Global Forum
Shaping the future 2019

THE INTERNATIONAL THINK-TANK
ON THE DIGITAL FUTURE

1ST INTERNATIONAL CONFERENCE FOR MULTI-AREA SIMULATION
#ICMASim 2019

8-10 OCT. 2019
ANGERS
FRANCE

THE ROLL OUT OF DIGITAL TRANSFORMATION

Facing Innovation, Simulation & Realities

Monday 7th & Tuesday 8th, October 2019

Angers, France
Centre de Congrès Jean Monnier

PROCEEDINGS

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Report written by
Items International

ACKNOWLEDGEMENTS

The 2019 edition of Global Forum/ Shaping the Future took place on 7th and 8th October in the city of Angers, France. This 28th edition of the Global Forum/ Shaping the Future was as lively and innovative as its predecessors. For the first time, the Global Forum was organized in parallel with ICMASim 2019 – the International Conference for Multi-Area Simulation. This first common experience was highly appreciated as it offered a great opportunity to network and develop innovative solutions and partnerships in a stimulating and inspiring environment gathering a diversified international audience.

We would like to address a few words of thanks to all those who have put so much time, effort and support in making this Global Forum another success.

We would like to express our sincerest thanks to the City of Angers for hosting the Global Forum and providing such excellent meeting facilities.

It was truly an incredible few days of inspiring keynotes, expert panels, lively debates and networking. A heartfelt thank you to all our distinguished experts, moderators, chairpersons and speakers for their participation, engagement and enthusiasm! Thank you for sharing your insight, knowledge and your experience with us and for making this event so special to us all.

Thank you to our fantastic sponsors and for their commitment and dedication.

We would like to extend a special thanks to the main sponsors of the Global Forum 2019 for their spirit of sharing, support and generosity (in alphabetical order):

> ADEME, Atos, Bouygues Energies & Services, COM-SCAPE, DAWEX, DPS, EDF, EMD, Engie, GSMA, Groupe INTRA, Laerdal, MEDUSIMS, Orange, RATP Dev, SSHRC CRSH, twin medical, VINCI Energies, Groupe ZeKat.

As well as the supporting sponsors, which are (in alphabetical order):

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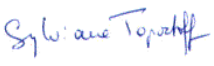
Thank you to all of you for being with us for so many years now. We are counting on all of you as partners and friends to carry on the vision of the Global Forum and look forward to seeing all of you next year at the twenty-ninth Global Forum. In the meantime, take care and keep networking!



Sébastien Lévy
Vice-President of the Global Forum

Sylviane Toporkoff
President of the Global Forum

The Global Forum 2019 was realized with the active and efficient support of its sponsors and supporting partners

SPONSORS

SUPPORTING PARTNERS

PROGRAMME

6 October 2019

Welcome Event

on the eve of the Global Forum
at the Galerie David d'Angers

7 October 2019

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Sébastien Lévy, Vice President Global Forum/Shaping the Future; Partner Items International, France

Sylviane Toporkoff, President Global Forum/Shaping the Future; Founder & Partner Items International, France

Keynotes:

Benoît Pilet, Deputy Mayor of the City of Angers, Vice-President of the Angers Urban Community, France

Edith Cresson, Former France Prime Minister; Former European Commissioner, President École de la Deuxième Chance, France

Laurent Prétrot, Vice-President, Digital Economy, Regional Council “Pays de la Loire”, France

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Jean-Pierre Chamoux, Professor Emeritus, Université Paris Descartes, France

Keynotes:

Joëlle Durieux, General Director, Finance Innovation; National Secretary, Réseau Thématique French Tech #FinTech, France

Ted Hewitt, President, Social Sciences and Humanities Research Council of Canada

Samia Melhem, Global Lead, Digital Development, Digital Development Team, WorldBank

Sarah Zhao, Partner BakerHostetler, USA/China

Nagaaki Ohyama, Professor of Institute of Innovative Research, Tokyo Institute of Technology, Japan

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5G &Evolution of Integrated Platforms

1st Day

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John Giusti, Chief Regulatory Officer, GSMA

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Sylvie Albert, Professor, Department of Business & Administration, University of Winnipeg, Canada

Speakers:

Marc Dufayet, 5G Marketing Product Manager, Orange Business Service, France
5G – Towards Real-Time Transformation

Yoshio Tanaka, Professor Tokyo University of Science, Japan
Things and Systems on IOT/5G Era

Jean-Pierre Bienaimé, Chairman, IREST – Institute of Economic & Social Research on Telecommunications, France
Unlocking the benefits of 5G for the Enterprise Market:
5G empowering vertical industries

Sophie Le Pallec, Head of Public Policy, GS1 France
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Aurélie Beaupel, Digital Independent Expert, France
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Steven Lafosse Marin, CEO & Co-founder, DGT4leaders–UMAN; President ISEP Business Angels, France
with **Abdessamad Ait El Cadi**, Lecturer, Assistant Professor & Logistic Researcher Université Polytechnique Hauts de France; Expert Advisor, UMAN, France
Innovation 4 Good

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1st Day

Chair & Moderator:
Alan Shark, Executive Director & CEO, PTI – Public Technologies Institute, USA
Artificial Intelligence and Data

Speakers:

Etienne Gehain, Digital Innovation Officer, ENGIE, France

Namir Anani, President & CEO, ICTC – Information and Communications Technology Council, Canada
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Kaiser Naseem, Digital Transformation Professional and International Development Banker, United Arab Emirates

Alessandro Guarino, Founder and CEO, STAG, Italy
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Walid El Abed, Founder & CEO, Global Data Excellence, Switzerland
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Eikazu Niwano, NTT Research Professor, Secure Platform Laboratories, NTT Corporation, Japan
Structured ID Components Over Secure Environments

Renaud Montin, Managing Director Consumer Division, Parade Connect; Chief Transformation Officer, ERAM Group, France
Parade Connect

Gwendal Azous, IoT Consultant Manager for Smart Cities, Smart Industries & Smart Building, Axians Consulting, France
Smart City Promise and reality of IoT—The Roll-Out of Digital Transformation

Gérald Santucci, Ambassador, INTEROP-VLab, Belgium
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Alain Ducass, President & Director, www.energeTIC.fr, France
Too Many International Digital Projects Fail or Produce White Elephants

Alessandro Guarino, Founder & CEO, STAG, Italy
Digital States and Digital Peoples

Alice Pezard, Attorney at Law & Arbitrator, France

Jenny Romelsjö, Case-Handler, Unit C.6 – Antitrust: E-commerce and Data Economy, DG Competition, European Commission
Competition Policy for the Digital Era

David Rousseau, Professor in Data Sciences, University of Angers, France
Where legislation meets climate change and electronics

Fabrice Tocco, Co-Founder & co-CEO, Dawex, France
Making Data Exchange Scalable & Secure

Paul Wormeli, Innovation Strategist, Wormeli Consulting, USA
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at the Greniers Saint Jean,
a unique & sumptuous event space built in the XII century, former Saint-Jean hospital

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Alain Guillaume, Business Development and Marketing Manager, Citeos, a VINCI Energies Brand, France
Futuristic Visions of the Smart City

Olivier Sala, General Manager, ENGIE Digital, France
Be the World Leader in Zero-Carbon Transition "As a Service"

Darin Beach, Chief Business Development Officer, Images & Réseaux, France
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Valérie Champetier, Founder, ThinkandAct, France
Cognitive Cities

Sylvain Nachef, International Business Development Director, Bouygues Energies & Services, France
Smart, Inclusive, Sustainable Territories

Gwenaëlle Carfantan, CEO, Setur, France
Urban Think

Thomas Mackenzie, Senior Research Consultant, Internet Governance, Items International, France

Eric Legale, Managing Director Issy Media, City of Issy-les-Moulineaux, France
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Jean-François Soupizet, Scientific Advisor, Futuribles International, France
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Abu Dhabi Data Management Program Open Data Initiative

Sherif Aziz, Advisor, Strategic Planning, Madayn, Sultanate of Oman
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Marek Canecky, Second Secretary, Permanent Representation of the Slovak Republic to the EU, Slovakia
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Philippe Denis, Executive Denis & Partners Consulting; Founder Resonate SDG, France
Trust, Tech Trust Challenges, Algorithm Issues, AI intelligence

John Erik Setsaas, Vice-President, Identity and Innovation, SIGNICAT, Norway
How Federated eIDs Increases Security and Convenience and Reduces Fraud

Tom Whitney, Head of Solutions Consultancy, iProov, United-Kingdom
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Speakers:

Raphael Guastavi, Deputy Head of Department – Products and Material Efficiency ADEME, France

Hugues Ferreboeuf, Project Manager, Shift Project, France
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Fredéric Croison, Manager, Inextenso Innovation, France

Caroline Vateau, Director, Business Unit Digital Responsible, Neutreo, France
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Dalia Badawi, CEO, Cairo, Egypt

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Sylvie Chauvin, Founder, Markess by Exaegis, USA

Mariane Cimino, CEO Hoa-Ora, France
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Nolwenn Germain, Business Development Director, E-mma, France
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Jan Roche, President, SimAust, Australia
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Cécile Jaglin-Grimonprez, Directrice Générale du CHU Angers, France

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Marc-Antoine Custaud, Vice-President, Innovation and Scientific Valorization, University of Angers, France

Speakers:

Philippe Allain, Professor of Neuropsychology, University of Angers, France
co-authors Paul Richard, Associate Professor, University of Angers, France & Deborah Foloppe, Post-Doctoral Researcher, University of Angers, France
The Potential of Virtual Reality Techniques to Assess and Enhance Functional Autonomy in Patients with Alzheimer's Disease

Frédéric Banville, Associate Professor, University of Montreal, Canada
Assessment and Rehabilitation Tools: The Usefulness of Immersive Virtual Reality

Alberto Cendron, Administrative & Commercial Manager, Logos, Italy
Integrated Pharmaceutical Logistics in Venice

Damien Claverie, INSERM, France
co-authors Florent Sigwalt, Guillaume Petit, Jean-Noel Evain, Monique Bui, Angélique Guinet-Lebreton, Marion Trousselar, Frédéric Canini, Dominique Chassard, Antoine Duclos, Jean-Jacques Lehot, Thomas Rimmelé and Marc Lilot
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Vincent Dochez, University of Nantes, France
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Why We Need SMART Agriculture to Feed the World?

Philippe Scheimann, Co-Founder, TOP Global, Israel
Coffee Industry 4.0 → 4.All

Michael Stankosky, Professorial Lecturer, Engineering Management & Systems Engineering, George Washington University, USA
Convergence of Ideas – Industry 6.0

Nicolas Mauduit, Business Manager, SMI IA – Group Bouygues Energies & Services, France

Didier Longueville, CTO, ZeKat Group, France
Predictive maintenance for rotating machines with IoT technologies and vibration analysis system

Patrick Vautier, Head of Marketing and Innovation, RATP Dev, France
RATP Dev Experiences with AI and Big Data technologies: A major tool to improve performance

Marc Boucker, Programme Manager, EDF R&D, France
Experience in Developing Digital Twins to Support Operation and Maintenance of French Nuclear Plants

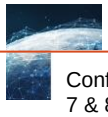
Deborah A. Foloppe, Post-Doctoral Researcher, University of Angers, France
Simulation Tools Based on Virtual Reality Technologies

Lena K. Swedberg, Quality Coordinator, Patient Security &Quality & **Peter Rodmalm**, Innovation Coordinator, Södertälje Hospital AB, Sweden
Södertälje Hospital AB, Sweden Smart Training Platform – An innovative simulation tool to prepare management and staff for the move to a new hospital building

ABOUT THE GLOBAL FORUM

The Global Forum/Shaping the Future is an annual, independent international event dedicated to business and policy issues affecting the successful evolution of the Information Society. As a high-profile international Think Tank, bringing together senior government officials, policymakers and industry leaders from Europe, North and South America, the Pacific Rim and Africa, the academia, and the civil society – both from advanced and developing economies, its main purpose is to promote interaction and dialogue between the different stakeholders, to give impulses for the formulation of common visions, and to pool knowledge, expertise, research, policy analysis and networking capability.

The Global Forum/Shaping the Future is a not-for-profit initiative of ITEMS International. It is sponsored by organizations from all over the world, interested in sharing and influencing global IT-agendas, and enabling business and government leaders from all sectors of the ICT communities to meet and work with suppliers and service providers.



The Global Roadmap

2019 The Roll Out of Digital Transformation - Facing Innovation, Simulation & Realities – Angers, France

2018 The Digital Transformation in the Broader Ecosystem – Copenhagen, Denmark

2017 Digitalization - Intelligent Pathways – Winnipeg, Canada

2016 Digitalization – The Global Transformation – Eindhoven, Netherlands

2015 Digitalization - From Disruption to Sustainability – Oulu, Finland

2014 A Connected Age – Geneva, Switzerland

2013 Driving the Digital Future – Trieste, Italy

2012 Shaping a Connected Digital Future – Stockholm, Sweden

2011 Vision for the Digital Future – Brussels, Belgium

2010 ICT for an Empowered Society – Washington DC, USA

2009 ICT & The Future of Internet – Bucharest, Romania

2008 Collaborative Convergence – Athens, Greece

2007 Global Convergence 2.0 – Venice, Italy

2006 The Digital Convergence – Paris, France

2005 The Broad Convergence – Act II – Brussels, Belgium

2004 The Broad Convergence – Malmö, Sweden

2003 Connecting Businesses & Communities – Rome, Italy

2002 The Promise of Broadband Services – Washington DC, USA

2001 Expanding the Global e-Society – Newcastle, United Kingdom

2000 Towards a Global e-Society – Sophia-Antipolis, France

1999 New Satellite and Terrestrial Applications – Sophia-Antipolis, France

1998 Networked Communities – French Senate, Paris, France

1997 Smart Communities Forum – Economic Development in a Global Information Society – Sophia-Antipolis, France / Rome, Italy

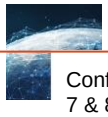
1996 Smart Communities Forum - US Tour of cities and regions – New York / Washington / San Francisco / Silicon Valley, USA

1995 The Second Europe / Japan Forum on Communications – Kyoto, Japan

1994 Europe / Japan Forum on Cooperation and Competition in Communications – Paris, France

1993 Europe / United States Meetings on Cooperation and Competition in the Field of Communications – Rome, Italy

1992 Europe / United States Meetings on Cooperation and Competition in Telecommunications – Washington / New York, USA



THINK TANK SYNTHESIS REPORT

The 28th edition of Global Forum took place on Monday, 7th and Tuesday, 8th, October 2019 in Angers, France.

Year after year, the Global Forum attracts high-level delegates from the world of politics, the business community, and academia for a two-day discussion on latest achievements and ongoing developments in the world of ICT. Influential leaders and prominent speakers from around the world came together to share their visions and concerns and to discuss the most recent developments and the most fundamental questions related to the topic of this year's Global Forum:

THE ROLL OUT OF DIGITAL TRANSFORMATION
Facing Innovation, Simulation & Realities

The following synthesis report highlights the key issues of each presentation and summarizes the discussions that took place during the sessions. All slides, speaker profiles, and other documentation are available for download on the website of ITEMS International http://globalforum.items-int.com.

Do not hesitate to contact ITEMS International if you wish to get in touch with one of the speakers.

The Global Forum's report is structured according to the actual sequence of presentations during the two conference days. The summaries of the presentations made during the Global Forum 2019 are listed in chronological order corresponding to their sequence in the final conference programme, as listed in the beginning of the present document.

Welcome Addresses

Day 1 – Morning – Plenary Session

SÉBASTIEN LÉVY, Vice President Global Forum/Shaping the Future; Partner Items International, France, opened the Global Forum 2019 edition in Angers.

Digital transformation is nothing new. It is impacting our lives, our societies and businesses since decades. Transformation isn't, and probably will never be, complete. We constantly strive to improve, become faster, more agile and efficient. However, the speed of change is accelerating and the complexity of change is increasing.

According to the World Economic Forum's Global Risks Report, geopolitical and geo-economic tensions represent the most urgent global risks in 2019, not to mention environmental degradation on a global scale.

We need shared global goals and coordinated, concerted action to sustain growth and to tackle these threats we are facing. There is much to do and we have to act fast. To some extent, we have to innovate how we innovate and this implies the use of virtual and augmented reality as well as visualization and simulation techniques.

Smart digital transformation is an important element in the common effort to ensure welfare, democracy and stability.

Within the coming days, we will listen to a great number of excellent presentations. Experts from all around the world will exchange their view in a wide range of topics in this vast field.

The coming two days will be challenging and stimulating, because, rolling out digital transformation doesn't just relate to technology. It is first and foremost people.

SYLVIANE TOPORKOFF, President Global Forum/Shaping the Future; Founder & Partner Items International, France, warmly welcomed the participants of this years' Global Forum.

The President thanked the speakers, moderators and attendees for their time and their commitment to the Global Forum.

This years' debate is about the roll out of digital transformation facing innovation, simulation and realities. The two days of the Global Forum will show that the real challenge does not just relate to technology –it is people, it is processes, it is infrastructure and more.

Before giving the floor to the keynote speakers, the President Sylviane Toporkoff thanked the city of Angers for hosting the Global Forum 2019 and offering this such a wonderful meeting place.

She expressed here gratitude to all those who have contributed in so many different ways to the success of the Global Forum. A special thank you was given to all the great sponsors supporting the 2019 edition of the Global Forum.

After whishing all participants to enjoy this Global Forum full of stimulating presentations, debates, fantastic speakers and networking, the President introduced the keynote speakers of this Welcome Session and handed over to the first speaker.

The President than moderated the Welcome Session with great ease.

BENOÎT PILET, Deputy Mayor of the City of Angers, Vice-President of the Angers Urban Community, France, on behalf of the Mayor of Angers, Christophe Béchu, welcomed the attendees of the Global Forum in Anger and provided brief remarks.

What other city than Angers—the city of the connected objects, the greenest city of France and one of the best places to live in in France—would be better suited to host the Global Forum?

In Angers, the participants of the Global Forum share the future in the best conditions. Being the only French city to provide such a level of excellence, the city is proud to welcome the 240 delegates from around the world to discuss digital innovation.

Angers is the first city in France to invest more than 100 million Euros in the digital transformation of the region.

The Deputy Mayor invited the participants to feel at home in Angers, and to come back whenever they need a place to test state-of-the-art technology.

In November, Angers is preparing its transition towards a truly smart city with the presentation of the consortium that has been awarded a 100 million contract for the next 10 years.

Angers is in a state of flux. In 2017, the city hosted the 22nd annual meeting of the WEF, the World Electronics Forum. In October this year, the trade fair *En Mode Senior* presenting technology and core advances concerning the silver economy took place in Angers. And for the first time, the Global Forum /Shaping the Future is organized in parallel with ICMASim 2019, the International Conference for Multi-Area Simulation in Angers.

Definitely Angers is focussing on innovation and international.

EDITH CRESSON, Former France Prime Minister; Former European Commissioner, President École de la Deuxième Chance, France, warmly welcomed the delegates to the Global Forum 2019 in Angers, a city dear to her heart for a very long time.

Edith Cresson the President and Vice-President of the Global Forum/Shaping the Future for their amazing job and dedication to this crucial think-tank. The Global Forum is one of the most internationally recognized and renowned think-tanks on the digital.

This 2-day think-tank is a one-of-a-kind moment to question and disseminate innovative ideas and visions in a convivial environment.

The Global Forum is a challenging event, a true international conference which manages to gather an amazing group of experts from around the world with many interesting profiles from a great diversity of different ICT perspectives. It gives a great occasion to discuss in prospective way different topics than usual. It gives the opportunity to create partnerships, start new projects and boost initiatives. The intellectual stimulus is enriched by great venues.

The main topic this year is “The Roll-Out of Digital Transformation, Facing Innovation, Simulation & Realities”. It is easy to see why the Internet of Things, artificial intelligence, machine learning, automation and so on are exciting. They have the potential to change the world as we know, but digital transformation should be about people and helping them achieve what they need.

The technologies are simply tools. Technology exists to make our lives easier and more comfortable and enjoyable. But often it does just the opposite.

The digital transformation should be human centric. That is why Mrs Cresson created “Ecole de la Deuxième Chance” - 2nd Chance Schools are based on the principles contained in the White Paper Teaching and Learning - Towards the Learning Society, that she presented when she was European Commissioner for Science, Research and Development and former France Prime Minister at the Madrid Summit of Heads of State in December 1995, and adopted by the Ministers of Education of the Member States of the European Union. The project to build 2nd Chance Schools was one of the five transversal objectives identified by the White Paper, "Combating exclusion".

LAURENT PRÉTROT, Vice-President, Digital Economy, Regional Council "Pays de la Loire", France, warmly welcomed the participants.

The Pays de la Loire region comprises 5 departments and 7 main agglomerations, with Nantes being the capital of this region, and the 6th largest French city. 3.8 million people live in the Pays de la Loire region, 25 percent are less than 20 years old. The unemployment rate of the region (7.6 percent) is one of the lowest in France, thanks to more than 130 000 companies and especially the two big ones, Airbus and the shipyard Chantiers de l'Atlantique, both located in Saint-Nazaire.

The strong network of universities and the Technocampus reinforces the link between industry and technology and supports the region in developing innovative solutions to improve the life of the citizens and foster economic growth.

Each of the 5 departments of the Pays de la Loire region is "French Tech" labelled. Each label is related to a specific expertise: IoT and smart city for Angers, virtual reality for Laval, smart mobility for Le Mans, and energy transition in la Vandée and Nates.

Digital has to be a tool to improve the life of citizens, while at the same time focussing on using technology in the smartest way possible. Angers has developed strong skills in the area of IoT and smart cities resulting from its long history in electronic components production. 100 million Euros will be invested within the next 2 years in order to spread connected solutions throughout the metropolis.

Nantes has been named the 2019 European Capital of Innovation for its ability to improve the lives of its residents through innovation. 5G is currently tested with 200 beta testers and partner companies selected by the operators. The marketing to general public is expected from 2020 after the release of compatible terminals.

The focus on smart mobility in Le Mans is the result of a long history in automotive and sport automotive innovation. The ambition is to leverage this expertise by reinventing mobility.

The specific expertise of the Vendée department is in the field of energy transition. SMILE (SMart Ideas to Link Energies) is an interregional collaboration between Brittany and the Pays de la Loire. Launched in 2016, the SMILE project is part of a plan for the operational implementation of energy transition and sustainable growth on a regional and national level. Its aim is to accompany and support the deployment of a series of important regional industrial projects connected to smart grids to promote skills on a European and worldwide scale.

The main aspect that all smart grid projects have in common is on one hand to improve the balance between the production of renewable electricity and its consumption, and on the other hand to introduce data flow management hubs, the Internet of energy.

The specific expertise of Laval in the area of virtual reality and augmented reality is globally recognised.

Beyond technologies, the Pays de la Loire region is known as one of the best places to live in Europe. The region is represented worldwide through its teams located in Europe, North America, Africa and Asia.

During the **Q&A**, Laurent Prétrot was asked about the economic ecosystem in the region.

Mr. Prétrot stressed one specificity of the region, which is the number of small and medium sized companies. Moreover, there is a strong culture of family owned companies. In 2016, about 50 million Euros have been invested to accelerate the deployment of fibre equipment all over the region.

The region is also characterized by a broad variety of industries in very different sectors and a strong dynamic regarding start-ups and new technology organizations. The region's economic system is a mix and a right balance. It enables to have the right development between what is needed as investment to be able to provide innovation, but also to serve the economy in a concrete way to foster economic growth. The Pays de la Loire region is focussing on keeping this balance between the necessary to push development and innovation and the wellbeing of everyone living in this region.

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Opening Session

Day 1 – Morning – Plenary Session

JEAN-PIERRE CHAMOUX, Professor Emeritus, Université Paris Descartes, France, the chairman and moderator of this session, welcomed the panellists.

Today, long term visions are essential. The three volumes of "The Digital Era" (edited by Jean-Pierre Chamoux) address some of these vision problems:

There is the need for a technological vision on systems, software and big data. We also need a socio-political vision on services, privacy (legal terms, standards, etc.), competition as the driver of economic development, and property rights (there is no investment without property rights). We then need a wide understanding of the worldwide political economy stakes, such as free speech, trade, finance, people movements, etc.

With virtual currencies like Bitcoin or Libra, currencies are designed and distributed by entities outside the government. This is of particular interest for international trade and the global industry leading worldwide economic development. The political economy stakes need to be seriously reviewed, thought of and redeveloped for an open world.

JOËLLE DURIEUX, General Director, Finance Innovation; National Secretary, Réseau Thématique French Tech #FinTech, France, provided an insight in the impact of new technologies on the financial industry.

Digital transformation is addressing everyone, but especially those who are born with these new technologies—the new generations, the millennials.

Today, 50 percent of the world population is under 30 years old. This young generation arrives in a world to reinvent with digital tools offering great opportunities. This generation is in search for of meaning and considers traditional companies as too rigid. It also sees start-ups creating new uses, services and ways of working due to new technologies, while the GAFAMI companies (Google, Apple, Facebook, Amazon, Microsoft, IBM) have become the first digital players and the first market capitalisations. This generation also knows that 80 percent of the jobs from 2030 are not yet invented. In a world dominated by skills obsolesce, new generations understood that they will have to constantly learn and update themselves.

The financial industry reflects this world in progress: Finance itself is in full transformation and irrigating the entire economy with disrupted technologies, such as today's artificial intelligence and blockchain technologies or tomorrow's quantum computing.

Negative long-term interest rates and margin declines push the financial industry, i.e. mainly banks and insurance companies, to become bigger and bigger to achieve economies of scale. New collaborations between the whole world and start-ups are being created. With FinTech actors, i.e. start-ups mixing technology and finance, a new world of ecosystems emerges, where the value chain turns from a linear mode to a non-linear network mode.

Today, customer journey and experience have great value to products and services. They become collaborative by creating interactions between people through platforms connecting new actors who enlarge the field of possibilities and creating products and worldwide brands. Collaborative platforms emerge, where all-sizes actors (corporate and start-ups) become links participating or orchestrating relationship to create value for themselves and customers.

With big data, machine learning and cloud computing AI has now reached industrial maturity. However, the GAFAMI companies own the largest amount of data to customise content and services. For the GAFAMI companies, customer data is a strategic asset accumulated during many years, and the dominant role of the GAFAMIs disrupted the entire economy.

Today, companies have to mobilise their internal skills and open up to external know-how and skills which do not always exist inside. The use of open innovation and co-construction is seen as a must. Of course, new technical skills will be taught, but also social and emotional skills, such as empathy, leadership, creativity but also fragility. Young generations are no longer afraid of failure. While in Europe failure is perceived as very negative, entrepreneurs in the U.S. consider failure as a way to progress in the long-term. Such emotional skills are much more difficult to automate and this means a lot of opportunities to completely reinvent talent management and training.

Facing the power of the GAFAMIs as well as the emerging power of BATX (Baidu, Alibaba, Tencent and Xiaomi), Europe and France must equip themselves to maintain their technological and financial sovereignty.

Finance Innovation is the leading French competitiveness cluster dedicated to the financial industry. It has been created 11 years ago by the French government and brings together 600 members. Finance Innovation is focussing on 6 major areas: banking, insurance, asset management, real estate, social and solidarity economy as well as professional consultancy. Its aim is to bring together large corporates, FinTechs and academics to create collaborative projects that can benefit from subsidies of the French government but also European subsidies. Up to now, Finance Innovation helped to raise 1 billion Euro for these innovative projects. Finance Innovation is a local and global cluster connected to 10 countries—and would be happy to collaborate with the Pays de la Loire region.

TED HEWITT, President, Social Sciences and Humanities Research Council of Canada, [www.sshrc-crsh.gc.ca] elucidated the link between transformation and society, what some of the critical elements are, and why we need to take attention.

We need to think about two poles of risk. On one hand, the danger that promising technology won't be used in ways that deliver its promise. On the other, the risk that technologies will get used in ways that bring about significant social harm. And on both of these fronts, knowledge gained from social science and humanities researchers working in collaboration with other stakeholders is absolutely essential to helping us learn how to use emerging technologies wisely and well.

Today, electric vehicles are seen as the modern and environmentally-friendly way of the future. But despite the recent embrace of this technology, it's far from new. In fact, electric vehicles first hit the market in the mid-19th century, even before gasoline-fuelled cars. The electric ones had better braking, were more manoeuvrable, and accelerated faster than their

later gas counterparts. Yet, gasoline-powered cars have dominated the global auto market for more than a century. What was responsible for this 150-year lag in the uptake of electric cars? The cost of production and original business models were largely to blame—but there was another factor at play too. Electric cars were often marketed as suitable for women drivers because they were easy to operate. And that meant that they came to be stigmatized by the perception that they were ‘women's cars’. Internal combustion engines, with thrusting pistons and explosions, were deemed more manly. They were harder to start and drive, and they had a greater operating range. As men made up the bulk of consumers, the die was cast in favour of combustion engine vehicles for cultural reasons as well as business ones.

The lesson is that technological excellence is not enough to guarantee a technology’s success. Human considerations are often paramount. If those factors are not taken into consideration, a new technology will fail to find users, reward its investors, or deliver potential for social value.
Our rejection of many innovations is based on fear: what we perceive that technology could mean for our health, security, or opportunities. A number of North America cities, for instance, are looking at setting limits to the use of facial and biometrical recognition systems due to perceived risks around unreliable identification. These technologies have been developed largely by white people in North America —and the norm has been established against which other body types, body groups, may present less usable data, leading to their disadvantage.

In another example of reasonable fears around the use of AI, Amazon attempted to develop machine learning tools to score job candidates. For a while it was using software that relied on data about past applicants to predict which people were best-suited for the company. This approach led to a problem: since many previous applicants were men, the program penalized candidates whose resumes contained the word “women’s” or listed certain all women’s colleges as an alma mater. Again, the point is that when used in ways that don’t deliberately guard against bias, technology can amplify existing discrimination and biases, adding to the disadvantages facing groups who are already disadvantaged.

Wilful abuse of technology is also a great concern. For example, Amazon's facial recognition software was used by US police forces without any rules to guide it. China's government is blending video footage with data from online transactions to give their citizens a "social credit score" that can seriously undermine their reputation, limit mobility, deny access to education and jobs.

University of Montreal professor Yoshua Bengio considers that the dangers of abuse, especially by authoritarian governments, are very real. As he says, “AI is a tool that can be used by those in power to keep that power, and to increase it.” One of the solutions to this threat is to gather together experts and practitioners in relevant fields to develop guidelines for the socially beneficial use of AI. Bengio was central to the development of the Montréal Declaration for Responsible Development of Artificial Intelligence in December 2018.

Who will benefit and who will be disadvantaged by digital transformation depends on two things: how well we continue investigating these questions, and what steps we take to weave these answers into our laws, regulations and institutions?

The Social Sciences and Humanities Research Council of Canada (SSHRC) has been mobilizing research to help inform how that future will be created. Recently, SSHRC

identified 16 future global challenges that could have a major impact on Canada in the next decade. These global challenges, such as living within the Earth's carrying capacity and working in a digital economy, have the potential to shape society in significant ways.

All the future global challenges identified by SSHRC cross multiple sectors and research disciplines. Most of them — 11 of the 16— mention AI in some capacity: in relation to media and democracy, to education, and to labour force participation, among other issues.

This year, the Canada-UK Artificial Intelligence Initiative has been launched. This new funding programme draws on the expertise of researchers in Canada and the United Kingdom to maximize the social and health benefits of AI. To be funded, the research will need to blend social sciences and humanities with either health and biomedical sciences; or natural sciences and engineering — including computational and/or mathematical sciences.
The impact of the work of the funded researchers extends well beyond borders. For example, a 6-year partnership will leverage AI to prevent and resolve conflicts, to the benefit of justice stakeholders and access to justice. This multi-million-dollar project brings together 45 researchers and 42 partners representing the world's leading research centres on the implementation and use of technologies in the field of justice.

Dubbed the most important international research project on AI and justice, it aims to increase access to justice through AI. It will provide a better understanding of the socio-legal and ethical issues stemming from the integration of AI tools within the judicial system.

