

In the framework of the upcoming Global Forum 2021, that will take place either on December 6<sup>th</sup> & 7<sup>th</sup>, 2021 or in March 2022 (depending on the global health situation), in Muscat, Oman, four preparatory thematic webinars, featuring contributions, reflections and dialogue among key experts and interested stakeholders, are organized.

*This report sums up the discussions of the Global Forum Thematic Webinar III.*

## Global Forum Thematic Webinar III

June 9<sup>th</sup>, 2021

### Sustainable Smart, Cognitive Cities, Regions & Communities and Tech for Good

#### From Industry 4.0 to Industry 5.0

#### Participants (60):

Fatma Al Mukhaini, Sylvie Albert, Saif Alriyami, Wafa Almamri, Namir Anani, Ingrid Andersson, Mieke Bakker, François Belorgey, Youssef Berbash, Jean-Pierre Bienaimé, Marek Canecky, Jean-Pierre Chamoux, Mariane Cimino, Don Davidson, Robert Deller, Koffi Fabrice Djossou, Pavan Dugall, Walid El Abed, Alexandra Fieux-Castagnet, Geneviève Fieux-Castagnet, Kevin Fitzgibbons, Shweta Ganapati, Christoph Glauser, Julia Glidden, Ellen Gute, Bernard Jacob, Nitya Karmakar, Hugo Kerschot, Steven Lafosse Marin, Corine Le Mouel, Sophie Le Pallec, Eric Legale, Judy Logan, Thomas Mackenzie, Eunika Mercier-Laurent, Jeremy Millard, Michele Mosca, Eikazu Niwano, Alice Pezard, Pascal Poitevin, Hervé Rannou, Susie Ruston McAleer, Gérald Santucci, Patrick Saunier, Alan Shark, Dan Shefet, Susanne Siebald, Baïla Sow, Lara Srivastava, Michael Stankosky, Bénédicte Suzan, Yoshio Tanaka, Sylviane Toporkoff, Daniele Tumietto, Eliane Ubalijoro, Rob Van Kranenburg, Daniel Van Lerberghe, Oriane Wiser, Paul Wormeli, Sarah Zhao.

The Global Forum Thematic Webinar III on "Sustainable Smart, Cognitive Cities/Regions/Communities and Tech for Good & From Industry 4.0 to Industry 5.0" took place on June 9<sup>th</sup>, 2021 from 13:30 to 15:00 UTC+2 via Zoom.

**60 participants from across the world joined this invitation-only webinar. Framed by short expert presentations, the participants engaged in discussions about what the future holds for us and the related challenges, and what the world might like in 2030 and beyond.**

It was the third of a series of four live webinars (the next will be on September 22<sup>nd</sup>, 2021) devised for the purpose of feeding the framework of the upcoming Global Forum 2021.

## Agenda

### Welcome and Introduction

### Topic 1: Sustainable Smart, Cognitive Cities, Regions & Communities and Tech for Good

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**Julia Glidden**, Corporate Vice President, Worldwide Public Sector, Microsoft Corp., USA  
Global Pandemic and Digital Approaches to Delivering Public Services

**Eric Legale**, Managing Director, Issy Media - City of Issy-les-Moulineaux, France  
Digital Technology Against Climate Change

**Eliane Ubalijoro**, Global Hub Director, Canada, Future Earth; Executive Director, Sustainability in the Digital Age, Canada  
Ensuring the digital age serves the 3Ps: for People, Planet and Prosperity

**Hugo Kerschot**, Founder & Managing Director Is- Practice, Belgium  
Digital Urban European Twins

**Alan Shark**, Executive Director, Public Technology Institute (a subsidiary of CompTIA), USA  
Smart to Cognitive Cities –A Work in Progress

### Topic 2: From Industry 4.0 (merging of virtual, physical and biological) to Industry 5.0 (interaction and collaboration between humans and machines)

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**Jeremy Millard**, Managing Director, Third Millennium Governance, Denmark  
How Zoomshock is Transforming Work, Geography and Society?

**Namir Anani**, President & CEO, Information and Communications Technology Council (ICTC), Canada  
Industry 5.0, Where Humans, Machines, and Intelligent Communities Intersect

**Daniele Tumietto**, Expert European DIGITAL SME Alliance, Professor Link Campus University in Rome, Italy  
Industrial IoT

**Oriane Wiser**, Project Coordinator Data for Good, The Netherlands  
Making Data the New Carbon

**Marek Canecky**, Permanent Representation of Slovakia to the EU  
From Industry 4.0. to Industry 5.0

### Concluding Remarks

## Welcome and Introduction

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Ingrid Andersson, moderating, together with Sylviane Toporkoff, welcomed the participants to this 3<sup>rd</sup> preparatory webinar of the Global Forum 2021.

