated the digital transformation when businesses, organizations and families are all relying on Internet and digital solutions to stay connected with one another to achieve a strong recovery.

Standards provide Foundation for unlocking the future potential of digital transformation.

They offer city and community stakeholders with the technical guidance for enabling integration and interoperability in their digital systems and infrastructure.

As more members of the global community look to facilitate the successful digital transformation, we also need to bring to their attention the important role standards can play in the process.

Our goal today is to explore the role of international standards in developing, driving and accelerating digital transformation in cities and communities. ITU-T Study Group 20 was developed international standards that address the standardization of IoTs and Smart Cities and communities. Study Group 20 enables the coordinated development of IoT technologies, including machine-to-machine integration, architectures for IoT, and mechanisms and as well as datasets deployed by various vertically oriented sector. Study Group 20 is building on an excellent partnership with IEC and ISO within a framework of a joint Smart City task force. I am happy to see my dear colleagues from ISO and IEC who are coleaders in this task force joining us in this virtual Forum. I'm very excited that today you will be joined by speakers from both ISO/IEC as well as other important organizations such as IEEE, TM Forum, OASC, who will be sharing the unique perspective and experience on using standards to accelerate digital transformation with us.

I also would like to take this opportunity to introduce you briefly to our great initiative called united for smart sustainable cities and I have the pleasure to Chair this initiative. So the United Nations General Secretariat recently highlighted in his roadmap for digital cooperation the digital technology has enormous potential for positive changes but can also reinforce and magnify existing forces. The U4SSC initiative aims to amplify the positive impact that digital technologies can play and impact the meaningful cooperation and partnership with city stakeholders. U4SSC is an UN initiative coordinated ITU, UNEP and UN Habitat and supported by 13 other UN agencies and programs to achieve Sustainable Development Goal No. 11 which is on make cities and human settlements inclusive, safe, resilient and sustainable. Study Group 20 counselor and the secretary for this initiative Cristina Buetti will provide you with more information about this

initiative during this Forum. As the Chairman of this initiative allow me to extend an open invitation to all of you to join us at the U4SSC and be part of our journey to bring sustainability and inclusive digitalization to all.

We have an excellent program ahead of us. And I'd like to thank our speakers, Moderators and participants for your participation. We highly appreciate your support and without further delay, I will give the floor to Mr. Jabir, the Moderator for session 1 to start off our virtual Forum today and I think thank you very much. Before that I give Gifty back the floor. Thank you I have much.

>> GIFTY AMOAH: Thank you Mr. Nasser Saleh Al Marzouqi and thank you Mr. Lee for gracing us with your presence. Before we delve in to the heart of our discussion, kindly take note of how the session will be run. So please note that all the questions will be taken during the Q and A session after all the presentations have been given. Participants can submit their question by typing in the Q and A window. The icon can be seen at the bottom of your screens. When submitting a question through the Q and A icon, kindly type first the name of the panelist to whom the question is addressed, followed by the question. If the question is addressed to the panel in general, please proceed without typing the name. The Forum is being recorded and the Forum will be made available on the event website. All presentation materials used today will be made available on website. So without further delay, I would like to give the floor to the Moderator of session one, Mr. Javier Garcia Diaz to lead us through the discussion of how standard can support digital transformation in cities and communities.

>> JAVIER GARCIA DIAZ: Thank you. Welcome to the first session. The topic is how standards can support digital transformation in cities and communities. Cities are called to achieve the SDGs and are challenged to provide the best quality of life for other citizens. In the current scenario the pandemic has provided a new stimulus of adoption of digital tools and emerging technologies. The concept of Smart Cities can provide guidance to make cities communities and also tourism destinations more resilient and responsive to crisis by having their interconnections and interdependencies better identified and by having their decision making capacity farther strengthened through city data.

Standards have proven to be an effective tool in developing and accelerating digital transformation for cities. Therefore, in order to overcome these challenges and build more inclusive, safe resilient and sustainable cities and communities it is of great importance to continue and strengthen collaboration and coordination between ITU, IEC and ISO in order to avoid duplication of efforts by national experts and reach our target audience. We are grateful to the excellent panelists for taking the time to join us. We look forward to hearing from them of how they are strengthening the cooperation international and at regional levels. Let me give the floor to our first speaker, Dr. Hyoungh Jun Kim. Dr. Kim joined the

research institute in 1988 and is currently working as senior vice-president of the institute. He has had about 33 years research experience in various divisions of EDRI, including info communications technology division, IT strategy research division, information and telecoms technology provision, protocol engineering center and intelligent convergence research lab. He has been currently serving as Vice-Chair of ITU-T to SG20 and is Chair of Working Party 1/20 and Convenor of JCA-IoT under SG20. The floor is yours. Thank you very much.

>> HYOUNG JUN KIM: Thank you. Thank you so much Mr. Diaz. Can you hear my voice?

>> JAVIER GARCIA DIAZ: Yes.

>> HYOUNG JUN KIM: Thank you so much. I would like to briefly introduce the presentation on behalf of ITU. I'm so happy to give you the presentation on behalf of ITU-T. So as you may see on the screen, in this presentation I would like to briefly introduce ITU-T activities to support the transformation in cities and communities. I will show what ITU-T did for cities and communities. And then I will introduce digitalization for the next topic. ITU-T Study Group 20 was established in 2015 in the middle of ITU-T study period. Before ITU-T Study Group 20 ITU-T had been carried out M2M and IoT activities through JCA-IoT and IoT-GSI. It is coordination activities not only ITU-T internal but also other places outside. IoT-GSI is a banner which under all IoT related questions in various Study Groups gather together and work together. Through this IoT-GSI ITU-T developed first IoT related recommendation which is Y20.16 overview in year 2012. JCA-IoT was extended its scope to include Smart Cities and communities under Study Group 20 instead of TSAG. JCA-IoT and GSI is maintaining standard roadmap which contain ongoing and published work on IoT and Smart Cities and communities in various SDOs. There are two activities which allowed nonITU-T member participation which are focused on Smart Cities and M2M. Next slide, as a result of IoT-GSI and M2M and SC&C activities, they established a new Study Group in 2020 which is dedicated for IoT. In the beginning it was assumed that the Smart City assumes one IoT applications. In year 2015, Study Group 20 was structured with two Working Parties, work partying 1 and Working Party 2. From the year 2017 name of Study Group 20 was changed as Internet of Things and Smart City and communities.

Next slide, please. The standards that ITU-T Study Group developed are called recommendations. This slide shows so-called core recommendation for IoT from ITU-T. Starting from ITU-T Y.2060 which defines what is Internet of Things, ITU-T developed the recommendation for common requirement, application requirement, IoT gateway requirement, network requirement, device manage requirement and finally functional requirements. In the year 2018 ITU-T published many recommendations based on oneM2M recommendations. After that ITU-T Study Group 20 is

developing the various recommendations based on those core recommendations and transpose the recommendation from 1MPM. Digital technologies and ICTs can deliver transformative impact in cities for each of 17 UN Sustainable Development Goals, especially for SDG 11 on sustainable cities. Digital technologies and other information and communication technologies are already being utilized in a number of ways to help cities attain smartness sustainabilities, liabilities, inclusions, resilience and economic prosperity. However at the same time, they can read the market concentrations exacerbate the working conditions, with inequalities due to unequal access and consume much the energy and contribute to green house gas emissions.

The standards support all processes of smartness and sustainability in cities from supporting the conception and bringing to market clearly cleaner and more energy efficient product to helping conserve to guiding the implementation of smart platform in cities that lead to the more transparent governance and participations to enabling circular economy models and advances in health care and health technology and more.

Therefore, the standards are a powerful knowledge tool that can support the global implementation and long term achievements of sustainable goal in cities. The International Telecommunication Union is the United Nations specialized agents for digital technologies and ICTs. With 193 Member States over 900 companies, organizations and members from academia, ITU-T's reach is truly global. So ITU has an important role reaching the standardization, standardizing on the use of ICT and digital technologies. And to educate on the opportunities but also the issues associated with uptake in cities.

Its international standardization report is especially vital to supporting interconnection and interoperabilities. One ITU standards per working day is approved on average and over 4,000 standards are currently imposed at the ITU.

ITU telecommunications standardization sector and its membership are at the forefront of standard development in various areas. So within ITU-T Study Group 20 is responsible for studies related to IoT and its applications and Smart City and communities. This includes a studies related to Big Data and e-services and smart services. Next slide, please.

In the area of IoT, in the IoT area, ITU-T Study Group 20 is developing various applications in various areas. For example, there were recommendations for smart palm, smart building, emergence core, et cetera. As I already mentioned, M2M specifications were transposed to ITU-T Study Group 20 and those were published as ITU-T recommendations in year 2018. Next slide, please.

In the Smart City areas, based on focus of activities and deliverables, ITU-T Study Group 20 is developing recommendations for smart services. Shared by a bicycle and smart train station and so on. Interoperabilities,

guidance for city leaders and stakeholder management, Smart City securities, accessibilities, emergency response, city requirements, service and platform and so on.

Also there is ongoing work on digital train system for Smart Cities. Next slide.