SSHRC is also supporting projects that look at the use of disruptive technologies and the risks that might bring for Canadians. For instance, SSHRC recently funded a project by two scholars at the University of Ottawa looking at new evidence on the ways in which big data is enabling Canadian political parties to collect and analyse massive amounts of identifiable voter information. Because this could put privacy and public confidence in the political system at risk, the researchers concluded that new Canadian legal policies are needed to fill the regulatory gap.

Massive public benefits are at stake in bringing social insight to the process of developing and introducing technologies. Quite a few of SSHRC's recent grants deal with ensuring that the full potential of emerging technologies actually gets developed and used for the benefit of all segments of Canada's population.

One project led by University of Toronto researcher Arlene Astell looked at research on factors preventing Canada's rapidly aging population from making use of technology for improving their quality of life. It finds that technologies are adopted or rejected by older adults to the extent that they are perceived to preserve or conflict with potential users' self-image as being capable and independent.

The crucial thing is to keep in mind that technology will bring more benefits and fewer harms when developed hand in hand with sound knowledge on how humans are likely to react and adapt to them, and on how the uptake of those technologies might impact other things that individuals and societies care about.

SAMIA MELHEM, Global Lead, Digital Development, Digital Development Team, WorldBank, drew attention to a digital economy transformation project that the World Bank is launching in Africa.

We have seen the world transforming from analogue to digital during the last 20 years. It is not only technologists, engineers and financiers that are involved in that transformation, but also social scientists and even philosophers in order to reflect where we have come from, where we are now, and where we are going. Many of the applications we are using are developed by young people under 25. Technology transforms people's lives and is bringing new sources of growth both in developed and developing countries.

The Digital Economy for Africa Initiative is an ambitious project aiming at Africa's digital transformation. The objective is to connect every individual, business and government in Africa by 2030.

Such "Digital Moonshot for Africa" relies on an ecosystem approach. Together with the African Union, many partners, also including private sector investors, are cooperating in the project to digitally enable the African continent in the coming 10 years. The World Bank Group committed a $25 billion financing to support of this Digital Moonshot.

The target is to generate 25 percent of the GDP from the digital economy in the African countries by 2030. This represents a big leap considering that some countries will start this journey from a 3-5 percent contribution to the GDP.

The digital economy is creating immense new opportunities, but the digitisation process requires a lot of transformation and skills (including reskilling the existing workers). That is not something happening on its own, and there is a lot that government and the public sector can do to enable such environment.

One example is the legal and regulatory environment for data. How to ensure people can transact in this digital world and conserve the protection of their data? The World Bank Group is looking on data protection in all the countries it is working with. In this context, the EU General Data Protection Regulation (GDPR) and some of its implications in terms of enabling and protecting consumers are good examples to look at. Many of the countries the World Bank is working with look at Europe or the USA, not to cut and paste but to emulate the good practises.

The Digital Economy for Africa Initiative focusses on 5 areas: digital infrastructure, digital skills, digital platforms for government, digital financial services and digital entrepreneurship.

Digital infrastructure means fibre optics but also satellite and 5G. In a world where IoT and sensors will be used to help farmers, but also to manage water distribution and reuse, it is important to make sure that there will be the right infrastructure for the IoT to be safely and securely used for its different purposes.

The initiative is cooperating with transport, water and energy projects: Whenever a road is being dug, they also dig for fibre, in order to decrease the costs of deploying fibre and to conserve energy and nature. There are very successful projects, such as highways that are also introducing fibre to be reused later on for digital connectivity.

Digital platforms refer to the creation of online access to public services. However, it is not easy to transform governments. There are a lot of processes and transactions that are traditionally based on laws and rules or that have become customs. But once transformed through digital, the workflow will be faster and easier. The counterparts of the World Bank Group in Africa are typically the minsters of digital economy, the ministers of ICT or ministers of finance.

Digital skills and digital entrepreneurs are two areas that are closely linked. Without a large number of people with digital skills there won't be digital entrepreneurs. Early on in its projects, the World Bank is looking at schools, creating labs and creating the opportunity for young children to use the Internet, but also to learn about the ethics of using the Internet.

Partnerships with private sector companies, whether they are global or local, are equally important to incubate the local tech talent to create applications and to link the applications and the innovation to the current and urgent needs, whether governmental or societal.

The development of the digital economy by 2030 should lead to an increase in the GDP per capital of 92 percent, which corresponds to an average of 450-550 per person, the creation of 44 million jobs on the continent and a 30 percent reduction in poverty.

The World Bank Group is working across the entire Internet value chain and is developing content in association with universities. One of the projects in this digital economy moonshot is called the Africa Centres of Excellence with 52 universities in West, East and South Africa cooperating internationally. The world is becoming more and more global and so is the content for education. Existing content can be reused, can be adapted and translated. The idea is not to reinvent the wheel but to work together.

Another big project of the World Bank that has started a year ago is the Human Capital Project. The project is trying to figure out the cost of having an undergraduate in Africa getting a degree in computer science, a master or a PhD. How can the World Bank programmes contribute to bring in scholarship for those who cannot afford it, and how to make sure that these young people, almost half the world's population, are well equipped to be able to maximise the use of technology for development?

SARAH ZHAO, Partner BakerHostetler, USA/China, presented a very ambitious plan of the Chinese government with regards to the deployment of 5G.

There wasn't much communication with other countries during the Cultural Revolution. After the Cultural Revolution, once the Open Door Policy was established, many foreign countries wanted to communicate with China—but there wasn't any direct phone lines. This represented a huge challenge for the former Ministry of Posts and Telecommunication (todays Ministry of Industry and Information Technology (MIIT) of the Chinese government. Phone lines had to be connected by operators, but there was no one speaking English and thus able to connect international calls.

To some extent, China was rather backward in those days.

Today, the situation has completely changed. The Internet penetration rate has reached 61 percent. As of June 2019, China was ranked first among the countries with the most Internet users. It is an enormous market. Corresponding to a survey published by CNNIC in June 2019, there are currently 854 million mobile phone users in China, more than double the amount of the U.S. 99 percent of them use the mobile phone to surf the Internet, do online banking etc.

5G and AI technology are the next steps. The Chinese government is heavily promoting 5G. In December 2018, the Chinese government MIIT issued 3 temporary licenses to the 3 major telecom operators for trial projects all over China. In June 2019, MIIT granted the formal 5G operating licenses to four big Chinese telecom operators.

How to upgrade 4G to 5G? It's an entire ecosystem that needs to be upgraded, as most of the mobile phones are still using 4G technology. The Chinese government recently decided not to focus on non-standalone (NSA) 5G networks (which is a combination of 4G and 5G) but on the more efficient 5G Standalone (SA) networks.

As many customers are still using 4G mobile phones, the Chinese central government encourages the purchase of 5G phones by granting a 500-yuan refund (about 40 USD) for each 5G phone.

In addition to that, each local government has its own encouraging policy to deploy 5G. In Shenzhen, telecom operators are awarded 10,000 yuan for each 5G base station completed.

The city of Beijing came up with a very specific policy—a 3 years workplan with 3 major goals: The first goal is to quickly build up the 5G network. Second, to develop 5G technologies. Beijing plans to invest about 30 billion yuan by 2022 to build 5G networks. The third goal is to make money out of 5G: the intention is to make about 2,000 million yuan from the 5G related industry.

Specific actions have been defined to reach these goals. The main focus is currently on the technology because there are still some high frequency issues to be solved. Then, the city wants the technology to be applied: 5G shall be used for the Olympic Winter Games in 2022. The Beijing Capital International Airport, which is the biggest in the world, already introduced a new AI parking system. The city of Beijing also promotes the AI 5G related industry, such as healthcare or an AI city platform.

The regulations regarding the data protection, security and privacy have been issued successively about 2 years ago. Since that time, more than 50 implementation rules and regulations have been issued, each one dealing with a different aspect.

NAGAAKI OHYAMA, Professor of Institute of Innovative Research, Tokyo Institute of Technology, Japan, provided an update on the current actions taken by the Japanese government in the area of digital transformation.

There are several policies issued by the different ministries of the Japanese government with high potential to create real value in the near future. The goal is to prepare the path towards a full digital society.

The digital transformational actions of the Japanese government are based on the concept of people and things. People and (IoT-) things are the main players in the cyberspace and AI can help to improve identification and authentication of both, people and things.

The intention is to realise full digital e-government to maximise the efficiency and convenience of governmental services for the residents. IoT-things could be connected through the Internet whenever necessary—not permanently. Residents could use the full range of e-services, they just need to show up every 5-10 years to renew their e-ID card, called “My Number card”. The card is free of charge.

The My Number card, e-ID with authentication and signature, is an e-government service with high security standards. It will also be used for digital ticketing during the Tokyo Olympics and Paralympics in 2020.

About 18 million cards have been issued since January 2016.

The prototype of a portal site, the “Maina Portal”, is now under practical use. My Number card is used for login; secure review of the personal data held by the public sector, including healthcare authorities, becomes possible through the portal side. The Maina Portal is the gateway to the e-government services.

To simplify administration procedures, the government would like every resident to have a My Number card. To increase adoption, people can use their My Number cards as an alternative for health insurance cards by 2021. The aim is to issue 100 million cards whithin the next three years.

Every Japanese resident has medical insurance by regulation. My number card can be used to check online whether a patient’s insurance is valid or not. All medical institutions (hospitals, clinics, pharmacies etc.) will be connected through a dedicated secured network. This should also avoid the expensive waste of prescription drugs, representing a few billion dollars per year. As patients are free to choose any pharmacy to get their medicines, a secured network covering the whole country is required.

The Japanese government is now focussing on the automotive sector. Every automobile in use, about 60 million automobiles right now, have to be inspected and registered in a database. The automobile inspection certificate is currently a paper-based certificate every vehicle owner has to keep. In the course of digitalisation and the IoT, regulation has been

revised and by 2025 the certificate will be stored in chip cards supporting PKI, maybe similar to those of the My Number cards. Further use cases combining both cards, for instance “e-keys” enabling car sharing without exchanging a physical key, are currently under development.

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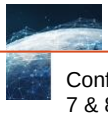


Session 1

Day 1 – Morning – Plenary Session

Transformative Infrastructures to Support Digital Applications: 5G &Evolution of Integrated Platforms

The moderator of this session, **SYLVIE ALBERT, Professor, Department of Business & Administration, University of Winnipeg, Canada**, opened the session and introduced the panellists.

JOHN GIUSTI, Chief Regulatory Officer, GSMA, [www.gsma.com], chairing, set the stage for the session:

All the digital services depend on the underlying infrastructure for delivery. It is important to focus on the transformative role that infrastructure can and must play with regard to services and applications, and how to make sure that it gets built.

In less than 2 decades, we have gone from Internet connectivity being an innovation to it being indispensable. GSMA brings together the 750 mobile operators from around the world, as well as around 400 companies from the broader mobile ecosystem.

Mobile is the dominant and often the only way that many people around the world will experience the Internet and digital services. Today, there are 4.2 billion individual mobile subscribers. Roughly 2/3 of the world population is a mobile subscriber, but only around 3.5 billion of those people have access to the mobile Internet.

There is a lot of work to do to expand digital inclusion and to see that digital transformation reaches everyone. However, there is sometimes a bit of a misfocus about the unconnected. Policy makers spend a lot of time only on the issue of coverage for the unconnected—but in fact, of the 4 billion people not connected, 3.3 billion of them already live under some degree of Internet coverage. They either do not have the skills to use it, they don't find the content relevant to their lives, or they simply cannot afford it. It is only 750 million people who have no Internet coverage at all. It is about 10 percent of the global population.

This represents an incredible opportunity. Such dynamic screams for stronger public-private partnerships—particularly in building digital skills, so that people can use that transformative infrastructure, driving further demand and therefore more investment in the infrastructure.

We also have to focus on the role the public sector can play in providing essential and relevant content over digital platforms. There is a real opportunity to bring more and more people into a digital enabled and empowered life.

Continuous access to information, online commerce, communication with family and friends, entertainment etc. has become an integral part of our daily existence. As digital services make their full weight felt in more high impact areas—such as healthcare, education, government services—access to digital and the need for the robust infrastructure that underpins that will only become more essential to everyone.

We are moving from just connectivity to intelligent connectivity where the advent of 5G is building upon the foundation of 4G. The growth of IoT devices is intersecting with the power of big data and AI to bring new waves of transformational new capabilities over this infrastructure.

There are of course a lot of questions and challenges that we need to make sure to address in the context of AI and big data. We have to make sure that it is done responsibly and ethically so that it is serving all of the word's citizens.

Today, 5G is real. There are 32 live 5G networks in 18 countries. We are seeing early leadership from Asia, Korea, Japan and China as well as the U.S. GSMA estimates that 5G will contribute 2.2 trillion USD of growth in the digital economy over the next 15 years.

The number of IoT devices continuous to grow at an incredible rate. The global IoT connections will triple to 25 billion between now and 2025. It is difficult to say with certainty what 5G will give us. We need to step back and remember that, when 4G was launched, it was initially for most of people about faster broadband speed. Few people could have predicted the growth of the platform economy that we now have seen right over this technology. 5G will definitely bring innovations that we cannot even imagine.

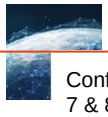
While 5G will certainly mean even faster and more robust broadband for the consumer and business sectors, it also holds a degree of a unique and new potential for industries. We will see use cases that use massive IoT and/or Ultra-Reliable Low-Latency Communication (URLLC) that transform existing industry sectors, e.g. in the areas of manufacturing, automotive or even in the case of city management.

Globally, we are seeing that 4G has taken on a bit of a dynamic of an industrial race between governments. This is not necessarily helpful, but experience has shown that policy leadership does have a link to infrastructure leadership. Those countries that are leading in 5G have made clear cut choices to foster investment and innovation in infrastructure.

As we move into this wold of promoting investment in new infrastructure, GSMA is advocating for the general concept of promoting a generally investment-friendly environment. But also, in case of mobile and spectrum-based technologies, timely and affordable access to spectrum—which has not been the case in some of the recent auctions.

There also needs to be a greater reflection on the role of voluntary infrastructure sharing. As there needs to be resiliency and redundancy, we maybe need to consider whether the existing approach of completely competing infrastructures is the right approach when you are trying to reach everyone.

Another key aspect is reducing the red-tape surrounding infrastructure rollout, e.g. the issues around rights-of-way access if you are laying fibre. All these impose cost and delay, some of them are for important public policy objectives. We need to make sure that our policy goals



meet our policy environment. If those two things don't match, we will not see the kind of results that we say we want in the policies we announced.

Also critical to digital inclusion is aligning tax policy to these goals. Particularly for those people who are currently not connected to mobile broadband costs of services and equipment will discourage uses.

We also need think creatively about reaching those who are not connected. Perhaps there is not a competitive or economic business case to reach. We do need to look at new models for Universal Service Funds that can work in collaboration with communities and with industries to drive that.

MARC DUFAYET, 5G Marketing Product Manager, Orange Business Service, France, [www.orange.com], provided an overview of the arrival of 5G networks.

5G – Towards Real-Time Transformation

Digital is a matter of transformation, but 5G is important for real-time.

New business ecosystems are driving unprecedented enterprise data growth. The global datasphere will grow to 175 zettabytes by 2025. Most of the data is produced by the consumers (entertainment, videos etc.). Currently, only 30 percent of the data are generated by enterprises, but this will double by 2025. In 2025, 60 percent of the 175 ZB will be generated by companies.

5G will be a transformation enabler for companies offering new opportunities. 5G also means higher bandwidths, enhanced throughput and performances. But first of all, it will promote the "Internet of Enterprises": 5G enables real-time and data is exploited as soon as it is produced.

5G will accelerate B2B digital transformation, with improved use cases for companies. 5G is more than just a new technology. With 5G you have 3 major improvements:

5G will provide faster mobile broadband. The first phase of 5G deployment, NSA 5G, means that the 5G network is operated in combination with the 4G network core. This first step of 5G is already available in several countries and will increase the bandwidth and the capacity of the mobile network. The increased bandwidth supports, for instance, the improvement of collaboration and video surveillance, the creation of new mobile workspaces as well as new use cases with fixed wireless access. NSA 5G will be launched in France next year.

The next big step will be 5G networks for Massive IoT. It will be possible to connect millions of objects (machines, sensors etc.) in one km^2. In order to allow all these objects to communicate, we need this Massive IoT. Massive IoT will be possible once the 5G core network will be deployed.

The third step is the critical IoT with low latency and real-time transfer.

Next-gen practices and driving benefits need 5G associated with other network technologies. 5G is just an enabler of real-time transmission. All those new services and use cases, that will be available for the smart industries, for the smart cities and consumers, are also linked to mobile edge computing. If you want to have real-time communication, you need to have these platforms of cloud services very linked to data.

To conclude, 5G will be the cornerstone of a rising ecosystem that we call the Internet of Enterprises. 5G is not just about connectivity, it is about the transformation of business models. Finally, 5G is a continuation, not a final destination, with 6G already on its way.

YOSHIO TANAKA, Professor Tokyo University of Science, Japan, talked about Japan's expected transformation of this industry with IoT and systems.

Things and Systems on IOT/5G Era

For a long time, Japan's manufacturing industry was characterized by selling existing products with enhanced quality, low cost production and global sales. There was a strong focus on just the QCD (quality, cost and delivery) approach. There are excellent Japanese companies who are providing high quality products and components with high quality. But the Japanese industry is suffering from declining market shares. In order to stop this trend, it will be necessary to incorporate new business mechanisms.

There is this need to change the industrial scheme and to shift away from simple product-based business models with revenues from products. Today, Japan's industry is changing from a product-based business model, based on revenue from products, to a system design. Quality, cost and delivery are still important, but it is important to also focus on the service related to products and their usage.

The new industry scheme is called "things and systems", with things being the product itself and system being an ecosystem, a service or any other system. The objective is to revitalize the Japanese industry by "things and systems" in an IoT world (outcome economy) with a new business design.

The concept was very appreciated by the Japan Association of Corporate Executives, a Japanese professional association of independent leading executives. They made a proposal to the Japanese industries, which is also supported by the Japanese government. The concept of things and systems is simple, but implies a change of business models. There is a close collaboration between industry and policymakers in the transition of the Japanese industry.

Two organizations have been created in April 2014 together with the industry and national research institutions and universities: The Things and Systems Society and the Things and Systems Consortium.

The Japanese government is releasing 5G spectrum designated for individual companies and local governments (local 5G) at the end of 2019. This will enable enterprises, regional authorities and other organizations in Japan to deploy the next-generation of local private, reliable networks.

The use of 5G and IoT technologies shall contribute to the creation of new markets and solve local community issues, foster open innovation 2.0 but also a more humane society.

JEAN-PIERRE BIENAIMÉ, Chairman, IREST – Institute of Economic & Social Research on Telecommunications, France, shared some thoughts about how to accelerate the creation of 5G vertical platforms and consolidate the 5G vertical requirements.

Unlocking the benefits of 5G for the Enterprise Market: 5G empowering vertical industries

5G is of great importance for the vertical industries.

The 5G Action Plan, issued by the European Commission 3 years ago, is still the framework in which the EU is proceeding. The Action Plan's main structuring targets are the commercial launch of 5G services in at least one big city in each of the 27 member states by 2020, and the deployment of 5G in all urban areas, highways, and main transport hubs in every EU member state by 2025.

There is also the very ambitious EU research and innovation programme "5G Public Private Partnership" (5G PPP) consisting of three phases of collaborative research. 700 million Euro of 5G PPP are public investment from the European Commission and at least 3.5 billion Euro are funded by the private industry. It is the most important research programme dedicated to 5G in the world.

Phase 1 just ended with a number of collaborative projects. Phase 2 finishes by the end 2019 with projects already involving many verticals: 5GCar for connected and automated mobility involves companies such as Volvo, PSA and Bosch; 5GCity for the smart cities realizes trials in Barcelona, Bristol and Lucca; 5G Essence is dealing with 5G for public safety, involving big companies such as Thales Communications & Security SAS.

Phase 3 has already started and will closely involve those vertical industries for validation platforms and trials. Among the 5G PPP phase 3 projects are 5G SMART for smart manufacturing, 5G!Drones for public safety monitoring, and 5G-SOLUTIONS for factories of the future, smart energy and other functions.

The true differentiator for 5G is the vertical markets. If we fail with the verticals, we will fail with (full) 5G.

Some requirements gathered from vertical companies: In the field of public safety, Leonardo stresses the need for integrating mission critical systems in the 5G ecosystem. In the context of Automated Driving, Volkswagen calls for Dynamic Network Slicing and predicted QoS. PSA Group emphasises the global needs in connectivity and requests hybrid architecture, sensors and femtocells networks for a perfect virtual knowledge of the road, the so-called virtual roads. Bosch, for the factories of the future, requires high reliability and low latency for new applications, such as mobile robots, factory automation, augmented reality and logistics.

5G has two main phases: After the completion of 3GPP Release 15—the first full set of 5G standards—in 2018, first launches relying on these enhanced mobile capabilities took place. Then, by mid-2020, there will be 3GPP Release 16. This second phase should unleash the capabilities of full 5G for the vertical industries.

A first 5G Vertical User Workshop has been organised by 5G PPP in Brussels in February. A second one took place in July in Rome, involving not only the telcos, telecom operators and vendors, but also the vertical industries. There is an increasing need to involve these companies to capture end user requirements and contribute to the 5G standardization process.

How to accelerate the creation of those 5G vertical platforms? There are already success stories with TCCA in the area of critical communications based on already existing use cases. However, in other areas, such as industry factories or automotive, it is still a story to be rapidly written in terms of user requirements. It is important to rapidly organise verticals, organise their messages, identify where work is still needed or what doesn't work in order to have platforms of real requirements.

Standardization is a long process. 3GPP Release 16 marks the second phase of 5G, but it is almost too late for integrating all the vertical needs. Thus, the next standardization phase is already under preparation. It will be vital to have the industries participating as active 3GPP members in the requirements capture process in order to gather needs, for instance in the field of V2X, and to enhance requirements for automotive, 5G for remote areas, wireless sensor networks etc.

With regards to the landscape of what is being done in the field of 5G all over the world, there are the European 5G trials, the standardization with 3GPP, and 32 5G phase 1 networks launched in 18 countries. Spectrum harmonisation and availability will be key.

The 3.5 GHz spectrum band—the first half of the C-band, the band that was previously the satellite band—is recognized as the core band for deploying 5G mobile services. It will be also important to consolidate those vertical needs and to ensure a secure-by-design 5G architecture.

Even if it is very important to accelerate launches all over the world, it is also important to have this full 5G deployment with the vertical industries. It is not about who deploys first, it is about who deploys best.

SOPHIE LE PALLEC, Head of Public Policy, GS1 France, addressed the issue of data governance and data sharing models, especially with regards to non-personal data.

Data as an Infrastructure

We are entering a new era with massive amounts of data that can be captured and shared. More and more aspects, not only of human activities, but of the entire world are put into data. That is what many call the "datafication" of the world. We can consider these data according to the activity they are referring to: Personal data refer to the activity of individual people, public data to the activity of public institutions, private and non-personal data refer to the activity of private organisations—the latter representing the biggest amount of data, most of them hidden in the companies generating the data.

Big data has proven to be instrumental to develop and test powerful algorithms and AI. It is infrastructure for new applications and potentially disruptive services in every sector. Today, data can be considered as a new factor of production. So far, the platform model has proven to be the most powerful to concentrate big amounts of data, thanks to network effects and "winner-takes-all" strategies. They could secure key positions in AI and they are disrupting a lot of services, especially consumer services with the collection of massive amounts of personal data.

But this model is blamed for threatening competition, privacy and economic sovereignty. The common alternative to the monopolistic platform model appears to be a multi-platform model—platforms competing with each other. Unfortunately, competition in this case often equates with fragmentation, silos, where all the benefits of data concentration are lost and digital transformation for some players can even generate a lack of productivity.

However, there could be an advantageous trade-off between these two models: the private data mutualisation within sectors based on interconnected platforms. It could be a powerful mean to reconcile the competitive approach with data concentration. But it raises a lot of concerns too, as businesses are still reluctant to share data that they consider as an internal asset. Data are often treated like cash hidden under a mattress, even though the value of these data comes from their sharing. It also requires data for mass adoption and a governance to define how to share the data on a fair basis.

Interoperability is the prerequisite to pave the way for these new platforms. It is not about technical interoperability anymore, but about semantic interoperability—which means that two systems must be able not only to speak to each other but also to understand each other. Thus, it is important to ensure that data are produced on structured formats in order to facilitate the production and aggregation of large amounts of data.

Public policies are more and more pushing for data mutualisation. Open data was easy to conceive when applied to the public sector as it is financed by citizen and must be widely accountable. That is not the case for private companies. However, for some specific applications, where private data would be needed, the concept of data of general interest is also being studied. Data portability for non-personal data, when hosted on external platforms, could also be a strong incentive to facilitate business data sharing. The objective here will be to convince companies to organise themselves in order to reorganise or pivot the sectors towards a "sectors as a platform". One example is "Data Agri", an initiative of two French

agriculture professional associations. They propose a charter associated with a label to promote information systems and solutions that secure the portability of data in agriculture.

Another example of an industrial platform for data mutualisation is CodeOnline Food. CodeOnline Food is a platform that is launched by GS1 France. It is the result of a collaboration effort within the food industry to convince all food producers to structure and open the consumer information data, e.g. ingredients and nutritional data, for everyone while ensuring that the data were issued by the producer. There is a strong societal need for more transparency about food products and the information was not easy to find or to collect until now. Of course, there will be a strong need for training and support to enrol the smallest producer, but it is a challenge to help them gaining a food hold in the digital world by sharing online structured and authenticated data on their products.

AURÉLIE BEAUPEL, Digital Independent Expert, France, presented an example of how to make technology quickly available to end-users.

How to make technology quickly available to end-users?

Making the infrastructure more and more efficient is a good thing, but at the same time we have to create the skills so that the technology can be quickly and optimally used.

One example of such limits of technology is the European Copernicus programme. Copernicus is the European system for monitoring the Earth. It is coordinated and managed by the European Commission.

Copernicus brings together all the data obtained from environmental satellites and on-site measuring instruments to produce a comprehensive view of the state of our planet. The information offered by the Copernicus programme is grouped around the six themes: soil, oceans, emergency treatment, atmosphere, security, and climate change.

However, if you want to use these data which are produced for more than 5 years, you need to use an intermediate platform like Mundi. The Dias Mundi platform managed by Atos under ESA contract and European Commission provides Copernicus data and licensed data on an infrastructure offering processing and hosting, as well as a marketplace to fully automate Earth observation in directly marketable thematic applications. Mundi is a market accelerator dedicated to the world of Earth observation applications.

But all this is not enough used. For this reason, hackathons have been created. These hackathons are two days of research and development allowing small or large companies to increase their implications.

For instance, during the Satellite Agri'Hackathon in February this year, the French Chambers of Agriculture have realised a solution to optimize the definition of soil potential. The definition of soil potential, a source of many applications, such as fertilization, irrigation etc., is a process involving complex and costly actions, both through resistivity measurement and through soil validation via field surveys. The identification of these potentials from indices or combination of indices calculated via the satellite images make it possible to clear customs for all or part of these field processes and therefore the costs associated with them.

Without the hackathon, the development of such application would have taken 3 or 4 years.

We have big data; we have the skills and we have to create such kind of collaborative work method to encourage start-ups as well as bigger companies to go faster. There is excellent technology, but we don't go fast enough in making it used by our companies.

EMMANUEL SIMIYU, Co-Founder & CEO, GOIP, Kenya, was asked to comment on how to make 5G really meaningful.

17 years ago, there were very few people with mobile phones in Kenya. Then, in 2007, the mobile money transfer service M-Pesa has been launched. 10 years later, mobile phones have become a necessity in the country because money could be transacted digitally.

The only way to make 5G meaningful is by giving value to the consumer. And the only way to do this is by addressing societal needs, especially in Africa. One can use the infrastructure to address issues like quality education, access to financing or improved agriculture practices.

We have looked at 5G from the infrastructure perspective, but we need to look at it from the human and community perspective. This will require a lot of changes, especially in how telcos and technology companies conduct business, in order to enable us to innovate around the infrastructure, rather than the infrastructure directing how the technical issues set the trend.

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Keynote Afternoon Session

Day 1 – Afternoon – Plenary Session

INGRID ANDERSSON, Associate Senior Expert, IKED, Sweden, moderating, welcomed the participants to this afternoon session. She then set the scene for the following presentations by introducing the European Nature-Based Solutions (NBS) project URBiNAT.

Digital Enablers in the context of Nature Based Solutions

URBiNAT focuses on the regeneration and integration of deprived social housing urban developments through an innovative and inclusive catalogue of Nature-Based Solutions, ensuring sustainability and mobilising driving forces for social cohesion. Interventions focus on the public space to co-create with citizens new urban, social and nature-based relations within and between different neighbourhoods. Taking the full physical, mental and social well-being of citizens as its main goal, URBiNAT aims to co-plan a healthy corridor as an innovative and flexible NBS, which itself integrates a large number of micro NBS emerging from community-driven design processes.

The Health Corridor is a 'green articulation' designed as a pedestrian walkway in the public space to integrate neighbourhoods into the urban structure. Each Health Corridor will integrate and link diverse NBS developed by the horizontal partners, deploying the NBS Catalogue and appropriate monitoring and evaluation methods and tools. This will be achieved by focusing on the citizens' well-being in relation to energy, water, food, nature, mobility, participation, behavioural change, digital democracy, social cohesion and the solidarity economy.

Participative-design will be the cornerstone approach in achieving new models of urban development. Technological Nature Based Solutions make use of digital technologies and advanced manufacturing techniques to enhance the process of co-planning, co-design, co-implementation, co-monitoring and co-management and to optimize solutions performances, increasing the number and quality of ecosystems and social services provided.

From West to East, the cities of Porto, Nantes and Sofia act as frontrunners based on their demonstrated experience in the innovative use of public space with NBS. From South to North, the cities of Siena, Nova Gorica, Brussels and Høje-Taastrup share and replicate URBiNAT concepts and methodologies, acting as 'followers'. Each city is supported by local partners, associations and research centres, as well as by 'horizontal' centres, universities and companies which link between cities. The collaboration with non-European partners, including in China and Iran, as well as with NBS observers based in Brazil, Japan, Oman and the cities of Shenyang in China and Khorramabad in Iran brings international experiences and dimension to the project.

Ms. Andersson moderated the session with great ease.

STÉPHANE GRUMBACH, Senior Scientist, INRIA; Deputy director IXXI, Complex Systems Institute, ENS Lyon, France, provided a thought-provoking comment on IT and the challenges of climate change.

Environmental complexity, what role for IT?

Digital is not changing a stable world; it is changing a world that has to adapt to climate. The general feeling is that we are, in our everyday life and in our professional activity, destroying the environment in which we live.

One year ago, the press all over the world announced that we have only twelve years left to save the planet, referring to the conditions on earth so that humans can live. The reason for this announcement was the IPCC Special Report on Global Warming of 1.5°C published in October 2018—a report requested by governments at the COP21 in Paris in December 2015.

The IPCC Special Report on Global Warming provides recommendations on how to limit global warming to 1.5°C. Global net human-caused emissions of CO2 would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050. The consequences on the way we live today are enormous. We will live in a society which will be very different from the way it is organised today.

All this is part of what has been called the Great Acceleration, which essentially shows an acceleration of everything since the 1950s: aspects of human society, as well as environmental aspects and aspects related to IT. Everything is accelerating: environmental changes, our activity and our impact and the overwhelming control that IT produces on our societies.

There are four different aspects relating digital and global issues of the environment: One is the capacity to make models of ecosystems, e.g. the climate, and to make predictions for the next 10 to 30 years. The second one is to use IT as a technological solution to solve problems that we envision. The third one is what economist would have called in the past 'negative externalities', i.e. things people don't really care about; but they do care now because of their impacts on the global system, such as pollution. The fourth aspect is control society.