It was emphasized that it is not possible yet to determine the final dates of the upcoming Global Forum. The Global Forum 2021 will be held either on December, 6<sup>th</sup> & 7<sup>th</sup>, 2021 or in March 2022, in Muscat, Oman. The final dates will be announced as soon as the situation permits, and in any case no later than September.

## Topic 1: Sustainable Smart, Cognitive Cities, Regions & Communities and Tech for Good

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**Julia Glidden**, Corporate Vice President, Worldwide Public Sector, Microsoft Corp., USA, **addressed the global pandemic and digital approaches to delivering public services.**

If this pandemic has thought us anything, it is the power of technology to maintain human connectivity and to hold the fabric of civil society together. The rate and pace of digital government transformation has been phenomenal. For the first time, the risk of doing nothing in the public sector was greater than the risk of doing something.

Under the pressures of crisis, the potential of digital transformation and smart technology has powerfully helped to transform the way we live, work, and interact in cities. The post-pandemic city may be smaller and more liveable. We will see smart technologies like data, cloud and AI more accessible, more affordable and more deployable than ever before. They have now been tested during circumstances of critical need, e.g., to ensure that hospitals have the facilities they need, to ensure that data is used as best as possible for predictive purposes, e.g., where energy grids may be overloaded, or where critical infrastructure needs data centres priorities, so that powerlines and cloud capacity are maintained and data can be retained locally.

Cloud enables workforces and students to work remotely. What does that mean for all the office space that could be transformed into more affordable housing? What about redistributing traffic through smart metering and smart monitoring in order to maintain many of the pedestrian areas that were opened up as we shifted to outside restaurants?

The deployment of data and AI together allows to target services where they are needed most. It also allows to better maintain the personal touch of governments, whilst maintaining the ability to deliver at scale, at any time, any day, through increasingly humane chatbots developed with ethical AI to provide unbiased and personalised services. For instance, in São Paulo, Brazil, a chatbot for domestic abuse support allows women to instantaneously connect with the services they need, with an empathetic tone and with rapid deployment. Another example is a chatbot deployed in Osaka, Japan, where the city needed to skill and bring on board more workers than ever before under crisis conditions.

However, we have also seen an increasing number of cyberattacks, an increasing vulnerability of personal data and privacy, and the need for data to be retained locally as much as possible. We are going to need cyber-resilience as a service, by design, embedded in city infrastructures—embedded not just in apps or add-ons, but throughout the infrastructure of the city.

As we are shifting to new jobs and new ways of working, digital skilling is becoming more important than ever—for both the city’s workforce and the civil servants. Since the public sector cannot keep pace with the private sector’s ability to rapidly upskill in an everchanging landscape, this has to be done in partnership, where the public sector, academia and the tech companies truly come together to build trust and collaboration. This can be done now, better than ever before. The foundation has been laid.

The need especially for cyber and data protection and trust has never been greater, and this has to be addressed in order to be able to respond to that critical need of citizens of having access and ensuring the human touch. Data and AI can do incredible things, cloud can enable what they can do, and chatbots can be more personalized and ethically designed, but nothing will replace the human touch.

And then, there is the vital issue of accessibility standards. Just like ethical AI, they must be embedded and build by design into every element of everything we do on the city level. It is at the city level, where people work and live, study, get their healthcare—and it is at the city level that we will truly be able to deliver the ubiquitous universal accessibility in terms of linguistics, visual, mobility, learning disabilities, and the devices we use.

The pandemic has created out of the tragedy a tremendous opportunity to continue to embrace change. If we go simply back to status quo, we will lose an exponential opportunity to improve the quality of life of all of us, the opportunity to create a more responsive, personalised government that is seamlessly blended in our everyday lives, that is citizen driven and that anticipates the citizens’ needs.

**Gérald Santucci** commented [via chat]: One issue in local government is stability. Mayors may change every 5-6 years, as well as staff. It’s not only a matter of training, also a matter of providing the leadership and tools to transfer the knowledge and the impulse to work across administrative and disciplinary boundaries.

**Rob van Kranenburg** commented [via chat]: These topics make clear how important the notion of identity, especially Self Sovereign Identity is becoming. See also the new eIDAS Regulation of the EU.

