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ET À L'INNOVATION

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Secrétaire d'État aux Numériques et à l'Innovation



EINDHOVEN



THE INTERNATIONAL THINK-TANK ON THE DIGITAL FUTURE



DIGITALIZATION: THE GLOBAL TRANSFORMATION

Monday 19th & Tuesday 20th
September 2016

Evluon Center, Eindhoven, Netherlands

PROCEEDINGS

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Report written by
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ACKNOWLEDGEMENTS

Global Forum/ Shaping the Future celebrated its twenty-fifth birthday on Monday, 19th and Tuesday, 20th, September 2016 in Eindhoven, Netherlands.

We enjoyed two days of inspiring keynotes, expert panels, lively debates and networking, and we would like to take this time to thank all the persons and organisations who helped us making this anniversary edition of the Global Forum a success.

We would like to express our sincerest thanks to the City of Eindhoven for hosting the Global Forum and providing such excellent meeting facilities. Thank you so much for the wonderful welcome cocktail at the Philips Museum.

We send our warmest regards and a heartfelt thank you to all our distinguished experts, moderators, chairpersons and speakers, who have generously given us their time and expertise. Their knowledge, passion and commitment were inspiring and informative for us all. It was a true honour and pleasure to have you participate in this 25th edition of Global Forum/Shaping the Future.

We were fortunate to have the support of world class sponsors and, we would like to extend a special thanks to

the main sponsors of the Global Forum 2016 for their spirit of sharing, support and generosity:

NxtVn, The GSM Association GSMA, AT&T, GPI Group, France Génétique Elevage, Nokia, Afiliat, Engie, Synopsys, Airbus Group, eBay, SecureNinja, IBM, and Byte.

As well as the supporting sponsors, which are:

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This 25th Global Forum 2016 has been a great event according to the numerous feed-back and the new initiatives and partnerships which steemed from it. We would like to thank you all for accompanying us on this adventure since so many years now and we look forward to having you in the coming years too.



Sébastien Lévy
Vice-President of the Global Forum



Sylviane Toporkoff
President of the Global Forum



The Global Forum 2016 was realized with the active and efficient support of its sponsors and support partners

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SUPPORTING PARTNERS



PROGRAMME

 19 September 2016

Welcome Addresses

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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

Joep Brouwers, Vice Director, Brainport Development, the Netherlands

Mark Bressers, Director of the Directorate-General for Enterprise and Innovation Regulatory Reform and ICT Policy Department, Ministry of Economic Affairs, the Netherlands

Marta Arsovska-Tomovska, Minister of Information Society and Administration, Macedonia



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Opening Session

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Future Vision

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1st Day

Chair & Moderator:

Ambassador **Miriam Sapiro**, Partner, Finsbury, USA

Keynote Speakers:

Theresa Swinehart, Senior Vice President, Multistakeholder Strategy & Strategy Initiatives, ICANN – Internet Corporation for Assigned Names and Numbers

Hiroyuki Hishinuma, Director, International Economic Affairs Division, Global ICT Strategy Bureau, Ministry of Internal Affairs and Communications (MIC), Japan
ICT Policy in Japan for the Internet of Things (IoT)/Big Data (BD)/ Artificial Intelligence (AI) Era

Mark Bressers, Director of the Directorate-General for Enterprise and Innovation Regulatory Reform and ICT Policy Department, Ministry of Economic Affairs, the Netherlands

Suvi Linden, Chairperson NxtVn Finland, Former Finland Minister of Communications Responsible for Media and Telecommunications 2007-2011, Finland

Per Blixt, Adviser for International Relations linked to Future Networks, European Commission

David Kibler, Consultant with Director General – Digital Affairs, General Directorate of Globalization, Culture, Education and International Development, Ministry of Foreign Affairs & International Development, France



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Session 1

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Infrastructures Challenges for Digitalization

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1st Day

Chair:

Antonio Amendola, Executive Director International Regulatory Affairs, AT&T

Moderator:

G rard Pogorel, Professor of Economics and Management-Emeritus,
Telecom ParisTech, France

Speakers:

Cl ment Allain, R&D project manager on precision livestock farming at the
French Livestock Institute, France
Main Challenges for a Precision Livestock Farming

Paul Wormeli, Innovation Strategist, Wormeli Consulting LLC
How to build: Information Sharing Environment

Michael Stankosky, Research Professor, George Washington University,
USA
21st Century Architectonic Organizational Concept

Erik Huizer, CTO Surfnet, the Netherlands / Chair, Dutch IPv6 Task Force
IPv6
IPv6

C cil Ameil, Chairperson Working group on regulation, ESOA – European
Satellite Operators Association
Infrastructure Challenges for Digitalization

Herman Schepers, Senior Director, Government and Regulatory Affairs,
GSMA

G rard Santucci, Adviser for Cross-cutting Policy/Research Issues, DG
CONNECT, European Commission
A Digital Single Market -- Where are we one year on?



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Digital Health Revolution Improving Society

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1st Day

Chair:

Giuseppe Grassi, Director Cardiology Department- Venice Hospital ULSS 12, Italy

Moderator:

Ingrid Andersson, CEO, Corporate Wellbeing, Oman

Speakers:

Ian Craddock, Professor University of Bristol / Director, SPHERE (an EPSRC IRC) United-Kingdom
Digital Health Revolution – SPHERE

Sophia Eberhard, MD, Senior Consultant in Psychiatry, Head of the Child – and Adolescent Inpatient Clinic, Malmö University Hospital, Sweden
Digital health, Sweden Sept. 2016: Progress and setbacks

Bernard Grundlehner, System Architect, IMEC, the Netherlands
Building Stones of a Longer Life

Alexis Normand, Healthcare Development Director, Withings, France
From Quantified-Self to Population Health

Janet Munro, SVP of Clinical Science, IXICO, United-Kingdom
Digital Health – improving care quality and outcomes

Toni Pekkola, Project Planner, JAMK University of Applied Sciences, Finland
Digital Health Revolution Improving Society – Personnel and clients in the middle of change

Line Kleinebreil, Consultant, “Be He@lthy Be Mobile” WHO /ITU program (World Health Organisation/International Telecommunication Union); Vice-President, Université Numérique Francophone Mondiale (UNFM)
Be He@lthy Be Mobile

Joe Jarzombek, Global Manager Synopsys- Software Assurance, USA
Cyber Security for Network-Connectable Devices

Nagaaki Ohyama, Professor Imaging Science and Engineering Laboratory, Tokyo Institute of Technology, Japan
Pragmatic approach to PHR in Japan



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Afternoon Keynote Session

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Moderator:

Outi Rouru, Senior Advisor, International Affairs, Central Administration, City of Oulu, Finland

Keynote Speakers:

Elly Plooijs – Van Gorsel, Independent Chair of the e-Strategic Council, the Netherlands

A future Identity-hub in Europe: a Dutch approach

Stephen Brennan, Chief Digital Advisor, Irish Government; founder and CEO, Centuri Analytics, Ireland

Small Business Trading Online

Kirsi Ekroth-Manssila, Head of Unit for KETs (Key Enabling Technologies), Digital Manufacturing and Interoperability, DG GROW, European Commission

Accelerating the digital transformation of European companies

Steven Lafosse Marin, Head of Sales Private Sector CyberSecurity, Airbus Defence and Space – Cybersecurity, France

From Cyber quantification to Cyber enforcement plan, with C-Level



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Cyber & Security

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1st Day

Chair & Moderator:

Steven Lafosse Marin, Head of Sales Private Sector CyberSecurity, Airbus Defence and Space – Cybersecurity, France

Speakers:

Michel van Leeuwen, Head of Cybersecurity Policy Division, Directorate for Cyber Security, Ministry of Security and Justice, the Netherlands

Don Davidson, Chief, Lifecycle Risk Mgt + CS/Acquisition Integration Division, In the Office of the Deputy DOD-CIO for Cybersecurity (CS), US Department of Defense, USA
Cybersecurity (CS) (as a Risk Based Approach)

Philippe Wolf, Project Manager, IRT – Institut de Recherche Technologique SystemX, France
*An experimental and technical cybersecurity platform
CHESS (Cybersecurity Hardening Environment for Systems of Systems)*

Chris Clark, Principal Security Engineer – Strategic Initiatives, Synopsys, USA
Are We Walking Yet?

Jacques Bus, Secretary General DEF Digital Enlightenment Forum, Belgium
The Effects of Big Data and Autonomous Systems on the Individual and Society

Koffi Fabrice Djossou, Senior Sales Director, Africa, ABS – Africa Broadcast Satellite, South Africa
Towards an African Vision of Cybersecurity Governance

Louis Granboulan, Cybersecurity Expert, CTO, Airbus Group Corporate, France
The risk of uniformity

Shakeel Tufail, CEO, Secureninja, USA
Crucial Investments in Cybersecurity & Digital Criminality



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The Digital Industry:
The Fourth Industrial Revolution and Societal Challenges

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Chair:

Desiree Miloshevic, Senior Public Policy and International Affairs Adviser,
Afilias, Ireland

Moderator:

David Langley, Senior Research Scientist, TNO, the Netherlands

Speakers:

Denis Gardin, Senior Vice-President, New Technology Ventures & Managing
Director, Airbus, France
Opportunities and Challenges in Digital Manufacturing

Marc Vancoppenolle, Global Head, Government Relations, Nokia, Belgium
Internet of Things -- Unlocking the IoT opportunity

Jeremy Millard, Senior Consultant, Danish Technological Institute, Denmark
Productivity, manufacturing & choices about the future of work

Adrianus Melkert, Director of The Board, NXTVn, Finland
From Disruption to Reconnection

Marie Ekeland, Member, CNN – Conseil National du Numérique ; Founder,
Daphni, France,

Raphael Schoentgen, Director Research and Technologies (CTO) and
Member of the Executive Committee, ENGIE, France
Smart Energy – What does it mean ?



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Revaluating Policies & Regulation

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Chair:

Jean-Pierre Blais, Chairperson and Chief Executive Officer, CRTC –
Canadian Radio-television and Telecommunications Commission, Canada

Moderator:

Thaima Samman, Partner/associated lawyer/President European Network for
Women in Leadership

Speakers:

Radoslav Repa, Third secretary, Permanent Representation of Slovakia to
the EU; Chair of the Telecom and Information Society Working Party of the
Council of the EU, Belgium
*The Digital Single Market and its Priorities under the Slovak Presidency of the
Council of the EU*

Serafino Abate, Director of Competition Economics, GSMA Government and
Regulatory Affairs

Antonio Amendola, Executive Director International Regulatory Affairs,
AT&T, Belgium

René Arnold, Head of Department Markets and Perspectives; WIK-Consult,
Germany

Suvi Linden, Chairperson NxtVn Finland

Nigel Hickson, Vice President, UN and IGO Engagement, ICANN

Sarah Zhao, Partner, Faegre Baker Daniels LLP, China
New China Internet and Cybersecurity Rules



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Keynote Opening Session

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Chair & Moderator:

Jay E. Gillette, Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, University of Oulu, Finland 2014-2015; Professor of Information and Communication Sciences, Center for Information and Communication Sciences, Ball State University; Senior Research Fellow and Institute Secretary, Digital Policy Institute
What We Need to Know Now: Essential Learning for People and Organizations in the Information Economy

Keynote Speakers:

Christian Buchel, Deputy-CEO, Chief Digital & International Officer (CDIO), ENEDIS; Vice-Chairman of EDSO, France
Smart Grids for Energy Transition

Julia Glidden, General Manager, IBM Global Government Industry, USA
Improving Society One Citizen at the Time

Gwenael Prié, Lead Digital Specialist, AFD – Agence Française de Développement, France
Accelerating development through digital technologies

Khaled Sedrak, Founder and CEO, NxtVn, Belgium

Yoshio Tanaka, Professor, Tokyo University of Science (TUS), Graduate School of Innovation Studies, Japan
Changing Industry Architecture by Things and Systems



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Innovation / Open Innovation in a Digital World

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Chair:

Bror Salmelin, Advisor to the DG for Innovation Systems DG CONNECT
(Communications, Networks, Content and Technology) European Commission
Modern innovation - drivers and challenges

Moderator:

Mariane Cimino, CEO of Group Homecare, Expert in health digital
transformation ITG, France

Speakers:

Giulia Barbagelata, International cooperation, Stam, Italy
*The INCONET – GCC 2 Network: Strengthening EU & Gulf Countries
cooperation in research & innovation*

Raphael Briner, Chief Marketing Officer & Co-founder, Knowledge Plaza,
Switzerland
Innovative alliances in a connected world

Julia Glidden, General Manager, IBM Global Government Industry, USA
Open innovation: Improving Society One Citizen at a Time

Laurent Journaux, General Secretary Inter-professional Association for
Genetic improvement of ruminants, France Génétique Elevage, France
*ICAR: a Professional NGO involved in standardisation in the field of ruminants
production*

Nikolaus Lindner, Director Government Relations DE/AT/CH and Russia,
eBay Inc. Public Policy Lab EMEA, Belgium

Mika Rantakokko, Chief Operating Officer 6City Strategy, Open Innovation
Platforms, BusinessOulu, Finland
*Smart Cities in the Forefront of Digitalization – The case of the Six City
Collaboration from Finland*

Jyan-yi (Jeremy) Shen, Economic Counsellor, Taipei Representative Office
in the Netherlands, Taiwan
Open Innovation in Taiwan



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Workshop: Cyber and Supply Chain

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2nd Day

Chair:

Don Davidson, Deputy Director CS/Implementation & CS/Acquisition
Integration, Office of the Deputy DoD CIO for Cybersecurity, USA
Supply Chain Risk Management (SCRM)

Moderator:

Bénédicte Suzan, CIS, R&T and Innovation Coordination, Airbus Defence
and Space, France

Speakers:

Colin Williams, Director SBL, United-Kingdom

Joe Jarzombek, Global Manager, Software Supply Chain Management,
Synopsys Software Integrity Group, USA
Procurement Language for Supply Chain Cyber Assurance

Gérald Santucci, Adviser for Cross-cutting Policy/Research Issues, DG
CONNECT, European Commission

Isabelle Hirayama, Strategy Analyst, IRT – Institut de Recherche
Technologique SystemX, France
Supply Chain and Cybersecurity Strategy

Philippe Wolf, Project Manager, IRT – Institut de Recherche Technologique
SystemX, France
Cybersecurity Best Practices

Florence Nnanga-Dupré, Security Policies & Compliance Manager, Airbus
Group, France
Building Trust & Confidence in the Supply Chain

Yannick Fourastier, Innovation Manager, Industrial System Design,
Cybersecurity, Airbus Group Corporate, France
Vendors assessments--Cybersecurity goods & services support

Alain Ribera, Senior Manager Cyber Security Program, Airbus Group
Corporate, France
Q&A



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Smart City & Region

2nd Day

Moderator:

Hugo Kerschot, Managing Director, IS-practice, Belgium

Speakers:

Gaby Rasters, Strategic Advisor, City of Eindhoven, the Netherlands
Introducing Smart Society Eindhoven

Mika Mannervesi, Director of City Development Services, City of Salo, Finland
Your partner in smart technology: Salo, Finland

Eric Legale, City of Issy-les-Moulineaux, France “Smart Living”
How Smart mobility modes will really change everyday life?