Models and predictions have a long history. The Swedish scientist Svante Arrhenius already identified the correlation between the quantity of C02 in the atmosphere and Earth surface warming at the end of the nineteenth century. Moreover, Fourier had worked on that on the first half of the nineteenth century. Today, we have reliable models. The first reports on these issues, based on modelling and prediction, were published in the 60s and the early 70s. We know since a very long time that we have to change our interaction with the environment.

The main aspect related to 'technological solution' is homeostasis. Ecosystems or living organisms recycle everything. It is a dynamic which stays stable. For instance, water drops from clouds, goes into the rivers and in the sea, and from the sea it evaporates again. It is a cycle. Homeostasis is the basis of these systems and this is what we have to reach, recycling everything. IT might help.

There are many aspects related to negative externalities. One of them is the Jevons Paradox. Jevons, a British economist of the nineteenth century, noticed that the more we would improve the steam engine, the more coal we would use. One might think that if you improve the efficiency of a steam engine, you would use less coal, but this is not what is happening. In fact, if you improve the steam engine then more people will use it. This is a very frequent paradox occurring in most saving applications of IT, the car industry etc. When there is saving, there is more usage and related to resources this is bad news.

The aspect of 'control society' means that, if we are to live in a world where the type of interactions with the ecosystem has to be severely reduced, then we have to measure it and we have to control it. All those devices, the IoT, smart cities etc. are actually related to a better usage of resources, but a better usage of resources means controlling what we are using.

This is really taking shape in Asia, mainly in China but in Japan as well. China is the most advanced country, with the most advanced political thinking on that. Europe has the tools and Japan has a very interesting model called Society 5.0. However, the Society 5.0 concept is not yet implemented, it is a governmental recommendation.

We have to think about the developments we make related to IT, and how they relate to this unique important question: How can we leave a world in which future generations can live in? Let us be careful in the way we intent to build a harmonious future.

Steven Lafosse Marin, CEO & Co-founder, DGT4leaders–UMAN; President ISEP Business Angels, France, with **Abdessamad Ait El Cadi**, **Lecturer, Assistant Professor & Logistic Researcher Université Polytechnique Hauts de France; Expert Advisor, UMAN**, France, addressed the question of how to value technologies to support the good. One answer could be UMAN—Universal Mutualised Aid Networks, an initiative supporting humanitarian and development activities with new technologies.

Innovation 4 Good

Created by and for humans, innovation is coming in different forms: new products, services, new processes, new packaging, ... These innovations are conducted to support a vision and to solve problems with meaning, for the betterment of humanity. Behind this question of the good, there are ethical challenges at stake. Technology can bring about radical changes in all aspects of life—it affects the way we live, work and spend in the future, and it should also serve societal goals.

While globalisation lifted millions out of poverty and allowed vibrant economies like the EU, the US and others to thrive, it also made many people feel left behind—triggering a resurgence of populism, nationalism and protectionism, which today threaten growth prospects and disproportionately harm low-income households.

The United Nations and the OECD have implemented development objectives and indicators as a call to action to leave none behind. The United Nations' Sustainable Development Goals 2030 (SDGs) are the successor of the Millennium Development Goals (MDGs) launched to build a fairer world, where everyone has access to the good of the Earth, where everyone

has the opportunity to realize his or her full potential, either as individuals or as families, where fundamental rights and dignity are guaranteed to all.

With nearly 7.7 billion inhabitants today, the world is plagued by long and complex conflicts, widespread involuntary migration, violent natural disasters and growing inequalities. According to the World Economic Forum 2019, it is an increasingly anxious, unhappy and lonely world for many people. Complex societal, technological and work-related transformations are having a profound impact on people's lived experiences.

It is very likely that there will be a steady increase in humanitarian needs over the next 15 years, while we are already facing a financing gap between the needs and the available help today.

NGOs, together with other actors of humanitarian aid, and public and private organizations are playing a key role in alleviating human suffering, promoting peace and development, and promoting human progress on a global scale.

It is also important to think about how to develop our societies. There has been a constant increase in urban sprawl during the last 30 years, and we are now facing the challenge of building smart, intelligent, cognitive, more inclusive and nature-based cities.

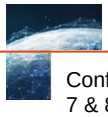
100,000 billion euros is the world's annual GNP. The consolidated budget for humanitarian aid and development amounts to 650 billion euros. Only a very small part of the GDP growth is allocated to development.

There are not enough donations for humanitarian aid and development efforts, and costs could be optimized. Moreover, there is a lack of follow-up donations and transparency. At the same time, the development of the Internet, connectivity and digital tools offer a fantastic opportunity to get closer to people and help each other.

Last month, UMAN has been invited to the launch of the Global Hub on the Governance for the SDGs, a joint OECD-UNDP initiative. The Global Hub initiative aims to facilitate targeted support to interested countries tackling the specific governance challenges of SDG implementation, provide a space to build leadership capacity on critical governance issues, and for national experts and practitioners to interact and learn from each other, in support of the achievement of the 2030 Agenda. It should leverage the full potential of SDGs 16 and 17 as key enablers of the entire 2030 Agenda.

2030 is close and we need to accelerate. UMAN supports humanitarian aid organizations in issues of financing, sustainability, integrity and capacity building, by valuing people, technologies and ecosystems. UMAN is a social connector platform that brings together all stakeholders in the development sector. Built with blockchain technology - the Internet of Value -, AI and other technologies, it allows transactions to be made seamlessly.

Given the growth of smartphone use worldwide, UMAN is also developing a mobile application for donors and beneficiaries to be easily connected. In view of the latest developments, the value of UMAN lies in establishing a stronger link between donors and recipients through the transparency of the blockchain and the ability to track the evolution of the project goes the application.



UMAN develops and prepares several use cases to accelerate the achievement of the SDGs.
Given the importance of the stakes and the speed of progress, it is crucial that advances in science are accompanied by democratic awareness and political and moral reflection that has to be shared and passed on to others and future generations.

The purpose of UMAN is to use innovation for the good. We should work together as individuals and, through our professional and personal commitments, build the necessary ecosystems to consciously rise to the challenges of our time.

The Université Polytechnique Hauts-de-France, former Université de Valenciennes, for instance, took the decision to adopt a rather innovative multidisciplinary approach. It is built upon two complementary and highly interconnected poles: "Science and Technology" and "Humanities. By linking the scientific and technological fields on the one hand and humanities on the other, the university aims to develop a cross fertilization of both poles in order to focus on innovation for the sake of humanity/ the good.

The core competencies of the University's 'Laboratory of Industrial and Human Automation control, Mechanical engineering and Computer Science' are AI and OR techniques with respect to decision making, human and machine interaction, and models for designing and evaluating complex/embedded systems in transport, mobility and logistics.

Following a human centric approach, the Lab is coupling techniques such as AI and OR, simulation, and meta-heuristics to tackle complex problems and systems with high dynamicity and stochasticity. These techniques are mainly applied in areas such as mobility, logistics and supply chain, but also to the humanitarian industry in the case of UMAN.

There are a number of ongoing research projects employing hyper-heuristics, blockchain, data mining and neural networks, quantum computing etc. to assess how these new technologies could help address new logistic challenges, and in particular humanitarian logistic challenges.

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Artificial Intelligences & Data

The chair and moderator of this session, **ALAN SHARK, Executive Director & CEO, PTI – Public Technologies Institute**, USA, opened the session and introduced the panellists. The chair then introduced the session's topic by giving an overview on the current stage of AI development.

Artificial Intelligence and Data

When looking at the amount of data that is being collected every moment, more than 500 hours of content are uploaded to YouTube every minute and 500 million tweets are sent each day—that is 5,787 tweets every second. 326 million people use Twitter every month. We have an explosion of data and we are just learning how to use it.

Artificial Intelligence is the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

The publication "Artificial Intelligence and its Impact on Public Administration" (available online) issued by the National Academy of Public Administration deals with the three issues ethics and bias and the future of work, i.e. how many jobs will be replaced? There is great displacement in every major movement. Economists say, AI will take jobs but might replace even more things we haven't even thought about. However, the speed of change will be very challenging for those who learned only one skill and are not involved in continuous learning.

Artificial Intelligence has grown because of advancements in complex algorithms. It has also grown due to a dramatic increase in speed and computing power (which continues to grow), the ability to digest data from various sources, and the ability to store and retrieve massive amounts of data, the ability to "self-learn" and advancements in artificial speech and recognition.

Basically, there are three stages of AI: The first stage being machine learning, i.e. user driven big data models for machine learning. Then we moved to machine intelligence, which is advanced networking trained to build ad-hoc models to learn from custom data. The third stage is machine consciousness, which is cognitive self-learning. We are not there yet, but it might come within the next 10 to 15 years.

Where are we now? Machine learning is advancing; it is an excellent augmented decision-making tool, excellent for finding patterns, excellent in data visualization, excellent in predictive analytics and excellent at Robotic Process Automation (RPA). All this is already happening. Augmented intelligence is helping us making better decisions, e.g. to solve the opium crisis in the US, to look for patterns for abuse.

But, how do we program AI to be more like humans? How to teach to delay a decision, to procrastinate or to negotiate, to respect and understand history and context, to respect and understand emotions, to admit faults and mistakes, weighing all options, to request additional information, to allow human "override" and to avoid bias, to understand human values and to comprehend ethics?

ETIENNE GEHAIN, Digital Innovation Officer, ENGIE, France [www.engie.com], provided an insight in the company's strategy to use AI in the context of energy transition.

Energy transition refers to significant structural change in the energy system. At some point in time, private individuals will invest more in the energy system than the big energy providers, e.g. by installing PV panels, batteries or buying an electric car. At some point, they would like to manage the risks and the functioning of the whole system just like the service providers.

This requires a lot of data and data processing. The system will become much more complex than it used to be when energy providers were producing centrally and just dispatching electricity to the homes and buildings. This is where AI is needed because modelling the whole system will become much more difficult and requires a lot of learning to deal with this new complexity.

About eighteen months ago, Engie nominated a Chief Data Officer (CDO) in order to leverage on the huge amount of data generated by the company. The CDO started with creating a data lake accumulating data sets to organise the collection and the availability of the data—even before knowing exactly what to do with it.

Engie has hundreds of data sets, but also hundreds of APIs giving access to these data sets, initially internally within Engie and then progressively externally for its customers. Clara Domus, one of Engie's smart building platforms in Italy, is exposing about 90 APIs so that the public can access the data generated by the platform. Engie also established an Agora of use cases enabling a community of data scientists to discuss and identify what can be done with those data. Engie identified about 200 use cases—and this is where AI comes in. 89 of the use cases are currently in development and about 40 are already in production.

Engie started with collecting the data, cared for the access to the data and then created the community to think about what can be done with those data. Today, Engie is able to offer services based on a variety of—not siloed—data. Engie accompanies its clients in the energy transition and provides "zero carbon as a service".

There is a strong relation between data and AI, but there are a few issues about data. Just to name three of them: First, the heterogeneity of scale and sampling rate; it is not easy to mix data collected daily. Second, noise or incomplete data; data glitches are a common problem when collecting data with the IoT. And third, the most important one being corrupted data. Fake data introduced in a system can be as dangerous as a cyberattack making a DoS on your system. If you have fake data, you can take wrong decisions or your AI can behave strangely.

Engie has research topics, such as research in automatic data labelling. This is crucial, because if you don't label your data you have difficulties to implement machine learning. Another big research topic is Edge AI processing and decentralisation, but especially trust and explainability and the reliability of the AI engines. It might be necessary to explain what happened or why a decision had been taken and this requires some kind of AI that is explainable. If you go too far, you will have business problems. The goal is to add AI functionality to Engie's services and platforms and progressively making them more interesting and useful to its clients.

NAMIR ANANI, President & CEO, ICTC – Information and Communications Technology Council, Canada, expanded on the subject of the socio-economic shifts brought upon by new technologies and trade dynamics.

The Intelligence Economy – Where Technology, Markets & Humanity Intersect

The Information and Communications Technology Council is a national centre of expertise for the digital economy in Canada with the aim of advancing Canada's digital advantage on the global context.

For the first time in history, it is not only about the exchange of services, equipment, products etc., it is about how do we create intelligence, how do we manage it, how do we trade it and how do we preserve it at all levels. For the first time in history, we are facing a whole new era: In the past we looked at technology and its impact on the speed of change and the sophistication of technologies. That is how technology was categorised. Now, we are living in an era where AI and the confluence of data is challenging us as human beings in the way it is impacting the future of jobs, its creativity potential (in creating IP and how to manage this), but also in the competitive nature (could it be substitutional to some other things that we are doing in the next number of years?).

Globally, we are seeing structural transformation that is certainly being shaped by trade dynamics, by environmental trends, by innovative technologies, but also labour market shifts that are dramatically changing the nature of work that we are in. It is a no ordinary destruction: On one side you have the AI data, the confluence of that plus the 5G with almost zero latency providing very fast connectivity for the AI to be able to make the decisions, and at the other side there are socio-economic shifts that are happening upon us.

55 percent of the population is becoming urbanised, generating approximately 70 percent of the GDP in the world. We are inhabiting less than 5 percent of the surface of the earth and a lot of companies and governments are looking at smart cities, creating the environment, attract investments and companies, create that hyperconnectivity that will unleash the economic environment of the future while serving civic society at the same time.

We are seeing shifting trade dynamics, not only due to political inflictions but because trade is no longer governed by products and services, but also by the amount of data that is been transferred around.

Demographic shifts are changing across many of the developing countries, which is different to the developed countries. There is a lot much older population in the developed countries and specifically the G7. We have to reflect that in the implementation of AI and data: How do we help the society? How citizens and consumers can interact in that environment of the future? What is the learning potential and the essential skills that have to be created? What are the jobs of the future that this environment will create?

There are three aspects to look at in order evaluate how the evolution of AI and data is going to impact our economy and society in the next years:

1) The intensification phase: It is the stage we are living with AI and the confluence of data, the availability of IoT and the multitude of 50 billion devices around. It is the stage where whatever we did so far, we can do it better with the advancement of AI. There are many examples for that. For instance, a Hong Kong-based start-up, together with researchers from the University of Toronto, had used AI to manage clinical trials to create a potential new drug to prevent tissue scarring. Something that normally takes a decade, took just 46 days from molecular design to animal testing in mice. Other examples can be found in the context of Industry 4.0 and advanced manufacturing.

2) The second stage, which we are living at the moment, is the substitution stage. Here you have the cobots and even in Industry 4.0 humans are interacting with machines. It is like the 5th level in autonomous driving, where the machine replaces the driver and the vehicle is fully autonomous in terms of human interaction.

3) The last one is the autonomous creation—and this is the social consciousness. This is the stage where we have to reflect on how this world will develop in this environment, and the one where we really have to look at how to govern that environment.

While there are much positive externalities, there are also negative externalities of the competitive nature, of the substitutional nature, or of the impact on jobs. However, it is an innovative space and we have to look at how to unleash it in the next number of years. As an organisation coming out with a research by the end of the year, ICTC is seeing that for every job lost there are several jobs that are being created.

KAISER NASEEM, Digital Transformation Professional and International Development Banker, United Arab Emirates captured the audience with three key messages in the context of this journey of levering technology in 2019 and beyond to improve the way we do things and the way we live our life even in the remotest part of the globe. The way we do this will matter a lot, because unless we leverage technology properly and strategically, there will not be much improvement.

Regulations always follow innovation. Innovation will happen without a regulatory framework in place. Innovation is undertaken by entrepreneurs, and entrepreneurs do not wait for the environment to be conducive. They innovate and regulations follow, always trying to catch up. For both the innovators and the users of the innovation it is extremely important that the innovation is used responsibly and ethically. There is a business case for that: If an innovation is used irresponsibly, the regulation that follows might be so stringent that it will stifle innovation. If we want to innovate, and make sure the innovation is used for the betterment of humanity, we have to behave responsibly. Knowledge gives us power, but with great power comes even greater responsibility.

Moreover, technology is just a tool and the envisioned solutions can only happen if there are users of this tool.

The biggest deterrent to both innovation and the use of technology is skills—not just the skills, but the ability to deploy them in 2019, especially for legacy institutions. In 1970, Alvin Toffler, author of the book “Future Shock,” said, “The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn.” This still holds true. Much of the today’s discussion related to skill gaps; not that we have to train more people, but that we need to retrain ourselves. Many of the institutions that are digitalising today are legacy institutions. They are headed by people who have been there for the last 30 years or so and it is very difficult to change them.

ALESSANDRO GUARINO, Founder and CEO, STAG, Italy, provided an insight in different national strategies for AI.

The Geopolitics of AI

Artificial Intelligence seems to have finally come of age. It also seems to be the technological area with the highest impact on geopolitics and national security. AI will soon be able to directly influence the balance of power, representing both a challenge and an opportunity for governments worldwide.

Even in its current stage, i.e. as augmented intelligence or machine learning for specific sectorial tasks, AI is able to influence the power sources of a nation—military, economic (better and more efficient manufacturing), and even demographics (a health sector powered by AI could alter a nation's demographics).

US and China are the two major powers moving towards competition, even rivalry, and possible isolation. Secondary powers are Russia, the UK, Israel, France, and India. The EU as geopolitical union is insignificant in the area of AI.

The tenets of an open Internet (and liberal democracy spreading by default) are fading: Borders are coming up in cyberspace. China took control of its cyber borders and uses technology as an enabler for the state. Russia is following suit.

China aims to become a world leader in the field of AI. In May 2018, CloudWalk Technology has signed a deal with the Zimbabwean government to provide a mass facial recognition program. This could be considered as an example of "data colonisation".

China has a number of advantages, such as access to huge amounts of data (800 million users online in the PRC sovereign space), but also a lax privacy protection and barriers to the reuse and aggregation of data, as well as a close connection between the tech companies and the state (the party).

Alibaba, Tencent, and Baidu along with iFlytek were named to the first AI "National Team" in China.

The US maintains leadership in the area of AI. The country has a very strong military sector and AI generally develops in the three sectors: private, military and public.

Other relevant countries with regards to AI are France, UK and Israel. The French President Macron engaged in AI during a speech at the College de France in March 2018. He announced a 1.5-billion Euro investment plan in AI.

The EU set up a High-Level Expert Group on Artificial Intelligence but seems to be rather reticent with regard to AI.

WALID EL ABED, Founder & CEO, Global Data Excellence, Switzerland, delivered an inspiring talk about how to maximise the business value of data.

DEMS Cognitive and Social IT Platform: The European Alternative to the US and Chinese AI

Data Excellence Management System (DEMS) is a unique cognitive platform that will enable societies and governments and companies to govern by value.

DEMS identified for one of the largest banks in Europe 500 billion Euros at risk, as well as the enterprises and customers exposing that bank. The entire task was carried out by machines within 8 days.

Contextual intelligence is a new form of intelligence to create sustainable value and govern by risk and to create a society which is a society of excellence. We have a doubled tsunami hitting this digital area and hitting the businesses—a data tsunami which is scattered in many different systems. Moreover, 80 percent of the data that is required to create the future does not exist. If you seek for this data in your data lakes, big data etc., you will not be able to create a new future. All you can do is repeating the past!

The second tsunami is the rules and regulations. GDPR is coming and oppressing companies and societies. It is a good thing, but requires discipline. One of the top consumer goods companies worldwide has 30,000 IPR systems in order to run their operations worldwide.

There is a ruling paradigm and we are all stuck in this paradigm which is transforming data to information, to knowledge, to insight, to wisdom. This requires a lot of money, takes time, is accessible only for the big players (due to the costs), and it doesn't link to the value.

The alternative is to deploy contextual intelligence that is linked to the value and that is accessible with our natural language. Our brain doesn't function at full capacity when we think in another language than our mother tongue. How does this work? It is a perfect collaboration between humans and humans, humans and machines, and machines and machines. Machines are not just tools; they are an entire part of the ecosystem. Without machines, we won't be able to create this new future.

The alternative to the Key Performance Indicators, a very backward-looking approach, are Key Value Indicators, which are future-looking indicators, and collaboration—sharing time, data and values. The value proposition is simple: Spend less money while complying with the rules and regulations and leave the machines focusing on automating the decision making, sharing data or even proposing the best approach to organise ourselves!

Global Data Excellence just received a 2 million euro grant from the Horizon H2020 research and innovation Programme EU funding Phase II, with an excellent score of 13.88 out of 15. The intention is to scale Europe with the alternative contextual intelligence and cognitive platform—an alternative to the AI coming from the US and from China. The problem is not that the EU is not doing enough; it is the adoption because people are still functioning "patch by patch" and buying from large companies. However, Global Data Excellence proved that it is possible to become number one with little money.

For those who want to adopt the cognitive platform: the EC is currently sponsoring the license at 70 percent.

PHILIPPE DENIS, Executive Denis & Partners Consulting, France, presented the Resonate platform that uses Global Data Excellence.

Resonate4SDG

Resonate is an engagement platform on the implementation of the Sustainable Development Goals. Whether you are a corporate, NGO, government or an induvial, Resonate monitors the time and money that you allocate to the each of the 17 SDGs, i.e. Resonate shows your impact on each SDG.

The main principle of the Resonate platform is the so-called engagement star. Individuals or organisations get engagement stars depending on the time or money they spent on each of those topics. It reflects the question “How and how much do I engage?”.

Resonate shows the objectives (“What I would like to do”), the real engagement (“How much was I able to spend?”) and the relativity (“What I did compared to what I could”).

The issue of relativity becomes very clear in the context of big corporates and the amount they spend for NGOs. Sometimes it is a lot of money, but it is quite few compared to what they could spend. It’s a question of relation.

There have been rules defined by the UN SDGs and the idea is to be able to monitor these rules in natural language, to have a semantic model in order to model all the SDGs on a uniformly structured basis, and to be able to connect to the database in order to capture the time and money that is behind. Then, for the Key Value Item (KVI) Dashboard, Resonate is able to compute the engagement star and AI as cognitive intelligence is put on the topic.

One could imagine a corporate Resonate platform on one side (it will be more complex for corporates to manage the SDGs, rules and guidelines behind and the access to multiple databases), and an individual Resonate platform on the other side (which is going to provide the individual’s willingness to do the good, whether it is for him- or herself or for the corporate). The idea is to see if there is an alignment or not of these engagement stars in order to move forward with other people doing the same type of activities, and with corporates adding their activities.

SIMON BOISSERPE, Innovation Development Advisor, Atlanpole, France, presented start-ups using AI and data in the healthcare and energy sector.

The Role of Data in the Economy

AI is increasingly used by businesses, and it is an important growth driver for start-ups. Atlanpole is a Nantes-based incubator providing monitoring and coaching assistance to SMEs.

AI in the healthcare sector is mainly used for P4 medicine. P4 medicine is predictive, preventative, personalized, and participatory. There are many examples for this in France.

One example is b<>com dealing with automatic organ localization and multi-modal image registration. b<>com uses machine learning to detect anomalies in organs. The algorithm draws the contour of the organs and helps professionals to detect potential problems.

Another example is the start-up HERA-MI. They develop machine learning algorithms to detect potential anomalies with regards to breast cancer.

We are just at the beginning of this technology, which is currently mainly used in research. However, the technology doesn't replace the professional.

In the energy field, Atlanpole, together with Enedis, the French electricity distributer, is piloting the Datalab Energie platform. Datalab Energie is collecting data and sharing them with SMEs that want to develop new services to optimize energy consummation.

One of these companies is EdgeMind. The small company has developed an algorithm to detect energy consumption anomalies, e.g. in schools (don't consume energy on week-ends), swimming pools, public buildings etc.

Case Law Analytic is a software to provide accurate analysis and reduce legal proceedings uncertainty by modelling court decisions through AI.

Robnak Hood is AI for trading.

XSun has designed and manufactured an energy-independent drone model that can make its own decisions for fully automated missions.

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Day 1 – Afternoon – Parallel Session

Promises and Realities of IOT: Roll Out of Digital Transformation

The chair and moderator of this session, **HERVÉ RANNOU, President, SenX & Items International**, France, welcomed the panellists and opened this afternoon parallel session on IoT.

NITYA KARMAKAR, Professor, Peter Faber Business School, Faculty of Law and Business, Australian Catholic University, Australia, expanded on trends and challenges related to the IoT.

Fire & Fury in the realm of Internet of Things (IoT): Winners and Losers

The Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the Internet. Smart systems and IoT are driven by a combination of sensors, connectivity, and people and processes.

Since 2008, there are more connected devices than humans. In 2020, there will be 6.58 connected devices per person.

The ultimate goal of the IoT is to automate human life. Key application areas of the IoT are building and home, manufacturing, medical and healthcare systems, media, environmental monitoring, agriculture, infrastructure management, energy management, transportation, better quality of life for elderly, but also the fashion industry.

The technology that can be worn on a human body is a wearable technology. Most common examples of wearable devices are smart watches and google glasses. However, smart devices are now available in the form of smart fabrics. These smart dresses have attracted the fashion industry towards this emerging trend.

Merging of fashion and technology is a hot talk nowadays. The google glasses have helped to increase self confidence in a face to face interaction where people can talk more when they have data in front of their eyes. The people have argued that the wearable technology has brought revolution and they expect the technology to make fabrics with the motive - “If tech fits, wear it”. There are Twitter dresses lighting up to spell out Tweets sent in real time, or a 3D printing dress that releases smoke based on the Wearer’s breathing and proximity to others designed by Anouk Wipprect. The same Dutch designer created the “Spider Dress,” a garment that features claw-like plastic arms which react when someone comes close to the wearer.

Some key questions in this context are: Can we imagine smart dresses to be a part of our wardrobe? Do you think drift from health towards fashion can be detrimental for health? Would you like your skin to be data fed? How can customs and religions define the acceptance criteria of smart dresses?

However, there are other smart wearables to mention: For instance, the Smart-Bra was made to detect the breast cancer and smart t-shirts to detect biometric data like pulse rate and calories burned in a day.

The smartly clothed body produces data as well as wears the data. The extended skin is equipped with artificial sensory systems, extending our natural body and sensory systems into the augmented space; the extended skin is datafied and the body is datafied.

The potential of the IoT is huge. Connected machines and data could eliminate up to 150 billion dollars in waste across industries. General Electric estimates that if the industrial Internet achieves just a one percent efficiency improvement then the results are substantial. For example, in the commercial aviation industry alone, a one percent improvement in fuel savings would yield a savings of 30 billion dollars over 15 years.

However, there are a number of technological challenges, such as privacy; security; technical standardization; social control; political manipulation due to the absence of governance; design and influencing human moral decision-making (including ethics); the environmental impact; difficulties to protect the patient's personal data due to leakages, destruction collusion attacks and insider attacks.

Fire & Fury or Hype to Reality: The economic impact of 100 billion connected IoT devices is forecast to be more than 11.1 trillion U.S. dollars by 2025. However, the journey of IoT adoption is not a seamless one due to the huge complexity to implement it.

For some people this technology may also be restricted due to cultural or regional norms or their self-beliefs of not datafying their bodies in some cases. The identification of challenges and its perfect solution will decide truly winners and losers.

EIKAZU NIWANO, NTT Research Professor, Secure Platform Laboratories, NTT Corporation, Japan, talked about strong IoT security based on a security environment as an extension of security.

Structured ID Components Over Secure Environments

There have been many reports of high jacking equipment and using it to launch cyberattacks on specific systems. We are facing such incoming critical security risks and in order to roll our digital transformation by IoT, this kind of anxiety has to be removed.

In February 2019, the Japanese Ministry of Internal affairs and Communication launched the "NOTICE" programme (National Operation Towards IoT Clean Environment) to investigate 150 million IoT devices and alert users with respect to their configuration risk. This had an impact on the citizens' awareness concerning the security risk of the IoT devices they use on a daily basis.

Managing Root of Trust (RoT) to assume device authenticity is a key issue in IoT security. To avoid maintenance problems of IoT devices and ensure long-term life cycle management (also of low-end IoT devices), simple security management without onsite management is required, as well as a regular update of the security model and the data because there is a huge number of IoT devices distributed in difficult places.

Supply chain and a dynamic configuration change the risk in an ecosystem. Dynamic automation risk in digital twin environments leads to complicate the whole system and sub-processing. It requires more flexible and trustworthy computing. There is a need for a global, but region depended security scheme. The cyber security risk and thus the security requirements are sector depending.

Taking all these aspects into consideration, a strong, flexible, but simple and trustworthy security solution has to be provided.

What is important to overcome these problems? There are a variety of secure environments as Root of Trust with tamper resistant or semi-tamper resistant capabilities, such as eSIM or iSIM). Once put into a device, it provides simple but strong trustworthy security. It also supports secure remote management and update capability for software components and simple and flexible administration can be provided. In order to ensure that trust, security by design, attestation, evaluation and a certification for systems and system of systems (SoS) with/ over secure environments has to be addressed.

The international organisation GlobalPlatform promotes this kind of scheme. ETSI/ ENISA (Europe), NIST (US), and the Japanese IoT Acceleration Consortium also started to work on the usage of secure environments.

What will be next? The issue of trust regarding devices in the ecosystem has been discussed, but we need to resolve the remaining trustworthy issue for the ecosystem itself. A trustworthy framework for the ecosystem itself with secure environments might have to be studied.

The issue to be addressed is "structure as trust". The ID structure of systems and a SoS is very important to ensure trust in the SoS because it relates to the responsibility structure.

Such structure can be device, house/building/car-city-region etc. There are many types of entities such as a person, things with the role of a supplier/consumer/provider etc. To assure that trust, security by design, attestation, evaluation and a certification for systems and SoS with secure environments have to be studied.

We should consider how to configure ID related components of the various types of secure environments on the basis of an overall structural architecture in ecosystems and SoS environments.

RENAUD MONTIN, Managing Director Consumer Division, Parade Connect; Chief Transformation Officer, ERAM Group, France, presented a very concrete use case in the field of connected shoes.

Parade Connect

The ERAM Group is a family company, handed down from generation to generation, since 1927. The ERAM Group is specialised on shoes and clothing. Three factories manufacture 1.2 million pairs of shoes in the Maine-et-Loire region.

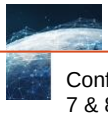
The ERAM Group is currently transforming and changing towards more sustainable products. ERAM is reinventing itself as a more sustainable company, focusing on "Change for Good", but also to move from a product company towards a service company.

Parade Connect is one of these new products. Parade Connect is the first connected shoe in the world that detects falls automatically. Sensors and algorithms are situated in the heel of the shoe. Once they detected a fall, the information is sent to a communication box with GPS and antenna situated in the tongue of the shoe. Then, the information is sent to the emergency services to organise the rescue.

The process is very simple: The shoe detects the fall; the user is localised via GPS and an alert is sent so that the people can come to rescue the user. The detection is automatic and the user doesn't have to do anything. Moreover, the shoe works inside and outside. The main objective on this innovation is to encourage people to move and to go out. This is especially important with respect to an aging society. Parade Connect received the CES Innovation Award at the CES in January 2019.

What is the current state? The final technical issues have been fixed, the algorithms have been evaluated with doctors and laboratories in order to be finetuned and the shoe will be launched during the next couple of weeks. There are two product lines: one product line for the large public and another one for isolated workers. In France, for instance, isolated workers represent 1.5 million euros. Parade is a brand of the ERAM Group which is leader in security shoes.

However, this product wouldn't be there without the ecosystem around: ERAM has long shoemaking experience and the Angers region is known as a technology hub. The electronics of Parade Connect are made in Angers, the city of ERAM Group's head offices. And the shoe is made in the ERAM Group factory in the Angers region. It is a very local innovation that will be launched in this year France, and hopefully European wide by next year. There already has been interest from the US and North America.



GWENDAL AZOUS, IoT Consultant Manager for Smart Cities, Smart Industries & Smart Building, Axians Consulting, France, [www.vinci-energies.com], elaborated on the importance of data processing, and the importance of implementing a collaborative data governance programme for smart cities.