**Sylvie Albert** [via chat] wondered whether there is collaborative measurement system to meet SDGs at the community level? It appears that there is a growing number of cities doing voluntary local reviews of SDG achievement.

**Eric Legale**, Managing Director, Issy Media - City of Issy-les-Moulineaux, France, **presented an approach to turning digital technology into climate action.**

Located in the southwest of Paris, the city of Issy-les-Moulineaux is one of the major innovation hubs of the Greater Paris region. Innovation and ICT are the economic driving force of the city. More than 50% of the companies settled in Issy are in the ICT sector, e.g., Capgemini, China Telecom, Cisco, Microsoft, Orange, Qualcomm, Eutelsat, Canal+, France24, RFI, Softbank Robotics, Withings, as well as several start-ups. With 70,000 inhabitants and 72,000 jobs, Issy stands out because of its particularly dynamic economic base.

Driving economic growth through innovation is a priority of Issy-les-Moulineaux since the beginning of digital transformation. The city has often been among the first French cities piloting and adopting new digital technologies and services. Hence, Issy-les-Moulineaux has become one of the most innovative cities in Europe.

Issy's ambition for the current decade is to use digital technologies to adapt the city to the climate change. Inspired by the example of the Norwegian capital Oslo, the Issy City Council adopted its first climate budget in February this year. It is not a financial budget but a carbon budget setting an annual CO2 reduction target. The objective is to measure each year, the reduction of greenhouse gases on the territory through greening and alternative mobility projects.

As a smart city, Issy-les-Moulineaux relies on an open and big data approach to create concrete Key Performance Indicators allowing to assess and measure the city's efforts to reduce greenhouse gases. The city closely follows similar European or global initiatives, in order to have comparable KPIs to show citizens the capacity of cities to play a role in combating climate change.

**Ingrid Andersson** wondered how the city drives the demand for these services?

**Eric Legale** explained that it requires a lot of work to convince all the stakeholders, local politicians, administrations and citizens. However, due to the fact that the city is piloting innovative projects since so many years now, Issy's citizens are very open to innovation. The city tries to sensitise its citizens by communicating on the use and the method of use of a new service.

Issy adopted a non-punitive approach to ecology, preferring to persuade citizens to change their behaviours. In January 2021, the city launched a web series on Issy.TV called "It starts with Issy" on individual or collective initiatives against climate change. For instance, one episode shows an interview with the Sustainability and Transformation Director of Microsoft France. Other episodes deal with revegetation and other questions related to climate change.

**Geneviève Fieux-Castagnet** wondered how much does this climate budget cost in one year?

**Eric Legale** clarified that the 'climate budget' is not a financial budget. The term 'climate budget' was chosen to stress the political will and involvement of the city in reducing CO2 emissions. As the adoption of a financial budget is generally the most important decision taken by city councils, the name 'climate budget' was chosen to show that it has the same level of importance to the city as a financial budget.

This climate budget concerns greenhouse gas emissions and the objective for 2021 is to reduce CO2 emissions by 2-6%. The climate budget relies on a collective approach and involves all public and private actors of the city.

**Ingrid Andersson** referred to the European Commission's efforts to look at indicators to measure the health and logistical improvements that can be achieved by adopting Nature Based Solutions (NBS) and by looking at the carbon or water footprint.

**Jeremy Millard** commented [via chat]: Studies show that making citizens aware is not enough to necessarily get them to actually change behaviour. You need to make it easier than not changing (e.g., with 'nudges') and to focus on group behaviour as people tend to be herd animals.

**Eliane Ubalijoro**, Global Hub Director, Canada, Future Earth; Executive Director, Sustainability in the Digital Age, Canada, **discussed the need for a new SDG ensuring the digital age serves the 3Ps: for People, Planet and Prosperity.**

Sustainability in the Digital Age (SDA) is an international initiative resulting from a series of workshops which identified that the UN SDGs were lacking a specific SDG around digitalization. There is a need for a new SDG that outlines clear targets for leveraging the transformative power of the digital age to benefit people, planet, prosperity, peace and partnerships: SDG 18 - Ensuring the Digital Age Supports People and Planet.

SDA focusses on the 3 branches research and innovation, training and network building, as well as developing policy standards and best practices to provide collective foresight and intelligence. The aim is to advance research, innovation, and action that leverage the digital age to drive transformative system changes for a climate-safe, sustainable, and equitable world. The work is done in partnership with Future Earth, the International Science Council, the Montreal Institute for Learning Algorithms, and the German Environment Agency.