One of important activities of ITU-T is on KPIs, key performance indicators. And the UNEC organized a united for smart sustainable stays. It is an UN initiative coordinated by ITU and UNEC and UN Habitat and supported by UNEC and so on, and WMO to achieve Sustainable Development Goal 11, make cities and human settlements inclusive, safe resilient and sustainable. U4SSC serves as the global platform to advocate for public policies and to encourage the use of ICTs to facilitate and ease the transition of smart sustainable cities. The U4SSC developed a set of international key performance indicators for smart sustainable cities to establish the criteria to evaluate ICT's contributions in making cities smarter and more sustainable and to provide cities with a means for self-assessments in order to achieve the Sustainable Development Goals.

Over 100 cities worldwide are already implementing these KPIs. Next slide. The scope of the JCA on Internet of Things and Smart Cities and communities is to coordinate the ITU-T work on IoT and SC&C and provide visible contact for IoT. This helps to coordinate with external bodies working in the field of IoT and SC&C and enable two-way communications with these bodies. External bodies include representatives from relevant SDOs such as many distinguished standards organizations. And JCA-IoT and SC&C is open to ITU members and designated representatives to relevant standard development organizations Forums.

I encourage you to take a look at supplement 58 to the ITU-T cities which provide the roadmap. This roadmap contains a collection of standard and ITU-T recommendation related to IoT Smart Cities and communities and identification system, including I.D. and networks. Next slide.

Two major goals of the Smart Cities is to improve the quality of life and to achieve sustainability through ICT-based smart technologies in various domains where our daily lives are working. Next slide, the concept of digital twin refers to maintaining digital replicas from the physical world and entities. It can provide effective presentations of any visible and invisible things to agents. It be help citizens understand and participate in their surrounding environments in eco-friendly and sustainable ways. Next slide, please. Mostly environmental concerns cannot be solved by C of single domain but in directions of engaged multiple domains. For example, define problem may be caused by transportation sector vehicle, manufacturer, sector power plants. So correspondence can handle the problem effectively and get multi based decision making possible. Right side, the mathematical form of digital twin concept defeats an output of particular function is an input to other functions.

The input and output to and from functions impacted by each other can produce a more exact answer. Next slide.

Last slide is about new structure of Study Group 20. In the January of 2021 ITU-T fixed the set of questions under its Study Group. The new set of questions of Study Group 20 is shown, architecture and requirements for various services and applications will be dealt in Question 2 and Question 3. The interoperability issues among various domains will be dealt in Question 1. It was also decided to have dedicated question, Question 4 for data processing and management issues. Question 5 will cover emerging technologies and question 6 will cover security issues. Finally, evaluation related issues such as KPIs and the maturity model will be covered by question 7. Next slide. This is my last slide. Thank you for listening. Due to the time limitation I had to speed up my speech. Thank you.

>> JAVIER GARCIA DIAZ: Okay. Thank you very much, Dr. Kim for your presentation. I will now give the floor to Dr. Bernard Gindroz. He has been working for the French environment and energy management agency as regional director and head of industry and innovative technologies, Deputy Director for sustainable cities and territories. He is currently since 2014 an independent consultant on energy environment, climate change and Smart Cities with a special focus on standardization and technologies. He is very active on standardization and including today in particular as Chair of ISO/IEC 268, technical Committee of ISO as well as sharing the CENELEC European sector Forum on smart and sustainable cities and communities. So Dr. Bernard Gindroz, the floor is yours. Thank you very much.

>> BERNARD GINDROZ: Thank you very much, Javier and thank you for this kind introduction. Good day to all. I will just share my screen.

Okay. Can you all see my screen or slide?

>> JAVIER GARCIA DIAZ: Perfect.

>> BERNARD GINDROZ: Thank you very much. So as Nasser said in his nice introduction we are living in a digital world. So let me give you an overview about ISO technical 268 contribution to setting the basis of digital transformation of cities and communities. Transformation of cities is very complex challenge but also offer great opportunities to higher quality of life, more attractiveness, for instance. But this remains complex and needs long-term vision and commitment. Citizen engagement and should be planned through a wholistic approach with priorities. And that's where digitalization will be a key enabler to boost this transformation where also the cultural results will play a major role across.

Sorry, not to the right. Yeah. Is it fine? Okay.

So now we have to set a few steps towards these transformation that is not just a one day travel or journey. It needs a long-term vision and a long-term commitment also where the political engagement as well as citizen engagement will be key to ensure successful results. And after that, we need to define some targets and performance indicators for setting



strategies with objectives and define some roadmaps in an integrated manner. During and for the implementation phase, that's probably the most interesting because we will see the change in this phase, digitalization will be a key driver. With digitalization we can now try to reach many of unexpected objectives we had a few decades ago. So digitalization is a key driver. And benchmarking, bench learning will be useful for promoting supportive motivating other cities to follow the same tracks.

So to move to this transformation and make this cities extremely attractive in fact standards are a driver of the tracks because they can boost this digital transformation. They are also an essential tool for collecting best practice and success stories in benchmarking but also process of bench learning because standards also bring trust and confidence and they can be considered as a valuable support to any of the transformation, any of the changes.

That's exactly what drives the spirit and the strategy of the technical Committee of ISO, technical Committee 268 about sustainable cities and communities. We are developing standards to support cities and communities in their sustainable development. We have 70 countries from all continents participating to this work. Others are participating, directly participating countries all observing countries. And we contribute to the establishment and meeting the UN sustainable development goals. So far about 50 standards have been published or are under development.

As I said before, the -- we need this type of long journey with a long-term vision and a few steps to be implemented if we want to have a sustainable development. And this is exactly as I said, the vision and the strategy that is followed within the technical Committee 268. And we have developed an ISO37101 standards, management systems for these sustainable development in communities that support cities in this journey from a long-term vision, setting strategies, defining some roadmaps with target and implementing these roadmaps through permanent improvement look, what we call standardized jargon a two track approach. And this is where we need strongly engagement involvement data collection and digitalization.

So the -- what we bring in this as I said just to the contribution of this 268 we developed standards as I said from vision to implementation in support of each of the different steps or phases, you can see on the top of this slide, and we ensure through this management system standards 37101, coherent and robust development of all these different phases. And also always with a culture of engagement and culture of results.

These standards are defined, developed and set as toolbox to what's paving the way to digital transformation. As these standards will set the baselines and strategic targets to be met with a clear roadmap towards them. And then with this in mind we can easily identify where we need to collect data, how to consider this data. It will pave the way to digital

transformation and from the presentation we see that this will be essential for starting to move to this type of digital twin that are extremely powerful in the planning, but also operational phase of cities and its transformation.

Also the TC 268 is in strong collaboration with our colleagues from ITU. We gather all our different workforces to support and deliver an efficient effective toolbox to cities and communities towards their developments, smart and sustainable development and for that we have a dedicated joint task force that is extremely important for ensuring coherent set of standards for cities and communities.

So in conclusion, I would like to say that all these standards we are developing among all three sustainable development organizations SDOs and we are developing standards to boost this digital transformation. It is really something essential. And standards definitely can contribute to the acceleration because they bring trust and confidence. By bringing trust and confidence they have also contribute to citizen acceptance and especially about engagement which is extremely key if we want to ensure sustainability.

This development also bring a lot of added value because they support confidence in the decision making and they can offer through benchmarking a list of best practices, case studies and also robust technical references, guidance and especially management system to confront the decision makers and Governments in this long and complex journey towards the transformation of the city.

Standards also boosting the digital transformation because they contribute to derisking the investment. Thanks to alignment for understanding, it contributes to speaking the same language, having the same understanding of terms, for instance, and this is something essential for being able to communicate with different categories of stakeholders. They are also setting reference framework and solutions and also contribute to results oriented engagement which is something that had definitely is extremely important for investors. And finally, standards are also key enabler to boost the digital transformation and especially thanks to the strength and collaboration we have between ISO/IEC and ITU for the benefit of communities and full support of Sustainable Development Goals, SDGs. We are working together. We are listening to the expectation and the expression of needs from cities, and we tried to transform this in a very easy to be understood manner from standards that are also comfortable for implementation. We will definitely support all cities and communities in that sense.

That's my quick contribution, quick overview just as an introduction to probably some further discussion. Thank you very much.

>> JAVIER GARCIA DIAZ: Thank you very much, Dr. Bernard Gindroz. Excuse me. I just took some water and it went the other way.

>> BERNARD GINDROZ: I was too quick in my presentation, that's

it?

>> JAVIER GARCIA DIAZ: No, I took a little water and it went through the other channel. So thank you. I will now just would like to give the floor to Mr. Michael Mulquin. Michael has spent 25 years partnering with cities, rural areas and industry on how technology can help neighborhoods and cities work better. For the last eight years he has been focusing on the development and implementation of smart and sustainable standards and has had the opportunity to learn from many different experts. He is Chair of the IEC Smart Cities systems Committee. And is an active member of the Smart Cities standards work between both ISO and within the joint technical Committee No. 1 of ISO/IEC. So without further delay, and with my breath recovered, Michael, it is my pleasure to give you the floor. Thank you very much.

>> MICHAEL MULQUIN: I'm very glad that you are still alive.

>> JAVIER GARCIA DIAZ: Thank you. Thank you.