Smart City Promise and reality of IoT— The Roll-Out of Digital Transformation

The value chain consists of the 6 bricks: Data capture, e.g. via sensors, to collect the information from the field; 'transport and collect' to transport the data to the database; the storage part; analysis with AI and machine leaning; and 'enterprise applications". Security is transversal to each of these 6 bricks.

After having undertaken a proof-of-concept to test technical solutions for data collection in smart cities, Vinci Energies is currently deploying smart cities in the city of Dijon, Marseille, and Aix-en-Provence.

Smart city is a reality. IoT platforms already federate data from existing systems, such as the Supervisor building management software solution or LoRa sensors and they now all host the data in a big data lake. The storage is a transversal brick for all the different departments.

However, there are some issues concerning how to manage the data: What type of contextualisation and can it be unique in a silo organisation? How to ensure reliability, compliance and quality of the data? Who will ensure data security and confidentiality? These are the questions related to data management today.

The historical organisation in the city is a siloed organization for each department. Though, with the data lake, we are moving towards a centralised organisation. Traditionally, data governance was led by the IT department based on structured data, but due to the immense amount of data in the data lake, it is not possible to continue with this old schema.

The new situation requires a decentralised solution and collaborative governance seems to be the right approach. Collaborative governance works in each department with experts and non-experts to understand at the beginning how to manage and control the data.

GÉRALD SANTUCCI, Ambassador, INTEROP-VLab, Belgium, invited the audience to take a journey with him to look back on Europe's involvement in IoT.

IoT: A European Journey

(Introductory notes: The term "Internet of Things" was coined in 1999 by Kevin Ashton while working on a presentation for Procter & Gamble in the context of RFID supply chains. The concept of IoT was born at the end of the 1980s at Xerox in Palo Alto when Marc Weiser invented the notion of "pervasive computing", and, in 1984, in Japan with Prof. Dr. Ken Sakamura who invented the TRON (The Real-time Operating system Nucleus), which afterwards gave rise to the concept of ubiquitous networking.)

An FCC Workshop on Radio Frequency Identification took place in Washington DC in October 2004. The Internet of Things was not mentioned yet, but there was already the idea that objects with RFID tags could be traced easily.

Soon after, the European Commission (EC) started to work on a Communication on "Radio Frequency Identification (RFID) in Europe: steps towards a policy framework", which was released in March 2007. At the end of this communication, the EC announced that it would continue monitoring the so-called Internet of Things. This was the first time the Internet of Things was mentioned in an international policy document.

Less than two years before, in 2005, the ITU had published the "ITU Internet Reports 2005: The Internet of Things"—the first international report on the Internet of Things. At this moment in time, things went extremely fast and the "Internet of Things" became IoT, supported by the social media use of hashtags like "#IoT".

The first European IoT conferences took place in Berlin, June 2007, and Lisbon, November 2007, but both of them were still about "how to move from RFID to the IoT", as if the IoT was merely a continuation of RFID—which it is, but only to some extent.

The first time the Internet of Things was referred more to the Internet and less to RFID only, was at the French Presidency of the European Union Conference on "The Internet of Things, the Internet of the Future" in October 2008 in Nice, where the EU Ministers signed a Ministerial Declaration on IoT.

In 2009, the EC published the Communication "Internet of Things—An action plan for Europe", comprising 14 rather wide-ranging action points: governance, privacy and data protection, the right to the "silence of the chips", emerging risks, vital resource, standardisation, research, Public Private Partnership, innovation, institutional awareness, international dialogue, environment, statistics, and evolution.

One year later, a new EU IoT Expert Group was set up, gathering about 40 persons with very different backgrounds, to design what should be the main topics to be addressed (architectures, identification, privacy and security, ethics, standards, and governance). This group worked until November 2012 and then, a choice was made in Europe: As it was no longer certain that there could be a consensus on making the IoT something integral and particular, people thought that it was time to place discussions on the IoT in the mainstream of the work on the Internet—a decision that was not without controversy.

Meanwhile, in 2009, the Chinese Premier Wen Jiabao gave a speech in the city of Wuxi calling for the rapid development of IoT technologies. It included the equation: Internet + Internet of Things = Wisdom of the Earth. This was the time when the IoT—not as a concept, but as a term—became truly global. Today, IoT is no longer a hype, but something that exists and that is deployed all over the world.

In March 2015, the EC established the Alliance for Internet of Things Innovation (AIOTI), which aimed to strengthen the dialogue and interaction among IoT players in Europe, and to contribute to the creation of a dynamic European IoT ecosystem to speed up the take up of IoT.

AIOTI has 13 working groups, 9 of them working in parallel and 4 horizontal ones for research, innovation ecosystems, IOT standardisation, and IoT policy.

Two months later, the EU announced its Digital Single Market policy. As a part of this policy, a Staff Working Document: “Advancing the Internet of Things in Europe” was issued in April 2016, with the three priorities: a single market for the IoT, a thriving IoT ecosystem, and a human-centred IoT approach.

Today, the EU has 3 main priorities in the field of the IoT: 1) research and innovation, 2) the policy, and 3) stakeholder engagement.

The priority “research and innovation” comprises large scale pilots: There are 5 big projects, funded between 15-30 million euros by the EC—which is twice as much in total. They cover smart cities, wearables, smart farming and food, autonomous cars and smart living. It also comprises “IoT security and privacy”, which in the past was realised separately from the rest of the research work. Today, there are clusters for the IoT as such, but at the same time, there is a cluster with 7 big actions on security and privacy, which are interlinked with the work on the technologies and applications for IoT. And it also comprises the Next Generation Internet (NGI).

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Session 4

Day 1 – Afternoon – Parallel Session

Digital Policy, Regulation & Governance

The chair and moderator of this session, **THOMAS MACKENZIE, Senior Research Consultant, Internet Governance, Items International,** France, welcomed the participants and briefly set the scene for the forthcoming presentations.

KOFFI FABRICE DJOSSOU, Regional Director, Gilat Telecom, Israel, addressed regulatory issues in Sub-Saharan Africa.

Policy Regulation Challenges in Africa

Sub-Saharan Africa has 444 million unique mobile subscribers and 747 million SIM cards. The mobile penetration in Sub-Saharan Africa stands at 38 percent, compared to an Internet penetration of 36.2 percent and a very low fixed broadband penetration of 1.9 percent.

Sub-Saharan Africa is facing a number of policy and regulatory challenges related to broadband access. There is a gap between supply and demand. Fixed broadband take-up continues to be low, although 40 percent of the population could have access to fibre cable.

There is a need for innovative regulation and reformed public policy. Policies that promote competition, open access, infrastructure sharing and private investment as well as public and private partnerships did not advance with the market and users' needs. Cross-border policy harmonization is another challenge in the contexed of broadband access.

Telecommunications regulation is underdeveloped in Africa, with only few countries moving up the telecom regulatory maturity ladder (ranking from G1 to G5)—most African countries reached G2 and G3 regulation. One of the core issues is the regulation of the level playing field in concentrated market structures, such as cyber security, threats to privacy, the loss of control over data and child protection, cloud computing, Internet of Things, and over-the-top service provision.

ALAIN DUCASS, **President & Director, www.energeTIC.fr**, France, provided valuable advice on how to avoid white elephant projects.

Too Many International Digital Projects Fail or Produce White Elephants

Too many international digital projects fail or produce white elephants. A white elephant is a possession which its owner cannot dispose of and whose cost, particularly that of maintenance, is out of proportion to its usefulness.

Why do we produce white elephant projects? Among the various reasons for "white elephants" are often a lack of competencies (e.g. in the area of digital economy), inappropriate terms of reference (e.g. Macedonia), missing aspects (e.g. eSignature), denial or non-consideration of cultural aspects, a lack of promotion, or conflicts between people. Other reasons for the production of "white elephants" can be that people have an interest in the project failure, or that there is opposition or disagreement between projects.

Usually, there are always people who are able to foresee the coming failure early in advance. Many failures could be avoided simply by good governance. It is important not to forget the human dimension and not just to focus on the technology.

Good risks and assessment studies have to be carried out before each international digital project. The project realisation itself should be accompanied by change management as well as rational and relational project reviews. Mediation and compliance-reviews after the project realisation can also help avoiding white elephants.

The objective of energeTIC is to avoid the production of white elephant projects. energeTIC supports training and coaching for a better governance by taking into account the human aspect of conflicts and realising relational project reviews and change management (transformation of conflicts, specific mediation tools etc.).

ALESSANDRO GUARINO, Founder & CEO, STAG, Italy, discussed how nations balance sovereignty with individual freedoms in the cyberspace.

Digital States and Digital Peoples

The world's perception of cyberspace has evolved from the libertarian promises of the 1990s to the current situation, where nation-states seek to re-establish their sovereignty. In 1996, John Perry Barlow wrote the so-called "Declaration of the Independence of Cyberspace"—a paper formulating the idea that, as cyberspace stands apart from the physical world, nation states would not and could not regulate anything that happened on the Internet.

Cyberspace, however, is not a natural phenomenon, but a historical and political one, and as such, is subject to influence by social and political entities. In the end, the vision of a single, borderless cyberspace that declared its independence from governments is dead and buried (assuming it has been alive at all…).

It survives in some of the governance organizations still very important for the modern digital space but confined to very narrow domains.

While the three important regions (the US, EU, China and Southeast Asia) have different approaches to data protection and cybersecurity, all three produce a huge impact on civil liberties and economic development.

In the US, there is this tense relationship between Silicon Valley and the government. It is the multi-faceted relation between freedom and self-governance—the gap between principles and reality…

The EU has adopted a very protecting attitude towards its citizens: The EU has become the main advocate of the precautionary principle, both in European regulatory policy and in international agreements. The extra-territorial scope of the EU's general data privacy regulation's (GDPRs') found the provisions for unlimited data retention clashed with European citizens' fundamental rights to privacy and data protection.

China and Southeast Asia are characterized by cyber sovereignty, securitization, benevolent and less benevolent dictatorships.

ALICE PEZARD, Attorney at Law & Arbitrator, France, briefly commented on the previous discussions.

All the panellists have stressed on the alternative regulations of the digital world.

The traditional ones are not appropriate to big data. Everywhere the Cyberspace which has to be protected is very competitive. A very sensitive market for example: the Africa Telecommunications.

Why not to say: everyone is looking for the best governance of innovation.

JENNY ROMELSJÖ, Case-Handler, Unit C.6 – Antitrust: E-commerce and Data Economy, DG Competition, European Commission, expressed some personal views on the challenges posed by the digital economy.

Competition Policy for the Digital Era

Digital is a top priority of the EU Commission. A few examples:

The aim of the Juncker Commission (2014-2019) was to create a Digital Single Market. Several legislative measures have been adopted since 2015, such as the EU Regulation on platform-to-business relations (P2B regulation), which entered into force in July 2019, the EU Regulation abolishing roaming fees by 2017, the EU Regulation on cross-border portability of digital services, the EU Regulation on the free flow of non-personal data in the EU is applicable since 28 May 2019, and the EU Geo-blocking Regulation.

In May 2017, the Commission issued the Final Report on its sector inquiry on competition in the e-commerce sector.

In 2019, the von der Leyen Commission (2019-2024) nominated Margrethe Vestager as Executive Vice President of the European Commission for a Europe Fit for the Digital Age.

However, an important question remains, how could competition law deal with the digital world? There are numerous studies realised by competition authorities all over the world— among those the DG for Competition. In May 2019, the EC published its report on "Competition policy for the digital era".

The report confirms that existing EU competition law provides a sound basis for protecting competition in the digital era. However, a number of traditional ways to look at things under competition law need to be adjusted to specificities of digital markets:

In the digital world, market boundaries might not be as clear as in the "old economy". Furthermore, in the case of multisided platforms, the interdependence of the "sides" becomes a crucial part of the analysis whereas the traditional role of market definition has been to isolate problems.

The report also discusses the role of data and access to relevant data sets in the context of market power, and pricing practices, such as the rise of free services/zero price.

The report also discusses the question of how to deal with data issues? It opposes data access versus protection of investments and privacy. Data pooling is often pro-competitive but there are competition concerns. More guidance needed. The report underlines the duty to provide access to data. In this context, there may be a need for sector specific regulation. Nonetheless, competition law can specify the general preconditions and inform the possible regulatory regimes.

How to deal with platform issues? It is important that to ensure that dominant platforms do not act as "gatekeepers" and hinder (potential) rivals' ability to attract users and compete/enter new markets. Dominant platforms have a special responsibility to ensure fair competition on the platform. The remaining question is, whether or not (dominant) platforms should be regulated.

DAVID ROUSSEAU, Professor in Data Sciences, University of Angers, France, provided an insight plant phenotyping supported by technology.

Where legislation meets climate change and electronics

We are running out of time on climate change. The expected impacts of changes, such as temperature shifts, droughts, floods, and storms, will affect agronomic conditions.

Crop production will largely be affected by climate change—it may impact both plant growth and production but increase crop diseases. It is therefore necessary to adapt to changing climate conditions and to select new crop varieties, e.g. plants adapted to low resource environments.

In order to be able to increase crop resilience to climate change, we have to know and select the plants suitable to grow in the altered environmental conditions. This requires to analyse large numbers of plants in varying environmental conditions and to identify the traits that make them tolerant to the changing climate conditions.

The problem is, that it is a rather long process which takes about 10 years.

Moreover, non-objective procedures with visual inspection and manual measurements result in non-uniform criteria and legislation between countries.

The use of technology adds considerable value to the process, such as speeding up annotation with autonomous devices or realising objective measurements via standardized sensors. Technology also opens up the possibility of a shared knowledge and legislation on variety selection.

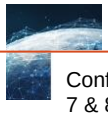
FABRICE TOCCO, Co-Founder & co-CEO, Dawex, France, explained how to source, exchange and monetize data securely and in full compliance with regulations.

Making Data Exchange Scalable & Secure

Dawex, a leading data exchange technology company and the operator of the largest data marketplace, allows organizations to orchestrate data circulation by sourcing, monetizing and exchanging data securely and in full compliance with regulations.

With the rise of Artificial Intelligence, Internet of Things, and the emergence of Smart Cities, among other disruptive trends like the autonomous cars, huge quantities of valuable data are being generated, analysed and exchanged. New data-driven ecosystems are emerging that organizations can strategically leverage using secure data marketplaces and data exchange platforms.

Since 2015 Dawex mission is to create the conditions for the smooth development of the data economy by facilitating the exchange of data between companies and organizations. Dawex Data Exchange Platform enables private and public stakeholders to organize data circulation and supports multiple data exchange use cases and business models including internal data exchange, data sourcing, free data sharing, data monetization and data marketplace orchestration.



Today more than 9,000 organizations from over 20 sectors rely on Dawex Global Data Marketplace and Data Exchange Platform solutions to build their data exchange strategy.

PAUL WORMELI, Innovation Strategist, Wormeli Consulting, USA, discussed alternatives to traditional regulation.

USA Governance, An alternative to regulation?

In its report “Alternatives to Regulation”, the OECD encourages governments to consider alternatives to traditional regulation. The OECD stresses that “there may be a range of options other than traditional "command and control" regulation available to achieve the government’s policy objectives. The "regulate first" approach may mean that more effective and efficient policy instruments are being overlooked”.

Corresponding to the OECD, alternatives to traditional regulation are market-based instruments, self-regulation and co-regulation approaches, as well as information and education schemes.

In June 2014, the UK’s National Audit Office (NAO) issued a paper entitled “Using alternatives to regulation to achieve policy objectives”, with the objective to understand the government’s actions to reduce rule-based regulation when it needs to intervene in markets to meet policy goals.

Regulation sets rules to protect and benefit people, businesses and the environment, stabilising markets and addressing market failures to support economic growth. But regulation can also create costs and it can, if overused, poorly designed or implemented, stifle competitiveness and growth. As alternatives to regulation, NAO proposes information and education, market-based structures, self-regulation and co-regulation.

Governance should be characterized by a decision-making body composed of representatives of stakeholders. It should be based on a charter establishing the rules for the decision-making process. Governance should be a process of evolving policies with oversight of its implementation. A method of monitoring conformance should be applied and self-evaluation should be common practice. Organizational credibility is key.

There are a couple of prominent examples of successful multi-stakeholder governance advocating a member-driven consensus process: The world-wide web with ICANN, the Extensible Markup Language (XML), the National Information Exchange Model or the Open Geospatial Consortium.

Advantages are the faster buy-in of principal stakeholders, the faster implementation and adoption, lower cost of enforcement, flexibility in adapting to change and easier change management, greater stakeholder satisfaction and lower programme cost.

However, there are a number of challenging governance issues to which governance has to adapt, e.g. when the market forces fail; when the stakeholders cannot reach a consensus; when individual components will not comply; when the reach is insufficient; when innovation is mandatory to reach a goal.

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Keynote Opening

Day 2 – Morning – Plenary Session

The chair and moderator of this session, **JEREMY MILLARD, Senior Policy Advisor, Danish Technological Institute**, Denmark, welcomed the audience and opened this second day of the Global Forum 2019.

The discussions of this session revolve around the following questions: How can digital help fight climate change and ecological damage? How could energy move towards zero carbon? What makes a smart city smart and did the smart city bang happen? How can digital be used to stimulate economic players in the region? And how can we innovate for good?

ARNAUD LEROY, President, ADEME – Agence de l'Environnement et de la Maîtrise de l'Énergie, France, [ademe.fr/en], addressed the environnemental footprint of AI and IT.

ADEME, a French state agency, is active in the implementation of public policy in the areas of the environment, energy and sustainable development.

It is incontestable that IT provides solutions in the context of energy consumption and climate change. IT provides tools to measure, monitor and control technical equipment to decrease energy consumption. Such applications can be found in smart cities, in waste management, in transport and mobility. IT in the energy sector is crucial, especially with regards to windmills, solar panels and other power generating equipment that depend on natural conditions.

However, we have to be very careful about the ecological footprint of IT solutions. It would be a mistake to think that IT solves every problem and just brings solutions for climate change.

IT is one of the sectors where carbon dioxide emissions continue to increase at a rapid rate. The global carbon footprint of the IT sector is estimated to reach the size of India's—the third largest CO2 emitter in the world—by 2025. If we don't address this issue by complementing the expansion of data centres with AI and other smart solutions that reduces their carbon footprint, we will have a big problem.

But the negative ecological footprint is not only related to energy consumption where we are able to achieve progress and improvements. It is also related to the raw materials used, i.e. the environmental impacts from the extraction of raw materials required to produce IT components.

The Shift Project is one of the projects realised by ADEME, together with other partners, to provide insights on these issues and to raise awareness. The problem is that we are facing a kind of invisible pollution. There is no black or white tide on the river, there are no forests destroyed. It is a problem of awareness and understanding.

IT brings solutions and we have to take advantage of these solutions, but at the same time, we have to be aware of the damage that may occur in 10-20 years, if we don't address the issue of multiplying data centres everywhere as well as the issue of raw material usage.

It is a fact that, as soon as new systems are produced, new data centres are also required, and then additional data centres will again be required to address the needs of the data centres set up a few years earlier. The data issue is a concern.

There are no clear solutions yet. ADEME is financing innovation projects, together with other major actors, to promote low-tech solutions.

IT is important and IT provides solutions to important problems—but we have to keep in mind that it has a cost. We have to find solutions to avoid the disaster that may occur if we don't find solutions for the issues mentioned above.

ALAIN GUILLAUME, Business Development and Marketing Manager, Citeos, a VINCI Energies Brand, France, [vinci-energies.com], elucidated recent trends in the development of smart cities.

Futuristic Visions of the Smart City

Fifteen years ago, a smart city was supposed to be something that would dramatically change the way people live in cities. Fifteen years on, there is no 'big bang'. People don't come to a city and have a specific stunning 'smart city feeling'. The concept of smart cities is more about evolution than about revolution.

The cities Paris (France) and Canberra (Australia) are two examples of how most cities developed their smart initiatives so far. The cities adopted a climate plan, i.e. one focussing on important strategic goals regarding energy transition and digital transformation, which represent the two pillars of a smart city.

In 2011, the city of Paris launched its street lighting project. The city invited private companies to propose solutions not only for the city's street lighting but also for a backbone platform for future smart city options—the first brick of the smart city.

This is the way most cities progress. The city wants to become smarter by providing more digital services, but at the same time, it wants to get a payback on the investment. Street lighting is a good starting point for such cities, because thanks to savings in energy consumption and streetlight maintenance (due to the use of LEDs), the city gets a payback both for the street lighting itself and for the digital communication backbone that is used for this as well as for other equipment.

Canberra proceeded in a similar way: 3 years ago, the city launched its street lighting project and used the resulting cost savings to put in place further smart city bricks.

The city of Dijon (France) chose a radically new approach. When launching its smart city initiative 2 years ago, Dijon put a wide range of verticals in the same tender, such as street lighting, CCTV, electrical vehicle charging stations and many others. Instead of relying on the usual vertical approach, the city decided to apply a transversal approach to become a smart city. The expectations are high regarding this approach, because it could prevent smart city silo approaches. It is too soon to have any feedback, but it will be interesting to see whether it is better able to apply such a large transversal approach compared to the much more vertical approach that exists so far in many cities.

Another example is Masdar in the United Arab Emirates. A huge investment of 15-20 billion euros was made to create a smart city. Masdar City delivers impressive results in terms of energy—it is a carbon neutral city—and it is a big success in terms of technology. However, in terms of a living city, Masdar is a big failure. Apart from a few students and civil servants, the city is more or less empty. They forgot the citizens in their planning. Just being smart is not enough, a city has to attract people.

The corner stone of the smart cities Paris, Canberra and Dijon is the hypervisor ensuring efficient operation. The hypervisor is a system that is put on top of all the other systems, such as the street lighting supervisor, the electric vehicle supervisor etc. The hypervisor is a platform that brings together the city's various monitoring systems.

Paris La Défense is large business district in Paris where millions of people travel to, from or through every day. As efficient management in this area is crucial, a BIM (Building Information Modelling) hypervisor produced by Vinci Energies is used to streamline management with 15,000 devices connected to the hypervisor. This allows real time data processing and 24/7 operation. The status of each piece of equipment can be managed easily. Any kind of maintenance is linked to this system.

Hypervisors are the cornerstone of smart cities. The next step would be to link different smart cities with hypervisors dealing with energy management on a large smart grid territory solution.

OLIVIER SALA, General Manager, ENGIE Digital, France, [engie.com], called for an integrated and "as a service" model to help cities and corporate customers on their transformation journey towards zero-carbon.

Be the World Leader in Zero-Carbon Transition "As a Service"

Two years ago, Engie took the decision to put energy transition at the heart of its business model. It was the start of a major transformation journey.

We are entering a new wave of the energy transition. In the past, energy transition was mainly pushed by states (via regulations and taxes). Today, local authorities/ cities but also companies are at the frontline. They have to respond to climate change and to the zero-carbon imperative. The equation to be solved is complex, because this transition has to be performed to a cost-effective price. Moreover, they also need to maintain a positive impact on all the stakeholders (citizens, employees, customers)—and the pressure is high. Engie's ambition is to become the world leader in zero-carbon transition "as a service".

What is meant by "as a service" in this context? Solving the zero-carbon equation requires a global approach. Working in silos doesn't work. There is a need for integrated solutions, combined with an in-depth analysis of energy needs and uses, sophisticated technologies, notably digital—but also financing solutions, because investment requirements are very high.

Cities are at the core of the energy transition: They represent 2 percent of the world area, 50 percent of the world population and 80 percent of the carbon emissions. Thus, they have to be part of the solution. Engie helps cities across the world through a range of contractual arrangements to become more sustainable, attractive and resilient.

Engie's "cities and regions" stakeholders include municipalities, airports, industrial zones, rail stations, campuses, military bases and other geographically delimited areas. Engie provides infrastructure, services and digital solutions.

Ohio State University is one of the major public universities in the US, with 110,000 people living on campus with almost 500 buildings and one hospital. In the context of an energy management project, Engie has signed a 50-year contract with OSU. A 1.2 billion dollars investment, provided by Engie and partners, should promote experimentation and breakthrough.

Engie and Springfield City Group, the master planner behind the emerging city of Greater Springfield, in Queensland Australia, also signed a 50-year strategic alliance to make Greater Springfield a net zero energy city.

Providing hyper vision capability that breaks the silos is critical. Livin' is Engie's software platform that allows cities to manage their entire connected infrastructure and equipment from a single place.

There are three objectives: 1) Enable real time decision making that enable decisions to be made across silos. 2) Optimized operations that pilot all infrastructure points and equipment from one platform increases performance and cost effectiveness. 3) Simulation (testing value scenarios with multiple variables using expert software).

This creates synergies, savings and a shared vision of the territory, which is just not possible unless you have this in place. Moreover, it is a way to engage economic stakeholders, but also citizens in the zero-carbon adventure. Livin' is deployed in several French cities, in Brazil and in Italy.

DARIN BEACH, Chief Business Development Officer, Images & Réseaux, France, discussed how digital technology is changing the world we are living in.

The Digital Tech That Will Change the Economy

The world is facing major transitions. These transitions are mainly environmental, although the digital aspects are becoming more important. Digital technologies are changing and will continue to change our way of working and living.

Images & Réseaux is a French competitive cluster in the Pays de la Loire and Brittany regions. It helps academics and companies to openly innovation together. Images & Réseaux is currently merging with the e-Secure Transactions cluster in Normandy.

Images & Réseaux has 390 members, about 70 percent of which are SMEs. The cluster has helped companies and academics raise about 1.6 billion euros in R&D since its creation in 2005.

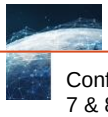
Images & Réseaux is working on cloud and wireless technologies, image treatment and processing, traditional multimedia, but also on AR, VR and AI, cyber technology, electronics and software. The cluster applies these technologies to different verticals, with smart cities being one of the major ones. But it also applies them to the health sector, back into multimedia, the factory of the future, agriculture and agri-food.

Digital technologies are major tools of the fourth industrial revolution. One of the key technologies in this context are new versatile communication technologies, such as 5G and IoT, but also AR and VR offer new interactivity, as well as new deep technologies, such as cloud, photonics, cyber and AI technologies.

The evolution of the IoT started from basic pings between objects. Today, we are getting to more and more data being transmitted between the objects themselves, machine-to-machine, and we are moving this processing power into the edge of the networks. As processing is moved closer to the users, moving to the edge can actually help reduce the impact on the environment.

There is a French touch in the IoT: Major LPWAN technologies and services are coming from France, such as LoRa, Sigfox or Qowisio (Ultra NarrowBand IoT).

The 5G revolution is just starting. 5G is not just 4G+1. It is a major transition and new network paradigm. For instance, 5G will allow slicing. 5G allows industries with specific needs or network requirements to set aside these characteristics and have this guaranteed. For instance, surgeries in hospitals need very low latency and high-speed data transfer when they are looking at an operation from a distance, so that the doctor can intervene quickly without having any delay. In order to guarantee this, 5G will be able to set aside parts of the



network virtually by its configuration. On the other hand, there may be IoTs that just need very little bits of data, every once in a while, and it is possible to also create slices to do that.

5G is expected to deliver significant performance improvements, it is 10 times faster, it is 10 times less consuming of energy etc. But 5G is also less: Because it does more with the same amount of hardware, we need less of the hardware to do what we are doing. It is more technology, but it is a more efficient use of technology.

To bring all these technologies to fruition, Images & Réseaux is focussing on helping innovation and bringing academics and enterprises together. Images & Réseaux moves around the innovation project life cycle—from the ideas of projects and innovation in R&D, to certify and make sure it is qualified and is meeting the objectives that are expected by the financers, the cluster helps to get the financing, and then follows through project realization and also the follow up in order to ensure that even after the project is finished all the impacts are done.

EYAL BLOCH, Head & Co-founder, TOP Global, Israel, provided examples of innovations for good and invited the participants to join the TOP movement.

How Can We Innovate for the Wellbeing of Humanity and Mother Nature?

We have to move from smart cities to wise cities. A wise city combines human, nature and buildings.

There is a need for a paradigm shift. The current paradigm can be characterized by the order “profit-planet-person". We have to change this paradigm to “person- planet-profit” and put people first and profit last. We have to care about the people and the quality of their life by also taking care of the planet (upgrading agriculture) and there will be enough profit “for everyone's needs, but not everyone's greed”, as Mahatma Gandhi said. The “fairy tales of eternal economic growth” have to stop (Greta Thunberg).

TOP (Technology for Peace) is designed and developed as a growing upcycle platform with a lively network of people, NGOs and businesses helping each other in sustainable development. TOP aims to share the proper conditions and tools to create a community of people, businesses and organizations to enable them to participate in an ecosystem of sharing knowledge, tools, resources, energy and inspiration to grow beyond their individual capacities.

But, how to make the shift? First of all, the shift is our mindset. We often speak about “disabled” people—a term that makes us think that we are facing someone who has no abilities. What if that person had diverse abilities or even extra abilities?

[A short video was shown illustrating the benefits of solidarity, education and knowledge sharing to fight against hunger]

Beneath this idyllic picture of tea plantations in Bomet County (Kenya), the tea pickers are malnourished because there is no food for the people. There are so many large tea plantations all over the county that there is no place for vegetables.

One of the projects TOP is involved in is building green-walls to help locals use vertical walls to produce healthy food which can also contribute to increase the income of people, school and communities in a very simple way, using plastic bottles and containers. With the green wall technology, a space measuring six-feet tall with a width of 3.5 feet can comfortably supply a family of two with enough vegetables and fruit throughout the week.

TOP also provides short training programmes. For instance, during a 2-days training course, a Kenyan woman was taught how to make bricks. 6 months later, she opened a brick factory together with other women.

All this is nice, but not good enough. If we want to make the next leap, we have to connect Artificial Intelligence with human wisdom—based on our values.

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From Smart & Intelligent to Cognitive Cities, Regions & Communities

The chair and moderator of this session, **HUGO KERSCHOT, Founder, IS- Practice**, Belgium, welcomed the audience and briefly introduced the panellists.

ALAN SHARK, Executive Director & CEO, PTI – Public Technologies Institute, USA, delivered some introductory remarks to set the stage for the forthcoming presentations.

Smart to Cognitive Cities – A Work in Progress

The expression "smart city" sounds like we have reached a certain destination. Though, when we think of the history of the world, we have had many smart cities that have come and gone and have lost their designation, such as Rome or Athens. They have transformed themselves. A better wording might be "smarter cities", because it is a journey, it is something that we continue to strive for.

What is the difference between a smart city and a cognitive city? A "cognitive city is a term which expands the concept of the smart city with the aspect of cognition or refers to a virtual environment where goal driven communities gather to share knowledge. A physical cognitive city differs from conventional cities and smart cities in the fact that it is steadily learning through constant interaction with its citizens through advanced information and communications technologies".

Smart cities are cities in progress. They generally include the following 9 factors: 1. Smart transportation (the ability to move people within a city effortlessly from one place to another); 2. Smarter digital infrastructure (the digitalization that makes all possible); 3. Citizen engagement and digital citizen services (this comes closest to cognitive); 4. Smart and big data (to make things better, we need information); 5. Data visualization (to make decisions); 6. Public safety; 7. Healthcare services; 8. Leadership and vision (we don't need silos of excellence, but a shared vision of how to accomplish the goals); and 9. Citizen pride and satisfaction (the public has different sense of expectations than the government).

Where are we now? Sensors are everywhere. Facial recognition exists. We have autonomous transportation being experimented and deployed. We have an App-centric focus, but also social media isolation. We have lack of (true) local news focus. We co-exist with machines and AI. We have condensed communications (emojis, Tweets, photos) and increased dialog with Siri and Alexa, etc. And there is virtual and augmented reality to help us cope with all these new things through simulation. We have gamification as a way to get stimulated and challenged. And there is probably more. Despite technology we are more alienated than ever!

We have emojis to express emotion, text to connect through short messages, we have video chats, blogs and other forms of (meaningful) engagement, we create human interaction forums. This is all well and good—but to what extend are we learning from each other in a positive way? How do we remain connected within our own communities? There are young kids that cannot look you in the eye, because they don't know how to! They do not shake your hand with a firm shake because they have never been thought. They would rather text you than speak to you directly… With all this technology, how do we get to cognitive? How can we truly get citizens involved? How do we get people better connected? How can technology help? How can we learn from each other in a world of great distrust and fake information? And how do we know what success looks like?