The result of the work around SDG 18 was the so-called D<sup>2</sup>S Agenda—Digital Disruptions for Sustainability. The D<sup>2</sup>S Agenda identified four disruptors that could be transformative and driving in terms of how digitalization could support and accelerate the climate agenda. Those four elements are: 1) Unprecedented transparency in the world, and how to harness that for data driven climate reporting, monitoring, adaptation and mitigation. 2) Intelligent systems that are allowing to use massive data and AI to harness collective and artificial intelligence like never before. 3) Mass collaboration can help to take advantage of this unprecedented transparency and intelligent systems. 4) Mixed reality, i.e., the merging of real and virtual worlds, which allows people to connect to nature and a possible future in ways never possible before when using traditional engagement methods.

In cooperation with the ClimateWorks foundation, SDA is realizing a project on reimagining climate governance in the digital age. Differential power systems are creating systems that require looking at governance in ways we didn't before. Powers, critical for moving forward, are not just inside but also outside of government systems. It is essential to make those different branches working together in ways to serve all, especially the marginalized, as we advance in the digital age.

SDA is involved in a Canadian Dialogue Series on Igniting Digital Solutions for the SDGs. In this context, SDA organizes a series of town halls across Canada to involve all sectors and stakeholders in the society to participate in how digital solutions can ignite the SDGs.

Moreover, SDA is involved in the 'Montreal Statement on Sustainability in the Digital Age' which calls on society to recognize that tackling the climate crisis, building a sustainable world, and working toward a just and equitable digital future are inherently interconnected agendas. The Montreal Statement's 5-year near-term actions are: 1) Building a new social contract for the digital age, which addresses individual rights, justice and equity, inclusive access, and environmental sustainability. 2) Ensuring open and transparent access to data and knowledge. 3) Fostering public and private collaborations. 4) Promoting research and innovation. 5) Supporting targeted communication, engagement and education to advance the social contract.

Sustainability in the Digital Age is also partner of the LEADS programme (Leadership in Environmental and Digital Innovation for Sustainability) which furthers research on climate, system-based approaches to sustainable development and digital innovation, while developing the careers of students and postdoctoral fellows entering the global sustainability community.

Together with UNEP, UNDP, the International Science Council, the German Environment Agency, the Kenyan Ministry of Environment and Forestry, and Future Earth, Sustainability in the Digital Age launched the Coalition for Digital Environmental Sustainability (CODES). CODES is an open stakeholder coalition established to firmly anchor environmental sustainability needs within the Digital Cooperation Roadmap. It underlines the importance of working across different networks in order to ensure to raise literacy not only on the digital side but also on the sustainability side. Only when literacy is raised on both sides, we will be able to engage all sectors of society and economy to find out how to contribute to our society's wealth, i.e., natural, human and social capital, in sustainable ways.

**Gérald Santucci** pointed out that the 3 branches identified for SDG 18 are not independent from another. How to ensure that these branches are not treated as silos? He proposed to also include the notion of security, as there is a need to have secure infrastructures in cities.

**Eliane Ubalijoro** fully agreed and stressed that this is why the work of SDA is truly multi-sectoral and multi-level. SDA is working with the people doing the research, as well as those who are designing the future on the technological, sustainability and the governance levels in order to align all different levels.

**Jeremy Millard** welcomed the work of SDA. Back in 2014/2015, efforts have been made to get technology as a pillar within the UN SDGs. However, it failed because many NGOs and other actors thought it was not important enough. The situation has clearly dramatically changed since then.

**Eliane Ubalijoro** added that the Covid crisis has accelerated the urgency of working at that interface of sustainability in digitalization. This crisis has also deepened the divide, e.g., with regards to questions like: Who gets vaccinated? Who has access to online capacity to book appointments? Who was able to study during Covid? But also, in terms of how women and girls, especially in low- and middle-income countries, are being left-behind.

SDA is working within the UN framework but bringing global stakeholders from very different sectors together. The intent is to raise the collective literacy and to harness the UN system to work across different levels of governance, i.e., to work at micro-, meso- and meta-governance levels at the same time. Working with the UN is important to have the possibility to have access to all of the members countries. SDA also creates interactions with the tech giants to explore how they can help contribute to the global commons at the interface of sustainability in digitalization to ensure that nobody is left behind.

A report on digital transformation and environmental sustainability has been recently initiated. A 2-days conference aims to review the report and determine how it can be transformed into an action plan and operational strategy. For more information see [www.sparkblue.org/event/digital-planet-sustainability-virtual-conference](http://www.sparkblue.org/event/digital-planet-sustainability-virtual-conference).