Céline Vanderborght, Smart City Manager Brussels Region, Brussels Regional Informatics Centre (BRIC), Belgium
Brussels Smart City

Cristina Pronello, Professor Interuniversity Department of Regional and Urban Studies and Planning, Politecnico di Torino, Italy
How much the multimodal real time information are effective on travel behaviour change? A case study in Europe – the OPTICITIES project

Eikazu Niwano, Producer R&D Planning Department, NTT Corporation, Japan
Tokyo2020 and Scenario-based Totalized Smart Cities

John Jung, Executive Director ICF Canada (Toronto); Chairman & Co-founder Intelligent Community Forum (NYC); President, Intelligent Community Forum Foundation (NYC), Canada
Smart Mobility in Smart Communities

Eelko Steenhuis, EU Project Advisor, Cities Northern Netherlands, The Netherlands
Groningen, facts and figures

Jiri Bouchal, Project Manager, IS-practice, Belgium
Open Transport Net -- Visualizing Open Data in Transport

Jean François Soupizet, Scientific Counsellor, Futuribles International, France
Smart cities: a few questions for a starting point



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The Data Revolution

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Chair:

Hervé Rannou, Président CitizenData, France
Data issues & questions

Moderator:

Jeremy Millard, Senior Consultant, Danish Technological Institute,
Denmark

Speakers:

Scott Cunningham, Associate Professor of Policy Analysis, Delft University of
Technology, the Netherlands
Scenarios for the Big Data Revolution

Sandro Etalle, Professor Head of Security Group, TU/e – Eindhoven
University of Technology, Netherlands
Where is my Money Data?

Stephane Grumbach, Research Director, INRIA, France

Ali Kone, Chief Operating Officer/Co-Founder, Coders4Africa Inc, USA
Waziup: Open Data Innovation

Herbert Lust, Vice-President and Managing Director, Conservation
International Europe, Belgium

Erik Rehben, Senior Consultant Animal Traceability Development and
Valorization, Institut de l'Elevage – French Livestock Institute, France
A new actor in data revolution in agriculture in France: API AGRO

Alfredo Ronchi, Secretary General EC MEDICI Framework, Politecnico di
Milano, Italy
My data are still mine?

Arjan van den Born, Academic Director, Jheronimus Academy of Data
Science; Professor Creative Entrepreneurship Tilburg University
Creating value with data -- Overcoming the Hype



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 organisations 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****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 25th edition of Global Forum took place on Monday, 19th and Tuesday, 20th, September 2016 in Eindhoven, Netherlands.

Once again, the Global Forum attracted 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:

DIGITALIZATION The Global Transformation

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 2016 are listed in chronological order corresponding to their sequence in the final conference programme, as listed in the beginning of the present document.



Welcoming Addresses

Day 1 – Morning – Plenary Session

SÉBASTIEN LÉVY, Vice President Global Forum/Shaping the Future & Partner Items International, France, welcomed the attendees and opened the 25th edition of the Global Forum in Eindhoven.

This year, Global Forum/ Shaping the Future is celebrating its twenty-fifth birthday.

A quarter century! Such a long life was hard to imagine when starting in 1992 with the birth event of the Global Forum in New York: the Europe/United States Meetings on Cooperation and Competition in Telecommunications.

25 years is a very long time considering the incredible pace with which technology has evolved. In 1992, the first website just went online, personal computing was in its infancy, and a mobile phone took your entire hand to hold it... When you compare technology and its role in our lives, in 1992, with their nature and impact today, it seems like 250 years have passed!

At the same time, these past twenty-five years have flown by. About seven thousand people from more than thirty different countries attended the Global Forum since its beginnings.

The role of the Global Forum has always been to highlight current trends and to provide a meeting point for 'old' and 'new' friends to present and exchange ideas in an exclusive frame. This is something of great value -- especially in times like these. For twenty-five years many of you have been a part of this story.

Sincere thanks to all those who have contributed in so many different ways to the success of the Global Forum over the years. A special thank you to all the sponsors, without whom it simply wouldn't be possible to reach the scale and the quality that we have become known for.

These organisations represent in an excellent way the spirit of cooperation and dialogue in which the Global Forum was born and which continues to make it a unique event.

It is an immense pleasure to hold this years' Global Forum in Eindhoven, which is both one of the oldest and largest cities and one of the most modern and innovative cities of the Netherlands.

To celebrate this quarter of a century, the Global Forum 2016 is guaranteed to provide an exciting programme full of inspiring presentations and awesome speakers.

The Vice President of the Global Forum wished an enjoyable and fruitful time at the conference -- This is the beginning of the next 25 years!



energy transition. The machines used in China to build solar panels are built in the Eindhoven Brainport region—but they are not used there!

The Brainport strategy also addresses mobility problems in the Netherlands. Companies like TomTom and NXP are very strong in the mobility market. Moreover, there are enormous challenges in the domain of safety and security and in the domain of food. All those technologies can help to bring people a better and sustainable life for many decades.

MARK BRESSERS, Director of the Directorate-General for Enterprise and Innovation Regulatory Reform and ICT Policy Department, Ministry of Economic Affairs, the Netherlands, welcomed the participants to Eindhoven. He wished all a fruitful conference with a lot of inspirations and concrete ideas on how to solve societal challenges and on how data and digitalisation can help.

One of the main concerns of the DG for Enterprise and Innovation at the Ministry of Economic Affairs is how to create growth in the Netherlands through digitalisation of the Dutch economy. Digitalisation is fundamental for economic growth: up to 1/3 of the economic growth in the Netherlands is directly related to digitalisation and ICT. Moreover, digitalisation is vital for dealing with all kinds of societal challenges, the biggest challenges of these times. Going in the digitised era is really key to solve these questions and the Netherlands has a good position to be there and to solve these issues. The Netherlands has two traditional main ports, the Port of Rotterdam and the Amsterdam-Schiphol Airport, but the country as a whole is a kind of digital gateway to Europe.

The Netherlands has an excellent digital infrastructure. The country has the biggest Internet exchange in Amsterdam, and nearly everyone is connected to the Internet. But that is not all. The Dutch are rather tech-savvy and a lot of people are interested in IT and new ideas. The Dutch are always the first to adopt Apps—and the first who drop them down once they get bored of it. This makes the Netherlands a good test bed for new solutions and new ideas.

Moreover, there is a very strong relationship between innovative businesses, research institutions and the Netherlands, Brainport is one of the best examples of this kind of triple helix.

There is also a lot of international research, especially in the field of ICT. The Netherlands is third in the world in terms of ICT research. In this way, the country really makes a strong contribution to this knowledge base. All together, that has lead to a situation where a lot of innovative businesses, including a lot of start-ups, have found the Netherlands a good starting point for developing their business; for these companies, the Netherlands are a kind of digital bridge to the rest of Europe.

However, there are also a lot of challenges to face. Digitalisation is not a Dutch challenge, it is not about finding Dutch solutions. We really need to help each other to invest in cooperation. For instance, getting established the EU Digital Single Market was one of the main priorities during the Dutch Presidency of the Council of the European Union. We need to make the cake bigger for all and digitalisation is the key to it.



MARTA ARSOVSKA-TOMOVSKA, Minister of Information Society and Administration, Macedonia, thanked the organisers and warmly welcomed the audience.

We are experiencing the 4th industrial revolution which scale and scope and complexity is transforming our lives unlike anything before. Digital transformation as the next step in the digital revolution is pre-requiring digitalisation.

15 years ago, a singer from Macedonia complained about her declined hardcopy sales. Friends suggested that it is time to digitalise. She took the advice and put her MP3s to Napster and other online platforms. Her popularity increased. Yet, her revenues from the albums sales were poor. Over the years, she started searching for innovative business models. She discovered iTunes, started selling music online. Facebook and Twitter helped her not only to better connect with fans, but to develop buzz around her new songs and spread them virally. Cloud computing enabled her fans to remotely store her music and access it virtually from any device. It was the technology, but also the innovative business models that boost the demand for her concert ticket sales. Although she shared her revenues with business partners she never met, the revenue streams became more stable and diversified and she kept searching for new possibilities.

This is just a simple illustration of how we, as people, businesses and societies are changing. It is not about pure digitalisation, which simply involves taking an existing process and then improving it by using digital methods. Digital transformation goes deeper and means creating new strategies and new models which lead to a new and better way of providing value.

Since 2000, 45 percent of the Fortune 500 companies are gone as result of a digital business models creating disruption in the marketplace.

We are living in exponential times. What does this mean for governments? What is the impact of governments and what impact can governments have?

Macedonia is a small country but the country has a sound agenda for digital transformation. It has identified four main pillars in its digital agenda: Macedonia decided to be digital by nature—meaning providing universal access to the technology and a common understanding of how to use it. Digital by design—means moving towards an integrated whole-of-government model supporting innovation and technological development. And digital together—meaning redistributing and decentralising power and governance as well as nurturing partnerships and participation. And finally, digital, but still human—meaning continuously building human capacity for the future.

The building blocks of the pillars may have poetic names, but they are vast and purely tangible, ranging from regulatory guillotine to performance dashboard. From the digital divide to broadband and 5G. From computer infrastructure to cloud computing. From interoperability to electronic service delivery. From geolocation data to big data and crowdsourcing. From smart cities to smart energy. From open government data to open government services. From leading to code to e-learning. From innovation to commercialisation. From pervasive surveillance systems to privacy. And from physical to cybersecurity.

The challenges we have are all the same and we must prove capable to embrace disruptive changes.



--- ◆◆◆ ---
Q&A

The question addressed to **Minister Arsovska-Tomovska**, was about ICT human capacity building, especially concerning young people.

The Macedonian government has imposed the very serious goal of doubling the number of graduated IT engineers by 2020. By introducing coding and computer programming even in elementary schools, a rather systematic approach has been taken to foster early adoption. Today, 8 year olds are learning to design algorithms.

Moreover, the government has opened vocational IT secondary schools, new IT faculties and an entire new IT university. These faculties opened 7 to 8 years ago. The number of ICT faculties has been increased as well as the number of students and the number of teaching personnel. And even more teaching staff is needed, to allow teaching in small groups of students and to further increase the quality.

Campaigns like “girls in ICT” or “women in ICT”, have been launched. These campaigns are not related to gender balance but to use the entire potential of the country. In order to be competitive in a knowledge economy, a country has to have engineers. One way is to produce practical engineers from the early childhood and to motivate these young children to go into technology.

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Opening Session

Day 1 – Morning – Plenary Session

Future Vision

Ambassador MIRIAM SAPIRO, Partner, Finsbury USA, the chair and moderator of this keynote opening session, welcomed the participants and briefly set the scene by highlighting the tremendous challenge before all of us: to think and to plan for a future that none of us can possibly know what it will look like.

We all know that the Internet has been a revolutionary and transformative force in our lives. Just multiply the changes we have seen the last 5, 10, 20 years by a multiple of at least 10 to think about the magnitude of what is coming next. What are the implications for business leaders, for civil society leaders, for governments, for all of us? We have to factor into these questions the added uncertainty that we have right now with respect to elections, in the US and in Europe. We see populist and nationalist views gaining major influence on the US presidential elections under way right now, and also sweeping across the UK, France, Germany, Austria, Hungary, the Netherlands, and elsewhere. Non-mainstream candidates are tapping successfully into growing voter anger and frustration towards incumbent governments, which they blame for reduced economic opportunities and a host of other problems. The implications of this shift are likely to be long-lasting and significant for global businesses and organisations and for the governments that represent them.

Business leaders have already begun planning for this novel environment and developing new strategies to maximise growth and to reduce risk. We are looking behind traditional messaging and advocacy to develop new ways to communicate with key stakeholders to build support and to defend against likely attacks. E.g., traditional messaging that tie corporate goals and success to economic growth is no longer as credible with many stakeholders. One area of particular concern are changing views on international trade and its impact on cross-border transactions and investments. Trade has become a toxic word in many countries and blamed for a variety of shortcomings that are actually not related. This is unfortunate, especially with respect to our vision for a digital future, where we depend on the ability of data and other forms of information to cross borders seamlessly and effortlessly.