If we have people that are isolated, we can have the smartest cities in the world—if the citizens don't appreciate it, what good is it?

VALÉRIE CHAMPETIER, Founder, ThinkandAct, France, presented an example of a cognitive city.

Cognitive Cities

Cultural and creative industries, i.e. cinema, TV, animation, video games, VOD, new media, publishing, book shops, fashion and design, are very important for cognitive cites because they bring talents, jobs, attractiveness, democracy, and they are all involved in digital.

Cognitive cities are more than smart cities: The most important aspect is the connection with their citizens. Cognitive cities want a deeper and new relation with their citizens, and this link has to be based on collaboration, cooperation, interaction, the sharing of information, transparency, and skills.

The city of Amiens is an example of a cognitive city. Amiens is a city in northern France. The city has a population of about 150,000, thereof 50,000 under 28. Amiens is situated the in the youngest French region, the Hauts-de-France. The city of Amiens was chosen to be the European Capital of Youth for 2020.

Youth is a key subject matter for cognitive cities. The city has to know what young people want. How is their life in the city? Do they find jobs? What is their engagement in the city's public affairs? Etc.

The city of Amiens organized a collaborative session about empowerment for young people. Participants have been young people, municipal officials, but also company representatives, of universities and schools.

During this collaborative session, the following important needs of young people have been identified in the context of cognitive cites: The first priority of young people is employability. Furthermore, they want to improve self-esteem, life skills, networking capabilities. They also need information on new jobs and new professions emerging from innovation. Young people want to look outside their countries' borders and they want their city to develop exchanges with other European cities and companies.

In a next step, a set of prototypes of digital tools have been elaborated together with the young people. These digital tools will be developed by the city of Amiens during its year as European Youth Capital.

The first one, is “The Compass”, a constantly updated search application that, once the user enters a skill, directs the user to private and public companies looking for such skills. The second one is a VR tool to simulate job interviews. The third one is about physical meetings with the city in order to discover new professions.

For the city of Amiens, this process represents the beginning of a mature relation with the young people in the city. One lesson learned is that everything has to start with employment. Another knowledge gained is that, when it comes to young people, everything has to have a digital dimension.

SYLVAIN NACHEF, International Business Development Director, Bouygues Energies & Services, France, [www.bouygues-es.com], set out a methodology for the creation of smart, connected and desirable cities.

Smart, Inclusive, Sustainable Territories

Humanity has taken more than 12,000 years to grow from a small number of human beings to 1 billion people in the early 19th century. Then, human population has increased by about 1 billion within less than 100 years. It then has increased by more than 5 billion people in less than 100 years. In 2019, there are about 7.5 billion people on the planet. In 2050, there will be about 10 billion people, and more than 12 billion in 2100. More than 50 percent of the world’s population currently lives in cities. Estimates indicate that more than 80 percent will live in cities by 2050. Humanity is facing a climate crisis, unless we collectively act faster and more urgently than ever before.

Authorities, intellectuals, businesses, enterprises, and civil societies have a duty to think about how to welcome, to include and to educate these newcomers. And they are billions! They are not necessarily migrants, but the simple growth of the local population. This means that cities will be built by thousands and that cities, suburbs, territories as well as shanty towns should adapt and evolve.

When it comes to smart, inclusive, cognitive or sustainable solutions, there is no one-size fits all… Even for the same issue, the solutions differ according to the needs and the socio-economic contexts. However, the methodology to reach solutions might be the same. It has to be adapted and rolled out differently depending on the context.

It is very difficult, if not impossible; to move forward without a real political will behind. This requires a political vision that will result in goals to be achieved or managed by a team that wants to work together to succeed.

The methodology applied by the Bouygues Group is based on the following 5 pillars:

The first one is a citizen centric approach. It starts meeting the inhabitants in order to understand how they live their city every day and to imagine together with them the way they want it to change tomorrow.

The second pillar is the economic balance. How to do more with less expenses? It starts by achieving economic assistance of each possible solution, but also in avoiding aberrant conflicts by using relevant KPIs that could be verified and evaluated.

The third pillar is a systematic approach based on the functions reflecting the vision and the goals defined with the city authorities. This approach is then translated into a system architecture—a technical backbone laying on a multi-technology network (5G etc.), that links and integrates the vertical systems, such as transportation, mobility, energy, health, water and the environment, to a hypervision platform that allows to operate and to maintain the whole system. This platform is able to connect all public infrastructure. It provides access to all public amenities and infrastructure in real-time and can be operated in a decentralised way. This hypervision platform is also an open system that allows to use the city data in order to develop new applications to meet the city needs.

The fourth pillar is the development of use cases, bringing together vertical systems to generate benefits and value and to meet the needs expressed by citizens. For instance, such developments could lead to new lines of public transport, mitigation of traffic congestion, safer roads, more efficient connectivity, construction of schools etc.

Yet, greater alliance on data requires higher cyber security to be addressed. By pooling these different functions and improving the efficiency of public services, we can improve the quality of services delivered to the end users, and thus improve the quality of life, energy consumption, economic performance indicators, and city resilience.

The last pillar is the ability to create an ecosystem that enables companies, start-ups, universities, and citizen associations to work together, thus enhancing the attractiveness of a city—especially by creating new job opportunities.

Bouygues deploys this methodology whenever it deals with smart and cognitive cities all over the world.

GWENAËLLE CARFANTAN, CEO, Setur, France, presented a smart and interactive planning tool supporting the implementation of cognitive cities.

Urban Think

How to manage water, save energy, reduce waste, and at the same time improve mobility dynamics and biodiversity?

Urban-Think is a smart inclusive tool for sustainable planning. It is like a use case to understand the city, its transversalities, and to communicate with people. Urban-Think is an intelligent decision-making tool that enhances the value of territories in real time, connects the chain of actors in the city and territories through local authorities and private actors.

Urban-Think is adoptable and customizable. The digital repository allows real-time evaluation of urban projects and visualizes, optimizes and simplifies decision-making for developers and local authorities. It is like a city avatar enabling data visualisation and interpretation.

The tool provides a visual perspective of urban and commercial data through relevant indicators. The quantitative and qualitative overview of a result in one neighbourhood can be compared to any neighbourhood in the city. It is like a territorial benchmark.

Urban-Think is interactive and connects data and promoters, communities and citizens for a more coherent, transparent, innovative, mixed and sustainable development.

The advantages of such digital intelligence are accelerated access to information and more transparency in the market. It ensures the reliability and durability of data to enable a better understanding of the territory and its evolution. Urban-Think facilitates collaboration between the actors of the territory. Furthermore, it optimizes costs, lead times, yields and performance of real estate programs by linking to existing and ongoing real estate value data platforms.

Urban-Think is prototyped and tested with Rennes Métropole. The Rennes Métropole (500,000 inhabitants) is partner and experimental territory of Urban-Think.

According to international standards (HQE, LEED) and evaluation criteria, Urban-Think is able to define a project with 6 core values (water management, energy and climate, societal approaches, mobility – accessibility, ecosystem biodiversity, and waste management) and increased values, such as proximity of services, health, risks, carbon footprint etc.

Urban-Think is for local authorities, developers, investors, consulting and citizens.

It is an innovative, collaborative “plug & play” platform. Urban-Think is a new tool providing quick access to all urban data in order to improve communication, understanding and interaction of projects as well as to facilitate dialogue and animate local democracy.

Human knowledge of the territory can be shared in real time, enriched and perpetuated in order to explain your projects of today and tomorrow!

THOMAS MACKENZIE, Senior Research Consultant, Internet Governance, Items International, France, provided an overview of the EU project URBiNAT.

URBiNAT

URBiNAT is a H2020 funded project which started in Summer 2018 and which is scheduled to run until Summer 2023. Its main objective is the regeneration of deprived urban districts—districts which, for a variety of reasons, become socially, economically and territorially cut off from the main centres of opportunity and prosperity in the city. The project is looking for solutions to reconnect the populations who live in the deprived areas of the cities of Porto (Portugal), Nantes (France), Sofia (Bulgaria), Siena (Italy), Nova Gorica (Slovenia), Brussels (Belgium), and Høje-Taastrup (Denmark).

It is a project which is very much focussed on realising the importance and the potential of Nature Based Solutions (NBS). URBiNAT is exploring these solutions to see how they can be used to address some of the most pressing urban and societal challenges.

It is a project which is about working with groups of people on the ground. It involves co-design, co-development and co-deployment of solutions, that are intended to empower and engage citizens in the process of transforming their neighbourhoods and districts.

In some sense, with its focus on urban transformation, increased efficiencies and the provision of certain basic public services and the use of digital technologies, one could say that URBiNAT is a project that has many of the hallmarks of a smart city project.

However, we should not forget some of the perverse effects that the smart technologies have had on relations between people living in the cities. The ultra smart city of Masdar is an example of what you can do in terms of smart technologies and smart cities, but conversely, what happens there is that you have a sort of unliveable city, which is not at all conducive to human interactions.

If it is not really about smart cities, does this make URBiNAT more of a cognitive city project? This cognitive city concept is an emerging concept which differs from the smart city concept. It refers to cities that have increasingly the capacity to learn, to become more efficient, sustainable and resilient through constant interaction with their citizens, notably with the support of ICT.

URBiNAT is based on NBS, and the NBS are grouped together to form so-called healthy corridors. A healthy corridor is a physical corridor which is designed to connect these isolated parts of the city to the more economic centres of the cities.

NBS to societal and environmental challenges can be defined as living practical solutions that are inspired by and supported by nature. They are cost effective and they simultaneously provide environmental societal and economic benefits. They are intended to help to build up the resilience of cities in the face of multiple environmental stresses, not least climate change.

It is important to underline that it is not that we are not familiar with these solutions, or that we haven't been using solutions like this since thousands of years. The only difference is that policy makers, people in cities, have started to recognise the real value of these solutions

when they are co-built and co-designed by citizens in cities, to start to address very real environmental challenges which we are facing.

The project is built on 4 pillars, which are cocreation workshops, the development of digital technologies designed to accompany the activities, the creation of living labs on a city level and international communities of practice, and the production of white papers (policy proposals) which will be presented to city administrations and the EU.

ERIC LEGALE, Managing Director Issy Media, City of Issy-les-Moulineaux, France, demonstrated that only smart citizens can make a city smart.

Smart or Collaborative Cities?

Issy-les-Moulineaux is one of the cities in the Greater Paris region. Issy-les-Moulineaux is a connected city since more than 20 years now and has a considerable experience in what people expect from these digital solutions.

It is very important to listen to the citizens and to seriously think about what they expect. In France, it is a good moment to do so: On the occasion of the French municipal elections that will be held in March 2020, numerous studies about what people expect are currently published in France. Digital solutions, digital cities or smart cities are always at the end of the list…

People don't know what a smart city is. They don't even need to know that, because what they are interested in are new services—they don't care about the technology behind it.

According to the different studies, people want first and foremost a "back to nature". They want more green cities and more sustainable cities. This is an important aspect, because during the last 2000 years, we built cities to protect humans against nature. Today, we have to change this paradigm and build cities to protect nature against humans.

If you ask people whether they want 5G technology or not, they are concerned about the installation of new antennas or 5G health rumours. This is because providers don't really explain what are the new services 5G will support? Yet, this is very important, because we are living in times where people are very concerned about these topics. People can block technological innovation and progress, if local politicians and city leaders are not able to explain properly what they are doing.

It is important to explain that a smart city or technology is important to help fight climate change. It is important to demonstrate that technology can provide concrete solutions to adapt our cites to the climate change. This is the most important aspect we have to explain to the citizens. There won't be smart cities when the citizens are opposed to it, but we can get the citizens on our side, if they understand that technology helps to be more effective in addressing these specific challenges.

Smart grids, for instance, can help save energy in the cities. But it is not a question of money. By developing the smart grid, cities will reduce fossil energy consumption, but at the same time, they will reduce pollution and thus protect the population.

A study of the US Department of Energy some years ago found that making the US national electric grid just 5 percent more efficient would have clean-air benefits equal to permanently eliminating the fuel and air emissions of 53 million cars.

Issy-les-Moulineaux, with its IssyGrid experimentation platform, has achieved to smoothen energy consumption peaks.

Mobility is another example. Due to an open data portal, it was possible to reduce traffic congestion. It is also possible to find available parking spaces in real-time. Issy is partner of the PoliVisu project, developing simple tools to support the public policy making process by using open data.

Next month, Issy-les-Moulineaux will launch a new pilot together with the French start-up My Anatol. My Anatol is similar to Waze or Google Maps, but unlike Waze, the city itself suggests the new road in case of congestion. This avoids rerouting through quiet residential streets. Moreover, My Anatol will send a caution message to the driver when the car is approaching a school, or an individual alert message in case an accident happened in the city.

Do we really want to live in a computer assisted city with sensors everywhere, knowing everything about everyone? If we do that—what will be the next step? A social rating system? Technically this is very simple…

As Jean-Jacques Rousseau stated more than two centuries ago, “Houses make a city, but citizens make *la cité*.” (*Les maisons font la ville, mais que les citoyens font la cité*.)

Cities exist since thousands of years, but it is above all the men and women living and working in the city who create the soul of the city.

The chair and moderator, **HUGO KERSCHOT, Founder, IS- Practice**, Belgium, briefly introduced the EU innovation project PoliVisu.

PoliVisu

PoliVisu is about the use of big data for policy making. The project is realised together with the city of Issy-les-Moulineaux (France), the city of Ghent (Flanders), and the city of Pilsen (Czech Republic).

Cities are producing gigabytes of data and information on a daily basis, but how do we benefit from all these data? PoliVisu is the second phase of another EU project in the area of open data and smart mobility, the Open Transport Net (OTN). The start-up company InnoConnect is a spin-off of the OTN project.

It is more and more difficult for politicians to make the right decisions. Insights generated from big data can support the decision-making process.

The first application developed was a visualisation of the traffic accident statistics of the Flemish region. All data were put in a heatmap in order to visualise the hot spots and the red spots of severe accidents. It is possible to put an extra layer on that map, for instance white

dots indicating schools, in order to identify hotspots next to schools. Such picture speaks much more than the 100 pages of reports and statistics that our politicians usually receive.

An image says more than 1000 words and an image says more than thousands of gigabytes of data. Data always have a story to tell, but one has to explain and visualise that story.

The city of Pilsen is a smaller city of about 100,000, with a dense road network and railroads and rivers crossing the city. There are more than 1,000 detectors of all generations on the roads of Pilsen, from new intelligent cameras detectors to car counting cables.

These data have been opened one year ago and are available in real-time. PoliVisu used the data to build up a real-time traffic model of Pilsen. The city has been divided in 307 road segments; updated data are available every 90 seconds.

Even in a small city like Pilsen, there are 55 million car detections per month and 29,700 cars at a single a traffic light per day. That is a huge amount of data. But out of this huge amount of data a city can generate a lot of knowledge and intelligence to realise its smart mobility.

Of course, one has to be careful about (big brother) surveillance. At the same time, it is very difficult to obtain the basic data from public services these days. GDPR is becoming a sort of an excuse to not going further. We have to think about how to handle these data in a good manner—because without data we can't realise smart cities.

It is possible to have a real-time view on how the traffic is moving on in such a city. It is possible to do predictions, such as modelling the impact of road works in and around the city of Pilsen, and to provide information to the citizens. This makes it a very powerful and interactive tool to have insight into the traffic of a city and how to manage traffic, road works in order to improve the traffic efficiency and to avoid congestion.

JEAN-FRANÇOIS SOUPIZET, Scientific Advisor, Futuribles International, France, reviewed different conceptual approaches to smart cities.

The Smart City: Rupture or Adaptation?

There is some disillusionment with the smart cities' global approach due to the limited results in spite of the success of the metaphor. Nevertheless, it gave rise to a large range of sectorial projects and some interesting new visions are emerging.

The metaphor "smart city" refers to the fact that we are looking for using digital to make a city more efficient, more sober, closer to its citizens and even more attractive and competitive.

Three emblematic projects:

1) Singapore Smart City is the winner of the Barcelona Smart City World Awards 2018, and represents the classical approach. The planners of Singapore Smart City compared the city to a human body requiring the five senses to percept the environment, the brain to learn and adapt, a nervous system to convey information, the muscles to act, etc.

Of course, one can always argue about whether or not a metaphor referring to a centralized system is well representing the metabolic evolution of a city. But Singapore is a fluid city, things are working well, and Smart Singapore continues the application of innovative digital technologies to improve the lives of citizens. At the same time, the Singapore administration and the political characteristics of the city are very specific.

2) Quayside Toronto, the “Google city”, is a new district build upon Internet and ‘“a test bed for new technologies”. It is the Internet city—a city driven by data, but a city under the shadow of an Orwellian World, the Smart city of Surveillance.

With Sidewalks Labs (a subsidiary of Google), the local and federal governments launched a completely new district. In June 2019, the Google-owned company released a Master Plan for the Toronto Smart City development—a perfect city, including the creation of 44,000 jobs, cutting greenhouse gases by 88 percent, affordable housing and many more. However, this raised urgent concerns about data and privacy. Citizens are worried about a monopolistic privatization of public spaces and of the data. This city would be an information system, obviously to the service of the citizens, but nevertheless there are fears and difficulties because behind there is Google’s business model that is based on the use of data.

Moreover, this could pave the way for a kind of Cyborg management of the city, a mix between machine and people—something that may not be very transparent.

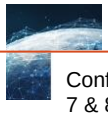
3) OnDijon is a project of smartization of all public spaces of the Burgundian metropole. It is a private-public operation to harness new technologies to the service of the city without altering public services missions. To some extent, OnDijon is putting the city hall back in control. The city is not working with a digital player, but with the traditional actors in urban activities.

The example of Smart Singapore is characterised by a predominance of the public authority. The system is open to create a favourable environment for innovation in an authoritative way. The civil society is playing the second role. The approach enables incremental changes in a long-term vision, with, at the same time, strong governmental control through national policies. It is a successful model which is linked to a specific environment.

Quayside Toronto is a model of shared governance giving a large autonomy to the private actor. At the same time, there is resistance from the citizens due to Google’s business model related to the use of data. Even if it is probably the most creative and dynamic approach, it represents a dramatic change under a new paradigm questioning the equilibrium of power.

OnDijon is a model based on the traditional predominance of the public authority in a classical democratic system. At the same time, this approach risks to be the less innovative. OnDijon is adaptive change, but a status quo in terms of governance. It might represent a possible European way for smartization.

The way in which the new cognitive cities are built is extremely important. Building a city is a long journey and governance is an important aspect. Within the coming years, we will have to find the right balance between emotions, which are part of the nature of human beings, and AI.



SYLVIE ALBERT, Professor, Department of Business & Administration, University of Winnipeg, Canada, addressed the issue of how to manage the challenges and the transformations that are increasingly confronting cities.

Innovative Solutions to Creating Sustainable Cities

There are many great projects all over the world that are worth repeating, but we have to move some of these projects from a whisper to a shout. It is not enough to have few cities—we need to have thousands of cities and towns moving in those directions.

It would be a mistake to think that the political systems are going to be the ones leading the transformational change. Politicians are elected for a very short period of time. The first problem they have is dealing with a professional bureaucracy. Policies are great, but how many of those have not yield the intended results, and sometimes even quite the opposite?

“in the course of history, our towns have existed within and outlasted empires, nation states, and regimes and have survived as centres of social life, carriers of our economies, and guardians of culture, heritage and tradition… Towns have been the centres of industry, craft, trade, education and government… sustainable human life on this globe cannot be achieved without sustainable local communities.” (European Cities and Town Charter on Sustainability, 1994)

Cities is where everything should and will happen. Most of what we need to do will happen within a city. If we can’t rely on policies, politicians and alike, who is going to take responsibility? It is very obvious from the reports that have come up that we need change more quickly than what has happened up to now. It is up to us, individually and collectively, to do something as it should be.

Many of our problems stem from becoming to specialised. We have legislated ourselves to the point to extreme ineffectiveness, really on dangerous grounds—a lot of with unintended ethical consequences.

Most of us can hardly do anything anymore. We hire people to paint our homes—and worse, painters these days often need a college degree. That is a barrier for the less fortunate in accessing jobs. We throw away things, instead of fixing them. Thus, we need more things to be produced cheaper and then, we demand more productivity from less fortunate nations; and these are the ones that are going to be the most affected when they are replaced with machines. Worse, we import food from places that cannot feed themselves. There are a lot of things that need changing. It is not the system generally, but it is a cultural change that needs to happen in communities.

Luckily, there are a lot of tools that are available to attack some of these changes: lots of social media and networks, and additive manufacturing that can change some patterns and can make things more affordable, more smart tools, the ability to do more holistic planning and engagement and move some of the good ideas to a larger subsection of our cities.

Making people more accountable is a very important part of real change. We have started to moving in some of those directions with some of the value-based concepts. For example, the Kids Society where people are finally leaning how to garden on their own, how to build

smaller homes and becoming more entrepreneurial platforms. We can do more with the sharing economy etc. There is hope in terms of making some significant change, if we could just get people to stop operating in silos and talk to one another and work on much larger aspects of the problems.

5 big steps to more sustainable cities:

1) Think big. Beyond trying to fix symptoms and applying some bandage-solutions, we have to start working on some real problems, like the SDGs. There are many good examples on how to do that. Putting some smart traffic lights helps the traffic flow, but it doesn't stop congestion. There are many problems attached to that, including the fact that in many cities up to 80 percent are driving single in cars. We have to change all of those aspects.

2) Think collaborative. This is the idea of shared governance, shared costs, citizen engagement, thinking about community, and rewarding people for doing the right thing.

3) Think replicate and improve. There are lots of best practices. We don't have to reinvent the wheel. We can reverse engineering many ideas. We can get more of our public engaged in ideation, teaching and learning people to innovate. The budgets of today do not need to be the budgets of tomorrow. We can find ways to reuse resources in a better way to fix the larger level of problems.

4) Think skills building. With individual self-sufficiency skills we can do more as a society. We need to equip people with both the emotional intelligence skills and the technical skills. More than half of our boards don't even have a discussion on the workforce changes that are currently happening with AI and other technologies. We cannot ask universities to be the soul entity responsible for training, retraining and meeting all of the challenges that will come with the skills in the changing economy.

5) Think sustainable and inclusive. We have to change these prevailing cultures of waste, of segregation, of what we value, of time horizons, of cost benefit, and including the rights of non-humans in everything that we do. These are all things that cites can do if they organize themselves and they start to think beyond repairing roads and collecting waste and if they focus not just the fun and fancy technology but also solving real problems.

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Safety & Security in an Interconnected Society

The chair and moderator of this session, **RANDY YALOZ, Founding Partner & Attorney at Law, E.L.C. Group**, USA / France, welcomed the audience. He introduced the panellists and briefly set the scene for the forthcoming presentations.

MOHAMMAD AL MADHANI, Data Management Director, ADDA – Abu Dhabi Digital Authority, United Arab Emirates, presented the Abu Dhabi Data Management Program (DMP), a new data-centric open data platform and open data sharing ecosystem.

Abu Dhabi Data Management Program Open Data Initiative

The Data Management Platform, which falls within the Open Data initiative under Abu Dhabi's Development Accelerator program, Ghadan 21 is envisioned to help unlock the high value potential of government entities' rich and dynamic data sets-bringing the UAE capital's digitization agenda into full realization.

Open Government Data promotes transparency and value creation by making government data available. The management of confidentiality, integrity and availability of data will ensure the quality of the open government datasets. Open government data contributes to knowledge sharing and learning platforms, promotes SMEs and start-ups in utilizing open government datasets and opens up tertiary market possibilities for citizen services.

The Abu Dhabi Data Management Program will fully enable the effective and efficient delivery of future government services, which in turn, will serve as a precedent for excellence from government entities wanting to build a better quality of life for Abu Dhabi citizens, residents, visitors, and investors

The key challenges facing government entities include the accuracy and quality of data, high operational cost and the difficulty to share and exchange data, a lack of knowledge of data ownership, but also a lack of confidence in statistics, indicators and reports, as well as a lack of unified standards, guidance and unified concepts.

The use of this platform for high quality data and shareable datasets from all government entities will bring about technology-driven initiatives for adoption in the UAE capital to foster data capabilities and drive the economy's sectors to form a collaborative working data relationship—ultimately resulting in a fully enhanced and evidence-based decision making process.

The centralized data platform is expected to generate five times worth of returns as compared to its initial investment, thus enabling the Abu Dhabi government to seamlessly

connect private sector enterprises and start-ups to gain valuable data from government operations. The program is set to demonstrate value realization from government data assets with a high financial impact.

The overall data management strategy is aimed at value realization from the data in terms of monetization, social welfare, national security, attract investments, contribution to the GDP, digital government transformation, improve the ease of doing business, development of a data maturity model based on Abu Dhabi standards, to enhance the happiness index and happiness in Abu Dhabi.

The Abu Dhabi data value paradigm is based on the following steps: 1) All government entities under the Data Management Program are assessed on-site for maturity and a roadmap for overall maturity is being built for the Abu Dhabi government. 2) Elaboration of handbooks, including detailed process documentation for all processes that would lead to data management best practices in the government entities. 3) Development of a centralized reference data and master data models for the Abu Dhabi government. Design of a metadata model that can be adopted as a standard by the government entities. 4) Development of a comprehensive data strategy communication. Implementation of a plan to ensure the awareness of all stakeholders of the strategy and the objectives. 5) Implementation of standards for cybersecurity based on a risk management model.

ADDA is responsible for building a common data strategy, policies, and governance model for the Abu Dhabi government that cover 13 data management domains.

SHERIF AZIZ, Advisor, Strategic Planning, Madayn, Sultanate of Oman, gave a thought-provoking talk on the impacts of digital technologies on our society.

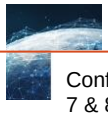
Choiceless in a world full of choices

In the 2017 European report (Special Eurobarometer 460) respondents were asked about the impact of most recent digital technologies on economy, society and their quality of life. More than two-thirds answered that these technologies have a positive impact on their quality of life: 17 percent answered "very positive", while 50 percent answered "somewhat positive". 18 percent think the impact is negative overall, with 4 percent thinking it is "very negative".

Almost two-thirds of respondents answered that the most recent digital technologies have a positive impact on society: 15 percent consider the impact "very positive", while 49 percent consider it "somewhat positive". 25 percent think the impact is negative overall, with 5 percent thinking it is "very negative". Only 7 percent considered stories published on social networks trustworthy.

In its report “The Future Well-being in a Tech Saturated World 2018”, the Pew Research Center found out that most people think that the positives of digital life will continue to outweigh the negatives. However, roughly a third of respondents predicted that harms to well-being will outweigh the positives overall in the next decade.

Big data gatherers know for sure that information is power (perhaps equally keen to deny that disinformation is abuse of power). Most things we do naively on the cyberspace is like



closing our eyes and bathing naked in the city square. Cameras depict everything about you in lifts and public spaces. We have very little private life! To top it all, we now have analytics out of these visual recordings. These analytics can forewarn a scuffle in the making, if you shout, for example.

Mid-2018, a large size democratic country's tender notification about their digital ambitions. As reported in the newspapers, they want to build "capability to crawl World Wide Web and social media to monitor and analyse various trends emerging and to gauge sentiment among netizens", also to distinguish between "positive, negative and neutral social media conversations".

In 2019, they wanted to link the national ID with the citizens' Facebook accounts. Another country has gone ahead with facial recognition payments as part of their cashless drive. We are now tempted to say that these are for enhanced security, naturally stemmed from social issues. Will the aggressiveness also create a new form of digital divide—for the poor, the very young, the mentally challenged and the elderly? Can technology really solve all our social problems?

Catherine Williams, chief data scientist at AppNexus, wondered what gives big data the power to do good and harm isn't so much its scale. Rather, it's the extent to which humans allow big data to orchestrate our lives. Big data has as much power to leave us "blind and deaf and in the middle of a freeway" as it has power to help us get home. The data should work in service of human beings, not the other way around.

Pointing to a specific social media platform, Robert Hannigan, the former head of the Intelligence Agency GCHQ said that this platform could actually threaten democracy.

The "fourth industrial revolution", can be a powerful force for good, with AI, IoT, blockchain, etc. But these same technological advances could have unintended consequences, if they are not designed and scaled in a smart and sustainable—and in a more responsible—way!

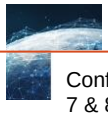
A complete digital world, with no alternative means to interact and transact could be a convenient denial of the constantly evolving vulnerabilities and sustainability issues. With Quantum Computing, the foundations of encryption may become susceptible in the future! Organizations and their customers are becoming faceless due to heavy centralization enabled by digital technologies.

"Hiding behind the Internet"—75 percent of customers hate Interactive Voice Response (IVR). IVR—a big killer of global productivity. Millions of man-hours are wasted listening to this.

Are you aware of the current Opioid overdose crisis? Of late, facilitated by the social media platforms; more than 47,000 died in 2017 alone!

Artificial intelligence (AI) is at the doorstep of our everyday life. Toby Walsh, a professor of AI, contested Elon Musk's apprehensions. But he also added: "AI needs regulating because the big tech companies have got too big for their own good".

Regulation is needed because, firstly, the difficulty level associated with AI product innovations might drop down drastically in the years to come. Secondly, almost all lethal



technologies have ultimately fallen into the wrong hands—be it individuals, organizations or even governments. Probably, this will happen with AI too.

The world has been at the height of an unregulated digital world and the colossal misuse of personal data gave us a lovely thing called GDPR! But did we overdo with the penalties? To catch some big fish will we wipe out all the small fellows?

Pervasively enabled by the ICT, the compliances surrounding us leave most entrepreneurs overwhelmed. Very little time for creativity and innovation. Giant firms employ 100 people for compliance and manoeuvring around the regulations.

KYC (Know your customer) haunts you every moment. Warnings, alerts, reminders for most trivial and important things come with the same intrusive thud. Accessing your own digital accounts is not guaranteed because the system always has to suspect you.

Now, let us think for a moment and try to learn a bit from the past deeds!

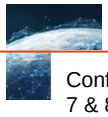
How can we reconcile our need for CO2 reduction and ambitious tourism industry growth and massive airport and fleet expansions? But there is always a need-based mantra. Let us look at the integrated transport system, which is a good lesson anyway. Everything from a Hyperloop to a bicycle is now relevant as part of an integrated system.

Planes based on “ionic wind” technology, might be the future of flight. Front end electrodes produce +20,000 V supercharging the air around it and splitting away negatively charged nitrogen molecules known as ions. At the rear, rows of aerofoils set to -20,000 V. The ions automatically move from a positive to negative charge, dragging with them air particles that create the so-called “ionic wind” to provide the aircraft with lift.

Purpose or the intent behind the use of the technology is very important. So are the expected outcomes. It is a question of priority. The promise that lot many revolutionary and disruptive technologies are around is real. What is not real is the belief that they are going to solve all our problems.

“Disruptive technology” is a bad phrase if it is built upon fickle emotions. It is a great phrase when we can perfect telemedicine or fly an aircraft with water molecules. “People first” and “quality of life” should be the focus of the digitally ambitious governments. They need to behave responsibly against the technology push. Industrial revolution had an adverse ecological impact. Social and psychological distress may be the ill effects of the information revolution. And, of course, e-waste is waste too!

Finally, wasn’t Einstein himself somewhat concerned about: “the deterioration of ethical standards that stems from the mechanization and depersonalization of our lives”?



MAREK CANECKY, Second Secretary, Permanent Representation of the Slovak Republic to the EU, Slovakia, provided an overview of the EU cybersecurity landscape.

Cyber Security in the EU

Cybersecurity incidents are increasing at an alarming pace and could disrupt the supply of essential services we take for granted such as water, healthcare, electricity, financial or mobile services. Threats can have different origins including criminal, politically motivated, terrorist or state-sponsored attacks as well as natural disasters and unintentional mistakes.