**Bernard Jacob** commented [via chat]: There are some relevant initiatives, mainly supported by Sweden, Germany and France in Europe, to decarbonize road transport by implementing ERS (Electric Road System). Sweden and Germany have launched some tests on open roads with the available technologies (catenaries, ground conduction and induction). France has launched large exchanges with all the stakeholders with 3 WGs under the supervision of the Ministry of Ecological Transition (and Transport).

The World Road Association (PIARC) has published a report (2018) on [Electric Road Systems: a solution for the future?](#) A [task force on that topic](#) has been set up in 2020. An [online questionnaire](#) is available for those who want to contribute.

**Hugo Kerschot**, Founder & Managing Director Is-Practice, Belgium, **addressed Digital Urban European Twins for better public decision making.**

Is-Practice carried out a survey on ‘digital transformation in public services’ targeting all kinds of cities—big or small, no matter whether they are tech-savvy or not. The cities were asked about the kind of services they need, their citizens’ needs, the means they have at their disposal, etc. Then, they were asked whether the city has already implemented an urban digital twin—most people didn’t even know what this was.

A digital twin is a digital replica or representation of a system, process or place which mimics its real-world behaviour. It’s a real-time updated collection of data, models and algorithms allowing for better real-time analysis of assets.

The notion ‘digital twin’ doesn’t originate from the public sector but from the industry. This reminds the notion of ‘e-government’, which was reproduction of ‘e-business’ 20 years ago. Besides, when talking about digital twins, we think about models—and small replica of historical monuments or places are as old as history.

The EU Horizon 2020 projet DUET (Digital Urban European Twins) aims at leveraging the advanced capabilities of cloud and high-performance computing, in the form of digital twins, to help public sector decision-making become more democratic and effective.

3D maps of cities have already been created within the former EU project EPIC (European Platform for Intelligent Cities). The EPIC project dates back to 2012 and the technology for 3D maps was not as efficient as today. However, the main problem, already at that time, was not the technology and the 3D modelling, but the difficulties in gathering useful information.

The collection of useful information is difficult even in recent projects such as the DUET project. The gathering of trustworthy and useful data is still, and probably will remain, one of the most challenging tasks in the development of 3D city maps.

Pilsen, a mid-sized city in the Czech Republic, is one of the pilot cities of the DUET project. For a long time, the city has a mathematical traffic map. The city also had a system for traffic light regulation producing a lot of data managed by Siemens. However, when Pilsen needed the data, the city had to pay for a spreadsheet to get back its own data. Now, they opened the data from thousands of sensors and intelligent cameras in the city, and it was possible to create a complete representation of the traffic density in the city. But not only that, based on the same sensors and with the help of mathematical models, it is possible to establish a map of the city's air quality. Moreover, a noise model, again based on the same sensors, will be produced within the DUET project.

The fundamental issue is less the technology but the information required to feed our systems. We need information to help policy-makers taking the right decisions to improve the cities and the citizens' lives.

**Sylvie Albert** remarked that this concept feels like the next level GPS system and wondered who would pay for it?

**Hugo Kerschot** reminded the geographic information system (GIS) 15 years ago: Many cities spent a lot of money for this new technology, but no one had a digital map, which is the basis for being able to use a geographic information system intelligently. Just as GIS, a digital twin can only prove its added value if you have the basic material. There are discussions ongoing in many cities about the availability of the information, if they can be used, whether it is GDPR compliant etc. For instance, there is a big discussion in Flanders about ANPR camera data managed by the police. The question is whether the data can only be used by the police for security reasons, or if the data could be used for others purposes such as mobility and traffic management.

**Jean-Pierre Bienaimé** commented [via chat]: Digital twins are becoming the global standard for Internet of Things management. The digital twin enables to precede the physical twin in order to avoid or detect failures (vehicles), to make adjustments and experiments before applying them to the physical/real object...

**Alan Shark**, Executive Director, Public Technology Institute (a subsidiary of CompTIA), USA, **closed the first topic of the webinar with remarks on the pathway from smart to cognitive cities: A work in progress.**

A cognitive city differs from a smart city in many ways. It is beyond a physical city. It is getting citizens to have an emotional "feel" for the city and understand all the improvements that have occurred. It gives them constant interaction and lets them know how these technologies are helping them.

But, how do we get to cognitive from smart? Are we even at smart yet? How do we get citizens truly involved? The great pivot of march 2020 was a turning point where people did get more involved in ways that we hadn't expected and at a much faster pace. The question of "how do we get people better connected?" is still a point of failure. In the U.S alone,

estimates show that there could be as many as 42 million people who do not yet have reliable access to broadband. How can we move ahead without addressing that problem? How can technology become a greater enabler, and how can we learn from each other in a world of great distrust and fake information? This is the other pandemic we need to address. And then, we have to go back and ask, “how do we know what success looks like?”