>> MICHAEL MULQUIN: Thank you everybody for setting such a great Foundation for this. We're looking today at how standards can provide a really good Foundation to help accelerate cities and communities the digital transformation of them to become more sustainable and to become better able to provide what their citizens need. Cities are very proud of their uniqueness. And seek to show all other cities why they are special. But, of course, the reality is that while every city is unique, a huge amount of the challenges and opportunities that cities face are common. Are common to many other cities. And one of the key things tasks that we have as standards bodies is to identify how cities can see which parts of the challenges and opportunities they faces are common, and which are those that are particularly unique to themselves. Because what's important is that we don't have every city having to try and develop it own set of solutions to all its own challenges. If we can provide common solutions to the common problems that cities face we can lighten the load of cities enormously and that's what we are trying to do in standards bodies. So in the IEC, we are working very hard developing a reference architecture that will provide a very clear detailed model of how cities work, that will help cities see, understand themselves and see what is unique and what is common in their city.

We are providing work on terminology and concepts so we can come up with a common language to help cities. And we are developing a whole set of use case collection analysis of work so we can get under the skin of cities and work out how the different systems in the city will work and how they relate to each other. That's why standards, that's why as we identify those common challenges and opportunities, and we identify common solutions through standards to those, we can help cities gain enormously in quality, time and money of the initiatives that they are taking. So standards are really important. And because of that, as we can get a sense of today,

there are many technical Committees, many standards development organizations, many Working Groups that are developing standards that are relevant to Smart Cities and I'm proud to be part of this very important community. We've done a lot. We have provided many very practical solutions already to tools to cities to help them in their movement towards becoming digitally transformed, more sustainable, smarter, more effective. And we can be very proud of that.

But what I want to do is just to spend a few moments with you thinking, challenging us a little bit and saying how much are our standards being used, and how appropriate can we know that they are for the cities that we -- we're aiming our standards, developing our standards for. They are very good. They are excellent but let's think a bit more carefully about how effective we are in the theory of the work that we are doing.

I often think, you know, we sometimes are very proud to be able to say tens of cities are following our standard. Maybe even 100 or 200 cities are following the standards that we are developing and implementing them. That's something we can be proud of. That's maybe a hundred million, 200 million citizens whose lives we have improved by the work we are doing. So that's something we can be very proud of. But I just like us to be realistic here.

There are nearly four and a half thousand cities with populations of over 150,000. If we are only touching 100 cities, 200 cities we are just barely touching the surface of what's needed because we know that times are urgent. We need to rapidly tackle climate change. We need to do a lot more effective work on making sure our cities are really sustainable. And we need to do a lot to ensure that our citizens can benefit from digital transformation. And if we are only touching the hundreds of cities, that's not enough.

So the question is why is that? There is a number of problems. One is that cities are interested in sets of complex issues whereas we in standards bodies tend to focus on specific areas of interest and technology. And often that means we develop our standard in silos from each other. And we try and guess how our technologies, how our solutions might help cities.

We have got another problem that with digital transformation and the way that citizens lives are changing nowadays, we need to move fast. And that's a difficult thing to do. And balancing that out if we want to move fast, we have to be accurate. We have to be sure that the standards we are promoting are standards that will stand the test of time. Cities are not going to invest time and resources to implementing standards if they can't be sure that they are going to continue to be supported by industry in to the future. And similarly industry isn't going to waste time and effort in our spend time and effort in to developing solutions if they think until three years' time the standards are going to change. We need to move fast but we need to move with a sure step and we need to make sure that the

standards we are putting together are ones that genuinely are going to help cities move forward. Just a take, the traditional way of making standards we make a decision, somebody suggests a national Committee, a company, a set of experts say let's standardize that. And if there is enough agreement, there is a process of developing those standards.

We put something together and we work really hard to make sure it works. It is logical. It covers everything. And once it is developed, we promote it and we market it. And it can be and this is I say extreme stereotype but it can be seen as build it will come process. If we do a good enough job people will come and stake those standards and use them. But, of course, that clearly isn't working because the vast majority of cities in the world today are not using our standards.

And are not able to follow these common approaches that we understand are so important. And so it is just to raise this question, increasingly nowadays when new products or services are being launched, there is this minimum viable product approach where rather than spending years to come up with a really perfect well formed product and then try and launch it, you actually start with a product that's very basic, that just has enough features to be useful and to see is there a market for that. Is there an interest. Is this useful and then to get those who are using it, as they use it then we start to get some good feedback about whether that product is useful. If it is not then we forget about it. If it is useful we say great let's continue to work with it. We can find out what added features we need to work on and maybe what features we thought were important aren't.

And that's a very interesting approach. And it is the kind of thing I suggest we need to be thinking more of. Now all of us, I mean the stereotype I went through it is a stereotype. It is a caricature of what happens. All of our standards bodies are trying to work through these challenges. We know that, you know, the united for smart sustainable cities is a great that ITU and others are working to embed their work in cities. We know that ISOTC268 has developed pilot cities that are working with them to pilot the standards. We know that OASC are trying to find ways to move more quickly. I think we need to do a lot more thinking about how we can make the processes better.

Where we can spend more time in trying to understand and get under the skin of what cities need, when we can start to trial options with different cities and industry to try and work out how it all plays out, where we can see when we find solutions that definitely are making a difference. That gives us the business case. That gives us the evidence we need to put the time and effort in to developing the standards. We develop them as families of standards with other standards bodies to make sure we are tackling every aspect together. When we develop them rather than focusing on marketing them to get them used, we also want to not only have a one-way communication, but actually to build links with those cities that are using

those standards. And those companies that are using those standards to get a sense are they effective and which bits are good, not so good, which are confusing so we can have a process of learning from that and of taking that back and having a continual improvement of the standards work that we are developing. A number of thoughts. I'm not going to go through them all but I kinds of things that we need to be thinking of much more seriously as standards organizations, we have a wider community. Many of you on this call will be involved in standards development work and others might be more involved more widely, we need to work as a whole community to make sure that we who are a standards bodies who are able to provide a certain kind of objectivity and credibility and transparency in the work we do, that we are able to develop the kind of practical standards that we'll be able to taken up gladly by not just tens or hundreds of cities by but thousands of cities around the world so we can see them accelerating their progress towards sustainability and smartness.

A quick mention of the features in the UK who have done an interesting piece of work and they interviewed users potential users to try and identify what gets in the way of standards being more widely used and there is some very interesting ideas and not published. It is the kind of thing that could be made available to standards bodies. And it gives some of the indications of the sorts of things we need to be looking at. So that we can do an even better job. I'm interested in continuing to work and to learn with you about how we can improve our processes. I would be very happy if anyone else is interested to see how we can work together to learn from each other and to have an even better process of building these standards that cities so much need to help provide that common way forward. I don't care who takes a lead on it. I would be very happy to find anybody else that we can work together to help get some good ideas up and running and start to learn together about how we as cities as we standards bodies can develop the sorts of standards that will genuinely accelerate the progress of cities towards digital transformation and sustainability. Thank you very much. Thank you.

>> JAVIER GARCIA DIAZ: Thank you Michael. Now fully recovered from my previous presentation. It has been really a pleasure to listen to you. Very relevant questions. Just what some of the colleagues were saying in the chat. We need to match the needs with the solutions and for that we need to listen and for that we need to involve in the standards development process to those that really know what they need. So thank you very much, Michael for your presentation. And now I move to the last speaker of the session, is Mr. Heng Qian is Convenor of ISO/IEC JTC1 Working Group 11 on Smart Cities. He is also currently the Chair of the standards institute of emerging technology and innovation in the Kilu University of technology in China. He is an advisor of China standardization experts committee and has over ten years of experience in management and

20 years of experience in IT related standards activities including IoT, Artificial Intelligence, Smart Cities, logistics information systems, automated and data capture, et cetera. He also as I said serves as Convenor of JTC1 Working Group 11 on Smart Cities and liaison officer to ITU-T of JTC1. So with all this, Mr. Heng Qian, the floor is yours.

>> HENG QIAN: Okay. Thank you, Javier. Hello. Good morning, good afternoon, good evening. So my topic is the uniqueness of the Smart City ICT.

So just like the previous speakers has mentioned technology integration helps cities to improve efficiency, reduce cost, open the floor to new of business services and improve the living conditions of citizens. And you can find that the ICT play a very key role in this one. And compatibility of ICT technologies is needed for cities and communities.

So you can find that key condition for creating value through integration is the compatibility of technologies. So which is best achieved through common and consensus based standards that ensure interoperability. So you can find that many ICT standards can be used in supporting this topic as digital transformation in cities and communities. And a lot of standards are from ISO/IEC, JTC1 information technology. We can find a list here. So data capture and identification, for example, bar code and RFID. That's JCT1/31 and data management so that's to promote harmonization of data management and facilities across sector specific area. So that's S C32. And also another topic is for daily life. We always say you have a concern and privacy and security. And in JTC1, SC27 is a right place.

And another point is the ICT network and cloud. And we can find that JTC1 SC38 and software engineering including application technologies and culture and programming language, that's SC7. And also IT service management, SC40 and also another hot topic is IoT including say sensory and digital twin. That's 41. And also the Artificial Intelligence, SC42. So you can find that under JTC1 we have a whole umbrella of -- whole family of members of ICT related topics and standards.

So let's move to the next. So if you look at this diagram from the top to the bottom, so on the top is Strategic Planning standards. Developing clear and efficient and overall Smart City strategy, identifying priorities. So just like our ISO TC268 Chair introduced. And if we move down, there is another layer for service standards.