Trade agreements that are done right can tear down digital barriers and help create a digital economy that works for all. The following twelve principles embody the points made above—and if embraced more globally, they can help fight balkanisation of the Internet.



The “Digital Dozen”:

- 1) Preserving a free and open Internet.
- 2) Adopting a prohibition against imposing customs duties on digital products.
- 3) Securing basic non-discrimination principles for goods and services.
- 4) Ensuring cross-border data flows consistent with consumer privacy.
- 5) Preventing localization barriers (meaning a country can not demand that there will be a local cloud or a local data center as a condition of doing business).
- 6) Banning forced technology transfers when companies want to establish a presence overseas.
- 7) Protecting inventors’ source code. You should not have to share your secrets in order to do business in another country.
- 8) Ensuring companies and organisations can select the technology that works best for them. Taking advantage of the choice of platforms that we have today.
- 9) Promoting innovative authentication methods such as electronic signatures.
- 10) Protecting consumers when they use the Internet.
- 11) Safeguarding network competition.
- 12) Foster innovative encryption, so we don’t have to chose between privacy and security.

None of these topics is easy to tackle, but these issues and many others are addressed during this opening session.

THERESA SWINEHART, Senior Vice President, Multistakeholder Strategy & Strategy Initiatives, ICANN – Internet Corporation for Assigned Names and Numbers, underlined that it is very hard to predict the future of the digital society. We are clearly in a global transformation due to technology and everything is quite anticipated. In her keynote, she focussed on some components that are relevant to enabling any future vision of our digital society and addressing any sort of global transformation.

Ms. Swinehart put this into three broad categories: Inclusivity, flexibility to embrace disruptive technologies and change, and the evolution of governance models.

Inclusivity refers to the inclusivity of users, of stakeholders, of ideas. We need to bring parties together. We need to bring the next billion that is coming online together—this is also part of the UN agenda with regards to connecting the next billion.

But with that, we also need to be enabling the use of language, encouraging the use of languages online. We need to be ensuring norms of engagement that encourage participation and policy development for invasions. And we need to take on policy development processes that bring all stakeholders together impacted by a decision. We need to be identifying the interdependencies across the different issue areas, whether it is education, or healthcare or anything else of that sort. One could say, this is an example of what multi-stakeholderism is about, but it is much more than that: it is finding solutions that are sustainable.

The flexibility to embrace disruptive technologies and changes. With cyberspace being so transformative, nobody predicts where we are today and we need to be embracing that. Corporations, organisations and institutions need to evolve to be sufficiently flexible to transform with the digital environment, regardless of the sector.



Customers are demanding different services and how they engage with us, but it is not just corporations and organisations and meeting the needs of their customers. It is also the flexibility to new approaches with regards to policies, regulations for addressing issues and those interdependencies. It requires being aware of what is happening in the broader ecosystem and preparedness for the change.

So, if we look at somebody's components and we look at the evolution of governance structures around different organisations, we need to have that flexibility to embrace the new players. We have seen shifts in how governments conduct business for companies and organisations, whether in response to citizens, shareholders or stakeholders.

ICANN has seen a shift in the governance conversations around ICANN and its responsibilities. ICANN is an organisation with a very limited mission and mandate. The core at its inception has always been the full privatisation of the DNS (Domain Name System). That is the final transition of the US stewardship role, of the contract it has with ICANN and is ending this historical relationship. It has been a commitment since the interception of the organisation through the public and democratic administrations and a lot has changed since the formation of the organisation in 1998. ICANN evolved with those times, inclusivity and the evolutions.

In March 2014, the administration announced its intention on the transition. And ICANN has been moving forward with that, with the community, to prepare a package of proposals that meet the criteria set out by the US administration. This package of proposals has both operational elements and governance elements. It establishes a set of checks and balances in order to ensure that all mechanisms are in place in the evolution of the governance structure of this particular model.

ICANN and the global community are looking forward and anticipating this conclusion at the end of this month. With that, we see an evolution of the governance models of this particular institution.

To conclude, we have transcendent years of change and communications—headed as clearly unpredictable, no day looks the same. What is predictable though, is the need for inclusivity, the need to be flexible for disruptive technologies and change and to be prepared for that, and the ability to evolve in the government structures as we need to do that. This will be key for policy regulatory areas to ensure we don't unintentionally harm the digital societies' evolution or the benefits of the next generation.



HIROYUKI HISHINUMA, Director, International Economic Affairs Division, Global ICT Strategy Bureau, Ministry of Internal Affairs and Communications (MIC), Japan, reminded that digitalization is simply the combination of 0 and 1. Through digitalization, data can be processed by computers and computers capacity and technological advancements increase year by year.

ICT Policy in Japan for the Internet of Things (IoT)/ Big Data (BD)/ Artificial Intelligence (AI) Era

Recent trends are the IoT, big data and AI. Data can be gathered from the real world by using the IoT, e.g., data sensing. Data can be accumulated to big data, and big data can be analysed by AI. The results enable us to solve societal issues, for instance, issues related to an aging population, regional disparities etc.

Another example is Digital Terrestrial Television (DTT). Integrated Service Digital Broadcasting-Terrestrial (ISDB-T) will enable data broadcasting, mobile reception (one-SEG) and disaster prevention, such as the Emergency Warning Broadcasting System (EWBS). It is thus solving social and economic issues, digital and regional divides.

IoT, big data and AI support the creation of new values. New ICTs, such as the IoT, are expected to play a more important role through the improvement of productivity in the companies and the creation of new products and services.

IoT, big data and AI lead to a new service image:

In healthcare, doctors can detect abnormalities with wearable terminals, and thus are able to provide usual hospital services at home.

In smart cities, a large number of transportation services are connected over the network to support safe automatic driving in urban areas.

ICT in education allows connecting each person's terminal over the Wi-Fi network to provide optimum learning tools to everyone according to his or her individual proficiency.

In smart farming, the IoT connects numerous sensors to the farmland and the livestock in order to manage each individual animal according to the environment and growth without any workforce required

In April 2016, the G7 ICT Ministers' Meeting took place in Takamatsu, Japan. The Charter for the Digitally Connected World states "Information and Communications Technology (ICT) has become a driver for a range of social and economic activities and an engine for economic growth and human prosperity." The intention is to define a kind of common goals with respect of free flow of information, oppose of data localisation, privacy and security for the next G7 meeting in Italy.



MARK BRESSERS, Director of the Directorate-General for Enterprise and Innovation Regulatory Reform and ICT Policy Department, Ministry of Economic Affairs, the Netherlands, wondered why digitisation is not going as fast as we would like it to be? Last year, the World Bank delivered a report saying our digital dividends have lagged behind.

Despite of how far things have gone—all these exponential developments of the last years—there are still a lot of issues and a lot of problems which we have not dealt with, yet. We can do a better job.

For instance, the Netherlands has a quite tech-savvy, welfare-state economy and are proud of that. But, on the other hand, a lot of companies aren't that tax heavy. There are a lot of SMEs in the Netherlands, and about 70 percent of all the SMEs do not have a native "digital by design" or "digital by nature" strategy. This is an issue. Another issue is the lag of human capital. This is not about having kids in schools learning to code but also about teaching people how to be relevant in this field. E.g., new doctors and physicians need to know how to use 3D printers. Another aspect is that the Netherlands has an excellent infrastructure and thus are also vulnerable to all kinds of cybersecurity attacks. Investment in the infrastructure is crucial. Another issue is the role of the government. There is actually a paradox between what is needed in terms of getting ahead and the time regulation needs to adopt. One example is the Digital Single Market: We need regulation to create the Digital Single Market. But the speed of the process is so rapid—how can we keep a balance between the lack of speed of our regulatory reforms and the necessity of reform and really look about how to support new business models and new developments?

There are four priorities:

We need smart businesses investing in development and we need space for experimentation. We know where we want to go ahead but there are many insecurities. E.g., how to deal with privacy in relation to big data? There is a need for more comfort and knowledge on this.

We need small governments—not only governments which help governments and citizens dealing with e-services, but governments which really know how to take action in new regulatory frameworks and which also know that the old fashioned way of regulation is not always the answer. We have to think about when to use regulation and when there are other instruments to stimulate development.

We also need a smart infrastructure. This has to do not only with cybersecurity but also with smart industry. We invest a lot in the smart industry. We also need the mobile infrastructure which can facilitate these developments.

We have to have smart businesses, smart governments and smart infrastructure and, of course, we need smart people. That at the end is the key. For instance, in the Netherlands there is the discussion about the advantages, but also the disadvantages of the robotisation of the industry and its impact on employment. Although it is important to look at this, the only reason why there is still one factory in the Netherlands that is producing cars is because there are robots! We need (smart) people, not in a defending attitude, but in an attacking, more corrective attitude, saying how to bring ahead those developments while at the same time looking at the social side of it.



SUVI LINDEN, Chairperson NxtVn Finland, Former Finland Minister of Communications Responsible for Media and Telecommunications 2007-2011, Finland, [<http://nxtvn.com/>], put emphasis on the fact that network technology evolution continues to expand human possibilities.

When looking at the role of the network technology for digitalisation, we all remember the “connecting people” slogan coming along with the GSM technology. The next step with 3G, was engaging people through different kinds of applications and the use of the Internet. Today, we are in the stage of transformation and what LTE and 5G is bringing to our lives is just great.

First of all, we need networks. Security and safety are very much embedded in digitalisation. Actually, digitalisation is very important for human beings, and through different kinds of applications we can humanize the technology. However, at the bottom of this is access to broadband.

The Broadband Commission promotes affordable and accessible Broadband. This should be a basic right for every human being and from that on it is easy to develop future visions.

There is a new global order. It is a great possibility for developing countries—with the biggest challenge, or opportunity, being regulation. Developing countries, with their governments, have to understand that affordable broadband is vital for their development and that it needs a new kind of regulation.

For Finland, the Netherlands and many other countries which have already regulated the different sectors quite well, the challenge is now understand that there is a kind of new regulation: the transformation from the traditional regulation to regulation that allows functional platforms. This is a real big challenge.

In the future world, and to some extent already in the present world, the new global order comes from the possibility to effectively use the spectrum. It is the natural resource for the digital world—and we all have it. It is not like oil, which some have and some don't. Everyone has spectrum and it will depend on the regulators how well they will use this natural resource.

Our future is about technological and economic convergence. It is modularity. We know that it is very hard to separate applications, communications and devices from each other. It is one big puzzle with different pieces.

The future is about the transformation of business models. It is the transformation of everything. Sharing economy is a very trendy word today. And we know that the sharing economy is something governments are struggling with in terms of regulation. But the people want to share; Airbnb is a great example of that. And there will be a lot of other things that people want to share. It is a new kind of economy.

The future is also about the rise of a platform economy. Uber is just one example of this platform economy. Business models are transforming and this means that all companies, everyone has to transform. This is a big challenge for our businesses. Do they have a vision of how to transform the business to be able to compete in this new kind of world?



DAVID KIBLER, Consultant with Director General – Digital Affairs, General Directorate of Globalization, Culture, Education and International Development, Ministry of Foreign Affairs & International Development, France, addressed the question whether the Internet can disrupt diplomacy.

A company like Uber has been able to totally change the way the taxi industry operates. The question is, can it be the same for international negotiations?

At the first look it seems that the two worlds are almost mutually exclusive. On the one side, the Internet would be the promise of limitless transparency, while diplomacy would remain a world of negotiations, not all of them being made public, for reasons that are obvious in certain areas.

To answer the question whether the Internet can disrupt the diplomatic world, we have to look a little closer to the words: Digital technology is a mix of concepts and tools. Concepts, for instance, is scalability. We all know that this is how start-ups operate and this is how they are acquiring market shares around the world. And again, the example of a company like Uber shows very well what this concept means. Concerning the tools, some of them have been created very recently and have an impact on public policy. E.g., the “Facebook safety check” that has been used in the context of the terror attacks in Brussels or Paris, that led governments to implement their own Apps for this kind of situation. Another example is the tool of data mining, which is used by various government agencies.

Diplomacy is mostly organised around negotiations and influence. When looking at the impact of the Internet on negotiations, ICANN is a very good example of how some circles are entirely dedicated to this. The traditional circle of the EU with the internal market is another example.

One that is very important to us is cybersecurity because this is a very good example for how the world of diplomats is now being changed because traditionally security and warfare were dealt by state departments and now most of us have very strong cybersecurity division

Another aspect is the role the Internet has had on influence. We are talking about infrastructure. E.g., the battle for infrastructure in Africa will be the battle for influence of that states and companies to position themselves.

With respect to the role of transparency and the Open Government Partnership, France took on the presidency in September this year. The OGP Global Summit 2016 will take place in Paris, France on December 7, 8 and 9. This is a good example on how the tools of the Internet impact policy making and the diplomatic work. The content of the summit has been produced via a platform that was open to users. This is a very good example on how technological progress can impact the world of public policy making.



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Q&A

Theresa Swinehart, ICANN, was asked how she sees technology transforming the expectations of consumers and users. It is happening so rapidly. What kind of shifts does she see from the multi-stakeholder global perspective and the implications for organisations and companies in terms of responding to these impetuses?

Ms. Swinehart explained that there are a couple of areas. If you are running transparent mechanisms of determining an agenda or in the negotiations, it is also the tools for managing the incorporation of all of that, whether it is public documents or it is various other things.