Increasing dependence on digital technologies has made cybersecurity a critical issue requiring swift and coordinated action at EU level. Since the first EU Cybersecurity Strategy of 2013, the EU has built solid regulatory and policy foundations and invested considerably in this area.

The cybersecurity market is currently one of the fastest growing markets in the ICT sector with huge economic opportunities. Key legislative tools that strengthen the EU's cybersecurity industry and reinforce trust of citizens and businesses in the digital world are the Network and Information Security Directive and the Cybersecurity Act.

The NIS Directive has been the first piece of EU-wide legislation on cybersecurity (since 2016). It includes a number of requirements around cybersecurity incident response and the implementation of technical security measures based on risk. The requirements are designed to improve cross-border cooperation in information and network security and foster a culture of risk management.

The NIS Directive has created a network of Computer Security Incident Response Teams (CSIRTs) in each Member State that carry out a range of tasks, including monitoring national security incidents, disseminating early warnings, alerts, and announcements about cybersecurity. Each Member State is required to implement a national cybersecurity strategy. Digital Service Providers must implement a range of risk management measures both technical and operational.

Since 27 June 2019, the EU Cybersecurity Act has established an EU wide cybersecurity certification framework for digital products, services and processes. Companies doing business in the EU will benefit from having to certify their ICT products, processes and services only once and see their certificates recognised across the European Union.

The use of certification schemes will be voluntary unless EU legislation prescribes an EU certificate as mandatory. Conformity with EU certification schemes can be achieved through self-assessments or by a third-party conformity assessment body.

There are three priority areas for certification: 1) The IoT; 2) Critical or high-risk applications; and 3) Security products, networks, systems and services, such as cloud services and 5G.

EU funding of cybersecurity is realised within the following programmes: The Horizon Europe Programme (digital, including cyber, is one of the key priorities), the Digital Europe Programme (2 billion euros earmarked for cyber); Connecting Europe Facility (3 billion euros earmarked for gigabit connectivity); and Invest EU (digital, including cyber, is one of the key priorities).

The EC's proposal for the European Cybersecurity Network and a Competence Centre aims to help the EU retain and develop the cybersecurity technological and industrial capacities necessary to increase the competitiveness of its cybersecurity industry and secure its digital single market.

The Commission's revision of the NIS Directive, in view of the implementation practice and new technological developments, is expected by 2021.

A Joint Cyber Unit has been announced by the new President of the European Commission.

PHILIPPE DENIS, Executive Denis & Partners Consulting; Founder Resonate SDG, France, addressed the issue of growing distrust in many aspects related to the techno-scientific development.

Trust, Tech Trust Challenges, Algorithm Issues, AI intelligence

McSweeney's Quarterly, The End of Trust (Issue 54), realised in cooperation with the Electronic Frontier Foundation, features more than thirty writers and artists investigating surveillance in the digital age. This collection of essays and interviews focusing on issues related to technology and privacy asks whether we've reached the end of trust, and whether we even care.

"In this era of constant low-level distrust—of our tech companies and our peers, of our justice system and our democracy—we can't be sure who's watching us, what they know, and how they'll use it. Our personal data is at risk from doxxing, government tracking, Equifax hacks, and corporate data mining. We wade through unprecedented levels of disinformation and deception. Unsure of how our culture of surveillance is affecting the moral development of a generation coming of age online, we continue to opt in." (McSweeney's editors)

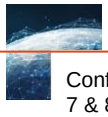
The AI Now Institute at New York University is an interdisciplinary research centre dedicated to understanding the social implications of artificial intelligence. In 2018, AI Now opened its annual AI Now Symposium with a large visualization sampling some of the news addressing social implications of AI and the tech industry:

The data analytics firm Cambridge Analytica used personal information taken without authorisation to build a system that could profile individual US voters, in order to target them with personalised political advertisements.

Facebook was rocked by a number of scandals, such as a huge data breach becoming the subject of multiple class action lawsuits. Throughout the year, Facebook executives were frequently summoned to testify, with Mark Zuckerberg himself facing the US Senate in April and the European Parliament in May.

In March, it became known that Google was collaborating with the US Department of Defense on Project Maven to help the agency develop AI for analysing drone footage.

Meanwhile, the spread of facial recognition tech accelerated. Facebook and Microsoft joined Amazon in offering facial recognition as a service.



AI systems continued to be tested on live populations with some serious consequences. In March, there were fatalities of drivers and pedestrians from autonomous cars.

All these events lead to a growing wave of tech criticism focusing on the unaccountable nature of these systems. The social implications of these systems are huge and there much to be done. However, as underlined by AI Now, here are positive changes too: the public discussion around AI is maturing in some significant ways.

Machine learning technology is far from being perfect. The research paper “Strike (with) a Pose: Neural Networks Are Easily Fooled by Strange Poses of Familiar Objects” (January 2019) details how easy it is to trick an image recognition neural network. They collected a dataset of 3D objects, rotated them, and then tested the image classification of a deep neural network. The research showed that once the objects’ positions were slightly altered, the failure rate increased. “If you start from a fire truck, you just need to rotate it a little bit and it becomes a school bus with almost near-certain confidence”.

JOHN ERIK SETSAAS, Vice-President, Identity and Innovation, SIGNICAT, Norway, explained why eIDs are important and how to implement them successfully.

How Federated eIDs Increases Security and Convenience and Reduces Fraud

An electronic identity is the digital counterpart to a physical identification method in the offline world such as a passport, ID-card or driver’s license. It is a verified identity that provides the credentials necessary to trust that a person is who they claim to be online.

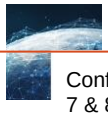
Such identification is essential to protect data and reduce instances of online fraud and there is a growing need for such identification to be universal. Just as a passport can be used to validate an individual’s identity wherever they are in the world, an eID should be able to confirm that someone is who they say they are when interacting digitally, no matter where they are.

A crucial key to succeeding with an eID is to gain sufficient critical mass in a two-sided market. Citizens will only see the benefits if there are enough use cases, and the same holds true for companies in need of strong authentication and e-signature services.

A vital component to a federated eID is widespread confidence in its security, stability and strong representation of a person’s identity. An organization providing eID must be trusted by consumers as well as the private and public organizations; without this trust, the eID will not work.

Recent studies have shown that consumers prefer banks over government, retail or social media platforms as providers of their eIDs. We already trust banks with our money, loans and credit cards, which means we are used to relying on them to support us and ensure our wellbeing. The banking industry is also heavily regulated, which means that they need to meet requirements for liquidity and transparency, as well as capital.

In the Nordics, solutions jointly initiated by a group of banks has taken the dominant position. This is because banks, when working in collaboration, have a huge advantage over governmental and third-party solutions. Banks tend to be incredibly aware of trust and risk



management, and are adept at minimizing fraud. Banks also have an advantage due to the fact that they are one of the few players who have already authenticated the majority of their country's citizens and transferred them to an online solution: online banking.

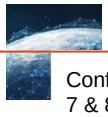
However, collaboration amongst banks alone is not enough to guarantee success. In order to form sufficient practical use cases for the solution, incentivising the transfer of a whole society to it, further cooperation with the respective governmental institutions and service providers is necessary.

Despite the setbacks some nations have seen, a few countries have been successful in implementing eID systems. Sweden, Norway, Finland and Denmark have overcome the hurdles of creating nationwide eID solutions, providing over 90 percent of their population with a digital identity. The authorities did not do it alone – the major banks, in collaboration with wider industry, were the deciding factor in effective roll-out.

Unified country level eIDs function foremost as a platform. There must be registered users, with services that they want to use, before an eID actually works in practice. In Norway, for example, the first decisive service that generated users was online banking. And, in the wake of its establishment, it was easy to start creating other online services based on the same eID, largely due to the fact that users were already available, and they fully understood how to use—and the benefits of—authentication mechanism.

Though eID usage generally charges a fee to the merchant, most operations will be happy to pay as it ultimately enables them to slowly get rid of their own onboarding and login solutions, which are costly to maintain. Also, eID provides verified user information, meaning offers a greater degree of security.

With the help of digital identity service providers, many banks have understood that they can use eID as an extended product offering to their corporate clients who are in need of logins, or are seeking strong authentication solutions for their own business.



TOM WHITNEY, Head of Solutions Consultancy, iProov, United-Kingdom, represented a start-up that focuses on user-friendly strong identity authentication.

Digital Transactions: How can we ensure Trust?

iProov is a world leader in spoof-resistant, biometric facial verification technology. Its technology is used by banks and governments around the world for secure customer onboarding, logon and authentication, to ensure new and returning users are genuine and to guard them against fraudulent attempts to gain access to personal data or use a stolen identity. The company is an expert in security and passionate about simplicity.

Biometric authentication should be a frictionless experience providing security when accessing data and transactions in an online environment. iProov authenticates users on smartphones, tablets and laptops, in fact on almost any device with a front-facing camera and a network connection.

The problem is how can we trust in the genuine presence of a remote person? The real heart of face verification is to determine whether the face you see is genuinely present or some sort of physical or digital copy. That problem lies at the heart of trust in face-verified identities, and it's a very hard problem.

iProov's patented Flashmark technology flashes a sequence of colours illuminating the face and starting our unique, world leading face authentication process. The controlled illumination technique involves shining different coloured light from the smartphone owner's phone onto their face, with different colours beamed for two and a half seconds each. While this is happening, a live video of the user's face is streamed back to headquarters, where it's analysed. The screen illuminates a sequence of colours which is different every single time they authenticate. iProov is stamping their face with unique cryptographic code.

This creates a 'one-time biometric', that is only valid at the moment it's being streamed. The different sequence of colours used each time means that the same video cannot be played back to fool the verification tech.

iProov is a simple 1-step, effortless journey that works across devices and platforms. Applications include onboarding, ID verification, border control, strong customer authentication and access control. Using the very latest in machine learning technology, including deep learning, iProov checks that the user's face corresponds to the face they originally enrolled. It's astonishingly accurate.

iProov's Flashmark-based one-time biometrics uniquely protect against spoof and replay attacks. Replay attacks, arising from social engineering and malware, are a particular hazard to consumers.

Genuine Presence Assurance is essential to create a truly safe and secure digitally interconnected society.

CHRISTOPHE YSEWYN, Senior Adviser Security & Retired Colonel, France, provided overview of the major current forms of cyberattacks.

Concrete Forms Cyberattacks Take in 2019

In its annual report, ANSSI (the National Cybersecurity Agency of France) identified 1,869 alerts, 391 incidents without counting critical importance operators, 16 major incidents and 14 cyber defence operations for 2018.

ANSSI also identified 5 major trends in terms of cyber threats observed in France and in Europe in 2018:

Destabilization and influence operations: These attacks have often an important symbolic impact. An increase has been observed in 2018.

Online frauds: There has been important growth of online fraud. As large companies are becoming more aware of cybersecurity, attackers turn towards targets less exposed and more vulnerable targets, like territorial authorities or actors in the health sector which were the targets of many phishing attacks in 2018.

Generation of cryptocurrencies: Cryptojacking is a cyberattack that targets legitimate and popular websites. The attackers include malicious tools that force the visitors' Internet browser to mine cryptocurrencies. It has been observed that the attackers become more and more organized.

Exfiltration of strategic data: Cyber-espionage represents a high risk for the organizations. They are extremely discrete and often benefiting from important financial resources. Attackers are increasingly interested in vital activity sectors and specific critical infrastructures like defence, health or research sectors.

Indirect attacks: To avoid the security measures implemented by big companies, attackers more and more target more vulnerable intermediaries, such as providers, suppliers etc., to reach their final target. Indirect attacks have known an important increase.

Who are the hackers? Mafia-like organizations, political oppositions, pressure groups and even governments are behind a large number of cyberattacks.

To assess the readiness of organizations to withstand cyberattacks, it is important to look at the entire supply chain, i.e. the network of organizations that are involved. A resilient and robust supply chain requires each supplier in the network to be ready. No matter how secure a network may be, it's only as secure as its weakest link. If one supplier in the network is not ready, this supplier represents a security risk for the organization.

Among the steps an organization can take to minimize the cyber risk are co-worker education, up-to-date tools, dark web monitoring, blockchain, adapted and trained crisis management organization, knowledge of the own ecosystem, insurance coverage, and of course threat identification.

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Environmental Impacts of Digital by ADEME – Agence de l'Environnement et de la Maîtrise de l'Energie

HERVÉ RANNOU, President SenX & Items International, France, chairing the session, welcomed the panellists and briefly set the scene for the following discussions.

RAPHAEL GUASTAVI, Deputy Head of Department – Products and Material Efficiency ADEME, France, [ademe.fr], emphasised the need to combine digital transformation and environmental responsibility.

Digital services could support the energy and ecological transition. While digital services are already widely used to support the energy and ecological transition, they may prove instrumental in making that transition happen.

Practical evidence of this can be seen in energy efficiency and energy savings with smart meters in individual homes and smart grids at city-wide scale; in mobility where digital services make it easier for users to access multimodal transport offerings and connect with passengers, e.g. with carpooling and carsharing services; in the circular economy where digital technologies are used to manage material and resource flows and encourage local manufactures to form symbiotic relationships with one another or where AI is used to extend the shelf-life of products and ease waste sorting and recycling; and in a more holistic sense with the development of smart cities whereby big data is collected and analysed to inform, plan and optimise public services, thereby helping to cut energy on water use and improve the way waste is managed.

It is important to stress, however, that these digital tools can only be a force for good if they cater to a real need—in other words, if they support the changing behaviour or changing business model. Conversely, if we treat them as mere gadgets and fail to explore their full potential, digital tools could end up doing more environmental harm than good.

Digital technology, no matter what its purpose, can be destructive if used improperly. As we make, build and use more and more computers, mobile devices, connected objects and data centres, we are depleting our planet's resources. Valuable and critical raw materials are a particular part of concern. They are only available in limited quantities and are often found in countries that are jeopardized for geostrategic ends.

Exploiting natural resources always has an environmental and social price with impacts on quality, energy use and biodiversity loss. Data centres, which consume enormous quantities of energy, are directly responsible for greenhouse gas emissions according to the host countries' energy mix. Right now, digital services account for 4 percent of the global greenhouse emissions—which is more than the global air transport.

If the current pace is sustained, that figure will be doubled by 2025, putting it above total transport emissions. In other words, digital services are not as clean as they appear on the first sight. If we want to carry on using them in the future, to support the ecological transition, or in health and education, we must do so frugally.

If the digital transition is to be viable and sustainable, it must be frugal and efficient. We can stop this process by taking a big picture look at technologies' environmental impacts considering the whole life cycle and using multicriteria indicators. The end result of the process should be products and services built on ecodesign principles, devices that are better designed, hardware that is repairable and made from recycled materials that are easier to re-recycle, optimized software and Apps at every level, that do the job for which they are designed without requiring so much processing power. A sustainable digital transition also requires consumers to change their behaviour, buying less equipment and ending our culture of planned obsoletions, consuming content frugally and only when needed, laying aside our obsession with gadgets, extending the shelf-life of products as much as possible by repairing broken items or buying second hand.

The digital transition should serve a purpose. It should be seen as a tool to improve people's everyday lives and not to exacerbate the problems it was designed to solve.

HUGUES FERREBOEUF, Project Manager, Shift Project, France, shared the results of a report on lean ICT issued by the Shift Project in March 2019.

Digital Carbon Footprint

If we don't' use digital in the right way, it could become more of a problem than a solution with regards to environmental issues. In the past 5-10 years, we have not been using digital in the right way. ("Right" doesn't refer to any moral judgement, but to the consequences on the environment.)

The Shift Project is a Paris-based non-for-profit association dedicated to tackling the decisive and delicate issues needed to make energy transition a success.

If we want to have a reasonable chance to limit global warming to 2 degrees, i.e. to reach carbon neutrality by 2050, we need to cut in half the greenhouse gas (GHG) emissions within the next 10 years. In order to achieve this target, all sectors have to reduce GHG emissions by at least 5 percent per year from 2018 onwards. The current pace of GHG emissions, however, corresponds to an increase of 2 percent per year. We have to decrease GHG emissions from +2 percent to -5 percent—which is a tremendous effort.

In 2018, digital technologies emit around 4 percent of the global GHG emissions. It used to be 2.5 percent a few years ago—with 2.5 percent being the amount of GHG emissions due to air traffic. That means that the impact of digital on GHG emissions is already 50 percent higher than the one of air traffic. "Digital" does not solely refer to the use of digital technologies and the resulting consumption of electricity, it also refers to the production of digital equipment. The production of digital devices requires diverse metals, and these metals have to be found in the ground. An average smartphone contains at least 50 different types of metals.

About 50 percent of the GHG emissions due to digital happen in the production phase. When considering the impact of digital on GHG emissions, we have to become aware of what matters—not only in terms of the way we use digital, but also in terms of how we produce digital equipment and how many digital devices we chose to produce. That is very important to keep in mind.

Unfortunately, if we continue with the current growth rate, there will be an annual increase of about 8 percent of GHG emissions due to digital technology. At the moment, digital is more a problem than a solution for the environment.

If we project the trend to continue, digital GHG emissions will be equivalent to the GHG emissions of the car industry, i.e. 8 percent of the global emissions, by 2015. It is rather easy to understand that building and using a car is consuming a lot of energy—a good part of the energy is carbonized and thus it is normal to have a lot of GHG emissions. But in the context of digital equipment and services, there is nothing visible indicating the big impact on GHG emissions.

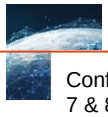
There have been about 1 billion digital devices sold in 2010 worldwide. This was mainly ICT equipment. According to recent projections (March 2019), there will be almost 10 billion digital devices produced every year by 2030. This corresponds to a multiplication by a factor of 10 in 20 years. The majority of this equipment will be IoT-like equipment, i.e. digital modules that will be included in environments or products that are originally not digital but that are being digitized with the IoT. This has not happened yet, but is likely to happen.

Actually, one of the explanations of the trend is that we are using more and more devices. One reason is that people are replacing their existing devices too often. The average lifetime of a smartphone in France is 18 months! Another reason is related to the IoT. We potentially want to add digital capacities to everything. In 2040, there will be 600-700 billion digital devices. Even though each of these devices is very small, it required energy to be produced and the smaller or denser it is, the more energy is needed to produce it.

IoT could also be a very good means to tackle the environmental issues, if we use it in the right way. If we decide to use IoT to build systems and things which are really smart from an environmental point of view—just saying they are smart is not enough to make them smart. Things might become more efficient if IoT is introduced and if, at the same time, the right policy to use the system is implemented.

In 2018, about 2 ZB of traffic were carried on the Internet. According to estimations, there could be 25,000 times more traffic on the Internet by 2024 (50 ZB). This corresponds to an annual increase of 40 percent in Internet traffic.

If we want to avoid this future, we have to become more reasonable regarding the way we use digital technologies. We have to understand how to limit the increase of traffic. Currently, 80 percent of the traffic increase is due to videos carried on social networks, streaming platforms etc. We have to be aware that the price we have to pay for watching more and more videos on Netflix is doubling the GHG emissions of the digital in 5-7 years. Is it worth it? We also need to prioritize the use of IoT where it makes sense. For instance, connected mirrors, connected pens, or connected toothbrushes etc. are definitely not part of this.



FREDÉRIC CROISON, Manager, Inextenso Innovation, France, talked about the quantification of environmental impacts in the context of the ICTFOOTPRINT.eu project.

ICTFOOTPRINT.eu is an online platform aiming to raise awareness amongst the ICT sector on environmental quantification of impacts.

The idea of this project was born in 2012 in the context of a study realised for the European Commission. One of the conclusions of the study was that there were methodologies to quantify environmental impacts, whether it be GHG emission, resource depletion, or other environmental impacts—but the actors of the sector were not aware of the existence of those methodologies. Thus, the idea emerged to create a platform to provide online contents especially for the ICT market in order to promote these existing methodologies on environmental qualification.

The project mainly focussed on GHG emission quantification, energy quantifications and energy efficiency measurement. The objective was to provide an overview of carbon footprint methodologies online in order to quantify some environmental impacts.

The project also organized 12 webinars dealing with different topics regarding quantification and solutions, e.g. eco-design applied to software and hardware production, in order to decrease the environmental impacts of the ICT the sector.

Moreover, ICTFOOTPRINT.eu created a marketplace where buyers and suppliers of eco-design solutions or solutions to decrease environmental impacts can meet and make business together.

One of the key deliverables of the project was a Policy Action Plan on “green ICT—a report for policy makers to raise awareness about the environmental impact of the ICT sector and on how to move on, i.e. from the quantification of the environmental impact to the implementation of solutions.

Things evolve very fast in this sector and the implementation of environmental quantification methodologies is quite recent. The aim of the project was to provide the ICT sector with some methodologies to quantify the sector’s impact and to raise awareness about the environmental hot spots, but also to communicate about those environmental impacts to the general public.

Most people are daily users of digital technologies, but many of them are not aware of the impact behind all these technologies, because it is about infrastructures that are not visible and tangible for the final user. It is important for the sector to quantify the impact, to communicate on that and to move towards more frugal and efficient solutions regarding environmental impacts.

CAROLINE VATEAU, Director, Business Unit Digital Responsible, Neutreo, France, demonstrated that there are practical methods to reduce the environmental impact of the digital services.

Feedback on Ecodesign of Digital Services

New models lead to new questions. The digital sector is living a very fast growth with more and more devices, more and more usage, and more and more mobile data. This leads to more and more cloud services and an increasing need for data centres on a global scale.

These new models also raise new questions about environmental impacts. Electronic manufacturing is one of the greediest and most pollutant industries. For instance, smartphones typically contain around 60 different metals, and ICT represents 4 percent of the global GHG emissions. Electronic equipment also raises an issue about waste management at a global scale.

To understand the environmental issue, one has to ask 3 main questions: “How much?”. E.g. how much GHG emission associated with watching a video? How much GHG emission associated with an online banking transaction via mobile phone? This question is related to the quantification of impacts.

The second question is “Who?”, because digital services are a complex system involving many different actors in the value chain. There is the company building the data centres, the company managing the cloud services, the editor of the software solution, and the provider of the devices. It is very difficult to have a coherent and consistent approach.

The third question is “How?” How to reduce the environmental impact in the entire value chain? This question has three main issues: 1) There is not one major impact on the environment but many. We mainly talk about the impact on the climate change or GHG emissions, but there are various impacts, such as water consumption, resource depletion, and energy consumption. There are many impacts to be addressed. 2) The impacts are located at different stages of the lifecycle of the equipment. It is very important to have a global approach integrating all the stages of the lifecycle. 3) There are many actors and we need to find tools to involve all the actors of the value chain.

Digital services, e.g. email services, streaming services etc., are the association of four major factors: 1) The end-user device: If you don’t have any smartphone, you cannot access to the Internet. 2) The telecommunications network: We need the data to be transferred through 3G, 4G, fibre connection etc. The telecom networks are required to implement the digital services. 3) The data centres: The data centre is the centralised part of the information system. There are data centres of all sizes, ranging from very small data centres to hyperscale data centres, such as Google, Amazon, Facebook etc. 4) The software: Software is needed to give instructions to the entire equipment in order to provide the services and to make them run.

The life-cycle analysis (LCA) is a rather old methodology. It is standardized in the 14000 series of environmental management standards of the International Organisation for Standardisation (ISO). The method requires, for any commercial product, process, or service, to consider the environmental impact generated at all stages of the lifecycle during manufacturing, distribution, usage and end of life. LCA could be used to break down a digital

service into its environmental impacts, such as water consumption, energy consumption, resource depletion and GHG emissions.

Ecodesign, is the integration of the environmental issue at the conception stage of your product or service. You have to define the function of the digital service (e.g. to provide information, to store data …) as well as individual functional units. Then, the life-cycle analysis methodology can be applied to assess the environmental impact and to emphasise hotspots. You then have to focus on these hotspots and apply key measures to reduce the environmental impact.

Another important aspect is to start the communication with interested parts. Interested parts include the provider (Could they provide more efficient services? How could they become involved in your approach? …) but also, customers and users (What are their requirements?). Every environmental approach is based on sobriety and efficiency. Going straight to the needs of the users will reduce non-necessary functions that have impacts on the environment.

More details in this methodology can be found in the Alliance Green IT White paper (2017), which is available online.

The GreenConcept project is a 3-years project that has supported 28 companies in implementing eco-design principles while developing their software and digital services. The GreenConcept project implemented eco-design principles for a large number of services, among them web conference services, IoT services to measure the temperature and prove energy efficiency in buildings, IoT services for agriculture, social network services for elderly, and many more.

The major part of the GHG emissions can be attributed to device manufacturing. Therefore, a key action is to use less devices and to extend their lifetime expectancy, but also to improve the cloud services and the sizing of all the digital services. The project helped to identify about 50 environmental improvement actions, related to business models, to devices, to cloud services, to data centres, to the network and to software management. At the end of the project, the environmental impact of the different digital services was divided by 3. Moreover, additional advantages have been identified, such as improvement of the accessibility of the services, improvement in connection speed, and improved user experience.

NegaOctet is a R&D project with the objective build and test a standard on environment assessment of digital services. NegaOctet should improve the knowledge in assessment of the environmental footprint of digital services and software, identify best practices (measurable) and support environmental labelling.

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Session 8

Day 2 – Morning – Parallel Session

Women in Digital Services

The chair and moderator, **DALIA BADAWI, CEO, Cairo,** Egypt, welcomed the audience and briefly introduced the panellists. The chairwoman then eloquently moderated the session and its very lively discussions.

VALÉRIE CHAMPETIER, Founder, ThinkandAct, France, appreciated the diversity of this female panel. All of the women in the panel have very different backgrounds; it is always inspiring to hear other people's stories and get their advice.

Promoting women in digital also requires advocating for more women entrepreneurs, but also strengthening the voice of women entrepreneurs. Only 17.5 percent of the tech workforce worldwide are women, and that they hold only 5 percent of leadership positions. The women in this panel have created their own path and are at the forefront of female empowerment and professional development. They are the role models for other women and they will enable others to create their path as well.

SYLVIE CHAUVIN, Founder, Markess by Exaegis, USA, addressed the issue of gender equality in the digital industry.

The current state-of-the-art of women in the IT and digital industry is that, in 2014, women made up 27 percent of the workforce of the French IT software and services industry—compared to 25 percent in 2010. Although women hold 57 percent of all professional occupations in the US workforce, they hold only 26 percent of professional computing occupations in 2017. According to the National Center for Women & Information Technology, only 17 percent of the Fortune 500 Chief Information Officer (CIO) positions were held by women in 2017. 11 percent of all executive positions in Silicon Valley were held by women in 2015. In 2018, the share of women in senior leadership positions at Facebook was 30 percent—compared to 23 percent in 2014.

Between 1960 and 1980 (the period of mainframes and minis), the IT department was entirely controlled by men. The organization of the IT environment was based on a top-down hierarchical structure. Computer training was mainly for men; women were employed for clerical tasks.

The 1990 to 2000 period (servers, networks and PCs) was characterized by departmental computing with a growing number of female users and a decentralization of IT. There were more female business lines managers involved and women started participating in the development of solutions.

Since 2000 (Internet, e-business, digital), all employees are involved in the IT environment and a collaborative and bottom up approach has been adopted. Moreover, there is a higher female contribution to digital development. Women are encouraged to join the field of IT to bring this female understanding and initiate innovative digital approaches.

Technology democratization has opened opportunities to women. There has been a transition from a “techno centric” environment to a “usage centric” one favourable for women.

Future drivers to enhance women’s contribution in IT and digital services are:

1) Funding of women owned start-ups: Richard Branson’s Virgin StartUp is pledging to fund an equal number of men and women business founders by the end of 2020. According to Atomico, 6 percent of venture-backed start-ups in Europe were led by a female CEO in 2018.

2) Attracting women profiles from other industry sectors: To compensate the shortage of IT experts, women are reskilled. According to the US Bureau of Labor Statistics, 1,4 million software development jobs are expected to be unfilled by 2020.

3) Benefiting from technology: Digital and Internet technologies represent an opportunity for women aid in breaking down barriers to mobility.

MARIANE CIMINO, CEO Hoa-Ora, France, shared her very personal experience and explained why she prefers to call herself a “humanist” rather than “feminist”.

Feminist? No, humanist.

Before starting, Mariane emphasised that she never experienced harassment or violence, that she has never been forced into an activity as a woman and that she is living in a country committed to gender equality. Fully aware of her luck, she doesn’t want to generalize her personal experiences.

Referring to her personal experience as a woman working in tech, Mariane didn’t encounter serious gender discrimination in the sector of health IT and health care during her professional career, i.e. at the university, the pharmaceutical industry, in public health organizations and as eHealth consultant.

However, areas such as IT quality, marketing and communication, social and human sciences, but also regulatory affairs are still more women dominated, while areas such as data security, infrastructures, IT developments and project management are male dominated.

As a woman working in a tech start-up, Mariane knows the clichés around these start-ups: Tech start-ups employ young people and have a cool attitude. Men are working as IT developers; women are working in marketing and communications. The use of a standardized elevator pitch.

However, as a CEO of a social care services platform, Mariane observed that a start-up culture is rather characterized by leadership (people have to be able to work in teams with young people, seniors, women and men, internals and externals) and employee multitasking (finance, communications, business development, IT, …). Moreover, a growing number of investors helping business in the start-up phase require these companies to adopt sound environmental, social and governance (ESG) practices. Other influencing factors of a start-up include environmental, demographic and digital transitions.

Women’s perceived strengths and weaknesses are still very much relied to their ancestral roles, such as welcoming, birth and family care, openness and open-mindedness, compassion and emotional intelligence.

At the end of the day, it might be less a question of gender, but a question of appreciation, judgment and discrimination due to age, social status, culture, power affirmation, the need of recognition …

Dare to be yourself with all your qualities and defaults and do your best with what you are!

NOLWENN GERMAIN, Business Development Director, E-mma, France, encouraged the audience to stay curious and to never stop learning.

Never stop asking! Never stop dreaming!

What is the situation? 45 percent of girls in France choose a scientific approach; only 7 percent of boys choose literary. Only 17 percent of the European start-ups are founded by women. Women account for only 11 percent of the workforce in cybersecurity.

Digital is everywhere you look (datacentres, cybersecurity, software, electrical transformation, blockchain, data analyst, AI, education, environment, robotics, design, electronic, FinTech, EdTech, LegalTech, cloud, finance, VR, energy, IoT, smart cities, Apps, e-commerce, Watson…). This requires people and skills, men and women.

E-mma is a French organization promoting gender diversity in the digital sector, which is at present still dominated by men. E-mma works on encouraging women to get started in a career in technology.

The organization believes that no area can be productive if it is not composed of men and women. The future should be where diversity becomes banality, and where productivity is about equality.

E-mma is represented in France, Albania (West Balkans), Spain and Belgium and will soon open branches in Germany and New-York (USA).

E-mma organizes coding workshops (with children and adults from 7 to 100 years), discovery workshops to understand the digital world, and tech conferences. In 2018, E-mma organized more than 500 events and taught coding skills to more than 20,000 women.

Nevers stop asking! Don't stop learning! But learning should be first of all a pleasure.

DAVIDE ADAMS SOKENG, Entrepreneur, Redactor in Chief, Aza-Mag, Senegal, presented an initiative created by women for women.

“Aza” means “powerful” in Berber language. Aza-Mag is a web magazine dedicated to female entrepreneurs in Africa.

Aza-Mag was created in September 2016 to promote female African entrepreneurs. It is designed as an online digital magazine in order to reach a broader audience. Aza-Mag has writers in the following 8 different countries: Senegal, Cote d'Ivoire, Ghana, Cameroon, Gabon, Mauritania, Canada and Guinea.

Women’s digital entrepreneurship is characterized by a networking approach: Women use the Internet to promote their products. Women groups on Facebook are generally used for business advices, good’s promotion, career advice etc. According to Roland Berger Strategy Consultants, more than 27 percent of women in Africa are entrepreneurs. Moreover, women produce 65 percent of the continent's goods (GEM's Women's Entrepreneurship report).