So we covered a good practice. It's in delivering and managing across our transitional and cross-sectional Smart City application service. Say public service, and also a lot of public topics here.

And if you just drive down, you can find ICT standards. So IEC standards covers a practice environment requirement, technical solutions and system operating requirements for product and service to ensure that we achieve the intended, expected result for supporting Smart City development. So you can find that numbers in the ICT layer. So they are

the numbers of subcommittees and Working Groups in JTC1. And you can find from the bottom data acquisition, then network communication, and then computer and storage and then to data and service support. And also you can find that framework indicators along with security, provide the support to all the layers.

Actually, at the bottom is physical infrastructure standards which aim to combine the technology solutions and requirements, to achieve digital transformation of city infrastructure. So that's including design, upgrade management and operation for physical infrastructure.

So we can find the place for the ICT players. So if we just say -- just if you move, zoom in, so you can find the ICT layer along with their upper service layer something unique, because cities are becoming more connected and interconnected, integrated technological environment from their infrastructure to transportation, education, to power utilization, and so on.

So Smart City ICT poses unique problem and challenges requiring for far more interpretation of application devices. So you can find in the shadow parts, so the data and the service support parts, and if you can find some detailed information, say city data model and data use, and also city platform and also some new topics, say digital twin in city level. So a lot of interesting and unique pieces are in this shadow place. So the -- it is turn to be -- let me see.

Okay. It is turn to be that is a unique Smart City ICT. So we can find besides the fundamental stuff, say platform, cloud computing and software engineering and so on. We have something unique. Software platform, for open city data, semantic interoperability of city data and coordinating city operations, city operating systems and also the measurement of Smart City. So indicators. So there is a lot of steps from that.

So here is the list of projects that JTC1 Working Group 11 is working now. That's a unique part that I have mentioned in the previous slide. So you can find from ICT perspective you can find indicator standards give us a way of measurement of cities. And if we move down the three parts on reference framework gave you a guidance in general and the three city model standards that are underway for semantic interoperability of city data along with digital platform projects. So we can find that uniqueness of it.

And besides that, to fight the pandemic we can do something. So in JTC1, WG11 we are working on city service platform for public health emergency which aims at preventing the spread of emergency influence providing early warning and reducing damage to the public. Currently it is a working draft. And we are -- try to move as quick as possible.

So that's all for the short presentation. And I hope we can do more ICT standards in supporting digital transformation in cities and communities. Of course, we look forward to more of your support and improvement. Thank you.



>> JAVIER GARCIA DIAZ: Thank you very much. Thank you for the presentation and for the time. We are precisely short of time as it always happens with this sessions. But I'm not going to keep our colleagues from one question to each. But which I'm going to ask you for the sake of time and respect for the second session as well to be telegraphic in your answers. I mean one minute maximum. I would like to start with Dr. Kim in relation to the topic you discussed before, I would like to ask you from your perspective, about the role of IT for digital transformation. Please.

>> HYOUNG JUN KIM: Okay. Thank you for the question. In my view the digital transformation is the adoption of digital technology to transform services and businesses. So it will be done by replacing manual process with digital processes. It is all about data and data has become extremely valuable. So using digital technologies we need to provide input to those new systems and IoT will be used to gather information. For example, if we want to adopt digital technologies in the city services, we need to gather various information from city infrastructures by installing the sensor. So IoT can do this job quite well. Thank you.

>> JAVIER GARCIA DIAZ: Thank you very much. Next question is for Dr. Bernard Gindroz. We know that standards represent the kind of harmonized models. How could they be relevant to accommodate with local and specific contexts?

>> BERNARD GINDROZ: Yeah, thank you for this good question. Indeed not only geographical and climate context have to be considered but local and culture and historic contexts are key. They are the identity of city and citizens. It is essential to keep this alignments in any urban development. Not to try to become copy from other cities but keeping its own identity. This is something important. So standards do not impose solutions. They are proposed interoperability transparency and sometimes solution about common to all issues. But most of the time and this is, for instance, what we are trying to do with RS37101 we aim to guide cities towards urban development by suggesting issues for consideration like attractiveness, preservation, improvement of environment, resilience, social cohesion and well-being and community identity is a key element. So I think we definitely need to understand standards in support of. They can be by ideas and food for thought for getting inspired about what type of element to consider when they want to move towards more sustainability.

>> JAVIER GARCIA DIAZ: Thank you very much. I think in fact, you captured one of the questions that was also in the chat before from the audience about the how to consider the needs of smaller towns, not only the big ones. That adaption to local needs.

>> BERNARD GINDROZ: Definitely. We are developing some guide to medium and small cities. Thank you.

>> JAVIER GARCIA DIAZ: Thank you. Next question, to Michael Mulquin. How can we develop standards that will address at the same time,

the very different areas of public policy, practical challenges facing cities, profitable business models for suppliers? And in one minute.

>> MICHAEL MULQUIN: The first thing to say is this is why we need to work together very closely as a standards community. We've got a range of different expertise, different technical Committees, bring different experience to bear. Different knowledge to bear. And if we can find a way of identifying a city need that we can then work all the different levels together, IoT, telecommunications, data, management processes and so on, looking at working with industry to make sure we are also looking at business models, if we can do that where we bring our separate expertise, looking at the different aspects of it in a way where we link together, we can come up with solutions that are workable. So that's -- that's the reason we need the joint Smart City task force and we need to widen out to bring in the whole set of experts. And just to mention one other thing, Joann O'Brien is going to talk more about the TM Forum work. One of the things that I'm involved in there is a return on investment model we are trying to develop for complex ecosystems with Smart City as an example. How can you where you need a number of different companies to work together with public authorities, how can you come up with a return on investment model that takes in to account all the needs of all the different companies but also the public benefit issues that cities are really looking to develop, how you can bring value to that. So that's a really interesting piece of work. And we'd love people to get involved in that and to give feedback as we develop it further. Thank you.

>> JAVIER GARCIA DIAZ: Thank you. That's a very interesting piece of information as well. So linking what kind of what you said in your presentation, that technical matters but also with the practical ones. How to implement and make understandable and useable the outputs of our standardization works. Last question for Mr. Heng Qian. Also talking about digital transformation, please can you share with us the way JTC1 Working Group 11 is considering city data standards in light of digital transformation?

>> HENG QIAN: Thank you. That's a good question. Actually a common data model enables city software application to share information and coordinate and execute city task. And also to support decision makings. So this requires a clear understanding of the terms used in defining the data as well as how they are related to each other. So turn to requirements, goes beyond syntactic integration, protocols and data types. It requires semantic integration, a constant shared understanding of the meaning of information. This is a very basic start. And in JTC1 Working Group 11 currently we are working on the city data model, series of standards that support us to do it.

And you can find that fundamental concept, and dominant specific concept and service specific concept vertical domains. And at the same time JTC1 Working Group 11 also has a task force on city data use. How

data can be used. So there is a lot of topics in Working Group 11 regarding the city data. Thank you.

>> JAVIER GARCIA DIAZ: Thank you for the clear and straightforward answer. And I would like to thank in fact, the four of you, the four panelists of this session. I thank you very much for the fantastic overview that you have provided us of the current standardization landscape in this area. And I in particular want to highlight the importance, it is as important to develop the standards as to ensure that we promote their application that they are being used. That's a very good take-away from my side. I want to also thank you for highlighting the joint task force between ISO/IEC ITU for coordinate these activities at international level on Smart Cities. And with that, Gifty I would give the floor back to you so we can move to the second session with as usual a slight delay from the program. I thank you very much.

>> GIFTY AMOAH: Thank you for the very interesting discussion. I would call on Dr. Bilel Jamoussi of the ITU. The floor is yours.

>> BILEL JAMOUSSEI: Thank you Javier for the excellent moderation. And thank you speakers. Good morning, good afternoon, good evening. My name is Bilel Jamoussi, chief of the Study Group department at the ITU and it is really a great pleasure to be your Moderator for session 2 of the virtual Forum. I have been personally involved in the journey of smart sustainable cities since the 2013-2015 time frame when we introduced the ITU Focus Group on smart sustainable cities and very pleased to see how advanced we have come as a community since then.

In the session we will look at the digital transformation from a slightly different perspective. Digital technologies are playing a key role in the global responses to the COVID-19 pandemic. Too many governments policymakers and SMEs and even ordinary citizens digital transformation and digital capability are no longer an option but a necessity. As more stakeholders coming together understand their respective role in the digital transformation, the global community is also working together to bring forth new initiatives, and new ideas to ensure there will be a successful digital transformation for all.

I'm very excited in this session we will have speakers representing different digital transformation initiatives led by industries and the United Nations who will be sharing their latest insights and activities on how they are contributing to successful digital transformation.

We will have a Q and A session towards the end. And you will have an opportunity for an open conversation with our speakers. Without further delay, please welcome Davor Meersman, CEO of Open & Agile Smart Cities. He has international experience and setting up leading infrastructures and organizations on the forefront of technological innovation. He is a member of the United Nations Sustainable Development Goal 11 global Council. And a member of the European Commission's Steering Committee on advanced

technologies for industry.

Mr. Davor Meersman, the floor is yours for ten minutes, please.