The other factor goes towards the ability to respond to a sense of immediacy. The consumers and users oftentimes have a reaction or are engaging in something. And identifying what is the trend/ what is the behaviour, how do you make sure that all voices are being heard in those processes, not just the ones more immediately? Whether it is a reaction to a corporation and their conduct or whether it is a reaction to diplomatic negotiations or whether it is a reaction to a process when we run stakeholder processes as around policy development—making sure that there is the time, the tools and the mechanisms to make sure that the inclusivity factor is captured and that the agenda, or the policy or whatever it may be, is not just a reaction to an immediate voice but rather capturing on everything in order to make sober decisions.

Amb. Miriam Sapiro, moderating, opened the following question to the panellists: Is there a conflict between the demands of international diplomacy, where the theory is that you have to give the negotiators some kind of ability quietly to explore new positions without getting into a box, and reconciling that with the increasing demands of stakeholders for not just more information but for being part of the process? How to reconcile these increasing concerns and demands for transparency with the ability for governments to explore very sensitive areas, which are sometimes classified?

Mark Bressers, Ministry of Economic Affairs, questioned how exclusively this question is related to the issue of digitisation. It is about what is the role as a government and how the government relies to the public. In a way, it is a belief. That is what standardisation and open source communities have told us. Either you believe in the system of “security by obscurity” or “multi-eyeball” as a more broader approach...

At the end, transparency is the key but there might be no clear answer. In the Netherlands, a legislation is under progress which says that every communication between civil servants has to be transparent. This has to do with document management systems and, in a near future, the civil servants might have to decide whether something has to be publicized or not. At the same time, people need some intimacy when getting ideas and challenging each other. Transparency is key, but we have to learn and develop best practices concerning when some intimacy is needed—a possibility would be to work with time lapses—and what are the moments in decision making where one has to be transparent.

However, the question is not just related to digitisation. Digitisation learned us a lot, but it is broader than that.



Mark Bressers, Ministry of Economic Affairs, referred to smart people and a human capital agenda. Technical development is out there, one can't stop it. We mustn't be naïve. The speed of the development and the speech in which robots and automatisations are killing jobs is beyond imagination. Research has shown that a lot of jobs, e.g., in banking or the insurance sector, will no longer exist in a few years. It is really going very fast and this makes people insecure. The job of a government is to deal with this insecurity and to say: What we need is people to learn, you have to develop yourself, every job in the next 9 years will become obsolete when you don't develop. The government has to provide these ways of developing but should not say "we are against robotising".

The following questions from the audience concerned regulation and the role of governments in regulation.

Mark Bressers, Ministry of Economic Affairs, explained that the Netherlands is experimenting with new kinds of regulation, which is called "the right to challenge". There is, for instance, some regulation which building companies have to meet because it has to be safe. But if this building company has other, more innovative, solutions to meet the same public goals—and here it is very important to describe the public goals—it can use the right to challenge. This provides more space for experimentation.

Per Blixt, European Commission, gave the example of the Government Action Plan which was launched one year ago. This was a good step forward. It is a kind of dynamic plan which invites governments to act together. It is much about best practice but also interoperability. eID is one example of that: A lot of money and support has been put in the eID over the last 15 years and now it is finally going to be implemented.

Suvi Linden, NxtVn, underlined that the right kind of regulation is the basis of everything. Regulation should not be hindering but enabling. Unfortunately EU legislation is still done inside laws. The topics of the DSM have already been on the table under Commissioner Neelie Kroes and things haven't move much since then.

Legislation today should be thought of as a framework. The example of Finland was given: Finland has a code for transportation: All legislation concerning public transport, busses, trains, taxis etc. have been put in the same package. This helps to get an overall understanding, because the different sectors are now converged into one. It is no longer suitable to have different legislation.

In the same way a code for the Information Society has been put in place. All the legislation that has something to do with digitalisation, whether it was electronic signature or spectrum allocation, has been put in the same code. This way it is easier for decision makers to understand how different things are affecting each other.

With respect to the DSM and Digital Europe one big obstacle is that the EU legislation is hindering certain things because they are in silos. Copyright issues are in a different portfolio than the eGovernment issues. There are different Commissioners for different things and it seems to be challenging to get a kind of overall view. The biggest challenge is to be able to change the mindset on how to create enabling regulation.



Theresa Swinehart, ICANN, confirmed that the interdependencies and identifying those are a very critical element. On top of that, where we talk about the governments being the entities finding solutions, it is actually multi-entities that need to help finding solutions. However, government plays a very strong role in that, in encouraging and identifying somebody's different areas. But also in the context of our educational systems and preparing the next generation, ensuring that we have flexibility around that, whether it is at the initial phases of education or at the later phases. Also corporations can also play a role and we need to start looking at partnerships. Not operating solutions in silos, not just in the interdependencies within governmental and regulatory context, but also in the solution context in which entities can start playing a role—both for the short-term but also for the long-term. And we are trying to do all this in a very disruptive sort of timeframe of change and technology.

The chair and moderator of this opening session, **Ambassador MIRIAM SAPIRO**, Finsbury, thanked the audience and the panellists for a lively and robust discussion. She concluded that we need a framework that is flexible enough to accommodate the ability to make regulations (governments) and forge norms (other stakeholders), while continuing to encourage the innovation and dynamism that are the foundation of the Internet.

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Session 1

Day 1 – Morning – Parallel Session

Infrastructures Challenges for Digitalization

GÉRARD POGOREL, Professor of Economics and Management-Emeritus, Telecom ParisTech, moderating the session, warmly welcomed the participants. He emphasised the multiple aspects of infrastructure deployment, the challenges they confront all industries with, and the transformations that can be expected. He presented the issues to be addressed in this panel:

- What changeovers are expected in agriculture and livestock farming from digitisation?
- What are the examples of transformations expected in the public sector, and the difficulties that are encountered?
- Is it possible to get an overarching view of digital advancements as a possible guidance to policy-makers and strategists?
- What are the current and future technological challenges for the Internet?
- The satellite industry being essentially transborder, would you say its services are now making possible a further step in global digitisation?
- What is the vision promoted by the EC regarding future communication infrastructures and their purposes?

He then introduced the first speaker.

The chair of this session, **ANTONIO AMENDOLA, Executive Director International Regulatory Affairs, AT&T**, [www.att.com], gave a concrete example of how one of the major telecom operators copes with the very strong technology push.

The objective of AT&T, just as other major telecom operators, is to give their customers what they expect, demand and need. It is as easy as that. However, this has huge implications both in terms of how services are provided to the customer and continuous massive investments.

The telecom industry has been on a hyper-drive for more than a decade and this pace is not going to slow down. It will even accelerate. Only in the US in the past 15 years, 1.3 trillion USD of investment have been put into the wireline and wireless broadband industry. This is twice as much as in Europe.



In 2007, AT&T was the first company in the world to introduce the iPhone. The company believed in the potential transformation and the effect that will have on people's daily life and the networks. AT&T invested billions of USD which resulted in a data traffic increase of 150,000 percent between 2007 and 2015.

114 petabyte cross AT&T's network each day, this corresponds to 130 million hours of HD video a day. This is a lot—a lot of money and traffic volume, and really one is the consequence of the other. Usually people tend to take these figures and such growth for granted. Well, it is not. Companies do not necessarily need to spend all this money in the networks. If AT&T is doing so, it is because they believe in innovation and for the benefits of their consumers.

To stay ahead of this dramatic hyper-drive growth, companies like AT&T have to rethink how to build and manage their physical infrastructures. Traditionally, legacy phone operators like AT&T spent years in developing new technologies, new routers, switches etc., in installing these technologies and creating networks. This took a long time.

Nowadays, there are new companies, applications and entire industries that appear over night and these companies have a completely different approach. Whereas traditional operators have a bottom-up approach—building the networks and then allowing new applications to be vehiculated on those, these new web and software companies have a top-down approach: They innovate, they create an application and new services, and then, through the flexibility that is given by software, they adapt and they create traffic etc.

This is why traditional operators like AT&T are becoming software companies. If you ask in which line of business AT&T is working today, the answer would be software. AT&T is turning all its networks into software defined networks, which is a huge effort. Through this, AT&T is providing the flexibility that their customers ask for. This will also have an impact on 5G and requires large investments. It also requires the corresponding flexible regulatory framework. Because, at the end of the day, there are two things that matter in this industry: scales and investment.

CLÉMENT ALLAIN, R&D project manager on precision livestock farming at the French Livestock Institute, France, addressed the challenges and opportunities of digitalisation for livestock farmers.

Main Challenges for a Precision Livestock Farming

Digitalisation in farming is already a reality.

About 5,000 farms in France use milking robots. 29 percent of the French dairy farms rely on embedded sensors on animals to monitor their activities, temperature etc. 26 percent of the dairy farms in France have indoor sensors. Such precision farming, or smart farming, also relies on 3D cameras as well as on drones, satellite, GPS, sensors for the crops.

Precision farming creates new needs and new challenges. One of the first challenges for the development of precision farming is the issue of communication and connectivity for barns and fields.



This is really a big challenge as connectivity on the countryside is not always available. 35 percent of the farmers are not satisfied with the fixed and 46 percent with the mobile Internet network.

In the context of a survey on dairy farmers carried out last year, it came out that a farmer had invested in 2 milking robots, 150,000 EUR each, and also brought the application for his smartphone to remotely control the robots. Unfortunately the farmer had no 3G on the farm and thus was not able to use the application. This example shows that the robot technology went faster than the connectivity on the field.

The second challenge is the development of IT infrastructure for connected devices. 67 percent of the French dairy farms are equipped with at least one connected device for farm management (robots, sensors etc.). This creates new needs for the storage, the exchange and the analysis of data.

The most important challenge is the need to improve farm profitability from new technologies. Most studies carried out on this issue show that almost all technologies implemented on the field are not economically profitable. Yet, such investment may still be worthwhile as it leads to improvements in the quality of life (labour time, comfort etc.).

The French Livestock Institute, together with the French mobile operator Orange, tried find solutions to improve farm connectivity. A farm is a complex system, with barns, fields, stables, and various materials that may cause difficulties for connectivity. In general, the problem of fixed Internet access is easy to solve, but once you want to extend the network on the farm the problems start. There are solutions, but they are not used on the field. At the barn level there are solutions using femtocells or WIFI network. At the bigger level, one can use small cell and WIFI-bridge network. For sites that are far away from the farm, there exist solutions based on the LoRA network or satellites.

Two examples explaining what kind of new applications based on innovative technologies and networks could be used on the field in the future:

The first one is a project on 3D imaging to assess cattle morphology carried out by the French Livestock Institute together with two companies. The idea is to take advantage of technologies that are initially developed for another industry, in this case 3D imaging for video games. It is now possible to take a 3D image of a complete animal from a smartphone. This offers a lot of interesting opportunities to assess the morphology of that animals, to select animals on the morphology trade, to adapt the feeding of animals to each animal according to the morphology information we have. This is really a new step in precision farming, because until now there were only rather simple parameters like milk weight, animal weight etc.

The second example on geolocation and behaviour monitoring for extensive livestock farming shows that not only intensive farming is concerned. In France, for instance, there are a lot of farmers in the mountains. It is a kind of extensive farming without fences. Traditionally the farmers had a shepherd to take care of the herd. Today, this is finished and the farmers need new technologies to monitor their animals. It is now possible to track the animals, to monitor their activity and one could imagine to implement other sensors, such as heart rate monitoring etc. This is a very concrete example of how livestock farming is evolving today and of course there are a lot of new needs regarding this.



PAUL WORMELI, Innovation Strategist, Wormeli Consulting LLC, brought in his rich background of working with the government sector.

How to build: Information Sharing Environment

One of the important infrastructure issues that we face globally is building the capacity to share information across disciplines, and in the government sector in particular. It is very important to start looking at ways to solve social problems that are independent of the organisational structures that we have built for years. It really comes home to us with building the capacity for information sharing.

3 years after the terrorist attacks on the World Trade Center in New York, the US congress passed a law requiring that the President of the US builds what was described as an Information Sharing Environment (ISE). It was not a new system, nor a new network or a new technology, but rather an environment in which information would be shared across public safety, public health and the issues of national security.

This ISE has to be distributed, decentralised—yet coordinated, so that it was a system or a capability that served a wide variety of agencies at all levels of government, federal, state and local, territory and tribal, the public sector and the US international partners.

The congress also called for the creation of a programme manager to build the ISE and to deal with that challenge. Though, the US has 18,000 police departments, 50 states and lots of other structures that makes it very difficult to think about sharing information across all elements of public safety, public health and national security.

An ISE is not a system, it is first of all an attitude that is trying to replace the notion of “need to know” with the notion of “need to share”. The goal is to create a philosophy that requires people that have data to make it discoverable, to improve decision making across all the aspects of society and the government role of society to recognise that systems have to be built with the sharing capacity built into those systems. It is really the collective experience of all of those mentioned constituencies working together and figure out how to do this. Such ISE is a set of services linked together in order to provide that level of capacity to share information across all entities of government. There are a lot of fundamental principles that have been addressed to how to build out this ISE—one of which is to have the communities who are involved be included as stakeholders. Ensuring that every stakeholder group is represented and considered in this development is crucial for creating an ISE.

One of the things that the programme manager for the ISE did, was to create an ISE Playbook which is available online. It is a list of 15 different plays that tells agencies who want to build an ISE how to get started, how to proceed etc. It came from a Playbook that was initiated by the United States Digital Service, which was a hyper technology group the President convened to help government agencies do better. It addresses what states and local agencies and others who want to build an ISE can do. Those plays are well documented, full of references, all of this available on the website (<http://www.standardscoordination.org/iss-playbook>)



One of the things the programme manager did for the ISE was to create a Standards Coordinating Council that brought together organisations like OASIS (Organization for the Advancement of Structured Information Standards), the Object Management Group and others, to share their ideas and standards and to help bring industry to the table to be sure that what was developed in helping states and federal agencies build out an ISE included the capability of the best technological minds.