The current pathways, at least through technology, are: Greater access to social media, the creation of digital neighbourhoods, emojis that continue every year to expand—for many people that’s the way in which we express emotion, the idea of video chat (“the Zoom revolution”), the creation of blogs to share information and other forms of meaningful engagement, and creating human interaction forums. However, these are far more goals than things that are actually been carried out today.

There is a general acceptance of what is called the common good. The U.S. Constitution starts with the phrase “We, the people”. Today, we are seeing: “Me. What’s in it for me?” How do I benefit? How do I improve my way of living?” This is something that many of us acknowledge, but what our programmes fail to focus on.

A recent study carried out by PTI showed that most CIOs do not consider smart cities a priority anymore. Cybersecurity is the new number 1 of the priority list. However, the study also showed that all those people were striving for smarter government. Definitions really do matter. We all aspire to having smarter, better and more responsible governments, and the word “smart city” sometimes gets in a way.

The other missing ingredient in evaluating the criteria for smart or cognitive cities is “what do the citizens think or feel?” The question is whether we are trying to address consumers or citizens? All too often governments look at their populations as essentially consumers of services and they address it accordingly. They are not building up a kind of relationship (digitally) that might help. Citizens are different, and they needed to be treated differently than consumers. This is one of today’s great challenges. When we talk about cognitive cities, we are talking about relationships, understanding, and we are missing some of that in our conversations.

## **Topic 2: From Industry 4.0 (merging of virtual, physical and biological) to Industry 5.0 (interaction and collaboration between humans and machines)**

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**Jeremy Millard**, Managing Director, Third Millennium Governance, Denmark, **addressed lessons being re-learned and the question of how 'Zoomshock' is transforming work, geography and society.**

First research on teleworking dates back to the early 2000s. In 2000, 5% of the workers did telework across the EU. This went up to 8% at the end of 2009. Studies showed that off-site worker productivity followed an inverted-U-shaped curve: If people worked 2-3 days a week at home, they maximise their productivity. If they work completely elsewhere than in the office, it would go dramatically down. Originally productivity goes up because people have less stress, they can concentrate without being disturbed, and they don't have to commute. But once they get over the hump of 2-3 days a week, many people lose contact and miss the social interaction at the office, the boss can't see them and they won't get promoted.

Another big issue at that time was the environmental impact and the hypothesis that telework saves carbon and travel. However, studies revealed the exact opposite due to environmental rebounds. Commuters tended to use public transports to go to work, whereas teleworkers were using their own car.

Similar studies were carried out recently. According to the OECD, the prevalence of telework among EU employees was about 11% in 2019. It raised to 40% in 2020. The off-site worker productivity followed the same inverted-U-shaped curve described years before! And again, trade-off effects have been observed between work and non-work trips, which increase CO2 emission levels. Contrary to the generally accepted idea that commuting trips have a greater environmental impact, non-work trips account for a significant share of CO2 emissions.

Research has also been done on the system context of work and how work is developing:

In the pre-Covid period, telework was technology-driven. The labour market was rather stable. However, as technology advanced, there was increased tech-enabled global outsourcing with significant worker exploitation, gig' work, etc., where people were teleworking at home, but were using technology to stay mobile.

We could see experimental moves to suburban and rural telecentres and hot-desking, while commuting and agglomerations continued to grow. However, there was a mostly voluntary, selective and low telework uptake in EU until 2019. Telework was mainly home-based with beginnings of mobile telework. The adoption of telework occurred mainly in highly advantaged demographics and highly specialised job types with others largely left out.

During Covid, telework was system shock-driven and technology enabled. The EU labour market is highly unstable with about 40% unemployment and furloughing. Moreover, there have been major shut downs of city and suburban centres, plummeting city-centre commercial real-estate values. Telework is largely coercive and widespread, almost exclusively home-based, and across most demographics and all relevant job types.

We don't know yet what will happen in the post Covid period, but we might see spatial mixing of work and population, a renewed focus on co-working centres, and hot-desking away from cities. Telework could be mainly 'hybrid work' and 'working from anywhere', with a strong return to mobile and flexible work. The uptake will be across almost all demographics and job types, but still with the threat of 2 classes of workers: the advantaged enjoying the benefits, with a (large) minority of most disadvantaged who experience mainly disadvantages.