>> DAVOR MEERSMAN: Thank you, Bilel. Thank you also for the invitation. It is a real honor to have the opportunity to present an update on what we have been up to as OASC. So I'll kick off with a short introduction and then kind of how everything translates and what kind of the method is that we use. We work on really is I think the core mission that also came out of the previous session and think a lot of it was a very welcome segway in to the presentation here. So what we try to do is out of realization of how important standards are, whilst maybe not explicit or known to all, it is like the air we breathe and it is important to maximize indeed usage update because it is the way forward in solving global challenges on the local level. So we OASC we are a global network that connects local levels all over the world and figures out minimal ways to ensure interoperability of solutions, services, data between local levels within local levels and also with broader -- with local levels. So with broader ecosystems.

We were founded -- we were founded six years ago by a group of cities, 31 cities from 7 countries. After three years we incorporated as a not-for-profit in Brussels. We represent an increasing number of cities and also kind of economic relevance for supply side to interact.

We are purely on the demand side. So nowhere in the Governments do companies take decisions on behalf of the cities. We only have one type of membership which is members and those are cities, towns and rural areas under the known definition of the joint definition.

And but the cities, the members they have support by partners. The core partners are the I think the ones that are core which are institutional partners that bring skills, know how, capabilities to the table for cities that doesn't let's say slant things in one direction or another. We have IMAC out of Belgium and we have the connected place catapult out of UK and the Fraunhofer institute joined in January and we have a few more of those announcements, those types of announcements coming in the coming period. Arvis University which is where our Chair helms from. And really good practice with the six iCap program on how to get standards right, locally regionally with the proper interfaces globally.

Of course, we -- the -- that group works with strategic partners. Some large. Some small. Usually at least on the national level. But typically beyond that. Like the United Nations, of course, we have been through ITU and various involvements and notably, of course, also U4SSC who I am happy are in this session and I will leave the explanation on that to Cristina. European Commission we have been working closely with units to make sure this motion of minimal interoperability is adoptable and made its way no key programs that have been developed, launched or recently launched. There is a lot to watch in that space. It is a welcome partner. And then, of

course, through the World Economic Forum, we had the honor to interface to other global communities and so forth.

In January we also launched our enterprise partnership program which is the most fruitful way let's say for global companies, companies that can deliver skill to work with our group of cities, also with let's say a strategic approach. January we had AWS, NEC group, join. We also worked with Microsoft on some aspects and we actually have, you know, other collaborations that aren't necessarily within the partnership program but where we do partner with companies and private entities that can bring scale. So we as a network we embody quite a unique consensus on the demand side that is global. And that morphs the work we do from practical to valuable by, you know, while cities create this platform for exchange, they also through the members become an addressable market to the other side of the market. So we do that through minimal interoperability mechanisms which, you know, refer to open standards and are a work-in-progress. And expandible let's say concept as well. And they function as catalysts because what one city does well another city can then just go and adopt. So we try realize this potential division and I know a lot, if not all the people in the standards community, realize it is there for the taking. So we try to offer that to the cities.

In a nutshell, what we try to do and I think it is also the challenge a lot of local levels face is well, they all face global problems locally. And they -- it is the same problems but in different shapes. Now the local levels though they are not geared towards international and global collaboration. What we try to do is improve that. So that they can work with the knowledge, with the tools, with the capabilities of other local levels in orchestration let's say between them.

So turning them from a drop in the ocean to being the ocean in that drop. So working with standing on shoulder of their peers. Because it is an important aspect I think or important nut to crack. The problems cities we as societies face on that local level in the places where we live they are, you know -- they don't discriminate based on where you happen to have been born or how big the city is or the community where you belong to. They hit us just as hard but what happens after, does change depending on where you are.

So what we try to do is, you know, ensure we do everything in a way that is accessible and position things, and work in a way that allows, you know, the -- well, where those kind of discriminating factors in terms of capabilities are mitigated. That means as a network we are free. It is free for cities. They don't pay anything. We try to make accessible as much as we can. We also try to be let's say an operationally reliable partner for cities to find stuff that they need. The -- the big part of what we do is also trying to be understandable, I think there is a problem in translation of the complexity of, you know, domains as standards try to capture and what your

average mid size city needs or policymakers need to have or to understand and to move forward with decisions. And that are needed as we all recognize. So that's kind of a way -- where we sit. We don't do a lot of -- I mean in the sense of we don't develop our own standards. We try to stay away out of good stuff happening. If it happens, we are happy. So I think that's where we try to do. We point, we adopt, we approve. We govern the things that we do but we try to harness and orchestrate good things happening elsewhere. And then make -- make that available in the optimal way to the community that we serve.

We do have some services let's say towards cities directly where we support them. So we have a festival which used to be called the connected Smart Cities and communities festival. The 10th anniversary was a virtual as many events were. We rebranded it as the CITYxCITY festival where we bring together the community. It doesn't make my job easier but it does make it better because it is a place where cities can come and work on the basis of trust. We have a catalog where we do one very simple thing actually. We ensure that whatever shows up on a city page in the catalog whether it is a city profile or the solution or the product that constitutes those solutions, that it has been either written or approved by a city. So other cities consulting that can trust that whatever page they are on that city has either written or approved. And it is a way to ensure quality and also cut through the post hike Smart Cities domain.

Finally we have an academy. There will be for free. We offer stuff that helps cities irrespective of science, almost vocational education on open data, how to manage public code. They are all innovative. Half code bases. How to keep those sane. Digital transformation we work with partners to do that and then just offer it and try to kind of have that impact. I have included the -- some slides more references. So we have a number of principles that we are kind of -- that we work around. And we try to also govern things properly. I'll end on that note.

So this is a bit the picture we have, you know, of the work we do globally and how we try to make sense of everything. So if you look at the right-hand side, those are let's say that's the dimensions or the MIMs and on the left-hand is how it connects. We work on three main dimensions that make it quite understandable to a city or community anywhere, kind of these fundamental dimensions of what is needed. So one dimension is interaction. It means, you know, can you inter -- you are on this journey of opening up and so you need to interact, how do you do that. So that's your context information management, marketplace mechanisms and so forth. We are working on personal data management together with the city of Helsinki, the Flemish government. MIM5 is on fair and Artificial Intelligence where you create where AI has sustain decisions and made governable by local levels. So these are dimensions where we are now adding MIMs. So these -- I haven't on the next slide qualified all of those because we are

working on that and these will be proposed at the General Assembly. So I'm giving, of course, leaving that prerogative with the city. So we will have the discussion and then the proper announcements at that stage. So on the left-hand side of this picture we have kind of the services and the networks where we link to. So we make sure that what we do is global and we work with national governments and we see an increased adoption of what we do. It is not us linking cities globally and we see national levels introducing the MIMs into the national recommendation, the guides and our Chair Martin is the one who has the best overview and then the service I talked about. And the co-op is more about the cities working together in a number of services we have at that stage. So this is a let's say work in progress. Unfortunately I can't share all of it. But we are, for example, announcing a partnership with OGC on the location part and a number of other things as well. Out of involvements we have and kind of the ecosystem we manage. So that's -- yeah. We will update that as soon as we can in the proper Forum also here. We are involved also within ITU but also IFRC and so forth. How does that work? How do we work? I just need another minute. So how does it work? So you have a proposal for an MIM. So it is -- is it a good idea? It gets presented to the cities if it is a good idea. It gets adopted as a work item. And then cities work on it together with some partners. And that kind of matures to a point where you can say okay this is a core. And now let's look for where that links to. This need that cities have. Where does it sit. Is there other -- are there other things that are relevant, yet still minimally kind of within the minimal frame. And then you work your way up to the specification which is when you can commit to something and to work and, of course, there is also a governance stage. I have included the information on the governance and bodies for the reference of the audience here in the slides. So we have Council of cities that represents all the chapters and our BOD kind of management headquarters that's us.

And then the technology Council Working Groups and strategic partners so all kind of here in the mix. If any questions or so on this by people directly on how to get involved I'm more than happy to show you the road in to our wonderful community. And we're very nice people and we like to welcome you. Thank you.

>> BILEL JAMOSSI: Davor Meersman thank you very much for sharing us with this incredible platform for implementing Smart Cities, its openness and reach and diversity is quite impressive. And I also learned a new term today, MIMs, the minimal interoperable mechanisms and it is nicely at the center of the needs and implementations. Thank you very much for sharing that with us. Ladies and Gentlemen, our next speaker is Joann O'Brien who is the vice-president of the Digital Ecosystems at TM Forum. She leads beyond connectivity at the TM Forum, helping members develop their diversification strategy. She is a transformative technology

leader who has led the development of two of the most successful areas of TM Forum, open APIs and business architecture. Joann is a proven technology leader with over 25 years of industry experience. Joann the floor is yours for ten minutes, please.

>> JOANN O'BRIEN: Thank you. And just to get started I decided to share a little video with you. I wanted to share our --

>> Application program interfaces or API are strategically important part of building across industries. They enable seamless communications across all services and industries and are the DNA of an API connected economy. Allow businesses to connect with partners and expose business capabilities to accelerate innovation. Without spending huge amounts of the time and money. Communication service providers are on a journey of digital transformation that involves reduced cost of operations, to create space for greater innovation. TM Forum's portfolio of more than 50 standardized rest bases open APIs are designed to develop architecture. TM Forum's open APIs enable the reuse and duplication of the IT estate and positioning the company for growth.