More information can be found at <http://www.ise.gov/>. There are a lot of tools that have been developed. They are free to use and there is no Intellectual Property.

MICHAEL STANKOSKY, Research Professor, George Washington University, USA, addressed the question of whether there is a guidance which could be given to government agencies and industry on how to cope with digitalisation of their activities?

21st Century Architectonic Organizational Concept

In the 1990s, the Defense Information Infrastructure (DII) Common Operating Environment (COE) has been developed as a framework for the creation of a set of cooperating computing enterprises, providing interoperable, secure information products and services.

In those pre-Internet and pre-Web days, the main concern was about the technical architecture. There were 4 architectures out there, however, each time one talked about architects, people had a different definition. The Army Science Board was commissioned to make some order to this and they came out with three architectures: an operational, a systems and a technical architecture. What was lacking was an information architecture—or data architecture.

The concept has been implemented and from a conceptual or operational standpoint, it brought those services closer together in terms of their command and control systems. The integration that we all seek is so illusive today.

One can look at this from a systems engineers' standpoint, within the Global Data Architectonic Concept. Architectonic means these are the designers structure requirements to an architecture. We hear about policy, silos, IoT, IoE, services, the industrial Internet—all kind of things—but we don't really have what we need when we design a city or a house. We need some guidance principles and we need an architect.

The guidance principles in the Global Data Architectonic Concept are basically guided by the idea of an orchestra: Codification—keeping all our ideas accessible to everyone, which Google does very well. Collaboration—making sure you get the right people at the right time, which Facebook does very well. You have to integrate Google and Facebook. You also need convergence, e.g., the iPhone today which converges a computer etc. But then, the final one, which is where the architecture really helps is coherence. The orchestra, you need a score. We all need to be singing on the same sheet of music.

Today, we are in this new world with some kind of control chaos. Maybe it is not even controlled. We don't have any guidance principles, we don't have an architect to go to.



Let's go back to that concept of the 1990s by adding the data architecture. It is a top down approach: you start with the vision, purpose and structure and then you have the data, the information knowledge, and then the systems and then the technical. But too often, the technical drives everything else and then we try to put it together and it doesn't make sense half of the time. Or we are not efficient or effective half of the time.

As we are trying to solve these incredible problems globally and trying to converge, we need to have some kind of a guiding principle and a guiding architecture or concept.

ERIK HUIZER, CTO Surfnet, the Netherlands / Chair, Dutch IPv6 Task Force IPv6, addressed some of the burning technological and social challenges of the Internet in the future.

IPv6

One of the most pressing technological challenges is that we are running short of IP addresses. This is a problem we are aware of since 15 years, but it is getting more important as we move forward. It is clear that with the IoT, i.e., more and more objects connecting to the Internet, we need more and more addresses. We run out of the current set of addresses on the Internet and we need to move to IPv6—version 6 of the Internet Protocol, to make sure to have enough addresses to sustain the growth that the Internet is going through.

IPv6 is currently rolled out well in only few countries, with Belgium being the leading nation in the world. It is to be feared that those areas that had of problems in rolling out Internet connectivity are now lagging behind also with IPv6, which will further hinder rolling out and reaching those billions of people who are not yet connected to the Internet. There is a strong responsibility for infrastructure providers to work on this and to make sure that IPv6 is introduced faster than it currently is.

The good news is that IPv6 has reached on average worldwide the 7 percent, and, as is well-known, once the 15 percent are reached introduction always goes very fast. However, it seems, that it will go fast in the Western world but not in the rest of the world.

Another challenge is related to our dependence on the Internet and doing all our business—private and commercial business, our business with governments—on the Internet. In this context, the reliability, the security and the safety of the Internet becomes more and more an issue. Unfortunately, more and more governments contrapose security versus privacy and make us believe that we have to give up our privacy on the Internet to enhance safety and security. This is quite untrue. But it leads into a sort of technology development battle where governments are trying to weaken technologies in order to strive to certain political goals related to safety. At the same time they weaken the Internet for those who want to protect themselves against cyber criminality and cyber attacks and just want to do their business safely. Proportionality of measures has to be taken into account and the immediacy should not be determining these issues.

The third challenge concerns the balkanisation of the Internet—or the demagoguery of the Internet. The open and accessible Internet seems to disappear in favour of purely commercial Internet substitutes with high walls around it. Facebook likes us to believe that they are the Internet and you don't need the rest of the open and accessible Internet. People



can shop through Facebook, they can watch TV through Facebook, they can game through Facebook. So why would they need the rest of the Internet? At the same time, while the telecoms are desperately trying to verticalise and not succeeding very well, we see that the Facebooks and Googles are verticalising from top down.

They are building their own Internets in developing countries with only limited access to websites they have acknowledged. This creates a balkanised version and this helps to strengthen a sociological function we all observe on the Internet: 30 years ago, we all had this vision that the Internet would help us to communicate all over the world, to understand each other cultures and each others problems—and by that be able to avoid wars etc. We now know better. What we see is due to social networking, people will only go for those people having the same opinion rather than for people with different opinions. Instead of more understanding, you see people locking themselves up in a small world with only friends that have the same opinion. And this is strengthened by the algorithms of Facebook which only tells you, what you want to hear. And if we balkanise it further on the infrastructure level by letting Facebook getting away with building their own parts of the Internet, we have a very big problem as a society.

CÉCIL AMEIL, Chairperson Working group on regulation, ESOA – European Satellite Operators Association, elaborated on the contribution of the satellite industry to global connectivity and the challenges of the future.

Infrastructure Challenges for Digitalization

ESOA represents the interests of all EMEA satellite operators who deliver information communication services across the globe. Notably Europe has been a leader in this industry for decades, despite increasing competition.

One of the key challenges of satellite operators is to contribute to the provision of connectivity everywhere and to everyone—making sure that all points of the earth are well connected. In order to reach this goal, we need to rely on what we have already relied on for years, which is a mix of technologies. When we are talking about network infrastructure, we are talking about a bunch of technologies, which altogether contribute to make end-to-end connectivity possible.

This is something the end-consumer doesn't need to know. It isn't seen, unless you see a parabolic dish on top of a roof or on the balcony, you just don't know that there is satellite behind.

Who knows that 90 percent of cable television in Europe depends on satellite? Who knows that in Africa, 7 out of 10 mobile network operators rely on satellites to make the connectivity over big countries and between countries? This just shows that there is an invisible network or infrastructure behind the service.

When you think about the level of technology and the demand to provide very high speed and even ultra high speed connectivity, this is an important challenge. And this challenge goes through a mix of technologies, which requires a dialogue between the industries.



Today, we don't have to rely on one single technology even though we all know that fiber is state-of-the-art for fixed connectivity, or even though we know that LTE-Advanced paves the way for 5G. But at the end of the day, one is not going to connect every point on earth and everyone with one single technology or solution.

When we talk about future connectivity, it is a lot about IoT. The reality is about connecting everything. It is about machine to machine, machine to people and people to people. It is really connecting everyone, everywhere to any device and this is the global challenge we face.

Some examples of what satellite is doing today: The contribution of satellites is rather well-known in the areas of television and the delivery of videos. More than 1 billion people worldwide depend on satellite to receive television in standard definition or HD—and soon in UHD. Millions of people get broadband connectivity thanks to satellites. More and more communications in the air are going to depend on satellite, but also in the cars and at sea. We see the satellite sector is going to develop increasingly in very different sectors. Though, on the air, in cars and on the sea satellite is a key application. However, it is not going to be the only one and satellite operators need to work in combination with the others.

What is the difference of satellites compared to other technologies? First of all, satellites are able to provide global coverage and cross-border connectivity. It is also a very resilient means of connectivity. When you need security and reliability, satellites are a solution because they are immune to natural disasters on the earth. Moreover, often satellites provide backup solutions in addition to existing terrestrial links. It is also something less easy to access and less vulnerable—although, of course, satellites depend on the ground equipment, which needs to be extremely secured. This is something satellite operators look at.

To summarise, there are a variety of challenges to meet: Challenges related to the geography, but also challenges related to the actual vulnerability of networks. Moreover, there is the issue of congestion. With videos being the bulk of communication in the future, we more and more will rely on ultra high capacity networks. And for that satellites are very good because they do broadcast and transmit content from one point to multi-points. Other challenges are related to the digital divide risk and the question of bringing connectivity to all. And of course, all this needs to be sustainable—we need something that works well and is reliable. At the end, it comes back to ubiquity and resilience, which means having this connectivity everywhere, on all devices and something that is reliable and secure.



HERMAN SCHEPERS, Senior Director, Government and Regulatory Affairs, GSMA, [<http://www.gsma.com/>], as representative of an organisation assembling more than 800 mobile operators, provided a global vision of the challenges of the mobile industry.

At this very moment, the UN General Assembly in New York is discussing sustainable development goals and how we are going to reach those by 2030. It is very interesting to see that the mobile industry is now part of this discussion.

Many regulators and organisations have come to realise what transformative impact the mobile industry has. If you think about services like mobile healthcare, mobile education, mobile agriculture, mobile money - how many people use their mobile phones these days to pay bills in developing countries. The potential impact is enormous—but the challenges are also huge. The digital services and the digital infrastructure are not there yet. If we look at Europe or if we look at Japan, Korea, the US, we like to call these countries digital pioneers, but there is still so much work to do around Africa, Asia, Pacific and Latin-America. Around 50 percent of connections globally are still on 2G. Of course, the mobile industry is working very closely with the satellite sector because they are complementary. The mobile industry needs satellite to help with the backhaul connectivity in many rural areas .

How to get from 2G to 3G or 4G? There will be a lot of countries that will leapfrog from 2G to 4G and ultimately, later on, 5G. Post-2020, we expect deployment of 5G infrastructure. At the Olympic Games in Korea we will probably see some small-scale deployment of 5G.

Spectrum, or the frequencies that carry voice and data, is probably the biggest public policy challenge that the GSMA has globally. It is the lifeblood of the mobile industry and without spectrum there is not much mobile operators can do. With 4G and 5G there is a need for more and more spectrum. Unfortunately there are many challenges. It is often not very clear when new spectrum bands are going to be available. Many governments do not have a clear roadmap in place. There is often a lack of clarity concerning the renewal of licences. There are many 2G licences in place, a lot of these will be renewed in the coming years, but there is not much clarity for the mobile operators. But the industry needs clarity; for investment to happen operators need certainty.

Also device manufacturers need to know what is going to happen. For instance, some Internet players are working on developing open source technology and provide it to the mobile operators, so that mobile operators can more cheaply provide broadband connectivity in less commercially viable areas.

With regards to spectrum policy, at the end of the process is the auction. Governments, often make spectrum available through an auction, not a “beauty contest” because there is a lot of demand for the spectrum. However, when they put a competitive process in place, they set the base price extremely high in order to be able to maximise revenues from this. Thus, many mobile operators cannot afford to purchase the spectrum and as a result infrastructure does not get rolled out much beyond city centres. This then pushes back against a massive public policy objective that most governments have, to roll out infrastructure across the country and to create connectivity in sub-urban and rural areas.



GÉRALD SANTUCCI, Adviser for Cross-cutting Policy/Research Issues, DG CONNECT, European Commission, presented the Commission's view on the progress of the future Digital Single market.

A Digital Single Market -- Where are we one year on?

The European Commission has identified the completion of the Digital Single Market (DSM) as one of its priorities. In this regard, it has been a busy year.

Using the metaphor of fashion, there first has been the "Spring collection" with a communication on an EU e-Government Action Plan 2016-2020, a communication on Digitising the European Industry, including the Internet of Things, a communication on a European Cloud Initiative, and a communication on Priorities of European Standards. Furthermore, the Commission followed a comprehensive approach to stimulating cross-border e-commerce for Europe's citizens and businesses: a proposal for a Regulation on addressing unjustified geo-blocking and other forms of discrimination based on place of residence or establishment or nationality; a proposal for a Regulation on cross-border parcel delivery services; a proposal for a revision of the Consumer Protection Cooperation Regulation. Regarding the Content initiative, the Commission adopted a communication on online platforms and the Digital Single Market and a proposal for a revised Directive on audio-visual media services.

Then, there was the "Summer collection" with a communication on a new Skills Agenda for Europe, a communication on Cybersecurity Industry, and a decision to establish a contractual public private partnership on Cybersecurity.

The "Autumn collection" followed with a review of the Telecom Framework, an action plan on 5G, and an initiative on Copyright with a view to promoting a fair, efficient and competitive European copyright-based economy in the Digital Single Market—an issue that is being fiercely discussed on social networks. At the end of the year, there will be the "Winter collection" with a reform of the e-Privacy Directive and an initiative on building Data Economy.

The review of the Telecom Rules is obviously essential to the DSM. There is a great variety of issues and options. The main goals are clear: 1) To contribute to ubiquitous, unconstrained connectivity in the DSM. 2) To promote competition and user choice. 3) To simplify the regulatory intervention and to achieve internal market coherence.

Investment in telecom networks is an important concern. The regulation of access to networks is indeed a key theme as it can affect incentives to networks roll-out. For a long time, competition in telecom has worked well in terms of price, quality and choice, being a driver for investment in telecom networks. However, lower prices and related user expectations have created an environment that is constantly challenging. Today, telcos are key technological enablers. Connectivity and data transport are essential for the internet of things. Technology neutrality is important as well. The problem is that the various technologies need to be linked and connected, and this, according to several studies, will require between 550 and 600 billion EUR. Therefore, the main aim of the review of the Telecom Framework is the creation of investment incentives.