**Namir Anani**, President & CEO, Information and Communications Technology Council (ICTC), Canada, **addressed the issue of Industry 5.0, where humans, machines, and intelligent communities come together.**

We are seeing a whole new era of industrialisation with automation robotics and AI capabilities, that go far beyond of what we have seen in the last 20-30 years. For the first time, technology advancements are not gaged by the speed of the sophistication or the cost of these technologies, but by the competitive nature that they have with the humanity.

Automation robotics are actually competing with job, and even on the level of Intellectual Property of creative content, whether it is music or arts. The question of who owns the IP is going to be part of the discussions and there are many aspects to that.

We have seen in the Covid 19 environment as much as it has been complexed on the lives and livelihoods in many nations, and we saw many industry verticals dealing the whole brunt of this environment. And we saw other industry verticals feeling some reprieve by being digital by default our transforming quite rapidly. Overnight, we became almost a contact free economy with e-commerce, digital banking, telehealth, e-learning etc. What will the trends be in the coming years? Will we go back to our normal or new normal? Possibly, there will be some level of adoption of e-learning, telehealth etc. that will continue.

Industry 4.0 enabled advanced manufacturing through its sophisticated capabilities of supply chain logistics, sophisticated robotics and automation in terms of ensuring or heightening the productivity. According to McKinsey, automation robotics and the advent of AI has increased productivity by 47% in the last 20 years. Industry 4.0 brought also the smart products. However, all that came to the end of its cycle.

We are in a world of mass customization, whether it is B2B or B2C. People are looking for a different type of manufacturing, and the consumer is taking the demand for personalisation to a whole new level. Advanced manufacturing and robotics can take up to 90% of that manufacturing; the last 10% of customization is just too complex and too costly for manufacturing organisations to do that. Cobots are becoming the essence of Industry 5.0. Robots are working with humans for the last mile of customization and meet the increasing demand for personalisation.

You have to work with collaborative robots to make that happen. These collaborative robots have the capability of learning as well—the cobot takes a mondan task and pushes the human to work on the high-level aspects.

Industry 5.0 is transcending to the citizen engagement and the smart cities. One example is the health sector and the collaborative techniques that are happening: It is possible to rely on a doctor in Japan to operate on a patient in the U.S., through 5G connectivity and with the advancement of cobots locally. Despite of jurisdictional and educational aspects of how this can work in different countries, it is already a reality that is taking shape.

Digital twins are creating a whole new environment to test such capabilities. We see this in the construction industry. There are companies in South Korea that don't have to be at the local site, they can operate their heavy machinery from totally different locations. These machines are very autonomous, they can take the large majority of constructions and build it.

While it was estimated that automation robotics will take away 14% of the world jobs, Industry 5.0 is including humans. However, academic institutions will have a more critical role to play in this development, because there will be a need for high skilled humans.

There is also a lot of development on the green economy, beyond just the renewables. The field of biotech and synthetic biology refers to technologies that are between the robots and AI development.

**Eunika Mercier-Laurent** [via chat] referred to Snecma and the future factory of Schneider as examples of Industry 5.0.

**Michael Stankosky** commented [via chat]: We need to start thinking about how to integrate the other AI: Anthropological Intelligence.

**Lara Srivastava** commented [via chat]: A greater focus on human-machine complementarity is vital for the development of a safe, inclusive citizen-centric digital world for all of us.

**Youssef Berbash** [via chat] underlined the finance and investments needs challenging emerging economies in the context of Industry 5.0.

**Daniele Tumietto**, Expert European DIGITAL SME Alliance, Professor Link Campus University in Rome, Italy, **introduced the Industrial IoT.**

Industrial Internet of Things (IIoT) technologies are key for SMEs to digitally transform their industrial operations and stay competitive. However, IIoT adoption is still a complex and costly process for SMEs, and concerns about security remain a significant barrier. The European DIGITAL SME Alliance has published a practical guide on IIoT for SMEs to facilitate adoption, address common security concerns, and emphasise the importance of standards as a go-to resource for both of these issues.

The IoT is continuously proving to enhance accessibility, competitiveness, and resilience of SME. IoT paves the way towards the improvement of industrial operations and the digital transformation of traditionally analogue companies. As such, it is a key priority of the European Commission's plan for the "twin transition" to a green and digital economy.

The guide on IIoT is an effort to provide small businesses with a lightweight guide to adopting industrial IoT solutions to digitalise and improve their operations within a secure environment. It starts by providing a rationale to adopt IoT and provide use cases that shows how IoT is capable of solving common issues in an industry setting.