The communication service providers they enable interoperability across different business units and with partners to simplify and streamline communications. TM Forum open APIs have been deployed in 66 countries around the world and download by professionals. Using them as part of platform strategy. BT is using them in their platform architecture strategy to simplify their IT systems. Telestra is using them as a network as a service platform strategy to standardize and simplify communication between IT systems and network domains. Myr Republic is using them. Orange uses them for a 0 integration and agile architecture. They are the key to simplifying your IT estate allowing your business to connect forage profitable partnerships, monetize data and innovate. Visit [www.tmforum.com/open-apis](http://www.tmforum.com/open-apis). Application program interfaces --

>> JOANN O'BRIEN: The open API program of TM Forum has summary video implies that it is really about business. It isn't. It is very much about the core elements of interoperability for any system. And originally when we started it was very much designed towards the Smart City. However the first and early adopters were much across the telecommunication space which is the core membership of TM Forum and then through partnerships with groups like OASC and fiber and many cities and now with ITU-T the use of the API has been extended in to the Smart City space. They are core reusable units to enable interoperability are proven and have a big community of developers around them to support them in their ongoing management and use. Smart Cities inside TM Forum we come from the enterprise side or industry side, our membership is made up of telecommunication service providers from all across the globe and all of their suppliers. So that's the primary community of TM Forum and Smart Cities is powered by connectivity. So having the ability to integrate and



manage that ease of integration between the connectivity providers and the city providers is what is essential to enable better rated scaleable services right across the globe. You don't want to have systems in one city not able to talk to systems in another city. We are mobile now due to COVID, but in the future, you know, that mobility will return and they need to be able to move seamlessly and have experiences or citizen experiences that can operate right across different cities and city platforms. Will be powered by common open architectures. APIs and data models essentially.

And that's where we have been focusing. We have also developed what we call the Smart City operating map and this defines a common language. Again building upon a proven methodology inside the TM Forum which has been developed or evolved over 25 years or so, the comment -- the operating map has now been proven in a Smart City context, particularly in China and applied in over ten cities in China. It is a very, very interesting model because it takes in to account the very complexity of the ecosystem model in a city context. What are the different dynamics the stakeholder relationships, that will need to manage and how do I create that fabric of seamlessness of difference services that run across city platforms. It is a very futuristic view of infrastructure and operations infrastructure that you need for a dynamic scaleable Smart City platform.

We have run many different partnerships arrangements to ensure harmonization of data models in APIs. We have worked with the firework group, API the same and now most recently working with ITU-T with our friends here, Bilel and Christine on the IoT component suite APIs which we will talk more about shortly.

So the way we think about Smart Cities from an architectural perspective and this methodology that we use is quite proven is to have a reference architecture that can be reapplied in different contexts. As Michael Mulquin said yes, every city is different. Has unique differences but yes, there are also all the same in other ways. And the more we can understand where things are common and the things are the same and understand where we would like to make them different, the experience and culture and understand how to adapt your infrastructure, so that the differences are just simply extensions of a common core, that's all you will gain scalability and interoperability and federation is a very important concept. And you need this common framework at the core of that.

This is how we think it. We designed Smart City capabilities, tech -- business capabilities what we call business capabilities are more value capabilities. They are the nontechnical capabilities. And then we design the core infrastructure, common assets that are needed to support that. And many ways we believe that the Smart Cities stack is fundamentally an IoT stack. It is application of IoT at multiple different layers as well as a series of operational patterns. So we just mentioned the Smart City operations map and then when you apply that, in conjunction

with IoT services, using a tailored architecture we believe you can get your scalability and interoperability in to your Smart City systems from there. And this is how you essentially -- this is kind of behind the scenes citizens will not experience this. What they would experience is a seamless service. Essentially the effective operations of a city in order for it to be a high quality experience, essentially needs to be completely almost invisible to the citizens themselves. They don't want to have to re-enter the data and use different Forums for different things. They just want to be able to move seamlessly and the movement of seamless movement across different silos of information and silos of systems is what the TM Forum has been doing for many, many years. And in the Smart City context this is what we are bringing to bear. Removal of complexity and silos of systems through common frameworks which are horizontal in nature. The IoT service management component suite and the device management suite, the device management suite mentioned here this has been transposed to ITU-T and in the process of being endorsed or ratified by ITU-T. We're very happy with that collaboration. It allows you to manage large scale volumes of devices. Creates an abstraction layer. If devices are using different protocols. And that really important because IoT really only operates or comes to its own at scale. And when you consider the deployment now of 5G across many different regions, this is where we expect and anticipate IoT the volume of application of IoT to come in to its own. For us the way we think about cities as collaboration and as partners and those in turn are delivering new services in to the Smart Cities.

The IoT APIs as well as all the APIs of TM Forum are freely available. The data models are embedded within those APIs. So we encourage you to act those and really join the group of people who are collaborating to simplify and streamline the development of the infrastructure.

And the reasons why we believe in standards for and believe in collaborating is that it reduces time. It reduces costs and ensures we create essentially sustainable cities. It is all about the ecosystem. But through IT we can create more sustainable cities by creating more effective IT systems which can enable seamless movement of information and citizens across the silos of data.

So essentially the way we think about it and have proven is that by collaborating and sharing on these common aspects of a city, a common infrastructural aspects of a city we reduce the cost over time and that's the important aspect. You will gain the value of five people's efforts and that's the intelligence and effort of highly skilled people as well as the fact that the work has been validated and endorsed by multiple different partners and therefore reduces the risk.

By applying these in to your city infrastructure, and your community infrastructure, this will essentially reduce the risk of your digital transformation which is ultimately what we are all aiming to do. And as we

have seen with COVID, we have seen the slight shift of the population moving from one direction in to cities we have seen a levelling of population. So again reducing the cost of innovation and R&D so that the smaller communities have an equal opportunity to participate in the digital revolution is a very important part of what we are doing with our cities and communities.

So I leave this there with you, Bilel. Thank you.

>> BILEL JAMOSSI: Thank you Joann O'Brien. Thank you for sharing with us the great work that you are doing on the application programming interfaces, the APIs and how they're really the glue in the digital transformation of cities, in fact, generally speaking APIs are really considered as the glue of the Digital Economy. So thank you for that and we look forward to collaborating with the TM Forum in the context of Study Group 20.

Our next speaker is Joel Myers, Chair of the IEEE initiative for Smart Cities. He is an IT engineer, entrepreneur and leading international technologist. As Chair of IEEE initiative for Smart Cities he has been focusing his Working Group on the redefinition of the digital transformation of urban environments from a truly people centric perspective. Joel, you have the floor for ten minutes, please.

>> JOEL MYERS: Thank you Bilel. Thank you for the opportunity to speak in this great event. I'm going to share my screen which shouldn't be that one. And on behalf of IEEE I'd like to begin by looking at the title of the -- the fact that we are discussing the roles in standards. It has been an eventful 12 to 14 to 15 months. There has been a wake-up call in a lot of areas understanding that Smart Cities and cities in general are such an important ingredient and the work to do that and integrate well-being in cities. There is no doubt standards, any of -- most of the people in the -- that are talking in the audience, standards are a key part of the solution in bringing about digital transformation. But also sustainability and resilience. Something that we have really seen as a key importance to the majority of the people that live in the world being those in cities. And IEEE is no stranger to standards. We have over, around over 1500 different standards and practices that are out there.

And even in Smart Cities it is a growing number of standards that have fallen in to the various verticals and horizontals as you can see in this slide. But what we have been looking at over the last few years is a different approach. Because as technologists we get excited about technology. And we get very excited about the things that we seek or improve society. But we have a tendency to look at them in a very myopic point of view and not really take in to account what's going on within the cities that we hope to introduce these technologies, these standards and best practices.

But again we agree they are -- standards and best practices need to be the glue. There are common language. They drive the functionality and

the capabilities. And they produce interoperabilities. So there is no doubt that we need to get standards in to cities. The question we have to ask ourselves is are we being effective. Is IEEE effective in doing that? And I think the answer on many levels is no. And it is a wake-up call. There are, of course, standards within IEEE but other organizations like ITU and TM Forum, we have seen today, ISO, OASC do great work as well. We've been looking at over the last couple of years.

But in IEEE what we noticed we were missing a key element to work closely with cities and that's very, very simply the cities. We're good at talking across technology experts and we have 450,000 members around the world. We are also very good with academia. But we ask ourselves whether that was enough. And, of course, the answer is it is just simply not enough. Although we have shifted, for example, with a discussions of people centric Smart Cities we have shifted over the past few years in just developing functional standards. Standards for infrastructure on the engineering side. We have taken a step to move towards nonfunctional discussions, standards that affect things like ethnics. It is quite a new approach for an organization like IEEE. But without actually building a proper relationship with cities and city stakeholders, there is no way that we can actually produce this acceleration. And therefore what we started upon and this was -- it has been happening over the last one year, is the global cities alliance which simply put welcomes and introduces the possibility of working together with cities, not necessarily political leaders or CTOs or CIOs of cities. Those in community, NGOs, the possibility of working with business as well and local economies. And we reached out and the idea is to be able to work together, to listen not just tell them what we think they need as a standard or a best practice. Or what way to integrate technology solutions that are out there in to their existing or nonexisting systems. But to actually listen to them and find out what their priorities are which have obviously changed as well very radically over the last year or so.