In the EU, the goal of connectivity has received support from all political levels in the member states—nobody could allow to lose out on IoT and 5G. If you take the IoT, the challenge will be a long-lasting one: It is estimated that by 2020, there will be 50 billion smart devices connected. We are more than 7 billion human beings on Earth. There are about 70 billion machines in manufacturing today, and only 5 percent of them are connected. But today's technology and IPv6 will allow to identify and connect every single "thing" that exists on Earth—which would mean about 70,000 billion connected objects. I'm not saying here that this *will* happen, even less that it *should* happen, but technologically speaking the possibility exists that it actually occurs in the near future. So there will be anyway increasing requirements and pressure on those who take the responsibility for the infrastructures.

We tend to talk a lot about the physical aspects of infrastructure in the context of the Digital Single Market. However, the Digital Single Market is also about the organisational aspects. It is not only the pipes. It is the way we organise regulation and the functioning of all infrastructures—broadband, FTTH, satellite, IoT, 5G etc.—in order for the whole to be consistent and make sense. This is often an unrecognised challenge, but I believe that work on the Digital Single Market will rapidly play an aspirational role for building what I would call a regulatory infrastructure.

Now, infrastructure is not only about telecom. The EU is also focusing these days on the so-called e-infrastructures, i.e., the research infrastructures. How to foster the emergence of Open Science, i.e. new working methods based on the shared use of ICT tools and resources across different scientific disciplines and technologies? This is an important issue to address if we want to promote and boost the relevant, efficient and effective use of science for policy-making and the greater good of our societies.

Let me share with you my view that all these infrastructures can be thought of as a "superstructure". We shouldn't look at them individually; we need to have an holistic view of all of them. Why? Well, because in the digital age as it is now unfolding before our eyes it is a necessity to transcend the purely technical aspects of infrastructures in order to consider that they are all together essential for the sustainable and resilient future of our societies. Nobody will contest that infrastructures are very important since they determine competitiveness and hold the key to any country's future competitiveness, if not survival. Our modern societies are increasingly dependent on the stability and resilience of a complex system of interdependent large-scale infrastructures. More than ever, we are aware that it is imperative to develop heuristic strategies for guiding the design of more resilient networks in the future.

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Q&A

The first question addressed the issue of how to encourage investment in the deployment of international connectivity infrastructure, such as submarine and trans-border cables. Would telecom operators, who traditionally have been responsible for such deployment, continue investing in connectivity between countries? The question also addressed the issue of regulation as enabling environment for deploying submarine and trans-border cables.



The second question was, where should the leadership come from to make changes to those gaps we are all experiencing. Is it from bottom-up, i.e., cities who are becoming more involved, or how will be in charge?

Herman Schepers, GSMA, explained that mobile operators feel squeezed. It is a difficult time. There are certain lifecycles for every business. There are always external factors and new players on the market that come in and are disruptive. For instance WhatsApp had a huge impact on SMS revenues and overall data revenue is on a decline. The regulatory pressures coming from governments and regulators, e.g., net neutrality, backs the question, why operators would invest in 5G if they cannot charge more for faster services and faster lanes? This is a massive debate. The problem is that operators are getting more and more nervous.

Another example of where things go wrong is the biggest spectrum auction ever that is going to start in India on 1 October. It is a lot of spectrum in lower bands and higher bands and the regulators estimate to be able to take 83 billion USD from the auction. Telenor, a big Norwegian multinational telecommunications company, has just pulled out of the auction. There is a need for a much more longer-term vision from regulators and governments when it comes to developing policy and regulation that is in the interest of society and that focuses on the longer-term economic and social benefits to society and economy at large. That longer term is often missing.

Antonio Amendola, AT&T, added that regulatory framework matters. But probably guiding principles, i.e., objectives, principles, long-term visions, matters more. It is the regulatory framework that drives investment. We do not have to take for granted that money has to be spent by telecom operators. Companies invest where they can maximize the value of their investment (ROI), and when they think they can really engaging up in a sound and solid competition. This is what drives innovation and generates new products and services, and even new ways to transform legacy networks. AT&T is moving towards a real software-centric network. Voice was no longer remunerative and is going down. So, what to do with the networks? AT&T decided to transform them. However, this needs investment and investment requires smart rules and a good regulatory framework.

Clément Allain, French Livestock Institute, gave the example of the French operator Orange. Orange is working a lot on technologies to extend the network at the farm level rather than implementing 4G or 5G in the countryside because they know that it will be too expensive. They consider that it is more intelligent to extend the network from a fixed Internet point by technologies that are affordable for the farmers.

Gérald Santucci, European Commission, confirmed that times are rather difficult for telecom operators. However, they have already faced hard times in the past. The problem today is the acceleration of change and the increasing competition within the pillars fixed, broadband, satellite, mobile etc., and the entry of new actors. Probably the telcos' survival is at stake. If they don't realise that they have to catch up with the requirements of the Internet age, they simply will disappear. The world of tomorrow is based on the Internet and actors must understand that. The costs to catch up are huge and therefore both public and private sector need to find a deal on how to move forward in this complex situation. They will do it—they always did. But it is difficult and really complex.



In order to help the private sector catching up, there are three keywords with regards to the review of telecom: refit, coherence and simplification. Refit, because there will be a lot of provisions in the current laws that will disappear because they are obsolete, in particular the end-user rights. Coherence, because we need to look at the review in terms of how it fits with audiovisual, with consumer protection etc. Simplification, because we know that the new law will in fact merge four EU laws that exist today. It will be a major effort to simplify life for all the actors in the field in order to make sure that these people will be able to find the resources they need to invest in the future. It will not be easy, but with some intelligence on all sides, they will make it.

The question addressed to Paul Wormeli concerned the fact that information sharing in the public sector might be compromised by inter-agency rivalries and turf battles. How to cope with such deep seated behaviour in our human organisations?

Paul Wormeli, Wormeli Consulting LLC, stressed that the key to overcoming that problem of turf wars and separate motifs for ownership is to develop solutions and approaches that are win-win, where every stakeholder group has a benefit out of participating in sharing. This applies to whether you are building submarine cables or sharing information between public health and public safety. If the participants all have an equal voice, they have a willingness to start with. There is this German concept of *Zeitgeist*: If the spirit is willing, the participants will move forward and it is creating that government process in many places. That is what the US is trying to do: to build governance processes where everyone has an equal voice, where is both legitimacy and transparency of participation and the notion of providing a voice to the various stakeholders and constituencies—this will include the public, the government, industry, non-profits, non-governmental agencies who operate on behalf of the public. We have to have a bigger concept of how we come together to solve problems and to ensure that everyone has an equal voice in the solution.

Michael Stankosky was then asked how to combine those two concepts—the need for an architect and the need for transparency and clarity of policy?

Michael Stankosky, George Washington University, emphasized that this is a relevant question. This is why in the operational architecture the policy guidance has to govern. It is like building a house and sitting down with the occupants in order to know what they want out of it, beyond the physical functionalities, e.g., whether they want to get a feeling of openness etc. The policy is critical and drives the architecture. That is why we are so disjointed today, everyone is doing so many things but we are not connected. It is a top-down approach. Policy is very powerful.

To provide an example: Most people talk about the Internet but they never talk about the Web. And everybody knows that Al Gore invented the Internet, but no one knows that the sole inventor of the Web was Tim Berners Lee. It was on an advisory meeting many years ago in Amsterdam where the construct of a semantic web came up. Look at the web and how Tim Berners Lee with the policy guidance had kept it open and free. Imagine he charged a penny for any time someone puts www... Just look at the governance and how he contrived to get all the world participating, and what is really the real content that we all enjoy every day—it is not the Internet but the Web.



The policy is critical, but if you follow the architectures but you don't have the operational one at the top-down in line, that everything else below it doesn't work. But right now, the world we are living in, we are all over the place and we don't know where to fit in it.

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Session 2

Day 1 – Morning – Parallel Session

Digital Health Revolution Improving Society

GIUSEPPE GRASSI, Director Cardiology Department - Venice Hospital ULSS 12, Italy, chairing the session, welcomed the panellists and briefly set the scene for the following presentations.

The digital revolution is the link of continuity between the past and the future.

Eindhoven stands for technological innovation. The panellists of this session will provide insights in the most advanced perspectives in many different health fields.

Venice, the most ancient western-type hospital still in use, is in the midst of a digital revolution: e-prescription and pharmaceutical supply-chain, m-health (remote home telemonitoring of congestive heart failure and of electrophysiological devices), the full digitalisation and remote access of radiological and cath lab examinations, outpatients' home access of lab tests.

New technologies and the Internet are also used to provide safety to the millions of tourists visiting Venice and the Venetian sea and beaches every year. Examples are websites or the interactive map of automated external defibrillators. An old city works in a very modern way.

The session's moderator, **INGRID ANDERSSON, CEO, Corporate Wellbeing, Oman**, welcomed the participants. This year's Global Forum is looking into societal challenges and the moderator really appreciated seeing health very high up on the agenda of societal challenges.

Many countries are being represented in this session: There are 6 countries from Europe, there is the US, Japan and a NGO.

The session starts with different European perspectives, followed by the NGO perspective. The session then discusses how to make digital health secure and working well with legislation and the privacy issues—which are very much on top of the agenda when it comes to digital health. This is followed by a Japanese perspective on how to integrate an ID card in the health revolution.



This multi-sensor approach is an inevitable future view of what the IoT will be able to do with us, when we can acquire data not just from mobile phones, but from your kettle, the biometric camera in your laptop, your smart TV or your central heating system. It is a good view on the things we can do with such information. This can range from managing long-term health conditions (self-care), new possibilities for epidemiology, discovering behavioural biomarkers (e.g. in dementia), and new ways of delivering behaviour change.

SPHERE has been designed from the outset as low-cost health behaviour sensing system for long-term use in the home. It is very powerful—but imperfect, like any technology—and will be used at scale in the coming years. SPHERE is keen to work with experts who are interested in accessing the data, deploying the system in clinical or research studies.

The project also opens a window into the likely future role and capability of consumer technologies. Whereas these technologies will become more widespread over the next 5 or 10 years and people will attempt to deliver a kind of value added services, perhaps in the healthcare sector, what will we be able to do with these devices? Given that we have an ability to acquire this behavioural data, we may question some of the ethical issues, let alone the security and privacy, around that. It should help us think through those things before that technology is actually routinely deployed in our homes.

SOPHIA EBERHARD, MD, Senior Consultant in Psychiatry, Head of the Child – and Adolescent Inpatient Clinic, Malmö University Hospital, Sweden, provided an insight in digital healthcare in Sweden and presented a smartphone application to be used in child and adolescent psychiatry.

Digital health, Sweden Sept. 2016: Progress and setbacks

The good news is that all regions in Sweden use electronic medical records, which is quite an achievement. The bad news is that there is no national strategy. If you want to read a record from another region, you end up with papers.

Hillestad assumes that healthcare might be the world's largest, most ineffective information enterprise, as worldwide most medical records are still stored on paper.

The health sector is slow to adopt modern information tools. There are many cost-benefit issues in healthcare, but also legislation and harsher regulations putting obstacles in the way. Many regulations are 10 years behind, just as strict safety measurements regarding log-on, detectability etc. The lack of precedents around IT in healthcare puts progressive healthcare providers in a catch 22, trapped by contradictory rules.

What is the current state of IT in healthcare in Sweden? Sweden has electronic medical records for all parts of the healthcare system, i.e., primary care as well as specialist care. The electronic medical record is accessible for patients at home, from their own device. To read their EMR, people log into the Internet with the same system they use for online banking.

Sweden has a bunch of online delivered treatments in psychiatry: Cognitive behavioural therapy programmes regarding anxiety, sleep disturbances, depression. Instead of physically being with a therapist, patients can do these programmes online at home. Moreover, there is



the Swedish medical information website 1177 providing extensive online guidance regarding all medical conditions. Sweden has electronic medical record-based reminders to improve lifestyle, and decision making support for practitioners.

Some examples of what is currently being developed in Sweden: Patients will be enabled to book and reschedule their healthcare appointment online. Sweden is a bit behind regarding booking and rescheduling of appointments, because the healthcare practitioners think that patients don't really know what they need, when they need, whether it is an emergency or a normal appointment. Moreover, patients will soon be able to arrange Skype appointments with their healthcare professional. Sweden is a long country and the distances are sometimes far to get to a doctor. This will improve accessibility to health care.

Single sign on for healthcare professionals is on its way, which means that once they are logged into their computer, they are signed up to all the different systems they have to use during the day. Another step forward will be improved medical records. The strategy is to find one system for the whole country.

Blue App (Blåappen) is a smartphone application used in child and adolescent psychiatry in Malmö, Sweden.

Skåne county, the unit's catchment area, consists of 85,000 adolescents. About 300 of them are annually admitted to the regional adolescent psychiatric emergency unit in Malmö, the largest unit in Sweden with 23 beds. Most common reasons for admission are suicidality, depression, acute stress disorder, eating disorder and psychosis. The majority of patients are 14 to 17 years old, with an even gender distribution. All of them have a smartphone.

The everyday challenge is how to deliver treatment in a time efficient manner. In psychiatry the diagnostic assessment always consists of a diagnostic interview and the use of structured questionnaires—up to now administered by pen and paper during both inpatient stay and after discharge. Pen and paper versions require a lot of resources making the use less attractive. It is not modern and it is not accepted by the patients. After discharge, the response rate for pen and paper follow-up is often low. In sum, the tool box turned out to be outdated, especially in the population of adolescents, and new methods for inpatient data collection and outpatient follow-up were needed.