Acknowledging the importance of working in a secure environment, the guide provides SMEs with security guidance at an organisational and operational level based on international standards such as Security for Industrial Automation and Control Systems (ISA/IEC-62443) and Information Technology Management (ISO/IEC 27001).

To download the SBS SME Guide on Industrial IoT: [www.digitalsme.eu/digital/uploads/SBS-SME-IIoT-Guide-2020.pdf](http://www.digitalsme.eu/digital/uploads/SBS-SME-IIoT-Guide-2020.pdf)

**Oriane Wiser**, Project Coordinator Data for Good, The Netherlands, **presented an initiative to transform global sustainability data into easy-to-understand dashboards.**

Data For Good strives to become a Global Control Center which monitors the progress made by change agents around the world towards achieving common challenges and goals, and eventually the United Nations Sustainable Development Goals (SDGs).

Data For Good is building a platform enabling any visitor to easily visualize the progress being made by change agents (i.e., any stakeholders that can be involved) all over the world, at different levels (SDG, country, organization, mission). Stakeholders can engage with, and contribute to the Global Control Center by taking advantage of its services.

A Private Client Platform allows to update project KPIs, model data, distribute tasks and network with other clients. People can register for private dashboards for organisations and governmental institutions, but also private projects. Moreover, it offers a call for tender option for project leaders (searching for volunteering, funding, materials...) which will be posted on the platform. A fact checking service enables registered clients to verify claims made by producers, brands and services.

Data For Good works with visualisation based on maps. It is possible to visualise all global projects that fell under a special SDG. The platform aims to show the progress that each and every one can make towards achieving the SDGs.

**Marek Canecky**, Permanent Representation of Slovakia to the EU, **provided a short conceptual overview on the transition from Industry 4.0. to Industry 5.0.**

Just to remind the four previous industrial revolutions: The first (1784) was characterized by mechanical production, railroads, and steam power; the second (1870) by mass production, electrical power, and the advent of the assembly line; the third (1969) by automated production, electronics and computers; and the fourth (now) by Artificial Intelligence, big data, robotics and more to come.

The 4 main features of Industry 4.0 are autonomous cyber physical systems, ubiquitous data, and ubiquitous connectivity. These features of Industry 4.0 are underpinned by key enabling

technologies—the most prominent ones being Artificial Intelligence, sensors, IoT, edge, cloud, and 5G networks.

However, along with the implementation of these key enabling technologies come several challenges that need to be addressed: As far as AI is concerned, the challenges are mainly related to trust, transparency and ethics. The challenges of IoT, edge, and cloud are mainly related to data ownership, sharing, and liability. The challenges of 5G network (and connectivity in general) are mainly challenges related to cybersecurity, digital divide, and Internet governance.

Most researchers define Industry 5.0 from the point of view of technology. From this point of view, Industry 5.0 is comparable to Industry 4.0 but with additional technologies, like human machine interface, digital twins, bio-inspired technologies, swarm intelligence etc.

However, if we really want to define Industry 5.0, we should ask the question whether the old paradigm of constant and eternal growth and job creation still holds. We have to change the paradigm and we should focus on the narrative of Industry 5.0., which builds on top of Industry 4.0, taking into consideration environmental sustainability and resilience (material and energy efficiency, circularity, climate change...) and social sustainability and resilience (human centricity, empowerment and well-being....).

**Michael Stankosky** proposed [via chat]: It would be interesting for this group to look ahead to create a definition for the 5<sup>th</sup> Industrial Revolution.

**Jeremy Millard** added [via chat]: Regarding growth and jobs — depends how we define these — we need to look at Kate Raworth's work on the doughnut economy.

## **Concluding Remarks**

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Sylviane Toporkoff, together with the Ingrid Andersson, thanked the speakers and participants and invited them to send any information they want to add to what has been discussed today. All material will be made available on the Global Forum's website.

The moderator reminded the upcoming Fourth Global Forum 2021 Webinar in September. By then, precise information on the final dates of the Global Forum 2021 in Oman will be available.

### **Global Forum Thematic Webinar IV on 22<sup>nd</sup> September, 2021**

- Health for All – Addressing preventative measures and medical interventions adopting new technologies
- Addressing Education and Learning in novel ways making use of Digital Solutions

The webinar will take place on 22<sup>nd</sup> September, 2021 between 1:30 pm to 3:00 pm Paris time / 7:30 am to 9:00 am Washington DC time / 9:30 pm to 11:00 pm Tokyo time.