And from that also look at their experience. Because they actually offer the strongest examples of have Smart City strategies, frameworks, pilots, and the use cases that have been put to test, what's the success? Are they ongoing. What were the pain points. And so we built this alliance and it is still ongoing. And we are welcoming of course new cities and countries continuously.

But it was a very big first step for us because otherwise we were, you know, basically driving blind. And from that, what we have e tried to understand is also the -- something that other speakers have talked about today, which is very clear if we step back from the technology itself, we realized that cities are highly complex. They are heterogenous, they do have some common factors, yes. But the basic point really is that cities are vary not just within countries or states but they vary even within neighborhoods. They vary from day-to-day. And they're continuously

changing. So without that relationship it is very difficult to create sustainability and resilience by offering, you know, good technology practices and it's also very hard to expect us to be able just to walk in to a meeting with a CIO or a CTO of a city and say listen you must be using our standards. That's been the first step.

The second step is probably as I say awareness, an awareness that we need a new approach. And this is something that a project the global observatory for urban intelligence, it is a project that we have collaborating on with ITU. It is the understanding that we are not talking the right language at the moment when we are trying to talk to city stakeholders. What we need to -- we need to understand our technology but we also need to be able to talk their language and their language apart from the fact that it could be multiple languages across nations and regions, but it also it is across multiple disciplines. So the complexity of an ecosystem of a city can't just be looked at from the point of view of understanding how technology works. Because the truth is, and this is a hard thing for a technologist like me to swallow, we serve. As technology we are serving a purpose.

And that is not an easy thing to accept. But once you accept it, then you realize that what you do need is a common language. A common language which will allow a diversion, diversion from a silo based approach to cities today which, you know, they have a multitude of service providers. They have a multitude of Government agencies. And then you have everything that's going on in the community. So how do you talk across that? We can't look from a technology point of view at a single silo based problem because it has a knock-on effect across all sorts of areas within a city.

And therefore, the global observatory of urban intelligence is an initiative which allows us to start on that journey and create firstly an anthology that is not technology driven that does take in to account the use cases that are really out there. And could be social, could be economic. Could be urban planning. Lots of different areas that touch upon technology. And find also a language that has all sorts of synonyms out there across spoken languages around the world. A development of an anthology and then understanding the correlations between them. Because otherwise each of us is going to be talking in our own world. And that's what happens today. What we need to do is to cross the world and build the correlations. And understanding the connections out there with information that exist in the general public.

And then build observatories. Build observatories to gather data which already exists and there is a huge urban deluge of data and work to model cities. If we can model cities with a language that we can share with the real communities, with the city stakeholders whether they have are a political or a business or their academia, but if we can use the same language and we can talk across different areas, and see the effects of

introducing standards or simulating policies, looking at use cases through the modeling, we can then allow these city stakeholders to get involved. Get involved directly and use tools that we can help provide that will create a community of users of standards and best practices. But we have to be able to prove that. Not just tell them that that's the best thing for them. But actually to give them the tools that will allow them to come to an understanding and that's where the global observatory for urban intelligence comes from.

>> BILEL JAMOUSSE: Thank you. Our next speaker is Ms. Cristina Bueti, ITU-T counselor of Study Group 20 and she also is the ITU focal point on Environment and Smart Sustainable Cities and as part of the International Women's Day 2016 she was named and as one of the 20 Geneva inspirational women working to save the environment. You have 10 minutes.

>> CRISTINA BUETI: Thank you. We have seen certainly cities and communities are at front lines of the COVID-19 crisis. But cities are not only at the forefront now, they are also likely to see the changes from pandemic from the physical form and to the economic and infrastructure. So these coupled with policies with the change, certainly affect the way how we approach work and study in cities and communities for years to come. Digital technologies like, for example, Artificial Intelligence and Internet of things are helping to advance COVID-19 actions and the Sustainable Development Goals. We have both seen that intelligence with medical devices, blockchain, electronic health records are just a few of the concrete examples of technology that COVID-19 has certainly accelerated. And we also believe that digital technologies are being harnessed to support other aspects also of the public health response to COVID-19 worldwide, including, for example, case identification, contact tracing and evaluation also of the intervention of the mobility data and communication with development. The united for smart sustainable city initiative is a United Nations initiative which is coordinated by ITU and provided in a platform to help cities discuss this issue and especially help them to achieve Sustainable Development Goal 11 that is dedicated to sustainable cities. The current work of the U4SSC is surrounding different areas, including five thematic groups which are focusing on development of series of policies, technical specification, for example, on city platform and including any health management framework for cities. There is another thematic group that specifically is looking at the economic recovery in cities. And coming to working with over 50 cities developing guiding principles for Artificial Intelligence and cities. And then, for example, through the -- with the leadership of the representatives from the UK Government, we are actually developing program and guidance for smart sustainable cities along with other issues related, for example, to innovative financing instrument for smart sustainable cities that are being studied in one of the many groups. This platform has been beneficial. We

had a lot of interaction and especially we have seen that as it was mentioned by previous Distinguished Colleagues, the cities represented are actually participating in the development of the various deliverables. The last one has been published is titled simple ways to be smart. It is the latest report published in March of this year. And it identifies a smart intervention not requiring excessive material or capacity inputs by really helping cities to become more sustainable. In terms of digital transformation, the U4SSC has looked at area life, for example, how to use blockchain for smart sustainable cities and also how to use frontier technology to accelerate digital transformation. These are some of the topics that have been studied and you can see that there are free reports that you can find on the U4SSC website. As part also of the work that we have been doing with cities, we have implemented a series of key performance indicators for smart sustainable cities to achieve the Sustainable Development Goals. And for the time being this project is currently implemented in over a hundred cities. You will see some of them listed on this slide and we encourage other cities to join. The KPIs are an excellent policy tool that can help cities to fight progress over time to benchmark their performance and to compare the results over the year. One of our latest (inaudible) has implemented the KPIs and you can see where -- with the visual presentation of the results. We have also published the various -- various sets of people, comprising city snapshots or verification reports or parts of case studies that provides an overview of the city's implementation of KPIs in more or less detail, starting with the snapshot that is visual representation and moving to the case study that's an in-depth analysis. With that I will conclude my presentation and I tried to stay in the time allotted and taken in to consideration that we had a few minutes of delay. So back to you, Bilel.

>> BILEL JAMOSSI: Thank you for allowing us to recover time and for your excellent quick and succinct introduction of the KPIs and U4SSC.

So Ladies and Gentlemen, now it is time for Q and A. Let me start by asking a few questions and I really encourage you -- all the participants to ask questions through the Q and A button at the center bottom of the screen.

Let me start with the first question to Davor, what differentiates the CITYxCITY Catalogue and 100ICC marketplace from other offers?

>> DAVOR MEERSMAN: The CITYxCITY Catalogue and the 100ICC marketplace and living in EU marketplace, and so forth. So they are all linked sister catalogs where the normally -- of equal standing and value. But we make sure that at least at the CITYxCITY Catalogue, there is a completeness of information. And so irrespective of how programs are being managed. What differentiates it is a catalog that is built by solutions with you. It is at only one that has a global reach that has this federated setup and not just tied to a project. There is no sunset, horizon. And it is not a money maker or something like that. So we count on institutional

program partners to help -- to see the value in this existing because out of all the research we do with cities it is a No. 1 need is for cities to find stuff that works and to trust that information about it.

And it is very difficult for supply side to do that on their own. So we are there to help. It is cities that governance it and that's what sets it apart.

>> BILEL JAMOUSSE: Very clear. Thank you. Joann O'Brien, what kind of innovation resulting from the pandemic can you see in the cities?

>> JOANN O'BRIEN: Thanks for the question. I think it is super interesting from the city perspective I mean COVID has massive impact on digital health or on health care and through the application of digital health. And health is essentially use case of the Smart City. Health has been accelerated by about seven years as a result of COVID. And this trajectory of preventive care managing an end to end patient experience across different -- across the entire community ecosystem is the big thing that needs to be managed in to a future and standards. And interoperability play an enormous role in that. What we have seen on the back of the pandemic is that there is now a lowering of barriers to change. There a newer acceptance to the need for change. And a greater cooperation of ecosystem players between cities, citizens, public and private partnerships and that's really what we need in order to accelerate. These platforms for coinovation and creation.

>> BILEL JAMOUSSE: Thank you: Joel, what ways of experience of advanced Smart Cities differed from that of others?

>> JOEL MYERS: Hugely. If you look at Africa and, for example, Smart Africa and what that network is up to, it has on one side huge disadvantages because it requires a lot of education. But on the other side, it can move in straight away and deliver systems that, you know, stand on their own. And therefore they can jump the queue a little bit with what goes on in places like Europe or the states where those type of areas have different things to deal with in infrastructure and -- there is obviously lots of politics to it as well. But generally speaking, it's the beauty of cities. I think that Michael Mulquin as it talking about cities in the last session in those terms. Any way we can move forward the acceleration by embracing the differences. You do need common factors. But in the end, accepting the fact that, you know, every city or country has different cultural political and economic systems is the key to ensuring sustainability.

>> BILEL JAMOUSSE: Great. Thank you. Thank you Joel. Cristina, you spoke about the standardized key performance indicators. How can they be used to capture the state of smartness for digital transformation in a city?