Smartphone applications have shown to be effective in healthcare both regarding data collection and intervention for behaviour change. Though, looking around in Sweden, the Child and Adolescent Psychiatry Unit did not find any solution on the market that met their needs. Thus, they decided to build a smartphone application that was named “Blå Appen”—the blue app, referring to both the colour of hope and blue as in moody—in collaboration with the IT-company Stretch, experienced in building IT-solutions for Swedish healthcare, and the Lund University.

Blåappen aims to deliver structured questionnaires in a modern attractive solution, leading to more screened patients, more precise diagnosis, correct treatment and shorter admission times. The aim was also to create a follow-up system of symptom mapping and feedback via smartphone after discharge via the application, available for all patients. Research has shown that keeping a connection with the patient after discharge via text messages, as add on to treatment as usual in the outpatient clinic, is a way to improve treatment outcome, boost mood, and reduce the drop-out frequency from open care treatment.



Using new technology not only makes it possible to collect data in a new more effective manner, but also opens up for new ways of assessment and treatment. The development of apps like Blå Appen has been a first step in this process for the Child and Adolescent Psychiatry Unit. For more innovative use of technology in psychiatric healthcare a close collaboration between researchers and experts in new technology has to be in place.

BERNARD GRUNDEHNER, System Architect, IMEC, the Netherlands, representing a leading R&D and innovation hub in nanoelectronics and digital technology, illustrated how wearables fit into medical technology and how they can contribute to a longer and healthier life.

Building Stones of a Longer Life

The impact of our lifestyle choices is visible 20 years later. Our today's lifestyle or behaviour may determine our health in the future.

Over many years, healthcare science has managed to increase life expectancy. But saving lives also means that chronic diseases appeared and became more prominent. If we extrapolate, we would come to the very depressing conclusion of a long and sick life. This is not what we want.

The key is in prevention. Just take the example of vaccination: Once global vaccination programmes started about 50 years ago, certain very common and dangerous diseases suddenly disappeared. This is the kind of trend we have to follow in order to make our future generation becoming old in a healthy way. However, vaccination can not do everything. The top diseases today, such as cardio vascular diseases or stroke, can not be treated with vaccination. Something else needs to be done.

How a chronic disease such as chronic heart failure can develop, and how wearables can make a change there? Such a disease can start with a sedentary inactive lifestyle and obesity. We know the statistics about obesity and we know that it is caused by inactivity and bad food habits. Thus, the solution seems to be very simple: Eat healthier and move more. However, it turns out to be much more difficult than that.

Why is it so difficult for people to change their habits? There has already been an action plan for changing habits more than 100 years ago, but even today it is very difficult to apply. It typically starts with certain clear goals and a strategy to reach these goals. There is the part of self-awareness where the user needs to understand his/her own behaviour and what triggers that behaviour. Then, there has to be strong motivation and a continuity of training. And, it has to be a sustained change of behaviour, not just a temporary one.

There are already coaches, professionals, that can help setting clear goals, but that person won't be there at all times, e.g., in the moments of weakness. Moreover, that person cannot be aware of your daily habits. You may not even be aware of your daily habits yourself. Self-awareness is a key ingredient for changing habits.

People thought that the rise of activity trackers during the past few years would really give the solution to this. People could track their own behaviour, quantify themselves. It was like a promise that this would lead to pre-self-awareness. But, it turns out that owners of such devices stop using these devices over time. After 12 months, about 50 percent of the users abandon their devices. They stop using it. The reasons are not yet clear. One reason might



be the form factor, maybe people don't like these watches etc. Imec is trying to embed these devices also into other form factors, such as clothing or textiles.

Another reason could be that the devices are not sufficiently accurate. Sometimes they give erroneous results, which has been validated in the clinics. They do not create actionable data. If the device is not providing proper estimations of your calorie expenditure, how can you then know how much calories you can take? This is one of the examples where the devices have to be improved. Imec has a few proposals there: models based on the activity, and also personalisation of algorithms seems to improve the estimation of calorie expenditure a lot. This could be one of the ways to get the people more actively use these devices, maybe in conjunction with good virtual coaches that provide feedback on the right moment in time.

The next step in building up a condition such as chronic heart failure could be hypertension. One of the ways to develop hypertension is through sleep apnea. Sleep apnea is when the airflow is regularly blocked during sleep, which not only leads to sleep deprivation but which can, in the long-term, also lead to cardiovascular diseases and hypertension.

It is estimated that 5 to 10 percent of the US population suffers from this in a moderate to severe way. However, 75 percent of these patients are never diagnosed. People don't know it from themselves, but there is also a hurdle to get the diagnosis: You have to go to a sleep centre with long waiting lists, and they will hook you up to a polysomnograph. For a polysomnography testing, people have to sleep with a mask with tubing that is attached to a machine kept at the bedside. This is far from being convenient. In the near future we will see devices emerging, such as smart blisters or smart patches, that can do parts of this analysis—maybe even at home in a more convenient form factor. Such testing could even be done on several days in a row to get a more specific diagnosis.

Many people do not measure their blood pressure regularly enough. In general, high blood pressure can be treated rather well—but you have to know that you have a high blood pressure. People find today's inflatable cuff systems inconvenient and many people do not use them often enough. Imec is developing a of watch that can measure blood pressure trends based on a combination of certain science biomarkers from the body. Such device lowers the barrier for people to regularly measure their blood pressure.

A next step in building up a chronic heart failure could be through type II diabetes to the first myocardial infarction, which could then damage the heart permanently and lead to chronic heart failure. And then, there is a path of no return. It means severely reduce the quality of life and lifelong intense care.

Can we change this? We can make wearables that could also help these patients to make them monitored at home etc., but the wearable devices mentioned above can essentially contribute to prevention. And nothing is better than preventing chronic diseases, together with a virtual coach that helps you controlling your diets and with the other wearables that can, for instance, prevent hypertension.



ALEXIS NORMAND, Healthcare Development Director, Withings, France, explained how a wearable device solutions manufacturer shifted from simply selling wearables to the end consumers in electronic stores to making these ties with healthcare.

From Quantified-Self to Population Health

Withings is a French company that has recently been acquired by Nokia. Withings essentially produces all sorts of wearables for the consumer market: a smart body scale (whenever you sit on it, you see your weight on your smartphone), a smart blood pressure monitor (you are basically historicizing your blood pressure on your smart phone), a range of activity trackers (heart rate, sleep,...) etc.

The devices manufactured by Withings aggregate data in an App. This might be different from what people are used to in telemedicine, because Withings is extremely consumer centric, i.e., the data is not meant to be feed the doctor treating a condition. It is meant to generate interest of the user to quantify him-/herself in the long run (steps, run, swim, sleep, heart health etc.).

However, despite this initial consumer focus there are more and more professional uses of these wearable devices. From the quantified self we have seen this transforming to something that Eric J. Topol called the patient generated health data movement. There is a new sort of data that didn't exist before the smartphone area, which is those data on health, behavioural data generated by the patient. And this is not just staying in the user's smartphone, Withings is creating ways for this to be fed in the healthcare system. 2 years ago, the big electronic health record providers started taking interest and integrating the data—this was an important change.

2 years ago, at the HIMSS conference, the largest and most important healthcare IT conference in the US, all the major companies, such as Epic, were showcasing wearable devices from different manufacturers. Patients could take their blood pressure and the data would immediately go into the electronic health record.

This telemedicine already existed 30 years ago. What is new here is the data and that the devices were not described by doctors. It is out there on the consumer market and doctors are taking advantage of it, essentially to collect data at a larger scale and in a cheaper way.

Many researchers, and increasingly care providers following up diabetes, obesity, or chronic heart failure patients, are using Withings' devices as a way to collect real world data beyond two visits. A doctor tends to spend less than 10 hours on a diabetes patient a year, but the diabetes patient spends at least hundred times more on managing his own disease. And if the doctor could have some way of knowing what is happening, the patient might be interested. More and more institutions are using these technical possibilities to collect additional data with consumer friendly devices.

Assuming that this will generalise, this would be a paradigm shift in the sense that it is no longer the data building a system around the doctor. It is actually the patient who is expecting the healthcare system to adapt to what he has and to send his/her data. And this has an impact because you have many users doing this. It is no longer just the healthcare system that is interested, or the medical system, it is also the insurance system and the research side of things.



The interesting thing is that the data is on your smartphone, but it is managed by Withings' cloud. This cloud allows Withings to improve the service, to improve the App, but also to analyse the aggregated data and use some sort of big data to potentially give some better algorithm or prescriptions. But at the very basic level Withings' does some epidemiology: They aggregated the weight data or the steps data from all their devices and put this on a map of the US, a map of France etc. There you can check out the distribution of Withings' users. The company is actually building a pool of people that they can survey to derive new insights and potentially new services.

Obviously, the healthcare system is dominated by curative care, but the more data on the long-run you can collect from users using new wearable devices, the easier it is to push prevention. Although, the real hope is to push prediction. Prediction only works for people with specific conditions etc. Withings, in collaboration with researchers and the pharmaceutical industry, is taking people with specific diseases, equipping them with different sensors and seeing if some of this data can predict a crisis. A lot of people do this with weight on chronic heart failure, but it is potentially applicable to any chronic disease with acute episodes.

JANET MUNRO, SVP of Clinical Science, IXICO, United-Kingdom, demonstrated how an application of IXICO's digital health platform is addressing a clinical need.

Digital Health – improving care quality and outcomes

11 percent of the children in the US are diagnosed with ADHD (Attention Deficit Hyperactivity Disorder)—and this is rising. Are we diagnosing these children correctly? The question is that we don't want to treat children for ADHD if they don't have it. On the other hand, the long-term consequences of not treating patients who do have ADHD are severe. The well established medication works and so we need to treat the right kids.

The American Academy of Pediatrics recognised this diagnostic dilemma, this problem that we need to improve the diagnostic process for ADHD in the US, and they require that information is attained from two environments outside the clinic in order for a diagnosis of ADHD to be made. Typically, that is from home and at school, but is this happening?

Only 50 percent of the kids have information from two places when they are diagnosed and less than 10 percent have information from home and school when they are followed up. That is not really good enough.

That is exactly that type of problem that a digital health solution can address. IXICO has a digital health platform that addresses lots of different types of clinical needs or research needs within the same platform. IXICO develops companion digital products, e.g., in multiple sclerosis pharmaceutical companies, diagnostic digital health products, clinical decision support systems, disease modelling software or patient engagement tools and this across a whole range of brain health disorders. Brain health and mental health is IXICO's speciality.

It is really about patient generated data. All of IXICO's systems fit into the same principle. They bring data in, from the patient's home, from the patient to the carer, using Apps or wearables. The Withings application is also integrated in this platform. It is used in the UK for patients with dementia. The clinic provides imaging data, lab data, treatment data. It comes into IXICO's analytics platform, and then reports are produced for physicians and patients.



Applying this to ADHD, first of all, scales are automatically requested by email from the parents and then the teachers. They complete those rating scales, which then come into the analytics platform, where they are automatically mapped against the DSM-5, the global standard for diagnosis of ADHD, and the American Academy of Pediatrics Guidelines.

A diagnostic report is produced with the physician and once they have assessed the patient, when they feel that the child has ADHD, then a whole system of clinical decision support with monitoring graphs is produced.

It is very important to keep the parents and teachers engaged and so there are blogs and forums and progress graphs for them in order to keep them actively contributing to the system. And when the doctor prescribes treatments, they continue to input information about the interventions in order to keep the clinical decision support up to date.

Does it work? Yes. It is been used with 20,000 children in the US. IXICO demonstrated with a randomised clinical trial that it improves care quality. Up to 90 percent of the children have those two assessments at the point of diagnosis and 80 percent follow-up. But beyond that, it actually improves patient outcomes as well. The application has been selected by the American Academy of Pediatrics in its 2016 National Quality Initiatives.

But it is really important that the physicians who have to commit their time, their efforts and resources into this, also like the system. And they do. The first thing they noticed is that it helps them to get the scales back from home and from school. Moreover, when they use the system longer, they understand and feel that it is improving the quality of care that they are delivering, and that they gradually, over time improving patient outcomes and improving communication with home and with school.

This is just an illustration of how an application of IXICO's digital health platform has addressed a clinical need, has improved care quality and improved outcomes.



TONI PEKKOLA, Project Planner, JAMK University of Applied Sciences, Finland, addressed some of the main challenges associated with digitalizing healthcare.

Digital Health Revolution Improving Society – Personnel and clients in the middle of change

The School of Health and Social Studies invests in the development of health and well-being. The school offers degree programmes in the fields of nursing, rehabilitation and social work. It is also involved in regional, national and international R&D projects. Currently there are 22 R&D projects.

Where are we now? The health sector is one of the most rapidly growing sectors. It is also one of those which have been the slowest to start using modern information tools. In many cases the organisations are using, or even depending on, old software which prevents the use of modern technology. The same goes for smartphones—they are using the oldest ones possible. There is always pressure to keep the expenses at a minimum and that is one of the reasons why they won't get the latest technology which is available.

An example of the digitalization of healthcare: A nurse says, "We don't need digitalization. We have just started using new patient registration and feedback systems. That was difficult enough to learn and we are no ICT specialists." Often, the personnel have difficulties to see the difference between automatisisation of services and digitalization.