The Women's Entrepreneurship Report highlighted a number of measures to raise women's profile: It is important 1) to train women on digital practices in order to help them boost their businesses via social networks; 2) to organize sessions to exchange experiences and knowledge sharing; and 3) to set up a mentoring platform.

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Keynote Opening Afternoon

Day 2 – Afternoon – Plenary Session

The New Perspectives of Simulation

CHRISTOPHE BÉCHU, Mayor, City of Angers, France, warmly welcomed the participants to Angers and introduced the scope of the afternoon sessions of the event.

JAN ROCHE, President, SimAust, Australia, stressed the importance of simulation and modelling as essential tools in the modern world. They are used to test ideas and systems and in turn, train industry specialists without real world consequences. Simulation and modelling allow experts to create an unlimited number of complex scenarios to analyse the results and encourage better outcomes for students, educators, industry and government.

SimAust envisions a future where modelling and simulation is embraced by all industries to create a better, safer world. SimAust is the peak association for the simulation community in Australasia and is recognised as such by relevant decision-makers in government, business and education.

The mission of SimAust is to connect Australasia's modelling and simulation network; empowering cross-industry research and collaboration, developing the profession through review and dissemination of standards of practice for accreditation and certification; and provision of trusted sector information.

JEAN-CLAUDE GRANRY, President ICMASim, Directeur of the Simulation Centre Health, CHU Angers, France, welcomed the audience and set the scene for the upcoming afternoon sessions.

For the first time in its history, the Global Forum is held in conjunction with another major event: ICMASim 2019 – the 1st International Conference for Multi-Area Simulation.

Nowadays, simulation cannot be ignored as it improves knowledge and develops technical and behavioural skills in a secured environment which reproduces real situations and backgrounds thanks to dedicated equipment. ICMASim 2019 gathers international experts of simulation in order to discuss practices, methods, questions and solutions.

This novel multi-area positioning allows an exploration of the various applications of simulation: medicine, sciences, transports (aeronautics, automotive industry, guided transport, maritime, industrial and military), space, nuclear industry, finances and sports.

The various aspects of simulation, whether synthetic, intensive, digital, or hybrid, are presented together with the necessary tools such as dummies, image walls, virtual reality, super-calculators or other simulation software.

CÉCILE JAGLIN-GRIMONPREZ, Directrice Générale du CHU Angers, France, announced the upcoming common afternoon sessions of the Global Forum and ICMASim.

The afternoon of this 2nd day is dedicated to common sessions of both events with the objective to create a multisectoral approach proposing a broad spectrum to explore the various innovative application fields of digital and simulation, but also innovative tools and techniques.

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Digitalization in Healthcare

The chair and moderator, **MARC-ANTOINE CUSTAUD, Vice-President, Innovation and Scientific Valorization, University of Angers**, France, welcomed the audience and briefly introduced the panellists. The chairmen then moderated the session and its discussions with great ease.

PHILIPPE ALLAIN, Professor of Neuropsychology, University of Angers, France, co-authors Paul Richard, Associate Professor, University of Angers, France & Deborah Foloppe, Post-Doctoral Researcher, University of Angers, France, demonstrated how VR can help people with Alzheimer's disease**.**

The Potential of Virtual Reality Techniques to Assess and Enhance Functional Autonomy in Patients with Alzheimer's Disease

Alzheimer's disease (AD) causes cognitive impairments affecting daily life autonomy. Initially, AD patients have difficulty with complex instrumental activities of daily living (I-ADL), e.g. making a cup of tea. These deficits are followed by a progressive decline in basic activities of daily living (B-ADL), such as toileting. These impairments are associated with serious consequences, including caregiver burden, institutionalization, depression and death.

Assessment of IADL/ADL in AD patients is mainly done with functional scales based on self- or informant-report, such as the Lawton-Brody IADL scale. However, this method poses several problems: AD patients may underestimate their functional impairments because of anosognosia. It also offers a very gross assessment of performance, instead of a precise characterization of ADL-IADL deficits.

In clinical neuropsychology, few objective methods exist to assess ADL-IADL. Most neuropsychological tests have been developed to measure cognitive abilities in artificial situations. Consequently, these tests have low ecological validity and limited ability to predict actual functioning in ADL-IADL.

In the same vein, few objective methods exist to increase autonomy in ADL-IADL in AD patients. Available neuropsychological "rehabilitation" interventions in AD are mainly restorative, aiming to "repair" cognitive functions (memory, etc.). The beneficial effects of this approach are frequently criticized, the transfer of gains to the real life being very low.

These arguments in mind, the Laboratoire de Psychologie des Pays de la Loire, in collaboration with Polytech Angers and the University Hospital of Angers, used virtual reality to develop different non-immersive kitchen environments to assess AD patients' abilities during the execution of a coffee-task and to train AD patients' autonomy in cooking activities.

Virtual Reality (VR) is a technology that allows people to navigate and interact with computer-generated three-dimensional environments in real time. These environments could be similar to those encountered in real life, allowing the user to realize activities close to those encountered in real life.

In addition, VR tools can be used to record accurate measurements of the subject's performance, give real-time feedback on subject's performance, and deliver therapeutic stimulation to subjects.

Virtual Reality may then be very useful in the assessment/rehabilitation of ADL since it may increase ecological validity of assessment and training protocols as well as the transfer of training gains to daily life.

The users are seated in front of a screen monitor. They first receive general verbal information about the assessment task and the virtual kitchen usage. Then, they have to select and move virtual objects placed on a virtual table via the computer mouse. Sound elements (water noise, noise from the coffee machine) are integrated in order to foster the sense of presence in the virtual environment.

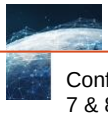
A training session is available to enable the user to get acquainted with the virtual environment. The task then is to prepare a virtual cup of coffee with milk and sugar, using a virtual coffee machine implemented in a virtual kitchen (starting by opening the coffee machine drawer up to putting some milk in the coffee's cup).

User's actions are recorded in real-time and saved. Different outcome measures are calculated by the computer from data recorded while the user completes the task: the total time to complete the task, the number of errors (including omissions and commissions). Moreover, an accomplishment score is calculated corresponding to the percentage of task steps completed with or without error.

The virtual kitchen was first used to assess the ability of 24 patients with Alzheimer's disease (AD patients) and 32 healthy elderly to prepare a cup of coffee. An identical real daily living task was tested in a real kitchen and scored following the same procedure in both groups.

There is evidence that VR training transfers to real world situations: Post-stroke patients (children and adults), who practiced street-crossing through VR showed an improvement in their ability to cross a street safely in the real world.

The Laboratoire de Psychologie des Pays de la Loire also developed a virtual-reality based system to help AD patients to "relearn" cooking activities. The system includes a virtual kitchen and the required virtual objects for each cooking task (i.e., foods, utensils; automatically displayed according to the task selected from the main menu).



The system includes a simple system of interactions: Simple actions (turning on/off buttons), are performed by pressing the left button of a computer mouse. Virtual objects are moved by sliding the mouse, and by maintaining the left button down to keep hold of the object.

The system includes an original learning method combining vanishing cues technique and errorless approach. In this method, several strategies are used to limit the risk of error:

1. The whole cooking task is demonstrated to the patient at the beginning of each session.
2. Then, the subject is asked to performed all the steps (actions) of the cooking task.
3. Ten seconds are given to the subject to perform each correct step.
4. If the subject does not perform the expected step within 10 seconds, a cueing method is used in order to draw his attention to the correct step to perform.
5. If the subject does not perform an action after 4 cues, it is automatically performed by the system.
6. Errors are avoided as soon as they are detected by the system.

A 79-year-old woman with Alzheimer's Disease was trained in 4 cooking tasks, during 4 days (1 hour per day). She could relearn cooking activities using VR techniques

A 79-year-old woman with Alzheimer's Disease was trained in four cooking tasks for four days per task, one hour per day, in virtual and in real conditions. The results indicated that our patient could relearn some cooking activities using virtual reality techniques. Transfer to real life was also observed. Improvement of the task performance remained stable over time. This case report supports the value of a non-immersive virtual kitchen to help people with AD to relearn cooking activities.

The ongoing research is now trying to confirm these data with other types of brain-damaged patients and with other daily life virtual tasks (prospective memory tasks, social cognition tasks).

FRÉDÉRIC BANVILLE, Associate Professor, University of Montreal, Canada, provided an insight in the use of virtual environments for the evaluation and training of executive functions, prospective memory and attentiveness.

Assessment and Rehabilitation Tools: The Usefulness of Immersive Virtual Reality

Virtual reality technology allows accessibility for specialized interventions. A survey realised with 70 psychologists has shown that VR intervention is needed and must increase during the next 10 years. Moreover, several studies have found that VR interventions are efficient, often more efficient than traditional interventions.

Since 1990, VR is more and more used in different health domains. From a psychometric perspective, VR provides several advantages, such as standardisation, verisimilitude and instrumental activities of daily living, generalisation, etc.

Studies indicate that VR is efficient in terms of the assessment of cognitive functions and rehabilitation of traumatic brain injury. VR can be used for rehabilitation of children, teenagers, adults and elderlies. The psychologist disposes of different virtual environments.

After a stroke, the use of VR is efficient for cognitive rehabilitation (and assessment) both for speech therapy and physical and occupational therapy.

In general, the studies support the value and relevance of virtual reality as an assessment and rehabilitation tool to help people who have suffered a neurological disease.

Studies have shown that cognitive changes are a normal process of aging. When exposed to a virtual environment and compared to young people, elderly judged the virtual environment more realistic and took more time to complete the task. However, they sometimes had the same success rate regarding the competition of the tasks.

One research study used the Virtual Multitasking Test to assess prospective memory thanks to several everyday life tasks.

Prospective memory (PM) is a complex cognitive process which involves remembering realizing an intention in the future. The virtual environment used in this study is the third version of the Virtual Multitasking Test, a three-dimensional apartment.

At the beginning of the test, participants are told that they are visiting their best friend. During the day, he is at work and they must live in his apartment. In the evening, they will go to a show with their best friend. However, during the day, 3 ongoing tasks must be performed (make the dinner, a roasted chicken; set the table for 2 persons; storing groceries).

During the realization of the 3 ongoing tasks, 6 PM tasks must be performed. The time-based PM tasks consisted to fax a document (3 times each 5 minutes) and let the marinade rest for 5 minutes. The event-based PM tasks consisted of remembering to put off quoted ingredients for the marinade during the activity “storing groceries” and to take the shirt out of the dryer when it rings. The activity-based PM tasks were to preheat the oven before beginning the marinade and programming the oven for 1h30 before putting the chicken in. These 2 last tasks were 2 steps of the recipe’s preparation. Finally, during ongoing and PM tasks realization, it had 3 interruptions planned during the experimentation: 2 different phone calls, one asking to feed a fish and the other asking to look for the tickets put on a table and a storm requiring the closure of some windows.

Another initiative uses virtual environments to teach and assess clinical monitoring in nursing. A multidisciplinary team of the Université du Québec à Rimouski has developed a virtual intensive care unit allowing nurses and students to dive into a digital environment to implement their theoretical knowledge.

Three different learning environments are currently in development: Clinical monitoring, psychotherapy, and functional anatomy. A trial version with postgraduate nursing students and
experimented nurses have been carried out in order to assess the realistic representation of the clinical monitoring script. The feedback was very positive.

ALBERTO CENDRON, Administrative & Commercial Manager, Logos, Italy, presented Log-Os, a revolution in medical logistics and an innovative system boosting the efficiency of hospitals performance.

Integrated Pharmaceutical Logistics in Venice

Log-Os is an integrated hospital logistics system providing online management of activities through a single IT solution capable of covering all processes, from the order to the supplier up to the controlled administration. An innovation that guarantees the minimization of storage and handling costs as well as maximum patient safety.

Log-Os is a Zanardo Logisticis' spin-off that operates specifically in the healthcare sector for developing new models of integrated logistics. Log-Os recently received the Prize Innova S@lute in Rome.

Log-Os is revolutionizing the management of drugs in Italian hospitals. Figures showed that 12 percent of the medicines given to public health establishments expires without being used. This generates a loss of 900 million euros, stressing the urgent need for a better management of medicines.

The organizational model Log-Os is active since 2005 in several Italian hospitals, enhancing the security of the patient, creating and managing a digital flow of physical and informative drug-tracking, also monitoring medical devices and other medical materials. The use of Log-Os has produced several advantages: drugs total deposits registered 30 percent decrease, the expired drugs number in stock was halved, also setting at zero le fraudulent dispersions caused by the negligent use of drugs and medical goods.

"The patient is at the centre of a supply chain process starting in the moment of his/her hospitalization, continuing with the first medical prescription and finishing with drugs delivery". The logistic model includes an interaction between hardware, networks, smart robots and trolleys combined with an excellent training of personnel—elements that are key for the success of an efficient logistic model.

Today, Log-Os represents an icon of medical innovation in Italy. Forum PA has recently awarded Log-Os with the Absolute Prize for the Engineering of Hospitals. Several Italian hospitals have chosen Log-Os, such as the Cardiology Ward in the Civil Hospital of Venice. The latter has been ranked as the third best Italian hospital wards by Agenas (Agency for Regional Medical Services). This achievement was accomplished also thanks to Log-Os, remarkably boosting the efficiency of the ward.

DAMIEN CLAVERIE, INSERM, France, co-authors Florent Sigwalt, Guillaume Petit, Jean-Noel Evain, Monique Bui, Angélique Guinet-Lebreton, Marion Trousselar, Frédéric Canini, Dominique Chassard, Antoine Duclos, Jean-Jacques Lehot, Thomas Rimmelé and Marc Lilot, addressed the issue of stress management training for caregivers.

Tactics to optimize the potential, a stress management training strategy, and experience modify independently phasic and tonic electrodermal activities of residents during critical simulated situations

Resuscitation situations can induce stress for the caregiver. Recognized stressful factors in these situations are the lack of controllability of the situation, the unpredictability of the situation and a long duration resuscitation.

During the situation, the stress reaction decreases cognitive performances. There is a higher prevalence for stress-induced diseases for the resuscitator compared to other categories of caregivers.

In the context of resuscitation, HFS (High Fidelity Simulation) has shown its efficacy with regard to learning and improving behavioural performances. HFS is known to induce acute stress in the participant through immersive and realistic situations and can conduct to a decrease of cognitive performance.

Initially developed by the French army, Tactics to Optimize Potential (TOP) aim at improving performance when preparing the action, during the action and promoting recovery after the action. TOP practice has shown its ability to reduce perceived stress. This tool could have a daily interest for the resuscitators.

High-fidelity simulation improves participant learning through immersive realistic and stressful active participation. Stress management training might help participants to improve performance. The hypothesis was that Tactics to Optimize the Potential (TOP), as a cognitive stress management programme, could improve resident performance during simulation.

128 residents in intensive care from the 1st to the 5th postgraduate year were convened to a high-fidelity simulation. The residents were randomized in two parallel-arms (TOP or control) and actively participated in one scenario. Only residents from the TOP group received specific TOP training (5 hours) before the HFS and a four-minute TOP reactivation just before the beginning of the scenario.

The primary endpoint was the overall performance difference between groups during simulation, combining specific clinical criteria, the Ottawa Global Rating Scale and the Team Emergency Assessment Measure scores, rated for each resident by four blinded independent investigators (with help of recorded videos). Secondary endpoints included the physiological stress level difference between groups, assessed by the Activation-Deactivation Adjective Check List and the electrodermal activity during simulation.

Four different scenarios ran consecutively during each HFS so that each resident participated actively once in one scenario. HFS followed the usual sequence: briefing, scenario, and debriefing. Scenarios dealt with crisis situations in the emergency department,

intensive care unit, operating room, delivery room, surgical ward or during intra-hospital transport. They were adapted to the training level of the residents.

Residents were equipped with recording wristband devices for continuous measurements of electrodermal activity (EDA), pulse, skin temperature and an accelerometer before the briefing of the scenario until the end of the debriefing. Electrodermal activity is a marker of the sympathetic system.

The overall performance was higher in the TOP group as compared with controls. Residents coping with stressful simulated critical situations who have been trained with TOP performed better during high-fidelity simulation in association with decreases of both tension-related stress reaction and sympathetic system activity. The benefits of TOP training should be considered in real clinical emergency settings and assessed by clinical studies.

VINCENT DOCHEZ, University of Nantes, France, co-authors Falvie Laidin, Rozenn Collin, Estelle Boulvais, Guillaume Legendre and Norbert Winer, presented an in-situ maternity training programme.

Implementation of the simulation in the maternities of the Réseau Sécurité Naissance (Pays de la Loire – France) and impact of training on the feeling of self-esteem

Health simulation just emerged in France and Europe—unlike North America, where it is much more developed.

According to the French National Authority for Health (HAS), in 2012, there have been 34 simulation centres (public and private) with high-fidelity equipment in France. However, materials and equipment are few and not very diversified.

Several studies have shown that there is a positive impact of simulation in obstetrics, particularly on theoretical knowledge.

The Réseau Sécurité Naissance is a federation of 23 maternities, gathering all professionals (public, private and self-employed) working in these maternities of the Pays de la Loire. Réseau Sécurité Naissance assists around 41,000 births per year.

A study has been carried out in order to evaluate the impact of the obstetric simulation training of the Réseau Sécurité Naissance on the feeling of self-esteem of professionals. The professionals concerned are midwives, childcare auxiliaries, obstetric teams (resident and senior), and anaesthesia teams (resident, senior and nurse). Each session was realised with 12 learners.

A total of 218 web forms were sent to 31 gynaecologist-obstetricians, 159 midwives, 4 anaesthetists, 18 nurse anaesthetists, 5 nurses and 1 childcare assistant.

A total of 65 responses were received, which corresponds to a response rate of 30 percent. 60 out of the 65 professionals had a positive opinion about the beneficial impact of simulation training on self-esteem.

Out of the 21 people who had to face shoulder dystocia since their training, 20 (95 percent) felt an improvement in terms of their event management practice.

Simulation represents a real overall benefit concerning the management of a shoulder dystocia.

Since then, a training programme has been created, called “Red Code at the Maternity hospital", an in-situ simulation directly in the maternity services of the Pays de la Loire. The programme is realised within about six training sessions a year, during two days with 12 professionals.

To conclude, there has been a real positive effect of obstetric simulation, in terms of theoretical and practical knowledge, neonatal and maternal morbidity, and communication in teams. The beneficial impact of the simulation on professionals’ feeling of self-esteem in the Pays de la Loire had been noticed. The experience will be continued and evaluated in the in-situ simulation programme.

PAUL WORMELI, Innovation Strategist, Wormeli Consulting, USA, emphasised the critical role that prevention should play in addressing the US opioid crisis.

Opioid Use Disorder Prevention Playbook

More than 72,000 people died from drug overdoses in the U.S., in 2017. Over 49,000 of them were related to opioid use, including of newer synthetic versions such as fentanyl. More than 115 people are estimated to die every day from opioid overdoses. The President has declared this epidemic to be a public health emergency.

Against that backdrop, the National Interoperability Collaborative (NIC) published “The Opioid Use Disorder Prevention Playbook”, highlighting a variety of prevention-focused programs, initiatives and strategies—so-called “plays”—that are being attempted to “get upstream” of the crisis.

The playbook offers examples of evidence-informed initiatives and ideas (the “plays”), being tried around the country, with as much data as possible relating to their efficacy. It also provides background and context relating to the epidemic, as well as insights into why multi-sector collaboration, interoperability and information-sharing need to be critical elements of any effective effort to combat the crisis.

The objective is to increase awareness of the need for more prevention-related efforts; to provide ideas to jurisdictions and organizations about “plays” they might wish consider; and to support groups at the local, state and federal levels that are collaborating to reduce the incidence of opioid use disorders.

There are a number of common themes in the 11 potential strategies (or plays) that communities can replicate or adapt in order to prevent opioid use disorders:

An important component of an effective prevention strategy is to reduce the likelihood of an opioid use disorder and up-front risk reduction. There is a strong, lifelong correlation between adverse childhood experiences, including abuse and neglect, and a broad range of health

issues, including substance misuse. Over 80 percent of the patients seeking treatment for opioid addiction had at least one form of childhood trauma, with almost two-thirds reporting having witnessed violence in childhood.

It is imperative to improve pain management practices, to encourage the use of non-opioid formulations for pain management, and to provide alternatives. One very important way to reduce the use and misuse of legal and illicit drugs is to control and limit opioid prescriptions for pain management. As it has become clear that long-term pain management using opioids increases the likelihood of substance use disorders, research has intensified on finding effective alternatives.

Associated with this, is the reduction of the long-term use of opioids for pain management. It is clear that the long-term use of opioids legitimately prescribed for pain management increases the risk of a patient developing a substance use disorder

Of course, efforts have to be undertaken to reduce the supply of illicit drugs. Since most heroin and fentanyl originate outside the U.S., current counter-narcotics programming consists largely of federally driven efforts.

Prescription monitoring programs have to be improved and expanded. Most physicians can determine if a patient has gone “doctor shopping” by seeking opioids for the same pain management from more than one physician. However, some doctors are either unaware of the system, unsure of how to use it or have concerns about its accuracy.

Another issue is to make provisions for safe disposal of unused opioids. An estimated two-thirds of teenagers who have misused prescription drugs get them from their family and friends, so many practitioners believe it is important to clear out medicine cabinets at home that contain unused drugs, particularly opioids.

Medication-assisted treatment has to be provided to inmates: Research has shown that medication-assisted treatment can decrease opioid use, opioid-related overdose deaths, criminal activity and infectious disease transmission, while also increasing social functioning and retention in treatment.

Treatment programs have to be expanded after incarceration. Abundant research shows greater success for preventing subsequent opioid use disorders for released inmates when medication-assisted treatment is fully integrated with behavioural health treatment, indicating that collaboration between health care providers and behavioural health departments can have a positive effect on preventing the reoccurrence of these disorders.

It is important to reduce the effect of stigma in interactions between individuals with substance abuse disorders and the professionals with whom they come into contact. This could include educational programs, small group discussions, seminars and training in specific approaches, as well as language that professionals (police, health care providers, etc.) should avoid.

To conclude, it will take the whole community to resolve this crisis and more innovative programs are required and more research on what works is needed. But we can overcome it!

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Industry 4.0 / Smart Industry

The chair and moderator, **JEREMY MILLARD, Senior Consultant, Danish Technological Institute**, Denmark, welcomed the participants and opened this common session of the Global Forum and ICMASim.

The 4th Industrial Revolution also Needs a Socio-Ecological Revolution

The First Industrial Revolution (1784) used water and steam power to mechanise production. The Second Industrial Revolution (1870) used electric power to create mass production. The Third Industrial Revolution (1969) used electronics and information technology to automate production. The Fourth Industrial Revolution is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.

Previous industrial revolutions produced an explosion in new forms of social activity and organisation, such as the United Nations, trades unions, welfare state, centralised and hierarchical governance, shareholder value business models, or market-led policy. These new systems and partnerships were designed to ease the transition from one socioeconomic order to the next—predicated on innovations from interaction between all actors of the triple helix (academia, business and the public sector).

Then came the Fourth Industrial Revolution and we are currently inventing new forms of social activity and organisation, most of which are known, like de-centralised and linked horizontal-vertical governance, shared-value business models, sharing and collaborative economies, cooperatives, employee-ownership, citizen assemblies, and evidence-based policy.

The “new kids on the block” are the civil society, social entrepreneurs, voluntary sector NGOs, and social movements, e.g. the Transition Town Network.

We are starting to realise that social innovation has to go alongside technological innovation, e.g. citizen science, behavioural insight, nudge, or design thinking—this time predicated on innovations from interaction between all actors of the quadruple helix (academia, business, public sector and the civil society).

What would be the societal responses needed for the Fourth+ (plus) Industrial Revolution? Basically, the technology remains the same, but the society will be responding in a different way with completely new forms of social activity and organisation, few of which are experimental and only some are on the drawing board: Ecosystem governance, “green” business models, nature-based innovation and solutions, and eco-based policy—but also

bio-mimicry, bio-based industries, circular and iterative systems (there is no such thing as “waste”), e.g. hydroponics, and rewilding. There might be nature-based societies with “doughnut” economies. Examples are local currencies or the Extinction Rebellion movement. The society will be predicated on innovations from interaction between all actors of the quintuple helix (academia, business, public sector, civil society and nature).

Living assets, i.e. people and nature, are the real and only source of innovation. People and organisations are learning from nature. The six critical nature-inspired qualities of a growing number of the most successful companies (nature’s good advice) are: 1) Decentralised, self-organising networked structures: e.g. self-leading teams. 2) Regenerative life strategies: e.g. evolutionary principles of survival and reproduction. 3) Frugal innovation: optimising resource use, as in circular systems. 4) Openness to feedback: internal and external communication for adaptive learning. 5) Symbiotic behaviour: linking individual and societal wellbeing. And 6) Consciousness: an emergent quality.

However, this can also be applied to technology: Nature has had 3.8 billion years of making and evolving successful and resilient designs from simple materials. Re-design manufacturing is used to mimic nature and escape mistakes of previous industrial revolutions. Additive manufacturing (including 3D printing) creates little or no waste because it forms objects to shape without moulds or cutting. Most material can be sourced from local, common and abundant (“waste”) feedstocks: plastic, metal, glass, fabrics, biomass, etc., thus is part of a local circular economy that drastically reduces shipping. Nature creates spider webs, silk, bones, shells, skins, feathers, etc. in same way: strand by strand, layer by layer. There are four key aspects: local sourcing, smart structure, safe chemistry, and reverse logistics (i.e. “unzippability”, disassembly and re-assembly).

To conclude, some final thoughts on the 4th Industrial Revolution and the socio-ecological revolution: When we have a societal or technological challenge: the first impulse should be how has nature solved it? The real enabler of innovation is not smart data or smart technology (these are simply tools) but the living assets of people and nature. Don’t “exploit” living assets (people and nature) as this creates systemic resistance. Instead, nurture them as both are the source of all value and innovation (both monetised and non-monetised), in addition to having their own intrinsic value. With people and nature in symbiosis “there resides enormous intelligence, much of which remains untapped…for example, we should model organisations and technology on living systems.” (Bragdon, 2016)

ELIANE UBALIJORO, Deputy Executive Director (programmes), GODAN – Global Open Data Initiative for Agriculture and Nutrition, United-Kingdom, presented an initiative supporting the proactive sharing of open data to deal with the urgent challenge of ensuring world food security.

Why We Need SMART Agriculture to Feed the World?

How are we going to feed humanity? Between now and 2050, most of the population growth in the world is going to be in emerging economies. In 2035, half of the working population in the world will be African. Are we ready to face that? What is really critical here is the way we have been producing food—we need to change how we are doing it in order to continue to feed our human population and at the same sustain our planet.

GODAN, Global Open Data Initiative for Agriculture and Nutrition, has been created in 2015. The organisation's secretariat recently moved from the UK to Montreal. In its first year, GODAN had about 100 partners; today, GODAN has grown to over 1000 partners in 117 countries around the world.

The initiative seeks to support global efforts to make agricultural and nutritionally relevant data available, accessible, and usable for unrestricted use worldwide. GODAN focuses on building high-level policy, and public and private institutional support for open data. The aim is to help improve agriculture and nutrition in the world so that the 2.7 billion people who are food insecure and the 700 million people who go to bed hungry every night don't have to live under these circumstances. How can data help harness the immense knowledge around the world to bring greater food equity in the world? GODAN is looking at how to achieve better access to good quality data, providence and timeliness, accessibility and interoperability for all. Especially the smallholder farmers in the world—many of them having between 3 and 3.5 hectares. A global data ecosystem that allows access to data for everybody can be transformative in terms of food security for the world.

The three areas that farmers are most interested in are market data, weather and agricultural integration. How to ensure that all farmers have access to this data?

An example is the sharing of soil-related data. For farmers, it is important to understand what is in the soil. How to minimize inputs and maximise outputs? How to ensure that all famers have access to data to ensure that with precision agriculture they are using the least amount of input, and ideally are using compostable natural resources to stabilize the soils and making it more resilient against flood-caused soil erosion, and at the same time ensuring that there is enough moisture holding the soil, that they don't lose crops in seasons where climate variability can be an issue?

There is new access to data also for pastoralists. It is not only about farmers, it is about people who are moving around being able to share data on "where are datapoints?", "where can I sell my products if I am going from one point to another?". It is about bringing mobility and access to market to anybody, no matter where they are and whether they are sedentary or not. How can we bring markets to the invisible people in the world who haven't been able yet to contribute to the global economies?

Another example is SAT4Farming in Ghana—an initiative to reach thousands of small-scale cocoa producers with information and services to improve their productivity and

sustainability. Most of the cocoa farmers in Ghana are over 50 years old. There is an aging population that is farming. How to bring usefulness to these markets? And how to integrate more women in these markets? This project is working with 200,000 female cocoa farmers around Ghana to give them access to data, to increase productivity making it more appealing and allowing them to bring in more income.

GODAN is a partner of the Africa Geospatial Data and Internet Conference (AGDIC), which will be held in Ghana in October 2019. It is really about how do we shape Africa's digital future? Most of the people that will be born between now and 2050 will be on the African continent. How to ensure that they prosper on the continent? There is a potential for Africa's economies to reach the same size as the European Union economy. How to harness those relationships in research, in policy and economic matters so that we have companies on both sides of the ocean prospering. This is really critical, because the division that we are facing today is also about the sense of scarcity. How to create a world where prosperity is enabled for everybody?

Let's use the data revolution to feed the world and protect our planet for the generations to come.

PHILIPPE SCHEIMANN, Co-Founder, TOP Global, Israel, proposed to change the term 4.0 to 4.All (for all).

Coffee Industry 4.0 → 4.All

What if we could influence the way coffee is traded? Most people are crazy about coffee, and every coffee lover has their favourite coffee and an opinion on how to drink it.

However, there is the tendency to consider the coffee as the raw material and to forget that there are people behind this raw material: the farmers.

When speaking about our favourite coffee, we usually think about Italian or Swiss coffee. Indeed, the following countries export the highest dollar value worth of coffee worldwide: Germany (n°3), Switzerland (n°4), Italy (n°6) and France (n°7) even though these countries don't grow coffee themselves. It is a very valuable industry to be in.

In 2018, more than 1 billion dollars have been invested in coffee related start-ups in the US. You only need 6-7g of coffee to brew an espresso that will then be sold for between 2-6 dollars. A rough estimation shows that 1 kg of coffee can be sold for 500 dollars. At the same time, a small-scale farmer (a share that constitutes 60 percent of coffee growers) will have to sell the coffee cherries for less than 1 dollar per kg. (A Kenyan small-scale farmer produces about 200 kg per year). The lack of equity in the value chain is obvious. At this point, people usually say that this is the reason why we have fair-trade coffee. Unfortunately, small scale farmers cannot afford fair trade certification.

Let's take a look at a project currently realised in Kenya with local NGOs and businesses. Coffee Industry 4.0 states that all the systems are interconnected for the benefit of the customer.

Another good example is what actually happened in Denmark, where the biggest cooperative, COOP, has set up an installation in Kenya for processing coffee to cut out all the intermediaries.

TOP (Technology of Peace) is trying to change the whole system by connecting the dots, setting-up this ecosystem that brings value to the process. In this ecosystem, you have the farmers working hard to get the coffee plants growing. You also have some NGOs addressing the issue of education for sustainable development, but also helping the farmers to grow organic coffee and to introduce mixed farming (permaculture). For instance, with an organic fertilizer that can be produced locally, some farmers were able to nurture 200 trees giving 300 kg to 4,000 kg within 3 years.

There is also an IT company (GoIP), a partner of TOP, that has developed a Nerve platform to connect farmers to relevant partners (e.g. agronomists and buyers). Thus, farmers switch from a needy/victim position to a leading position where they have a say in their situation.

In collaboration with GoIP and GDE, a Swiss based AI company developing a platform to govern by value, TOP is setting up the rules for each actor, what kind of value they should get. Data from each actor is gathered by the system so that it is possible to answer the request of a Swedish company to a Kenyan Coffee factory: “We want to buy organic coffee from farmers who give a decent salary to women”.