>> CRISTINA BUETI: Standardizing behaviors are important and those contained in the U4SSC KPIs can help cities capture the ongoing as well as the future and also the digital transformation by allowing, for example, to track the progress, to perform long term analysis, to benchmark



the performance of strategic goals and key smartness or digital transformation.

So in a nutshell I would say provide a sort of apples to apples comparison with the performance of peer cities.

>> BILEL JAMOSSI: Thank you. So the panelists I invite you to look at the Q and A button. There are a few questions that had you might be able to answer, that would be great. Either by typing them or by or verbally. And now mean while I will go in to maybe a quick second round of questions. So Davor, how are the MIMs bringing together the demand and supply side of the market?

>> DAVOR MEERSMAN: So think the MIMs, they represent the demand side consensus. So let's say utility within that demand side. So that's one kind of dynamic and when you do that, you create a coherently addressable market for the supply side. So it operates on a number of levels. Even within a city MIMs are using to connect data streams and helps city get a handle on what -- what's moving and what they need operationally. It allows them to share with other cities to manage their own ecosystem. And while they are all doing that, in the concerted fashion, you create a globally accessible local level. It brings together those sides and it actually works on the other dimensions as well.

>> BILEL JAMOSSI: Great. Thank you. Joann, what role can standards play in making IoT a cornerstone technology in the post-pandemic smart stay?

>> JOANN O'BRIEN: It is very important that IoT is standards based. In some respects we are a little bit too late. There is a huge amount of IoT out there and the uptake of standards is a little bit haphazard to be honest. So what we really need is a drive and awareness of standards right through in to the innovators. They -- in the coinovation hubs, university incubation, not sure the message regarding standards is really reaching. The alternative is that IoT will not work with each other. There will be again silos of different types of systems which will detract from the ultimate experience for citizens and will cost more money for cities. If cities want to drive down the cost of innovation they need to demand standards. And then secondly, that they possibly start to shift away from the RFP process because of it -- its very nature. It doesn't allow for a lot of co-creation. Work more with [koe](#) creating with local providers and advocating standards to those local providers and you will get try before you buy and you will get to cultivate the technology and innovation locally. So I think getting these factors right are important. It is good that we not just bring in -- end up with one or two or three very large companies who will manage the entire IoT sector. We should be cultivating innovation locally in our all our communities. If we can get the communities to use the standards we can cultivate an entire ecosystem.

>> BILEL JAMOSSI: Great. Thank you. Thank you Joann. Joel,

you spoke of the global observatory for urban intelligence. Can you speak of how it will lead to growth?

>> JOEL MYERS: It will provide a decision support system and not just necessarily to us as technologists but mainly for city stakeholders that work in municipalities, that are looking at frameworks, and strategies that then led to policy making in general for their cities or towns.

And it does that by as we were paying beginning with an anthology, a common language and creating correlations between the various heterogenous aspects. But then by permitting the idea of modeling cities. The idea is to arrive at digital twins of cities but not necessarily one flavor. It could have thousands of flavors for each city depending on which entry point and weight you give to priorities. And that can be done across the board. So, you know, to achieve sustainability by helping policy making but you can also help on the idea of what to finance or budget for. How to plan better on the urban side or work through the various sides of infrastructure that need to be built to support. But then you also have prediction and risk management. When you have modeling, we know that as technologists we are in better position to help those that take decisions on the ground in cities to look to the different types of options that they have before they happen.

>> BILEL JAMOSSI: Great. Thank you. Cristina, you spoke of the U4SSC KPIs. How can they be utilized for pandemic reporting in a city?

>> CRISTINA BUETI: KPIs are divided in to three overarching dimensions, economy, environment around society and culture which contain various categories. Categories on health provides a high level yet comprehensive overview of the state of health services and delivery and administrations. They provide the necessary found addition or back drop information that the city needs. This is very important because that can really help also the city to set and put in place the effective policies and strategies.

>> BILEL JAMOSSI: Fantastic. We have maybe three or four questions on the Q and A chat and they seem to be all focused on the platform for Smart Cities, how financed and utility of a digital technology, and requirements of a platform in terms of blockchain technologies. And Marco Karugi asked a question about the evolution of city centric platforms and related solutions. Would any of the panelists like to address any of these three questions or all of them?

>> DAVOR MEERSMAN: I think a platform, there is three different questions. Just to qualify, John Gustaf's question is on the OASC platform? In terms of OASC we work within programs. So on project base level, we also have enterprise partners that we work with and kind of deliver value toward and so forth but we are not-for-profit. We generate revenue, of course, but not that sort of primary objective.

Yeah. And then maybe I'll pick in on Marco's question. In terms of small cities and communities, I think it is a conversation I have been a part

of also with some of the larger cloud providers. I think there is a lot to be said in kind of the accessibility and affordability of these types of infrastructures for small cities and communities. And I think a lot of it will have to be there because as you rightly point out, it's -- think cost reduction is maybe even an understatement. The cost of opportunity is just prohibitive on both sides I think of the market at a moment.

Standards play a huge role but also the way it is delivered and the Capex versus opex, the usual stuff. There is a trust dimension and also a geo political one as well to an extent. So I think those are kind of the issues that need resolving as well as just getting the facts straight. So I think -- it is related to trust but I think things like data ownership control and so forth, what does it mean for cities, not saying technically but up to a level where it is palatable, comfortable and explainable to constituents.

>> BILEL JAMOSSI: The beauty of these virtual platforms is that we get the benefit of keeping our speakers from the first package and I see Michael's hand is up. So Michael, the floor is yours if you wanted to address any of these questions.

>> MICHAEL MULQUIN: Just a couple of things. I mean block chain is clearly a key part of the digital transformation. It is not just about obviously the finance. All that's a key part but it is the way that it allows smart contracts, a whole range of other things like that. There are challenges. One of the issues about blockchain it takes a huge amount of energy at the moment to manage it. So there is still a lot to be done in thinking about that. And it is one of those areas, there are many key technologies that we need to be looking and utilizing but understanding there is positives and negatives around them. And in terms of the platform, I think I was involved a couple of years in the a very interesting initiative on city as a platform which was looking at city data platforms. And we -- I interviewed and other people interviewed some city platform people managing city platforms to try and get a sense of why they were doing it and what they were doing. It is very clear, cities you can't take cities as an island. Cities are a part -- the city region, so lots of people who don't live in the city but maybe work in the city or come to shop in the city or get services from the city, there are supply chain companies for the city in the region and there is economic issues that are much bigger than single city and then you have got I think Joel was talking about or others within a city you -- cities aren't homogeneous, they are heterogenous. It is not just a cost thing. There is a need to find ways to help all of these different ways of collecting data and providing information to be managed in a federalized kind of basis where you are able to aggregate and you are able to break down in different ways. You are able to question different areas of interest to find the answers that are relevant to what you are doing. This is one of the reasons why standards are so important because you can clearly manage platforms city by city. When you recognize there is real need,

there are things like I know Barcelona one of the issues is there is quite a few cities close to Barcelona where most of the people in those cities work in Barcelona and you need to have common ways of dealing with things like travel and all the rest of it across all those different cities. So this is one of the challenges and one of the reasons why we need to be much more ambitious in terms of how we get standards, how we make the kinds of standards that many, many many, many cities and regions are going to actively, you know, implement so that we can start to break down all the silos at the moment make life more difficult for all of us. Thank you.

>> BILEL JAMOSSI: Thank you very much Michael. In the interest of time, I think I will thank very much our panelists for participating in session 2 on COVID-19 accelerating city digital transformation role of industry and UN initiatives. I thank you very much all the participants for your participation and also the questions that you have asked and I would like to turn it back to my colleague, Cristina. Over to you.

>> CRISTINA BUETI: Thank you so much. And as we are running a bit of time allow me at least to really offer our sincere thanks to all of you to the participants, to the speakers, to the Moderators for this session, so informative and engaging. The discussion today around the role of international standards and the industry initiatives in accelerating digital transformation especially in the face of pandemic has been productive and has provided a lot of food for thought.

The one thing that has conclusively has remained a cause, the role that standards can play in ensure that our cities become even more intelligent across the board. More responsive to citizen's needs proactive and fruitful in planning and resilient to any future life of which we are in the midst of experiencing.

I mean that the pandemic has certainly changed completely the way how we live as residents whether it is cities, communities, rural areas and I really hope that the many key take-aways from the discussion today will be useful in really in our daily work but also to support the cities in their own Smart City journeys.

We will be publishing an outcome document from this event which will capture the key take-away, the key messages. We are developing this document together with the Moderators and the speakers of today's event. And it would be made available on the event website next Monday. We will also send a notification to all attendees of this event. And while last but not least allow me to thank all the ITU colleagues that have contributed to the success of this event, starting from Gifty and Kaoru who have been doing amazing work and thank again to all the attendees for being a part of this family and this discussion. The Forum can be considered now officially concluded. Thank you very much everyone.

>> MICHAEL MULQUIN: Thank you.

>> Thank you.

>> Thank you.  
>> BILEL JAMOUSSEI: Thank you. Bye-bye.  
>> Bye.  
>> BILEL JAMOUSSEI: Have a good weekend.  
>> NASSER SALEH AL MARZOUQUI: Thank you all. Bye.

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