Imagine that there is a barcode providing traceability of coffee next time you take a cup of coffee (from farm to cup), letting you know that, by buying this coffee, you support SDG1 (no poverty), SDG5 (gender equality), SDG 10 (reduced inequality) and SDG13 (climate action). Wouldn’t this be a competitive advantage?

MICHAEL STANKOSKY, Professorial Lecturer, Engineering Management & Systems Engineering, George Washington University, USA, discussed one of the major growth opportunities for organizations.

Convergence of Ideas – Industry 6.0

Industry convergence is not a new concept; it may actually be one of the oldest. As markets interact, they naturally exchange ideas, processes, and technologies, which makes them grow more intertwined. Agriculture and trade collided to create banking. More recently, the overlapping potential of healthcare and consumer electronics created wearables.

Our globally connected society is only increasing the speed and scale with which convergence opportunities present themselves. Convergence at its core is centred around idea sharing. The concept of leveraging and learning from other industries to avoid wasting time and effort on creating something that already exists is often discussed in the context of product innovation, but the same can be applied across the board.

Multi-industry resource pooling is an obvious benefit of convergence. As industries move closer together, their functional needs align more closely. This allows vendors that serve these industries to increase investment because the market for that need is now larger.

A few years ago, CEOs could see the competition coming. The biggest risk was the advent of a new rival with a better or cheaper product or service. And you could fend off the threat by improving or expanding the range of products and services you offered, or getting to market more efficiently and imaginatively. Today, the competition is often invisible until it's too late.

We can observe the 'Uber syndrome', where a competitor with a completely different business model enters your industry and flattens you, and "disruptive innovation", where new entrants target the bottom of a market and then relentlessly move up market, eventually ousting established providers. What was once a relatively rare phenomenon has now become a regular occurrence. Innovations that harness new technologies or business models, or exploit old technologies in new ways, are emerging on an almost daily basis. The most disruptive enterprises don't gradually displace the incumbents; they reshape entire industries, swiftly obliterating whatever stands in their way.

What are the strategies to prepare for the next level of competition under Industry 6.0?

First of all, prepare for digital invaders:

- Technology as the main game-changer with uncertain/ unknown impact.
- Change in the way organizations engage with customers; creating more digital, individualized experiences.
- Getting to a segment-of-one understanding of the customer base.
- Exploring the opportunities in adjacent spaces and stripping out bureaucracies so that organizations can move swiftly.

Put more scouts on the front line: Delegate all but the most important decisions to the people who are closest to your customers. With decentralized decision-making, you'll have more scouts with greater freedom of action on the front line.

Share to shine: Ratchet up your plans to form new partnerships and be ready to “reciprocate” by sharing key resources with your allies so you can grow together.

Seize the middle space: Disruptors like Alibaba, eBay, Spotify and WhatsApp have each become the lynchpin in a virtual network other companies use to reach their customers. Building an online forum where buyers and sellers can trade, share information and swap insights, and stimulating the development of a healthy ecosystem, can be a highly profitable strategy.

Create a panoramic perspective: “The more nebulous your enemies and the faster the pace of change, the wider and further you need to look”. “The hardest thing is working out whether what’s happening is hype, trend or tsunami.” Cloud computing, mobile solutions and the Internet of Things (IoT) are the technological elements of today’s “wave” and will continue to dominate. Cognitive technologies (systems that understand natural language and are not programmed but learn) are rising on the horizon as the bridge to new levels of personalization and insights from exploding volumes of data.

Cultivate your organization’s cognitive capabilities: Using predictive and cognitive analytics to scrutinize the real-time data you receive from the marketplace and your partners will help you forecast the future with a greater level of confidence.

Form your own futures squad: Set up a specialist forecasting team, equipped with the right technologies and skills, trained to use probabilistic reasoning techniques and to recognize and eliminate bias.

Take an eco-centric view of the world: Assess the caliber of all the enterprises in your ecosystem. Are you leveraging all their contacts, skills and assets? Are there any weak links? Are there any missing skills? Does your ecosystem have the right expertise to exploit new trends and technologies and boost its power to compete? If not, where should you look?

Be first, be best or be nowhere: “There are no rules or prior case studies on what we’re trying to do with our business and business model. We feel like we’re operating on the edge of the market”. The trickiest issue is choosing the right new business model; concerns about investing too much too soon or cannibalizing current revenue streams crop up regularly among today’s CEOs. It is hard to test new models within the existing corporate frameworks; however, in order to survive, organizations need to be turned into “living laboratories”. “We live in a moment where individual creativity and continuous innovation are essential. We should be thinking in terms of ‘return on inspiration’.”

Investigate unfamiliar territory: Concentrate on building broader networks and look at what companies in unrelated industries are doing to get completely different ideas.

Go offline to test for the best: Set up an innovation center outside your current organizational structure for incubating and piloting new business models and offerings. Give it the latitude to experiment properly. Including sufficient time and resources.

Create and capture the moment: Once you’ve decided to launch a new business model, product or service, move fast and be prepared to bet big. It’s difficult to triumph as a market pioneer when technological advances are appearing so rapidly, they can render even recent innovations obsolete.

Organizational restructuring in light of Industry 6.0 requires:

Opening up to customer influence: Businesses are becoming not just customer-centric but customer-activated. Establishing Customer Advisory Boards to get direct input on strategic issues – Customer influence should not be confined to activities in which customers have traditionally participated, such as developing new products or services. Instead, CEOs stand ready to relinquish absolute power of what is typically considered their domain – developing business strategy.

Pioneering digital-physical innovation:

- Digitization of front offices to sync with customers more effectively.
- Reconfiguration of businesses' offerings to capitalize on social networks and mobile connectivity.
- Reshaping of operating models to inject customer input into every aspect of the buying and selling chain.
- Crafting engaging customer experiences.
- A shift to social and digital interaction.
- Understanding and engaging the customer as an individual rather than as a category or market segment.

Chief Financial Officers step up to help create new business models. Chief Human Resources Officers take up social and analytics to rework work. Chief Information Officers look outward to generate new value. Chief Marketing Officers have big aspirations about enabling transformational change and face big hurdles. Chief Supply Chain Officers embed customer analytics to advance operations.

What the "Torchbearers" in the Industry 6.0 look like?

Scope:

- Forward-looking and bolder about exploring opportunities in related industries.
- Clear understanding that they compete as part of a bigger ecosystem of interdependent entities, which greatly enhances their potential impact on the market.
- Strong ability to define where they want to play, while keeping their options as open as possible in an era of discontinuous change.

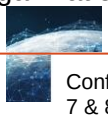
Scale:

- Brave about investing in emerging technologies with high risks and returns.
- Very aware of the need to preserve their competitive advantage and scale their expertise.
- Supportive of their ideas to the hilt because they know the biggest slice of the economic pie will go to just a handful of enterprises.

Speed:

- Agility, strong will to experiment and confidence about taking the lead.
- Recognition of the pace at which the economy and technology are evolving and the importance of dominating the market before the competitors do.

The convergence of ideas represents the most fundamental growth opportunity for organizations and will redefine industry boundaries by shifting the focus from individual products to cross-industry value experiences, based on digital business principles. On the other hand, the convergence is also a threat since other companies can absorb the organization's core business to fulfil their own industry convergence objectives. The success



of cross-industry value experiences depends on a thorough ecosystem strategy, selecting the right partners with in it and executing an industry expansion strategy.

NICOLAS MAUDUIT, Business Manager, SMI IA – Group Bouygues Energies & Services, France, [www.bouygues-es.com], addressed the topic of Industry 4.0.

Industry 4.0 comes after the first three industrial phases of mechanisation (the use of water and steam power), electrical (rapid standardisation and mass production) and computerisation (telecommunication and automation). The fourth industrial evolution enables the industry to enter the era of cyber systems and global interoperability of different devices, software and management. For instance, manufacturing execution systems (MES) track and document the transformation of raw materials to finished goods and enterprise resource planning (ERP) systems.

These new technologies serve a lean and agile approach and improve the efficiency of industries, while at the same time considering the societal aspects linked to this change. Unlike mechanisation and automation, the idea is not to replace humans, but to provide more efficient tools to avoid waste, e.g. of raw materials, to identify activities with high added value, to improve the efficiency of a production site, and to guarantee quality and product traceability.

Some concrete cases illustrating how IT, digital and robotic solutions changed the production process in the manufacturing industry:

All begins with the conceptual design phase: In the past, it took a lot of time to create and review plans, drawings, specifications etc. There were lots of conflicts to manage, because it is impossible to predict all the problems that might occur during the implementation phase.

Today, the design office relies on digital design, the so-called digital twin. Digital twinning allows the creation of digital models of all components necessary to the manufacturing process. Virtual reality can be during the entire design phase. It is possible to visualise the whole project even before the first stone is set in the ground. The design phase becomes much more dynamic; it is possible to anticipate assembly procedures, integrate new equipment and manage conflicts. This leads to decreasing correction costs, e.g. it is much easier and cheaper to move a wall virtually than once it is built.

Digital twinning can be used from the design phase up to the operating phase. It can even be used for maintenance.

Once built, the factory needs raw materials, processes and maintenance. Purchasing the raw material requires communication with the supplier to manage availability, quantity and cost. It can be delivered in various forms (silos, big bags…) and will then be consumed little by little. The material has an identification sheet to ensure traceability. In the past, monitoring was mainly done manually, the arrival date of the raw material was estimated, the consumption was calculated manually taking into account production forecasts—which led to errors at various levels of the process.

Today, digital solutions are available for inventory management and tracking is done electronically. Both the supplier and the purchaser of the raw material share the same

information system. GPS allows real-time tracking of raw material in transit, there is no doubt about the arrival date.

Today, it is possible to use computerized inventory systems to manage counting and record-keeping. Stock traceability is much more precise. Provenance or date and the time of its use can be easily identified. All data are collected, connected and transferred to a computerized system, which reduces errors and increases transparency.

Automation already entered the industrial world, but today's systems are even more connected and more interoperable. Process supervision also integrates recipe management and is connected to the inventory management system. This allows real-time monitoring of the production process and to adapt the production activity to changes.

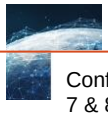
Manual operations are still necessary in manufacturing. They are based on respect, the manufacturing order and manufacturing instructions, sometimes written down or transmitted orally through generations.

Although, it is possible to digitize checklists and work instructions and to equip the production operators with smart workplaces to check whether the work is done corresponding to the required specifications. Cobots (collaborative robots) can be employed to carry out simple tasks.

There is no factory without maintenance. In the past, technicians made their regular rounds to check equipment, read meters etc. Today, ICT allows to connect the equipment and to monitor its performance in real-time. Predictive maintenance even allows to detect possible defects and fix them before they result in failure.

Industry 4.0 is the introduction of new technologies in the industrial field, e.g. mobility, IoT, networks, remote access, virtualisation, data bases, cobotics etc. This requires a radical change of mentality for the industrialists—and this could also represent an obstacle.

However, we don’t have to forget that all these data and information have to be interpreted and up to now, this still requires human experience. Technology has not to be adopted just for the sake of technology, but have a positive impact and to enable the industrials to do things they couldn’t do in the past.



DIDIER LONGUEVILLE, CTO, ZeKat Group, France, [groupezekat.com], addressed the issue of predictive maintenance.

Predictive maintenance for rotating machines with IoT technologies and vibration analysis system

The problem of vibrations of rotating machines is probably one the most ancient concerns of engineers.

Because vibration is the most common symptom of anomalies, predictive maintenance is often based on the vibration analysis of rotating machines. What is the recipe for vibration analysis? First of all, you need sensors—there are the usual sensors, such as piezo, magnetic, optical, or acoustic sensors, but also the new generation of very small and effective microelectromechanical systems (MEMS). You also need very good electronics because you are dealing both with very small and very strong signals. Thus, you need power supplies, amplifiers, filters to remove the unwanted noise, and converters.

The mathematics (Fourier, Hilbert, etc.) and algorithms behind are crucial. Just to mention that the French mathematician Fourier was recruited by Napoleon—which means a long time ago! In other words, we are not really inventing things, we are just putting them together in a new way. Moreover, there is also a lot of physics required, a lot of experience (logs, REX, statistics) …and a bit of touch and feel.

What's new then? The time when it was necessary to use a bay full of expensive electronic devices isn't so far: Not long ago, the equipment was expensive, bulky, and energy-greedy.

Then came the time of portable instruments; most of the advanced data interpretation required additional office work. However, these machines are very expensive and are not fully capable of analysing the data. They mainly capture the data and show the trivial data, but then the expert has to analyse the data offline. Another problem is the periodical visits required. Often, these machines are located in difficult or even hazardous environments and the people in charge of maintaining the systems will go there once or twice a year, which corresponds to a very small amount of measurements.

Now has come the time for IoT. IoT is really the synonymous of small, compact, energy autonomous and affordable. Edge computing, as well as the related fog computing, are IoT's best friend. One IoT per critical equipment provides periodical business-oriented data.

However, what if the generation of experienced technicians soon will retire and all their knowledge will get lost? The solution will be an organization that requires no more travels on site, in sometimes dangerous, hazardous places, for instance by using HL2 PLDs (Place and Leave Devices). Business oriented data will be available on any screen (phone, tablet, PC), enabling targeted information (alerts for immediate action, warning for soon coming adverse events, long term monitoring).

The benefits of such organization are targeted maintenance, improved collection of long-term data, a reduced risk of breakage and thus longer lasting systems, reduced cost of operation, and thus an improved ROI.

No edge computing, no fun! All this is possible because we are now capable of embedding advanced software in small pieces running on very cheap microcontrollers with low memory and low power. Starting from a signal through maths and algorithms up to business-oriented information, it is possible to send alerts for immediate actions, warnings for planned actions, predictive maintenance due dates and preventive maintenance optimization.

There are different approaches of embedding software in the systems. hl2gener (ZeKat Group) favours a deterministic approach: This approach starts from real life, the physics— from this starting point data are collected and analysed. Another approach is the random approach, which features AI. Here, you start from neural networks, collecting and self-learning.

The deterministic approach is the more flexible one: You are adaptable because depending on the machine you can define parameters appropriately. Because the properties are known, you know whether the equipment matches the specifications (maker, ISO, etc.). Moreover, it is possible to reuse standard sensors.

With the random approach, you have to “take it or leave it”, because it is like a kind of black box. You have to ask the question, whether the equipment matches the self-learned model. This approach relies on proprietary sensors.

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Transport, Technologies and Tools related to Simulation

The afternoon was dedicated to common sessions on transport, technologies and tools related to simulation.

PATRICK VAUTIER, Head of Marketing and Innovation, RATP Dev, France, [ratpdev.com/en], provided a most interesting insight in the experiences made by a transport operator.

RATP Dev Experiences with AI and Big Data technologies: A major tool to improve performance

RATP Dev was founded in 2002 with the goal to develop, operate and maintain new transportation systems in France, Europe, and around the world, drawing on the know-how of RATP Group.

RATP Dev is committed to innovative mobility. RATP Dev's strategy is based on two pillars: open innovation and in-house innovation, by supporting future-thinking start-ups and encouraging their employees to think out of the box.

Special attention is put on new software solutions based on big data with the objective to better perform daily operations and to develop new and better services aligned with the needs and expectations of cities and inhabitants. Big Data can be applied to transportation to improve service for the public, such as traffic information, service interruptions, etc.). The diversity of data is used to improve knowledge and performance.

The company uses a very pragmatic approach based on use cases:

Network monitoring supports the analysis of operational contractual KPIs, traffic conditions, dwell time adaptation, bus fleet supervision and impacts on contractual penalty regimes. Understanding commuters' needs and behaviours is useful with regards to contracting KPIs. The reconstitution of origin and destination flows supports the design of the network and transport offering, as well as dealing with requests from cities authorities.

Calculating occupancy rates (passenger loads) is useful for the network design, as it enables better network sizing. The identification of fraud patterns is useful in the context of training ticket inspectors and directly impacts fare collection.

A dynamic replay of a day's events is useful for understanding past performance and exchange with the transport authorities. Simulation is used to create alternate transport scenarios. This is useful for dealing with peak times and overcrowded usage, and to adapt the number of services to the demand.

RATP Dev has been operating Kicéo since January 1, 2017. The bus system covers 23 towns within the Golfe du Morbihan - Vannes Agglomeration in Brittany, in the west of France. It also provides school transportation.

The highly efficient geographical coverage ensures that more than 170,000 people have access to a rapid public transit solution. To optimize service and costs, RATP Dev has progressively restructured the system. It revolves around three main routes focusing on the city of Vannes, which will gradually speed up travel times as bus frequency increases to every ten minutes.

The other routes and timetables have also been revised to make the system run more smoothly. In addition, on-demand transportation routes improve service to outlying residential areas. Finally, paratransit now includes evening service to cultural and sporting venues.

Kicéo is also matching new passenger practices by offering more digital services. For example, e-tickets can be bought via smartphone, and the "Mon car dans ma poche" app tracks school buses in real time.

In 2012, the tram was a completely novel concept in Casablanca, Morocco. Today, 140,000 people use it every day. Since the line opened, Casablanca's mobility needs have steadily increased. Residents find the tram a beneficial alternative that eases saturated road traffic. Passengers particularly applaud the tram's punctuality, expressing 95 percent satisfaction in a recent survey. That's a fitting tribute to the work accomplished by RATP Dev.

A combination of real time geo-localisation of vehicles, passengers' checks in and out enabled RATP Dev to estimate the occupancy. Simulations have been realised with regards to the impacts of changing headways and timetables on occupancy, regularity and passengers' satisfaction.

Lessons learnt from these experiences RATP Dev made with AI and big data technologies: It is important to make the analysis more obvious with longer and more comprehensive series of data, to accelerate creativity and testing, to change the way to instruct decision inside the organisation, to change the dialog between stakeholders—and, last but not least—visualisation is key.

MARC BOUCKER, Programme Manager, EDF R&D, France, [www.edf.fr], demonstrated the use of digital twins in nuclear plants.

Experience in Developing Digital Twins to Support Operation and Maintenance of French Nuclear Plants

There have been a number of breakthroughs during the last 30 years: Non-linear solvers, transient algorithms, advanced constitutive laws, multi-phase flow, mesh adaptation, parallel computation, multi-physics, multi-scale, probabilistic approaches, data assimilation, simulation plat-forms, and environments to develop, run and analyse.

During the last 3 decades, EDF R&D and his partners have built a quite comprehensive advanced simulation capacity, based on numerical tools and methodologies. This asset benefits to all group activities, i.e. electricity generation, distribution, and services.

There is no standard definition of a “digital twin”, but a set of common features: The digital twin of an industrial component or system (“object”) is a digital image of it, based on a virtual representation relying either on the physics (model centric) or on a data analysis (data centric),
or on both, as well as on a connection with the real object, allowing the twin to be updated with the received data.

A digital twin allows to individualize decisions according to each object, to extend the observation domain (limited in the real world) to the whole model, and to forecast the future object behaviour based on an optimal knowledge of its state at each time.

EDF operates 58 nuclear power plants in France. On each plant, the last barrier against accidental release of radioactive products in the environment consist in a prestressed concrete containment building. This structure is not replaceable, and the issue of ageing management has to be addressed with specific care for long-term operation. For this purpose, EDF developed digital twins for concrete containment building. These twins have to be as representative as possible of the actual ageing of the containment structures.

Built on the EDF Lab Les Renardières site, the VERCORS mock-up is an experimental tool to better understand the role and the evolution of water content in a concrete containment building. A large amount of data is collected on this experimental facility, whose age is going 10 times faster than a real containment’s one, and used to feed the digital twin of the mock up. The final goal of this research program is to design and implement relevant digital twins for full scale existing containment and to use them for maintenance and long-term operation purpose. Then, these digital twins have to be as representative as possible of the actual ageing of the containment structures

An “interoperable” organization built around VERCORS to last until the end of the experiment.

Digital twins form a new stage of engineering and analysis tools, to tackle more and more complex systems. They are already successfully used to support different objectives related to design/operation/maintenance/end of life of an industrial “asset”.

A successful example has been shown in the field of maintenance optimization of big components of nuclear plants, others are currently under development. This raises new scientific, technical and organizational challenges, such as handling and maintaining the inherent complexity (sensors, communication, data, simulation tools), the problem of multi-purpose digital twins, the capability to “update” the twin in real time and issues related to acceptability (users, regulators).

DEBORAH A. FOLOPPE, Post-Doctoral Researcher, University of Angers, France, presented two very recent studies on the use of virtual reality tools for simulation.

Simulation Tools Based on Virtual Reality Technologies

Simulation is the process of simulating something, or the result of simulating it. Simulation is the imitation, in some aspects, of a process of interest, on the basis of a model including parameters and variables, which are the images of the parameters and the variables from the process of interest. The process of interest can be of various kinds, e.g. astronomical, biological, social …

Physical and mechanical simulation are two main kinds of tools. But the most often, simulations are based on software, sometimes associated to elements of analogical computing. They are especially interesting convenient for the implementation and the control of models related to the focused process. For example, tools based on virtual reality (VR) can imitate realities, by replacing sensory input from real world with computer generated sensations (vision, hearing, touch, and even smell and taste).

A VR based system allows humans (users) to experiment virtual worlds and to perform some tasks in virtuo due to dedicated devices (pseudo - natural).

VR allows to experiment easily various scenarios and tasks and to fine tune parameters and variables. Interactive systems allow data recording and analysis. People can use VR, even if they are unfamiliar with technologies.

Study 1—A Virtual Reality-Based Tool to Investigate Spatial Planning:

The early neuropsychological assessment tools have been developed with the construct validity of the measure as a primary consideration. Such traditional tests are known to provide objective and standardized measure. However, they use specialized and decontextualized exercises which break the functioning unity of the multiple cognitive capacities. Thus, tests based on process-oriented exercises have been developed, such as the Zoo Map Test.

By soliciting various capacities to solve a practical problem, this test brings an interesting framework to assess multiple aspects of the planning. This test has shown its usefulness in various clinical populations. However, additional investigations are needed to understand planning behaviours in more details and measure them with improved accuracy and ecological validity.

To his end, this paper-and-pencil test has been converted into a Virtual Reality-based assessment tool of planning. The study examines the difficulties and the limits as well as the new opportunities in converting a 2D map consisting of roads and places into a 3D virtual environment.

Study 2—Comparing four interaction techniques on a simple structured navigation task using a Head-Mounted Display:

Virtual Reality is a scientific and technical domain that can provide mediums to dive users into an interactive 3D computer-generated world. Several processes of immersion give the user the feeling of having quit the real world and of being present in the virtual environment, physically as well as psychologically.

VR must provide a coherent experience in terms of sensory, cognitive and functional information. Fidelity, as the objective degree of exactness with which a system reproduces real-world, is hence a key point to design immersive VR-based systems.

Since the 2010's, low-cost cave automatic virtual environment and many Head-Mounted Displays (HMD) are available for immersive VR. However, navigation through 3D environments displayed in HMD is still challenging because it can cause sickness and disorientation. Since techniques based on haptic devices like keyboard and joystick have been extensively explored in the past, this study aimed to investigate the impact of the navigation technique on performance on a simple traveling-centered task and the user experience with the HMD HTC Vive.

The study compared four continuous navigation techniques: Arms Swinging, Walking-In-Place, Pointing and Touchpad. Results on the learning effect indicated that the repetition was especially beneficial for Directional Touchpad. With respect to the user experience, the results revealed a general discomfort of attendees with the presented systems, but they found themselves competent at the end of the experiment in the accomplishment of the proposed task. Joysticks or directional was associated to a failure in using the gaze to orientate the camera view in virtual reality.

LENA K. SWEDBERG, Quality Coordinator, Patient Security &Quality & **PETER RODMALM, Innovation Coordinator, Södertälje Hospital AB**, Sweden, presented a concrete example of using simulation to train hospital staff.

Södertälje Hospital AB, Sweden Smart Training Platform – An innovative simulation tool to prepare management and staff for the move to a new hospital building

The Södertälje Hospital is located in the city of Södertälje, 30 km southwest of Stockholm. It is a new hospital inaugurated in 2017. The hospital has the following medical wards: Anticoagulation, Emergency, Respiratory, Anaesthesia, Childcare, Diabetes, Diet, Paediatric, Maternity, Geriatric, Gynaecology, Infarction, Surgery, Obstetrics, Psychiatric, X-ray, Pain Treatment, Strokes, Ear, nose and throat. Sodertalje Hospital has a capacity of 183 beds and serves about 200,000 citizens.

A refurbished building opened in October 2019 with five wards. Relocation into new spaces (five medical and surgical wards to move into new wards, larger wards with single rooms and no change in staffing…) require staff education, training and orientation in order to provide competent and safe care. Moreover, there is a need to standardize work processes and routines.

The aim was to develop, test and evaluate a new simulation tool to prepare management and staff for the move to a new hospital building. The Smart Training Platform (STP) was identified as an innovative tool suitable for the project.

The STP simulation tool has been developed in the framework of an innovation project funded by the “Region Stockholm Innovation Fund”. It has been developed at South General Hospital Innovation in co-operation with Sodertalje Hospital Innovation.

The set-up of a STP simulation requires a 65” 4K touchscreen, a motorized stand with tilt function, a PC with FileMaker Pro Advanced, an iPad with FileMaker Go, a local WiFi-network, and speakers. It has to be suitable for simulating teamwork and facilitating team training. The tool requires a FileMaker DB with staff, patients, events, equipment, sounds, icons etc., a flexible frontend and digital game pieces for staff, patients, and MedTech devices. It requires functional buttons with sound to simulate patient calls, presence indication, call for assistance, emergency alarms, or code blue alarm, as well as an iPad for controlling the time of day, trigger events, alarms and phone calls.

The simulation sessions are led by two instructors: The facilitator coaches the staff focusing on the training aims. The game leader uses the control iPad to send out events to the game board, such as phone calls to the ward, calls from patient rooms and acute alarms.

Before starting, the participants receive an introduction: During a theoretical part specific training aims, such as orientation to the new floor plan and the use of standardized care routines and standards, were explained to the participants. Then, they receive a brief explanation of the simulation tool, the new signal system and how they move game pieces, respond and act on events, signals and alarms during the simulation.

The participants are given team roles and necessary information to get started. Patient data is showed on the digital prio-board.

"It´s 7.15 and you take over after the night shift- what´s your next move?" Events of all kinds will occur and make the team react, act and interact. The training focus is on teamwork and communication.

The facilitator pauses the simulation and asks the participants to reflect on an action they had just taken, to discuss if there might be another way of doing a specific task, to reflect on some other situation they might encounter at that time of day, to move forward and not get stuck on a specific topic too long.

The hospital management of the Södertälje Hospital used the STP simulation tool with regards to logistics, resource and staffing. The hospital's multi-professional team tested new standard "bedside rounds" within 1 session à 2 hours. With the help of STP, the nursing staff prepared work related to the new environment, systems and work processes and multi-professional teams (on site in new wards) used STP in parallel with" real life" simulation.

The nursing staff participants (104 persons) were asked to evaluate their experience of the simulation session using rating scores and a free text field for additional comments. The data was analysed using descriptive statistics. Verbal feedback was obtained from simulation sessions with the hospital management and multi-professional teams.

The ratings were in general very high with an overall satisfaction score of 9.0. Free text comments covered many aspects of moving to a bigger ward as well as the experience of the simulation session.

To conclude, STP is a very flexible and interactive tool, that can be easily adapted for other purposes. Mobile solution, simulation can be done on-site. Technical issues provide valuable input to a further development of STP.

The simulation was well tolerated by the participants—it is fun and easy to like! STP and realistic events promote awareness, critical thinking and active learning. Need for improvements include timing, group size, length of training and attendance of team leaders. The use of STP in parallel with "real life" simulation on site is on-going and promising.

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END

CONTACT

CONFERENCE DOCUMENTATION

All conference documentation, including programme, presentations and slides, speakers' profiles, participant's testimonials, photos and related information on the Global Forum 2019 are made available for download on the website of ITEMS International

http://globalforum.items-int.com.

HAVE A QUESTION OR COMMENT?

Please do not hesitate to contact ITEMS International if you need any help to get in touch with the participants of the Global Forum/ Shaping the Future.

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Your feedback is important to us and we would be pleased to receive your comments on this year's Global Forum as well as suggestions for the next year's Global Forum.

The team of ITEMS International will be pleased to answer any question and to provide you with more information about the 2020 edition of the Global Forum.

Please make sure to check our website regularly for updates.

ACRONYMS & ABBREVIATIONS

AD	Alzheimer's disease
ADL	Activities of Daily Living
AI	Artificial Intelligence
AIOTI	Alliance for Internet of Things Innovation
ANSSI	National Cybersecurity Agency of France
API	Application Programming Interface
AR	Augmented Reality
B-ADL	Basic Activities of Daily Living
BATX	Baidu, Alibaba, Tencent et Xiaomi
B2B	Business to business
CCTV	Closed-Circuit Television
CDO	Chief Data Officer
CEO	Chief Executive Officer
CNNIC	China Internet Network Information Center
CO2	carbon dioxide
COP21	21st Conference of Parties
CSIRT	Computer Security Incident Response Team
DG	Directorates-General
DoS	Denial of Service
EC	European Commission
EDA	Electrodermal Activity
e-ID	Electronic Identity
ENISA	European Union Agency for Cybersecurity
ERP	Enterprise Resource Planning
ESG	Environmental, Social, and Governance
eSIM	embedded-SIM
ETSI	European Telecommunications Standards Institute
EU	European Union
GAFAMI	Google, Apple, Facebook, Amazon, Microsoft, IBM
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GHG	Greenhouse Gas
GHz	Gigahertz
GNP	Gross National Product
GPS	Global Positioning System
G7	The Group of Seven
HFS	High Fidelity Simulation
HMD	Head-Mounted Displays
HQE	Haute Qualité Environnementale

I-ADL	Instrumental Activities of Daily Living
ICANN	Internet Corporation for Assigned Names and Numbers
ICMASim	International Conference for Multi-Area Simulation
ICT	Information and Communication Technologies
ID	Identity
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Rights
iSIM	integrated SIM
ISO	Organisation for Standardisation
IVR	Interactive Voice Response
ITU	International Telecommunication Union
KVI	Key Value Item
KYC	Know your customer
LCA	Life-Cycle Analysis
LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
LoRa	Long Range
LPWAN	Low Power Wide Area Network
MDG	Millennium Development Goals
MEMS	Microelectromechanical Systems
MES	Manufacturing Execution Systems
MIIT	Ministry of Industry and Information Technology
NBS	Nature-based solutions
NHI	Next Generation Internet
NIS	Network and Information Security
NIST	National Institute of Standards and Technology
NOTICE	National Operation Towards IoT Clean Environment
NSA	Non-standalone
OECD	Organisation for Economic Co-operation and Development
OR	Operations Research
OSU	Ohio State University
PhD	Doctor of Philosophy
PKI	Public Key Infrastructure
PM	Prospective Memory
PPP	Public Private Partnership
PRC	People's Republic of China
PV	Photovoltaics
P2B	Platform-to-Business
QoS	Quality of Service
REX	Return on Experience
RFID	Radio Frequency Identification
ROI	Return on Investment
RoT	Root of Trust
RPA	Robotic Process Automation

SA	Standalone
SDG	Sustainable Development Goals
SMILE	SMart Ideas to Link Energies
SSHRC	Social Sciences and Humanities Research Council of Canada
STP	Smart Training Platform
SoS	System of systems
TCCA	The Critical Communications Association
TOP	Tactics to Optimize Potential
TRON	The Real-time Operating system Nucleus
TV	Television
UNDP	United Nations Development Programme
URLLC	Ultra-Reliable Low-Latency Communication
US	United States
USA	United States of America
USD	US Dollar
V	Volt
VOD	Video on demand
VR	Virtual Reality
V2X	Vehicle-to-everything
WEF	World Electronics Forum
XML	Extensible Markup Language
ZB	Zettabytes
2D	Two Dimensional
3D	Three Dimensional
3GPP	3rd Generation Partnership Project
4G	4th Generation
5G	5th Generation

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