Today, patients are using mobile applications and latest models of smartphones, even if there are still some patients who don't have a smartphone. Let us imagine a situation in a doctors practice: The patient has a smartphone and is worried because, together with a web search engine, he found out that his symptoms might indicate some disease, e.g., high blood pressure. So, is the problem in the patient or in the mobile phone? To find this out, the doctor has to make the same check-up that he does with a patient without smartphone and might even have to use the same online resources as the patient.

When it comes to personnel, there are also old habits and fears that make digitalization in healthcare and social services difficult. There might be fears of technology. But there is also the fear of losing their jobs. According to the latest report of the Finnish Business and Policy Forum EVA, at least 20 percent of nursing tasks could be operated by robots. And of course, one of the fears is, if something goes wrong, who is going to fix it?

What comes next? There are major changes going on in healthcare and social services and there are also some examples of digital strategies, e.g., the Finnish Nursing Association which is preparing the personnel to forthcoming changes. In the future, digitalization also means that the professionals have to have more and more multi-professional collaboration. There are similar databases like in Sweden, and in many cases Finland is like Sweden with regard to the healthcare sector.

In the future, services will be available 24/7 independent of the location of the client. There are also examples like chat appointments with medical doctors or dentists using a video connection. Robots are starting to be used in elderly care. There are many possibilities in robotics which are not utilised yet. Also, virtual reality in rehabilitation is starting to show some results.



How should we be prepared for the future? It has been predicted that the future of medicine is in smartphones. At the same time, it is also predicted that smartphones will be a thing from the past in just 5 years due to the development of IoT and AI.

During the past year, project teams, in School of Health and Social Studies, have tried more than 70 health related mobile applications, even in extreme conditions (such as degrees up to -30°C). Choosing the Apps proved to be rather difficult. They are lacking information, scientific proof, validity, safety, etc. The School's project teams checked tools such as mobile application rating scale (MARS) but they turned out to be burdensome and time consuming. They found out that there is a need for tools for professionals and clients to evaluate the quality of health mobile applications.

In their projects, using co-creation methods, the School of Health and Social Studies has been able to help the personnel of health and social services to implement mobile apps into their daily work and well-being. They have even developed new tools and have involved the health personnel to prevent fear of new technologies.

In the future, patients can monitor their health more easily and with new technologies they will have more demands towards the healthcare providers. Still the change is depending on the client. This is why mobile applications and new technologies should support the client's behavioural change. Due to the constant development there is also the need to update the education content. With education we can improve access for all, co-creation provides the possibility for personnel and clients to be heart and hopefully these things will lead to improve quality and digitalization of healthcare and social services.

A few examples of what is done in Jyväskylä:

Me First!: Personnel of healthcare and social works develop new possibilities (co-creation) and get familiar with m-health solutions.

eBoss - Wellbeing Coaching for Young People: The eBoss well-being coaching programme (including the use of health and well-being related mobile apps, gamification and well-being/activity bracelets) will be produced and piloted with 156 students and 40 teachers and counsellors.

DIKO - Well-being at work via digital and experimental methods: The project aims to prepare the homecare employees and management to the digital era and to improve their well-being at work. The most important tools to achieve this are the organization's self-driven development and experimental methods.

EETU-project: e-health and m-health technologies in children's occupational therapy.

SmartHome 2.0: From SmartHome to Smarter Home



LINE KLEINEBREIL, Consultant, “Be He@lthy Be Mobile” WHO /ITU program (CInternational Telecommunication Union); Vice-President, Université Numérique Francophone Mondiale (UNFM), illustrated a practical example of how ICT can help solving problems related to noncommunicable diseases.

Be He@lthy Be Mobile

There are hundreds of millions of people suffering from noncommunicable diseases (NCDs) all over the world. According to estimates, 50 percent of those people do not even know that they have diabetes, hypertension or cancer.

In many parts of the world there is a lack of professionals, and, for instance in some African countries, the healthcare professionals who are working on the field have not been trained on NCDs because this wasn't an issue a few decades ago.

However, everybody has a mobile phone. Part of the problem is that there are hundreds of thousands of Apps and beautiful pilots in healthcare using mobile phones and trying to address some local problems or some disease specific problems, but all these pilots, even if they present good results, are on a limited scale. There is a need for a global challenge.

“Be He@lthy Be Mobile” is the first initiative ever realised by two UN agencies (WHO for healthcare and ITU for telecommunications). They have joined forces, trying to work together, which is not easy at this level, and to built up and to implement the programme. The name of this programme is really to use limited resources in developing and developed countries using the mobile phone to fight and reduce the burden of NCDs. The programme started in 2011 with a UN resolution.

The programme is aiming at large scale implementation and large scale means at least 1 million citizens in the participating countries. The programme is limited to 4 years and 8 countries. Up to now, the UN received more than 40 expressions of interest, but in order to participate, the application has to be signed by the high level of the government, because the government is really involved in the future large scale implementation. Each country selects one specific topic.

The first country that has started was Costa Rica; they use mobile phones to help people stop smoking. It is prevention of cancer. The second country has been Senegal and they chose diabetes. Senegal uses mobile phones to prevent diabetes, to improve early diagnosis and to reduce complications by better coaching the people who have diabetes.

Other countries involved are Egypt, India, Norway, and the UK. What is really interesting is that, for example, everything that has been developed in Senegal has been shared with the different governments and is now being implemented with some slight changes in Egypt and in India. India started with adopting the model of Costa Rica on smoking cessation, but then also implemented the model on diabetes prevention, which went from Senegal to Egypt and now to India.

Another important issue is that everything is public domain. Everything that is done in this programme is reviewed by a group of experts, is evaluated by WHO scientific groups and given to any government who wants to do the same.



Working with WHO is not easy for the private sector, but the ITU is much more flexible in working with the private sector. Thus, it is the first big large scale programme which is public and private. Many companies have already joined on the global level. There is no promotion of any product, but those companies who joined the programme say that they are extremely happy with what they can learn. They discover on the field the complexity of the ecosystem to implement on a large scale.

Working between two UN agencies is not easy, but when it comes to the local government it becomes even more difficult. For instance, in Senegal you first have to organise a discussion between the Minister of Telecommunication and the Minister of Health. Then, you have to come to some signed agreement between the telecom operators of the respective country and the government. Then, you have to bring all the pharmaceutical players together, as well as all the patient associations, because the patient and the consumers have to be involved from the very beginning as the product has to be adopted to their culture.

Be He@lthy Be Mobile is not a very expensive programme. It starts with the most simple thing which is SMS. In the example of Senegal, all the telecom operators have send a message to their clients, i.e., almost the entire population, asking them whether or not they want to receive the information to join the mDiabetes programme, and they answered yes or no. Moreover, there are groups of SMS, which are addressed to the general population in order to send information to make them understand that they might be at risk and that this has to be diagnosed, but also to healthcare professionals, especially at the bottom of the pyramid to give them a minimum of training, and to diabetes patients who have no insulin treatment. In Senegal, as 90 percent of the populations are Muslims, there has also been a special training for diabetes and Ramadan and this has been a great success.

Other disease areas started to use the same platform because it was also a training inside the country trying to foster cooperation between the different programmes for communicable diseases, noncommunicable diseases or diseases such as Ebola or Zika. They all use the platform now.

More information are available on the website of WHO. As it is a learning process, all participants and private companies involved have access to all the documents.



JOE JARZOMBK, Global Manager, Synopsys - Software Assurance, USA, [<http://www.synopsys.com/>], addressed the issue of securing IoT-connected devices.

Cyber Security for Network-Connectable Devices

We are living in an evermore connected world. Everything that we deal with in this modern society is interconnected. Healthcare is now interconnected. However, there is a growing concern about this whole IoT.

For instance, this entire concept of fitness for use, or fitness for purpose and how that was reusing technologies that were developed for one application, and then it was using the technologies for others—without really understanding whether it is right for the environment it is used for. There is a bit of lax security for the growing number of IoT embedded devices in appliances, industrial applications, vehicles, TVs, smart homes, smart cities, healthcare, medical devices, etc. The concern comes from the fact that the sloppy manufacturing “hygiene” is compromising privacy, safety and security—incurring risks for faster time to market. We take any technology that is just available and are not thinking from a consumer safety and protection perspective.

There are numerous examples in the US of IT risks that had become the vectors of attack and have compromised privacy and financial. Millions of healthcare records have been stolen, and this is putting the patients at risk. But the virtual harm is one thing. We are now seeing physical harm: cyber exploitation with physical consequences. There is increased risk of bodily harm from hacked devices.

The corresponding regulatory regime within the US is the Food and Drug Administration (FDA). There has been a recall of an infusion pump, because there were so many known vulnerabilities in it that it literally put peoples’ lives at risk. Imagine you would be in a hospital, hooked up to an infusion pump and somebody from outside the hospital could go through the hospital’s networks, search the IP-addresses, find out you are lying in that bed and they can literally change the dose of the drug administered. And there are no fingerprints because nobody is tracing. Because they weren’t build with that in mind. Hacking is not intended use.

There has been a survey published in February this year by the Barr Group: They interviewed 2,400 engineers of companies who produce these devices. The results were that 22 percent of these engineers consider that their devices can kill. They also think that their companies are not taking safety and security seriously enough. There were actually proactive safety and security that could be used but the companies won’t focus on it. The engineers who are producing the devices were concerned about this.

Synopsys is seeing this shifting business concern with software liability, because most people say “why dealing with software?” It is software that enables it and software that controls it. We have gone from this curve of looking at quality to quality and security to today, when we are focussing on quality, security, safety, and privacy.

This has financial implications: Within the last months, there was a company who had lost 10 percent of their stock value in one day because it was reported that their medical devices were unsafe. That they had some of the known vulnerabilities in it. Now, CEOs are starting paying attention to this. In fact, 90 percent of all reported security incidents result from exploits against defects in software. People weren’t paying attention to that. Now they suddenly care, but it is almost too late because the damage already happened.



ITU has several standards that are used. ITU-T in particular is recognised by the UN—there are 109 nations, it is translated in 6 languages. We have ways of measuring vulnerabilities, weaknesses, and malware in devices by using these international standards that are put up by ITU-T.

If you say you have tested your healthcare on those network connectable devices: How did you test them? Did you test them for known vulnerabilities? Did you test them for exploitable weaknesses? Did you test them for malware? We have standards. There are tools out there, just like the CVEs (common vulnerability exposures). There are over 300 products and services offered worldwide that are using these ITU-T standards—that people just aren't using.

One practical implication of this is been rolled out this year: Underwriters Laboratories (UL) provide their Cybersecurity Assurance Program. UL focus on proving consumer protection for network-connectable devices. UL have the general requirements that Synopsys looks at for exploitable weaknesses, vulnerabilities and malware. UL look at specific technologies, industrial control systems and medical devices. UL is providing independent testing and certification of these devices. And the third part comes into the organisational processes that go with this.

The point is, there are solutions available to people—but do you want to take advantage of them? It really comes down to consumers becoming more demanding of the software in IoT systems. You should demand safety and security to be built in by the suppliers of these. And healthcare providers, i.e., the hospitals, as consumers who are buying, can send a very strong signal to the market by saying “cybersecurity in network connected devices should be mandatory”.

A good example is the Mayo Clinic. They realised that medical devices companies are generally small companies. The Mayo Clinic started working with them and found that including specific contract language is a good tool for setting security standards.

Synopsys has sample contract language and would willingly give them away in order to allow people to work with and convey what is important to them to their suppliers. There are solutions available. It is just a matter of wanting to do that.



NAGAAKI OHYAMA, Professor Imaging Science and Engineering Laboratory, Tokyo Institute of Technology, Japan, explained how the Japanese My Number Card will also become a healthcare PKI card.

Pragmatic approach to PHR in Japan

All Japanese residents are required to have a medical insurance. As Japan is characterised by a rapidly aging population, medical cost mount up to 400 billion USD per year. This is a social challenge that calls for a pragmatic solution.

Many countries have tried to establish personal health records (PHR). Thanks to the new infrastructure that is under construction or in practical use, mainly for the domain of taxation, not for healthcare. This is an important point because most of the cost is paid by the domain of taxation.

The fundamental requirement of the pragmatic approach to PHR in Japan is that systems should be secure, reliable and sustainable. Any mixture of people's healthcare data, that might be caused by manual or automatic system operations, have to be avoided.

The Japanese approach is based on mutual authentication using a double PKI.

How to support multi-application using My Number Card? Every Japanese resident may have a My Number Card. This card supports JPKI (Japanese Public Key Infrastructure); for personal authentication there is a certificate and a secret key. The secret key never can be read outside the My Number Card. The medical insurance, for example, sets up a table of certificate serial numbers and an insurance certificate ID. For the credit card, if the card holder wants and the credit card institution agrees, they make a table with a credit card number with a serial number. It is the same for digital tickets, here a table with serial numbers and the seat number will be created.

The new e-ID card is called "My Number Card". My Number Card is based on the My Number Act. My Number Card is issued since January 2016. During the last eight months more than 11 million cards have been requested by residents including foreigner residents in Japan. Japan has a total population of 130 million people. A budget for 30 million cards within this fiscal year is foreseen. My Number Card supports both digital signature (non-repudiation) and personal authentication (log in). Personal authentication supports PIN-less scheme like sign-less.

In case of emergency, e.g., when the card holder is unconscious, the PIN-less scheme enables the ambulance crew to access the emergency data of the card holder. The PIN-less scheme is supported by My Number Card as a default function. The PIN-less scheme uses a mutual authentication process; prior to the internal authentication (the server checks the card), external authentication (the card checks the server) is carried out instead of a PIN. This mutual authentication uses PKI and the field, i.e., device or organization, code. The field code changes the response to the server to distinguish the correct response from others; other fields or devices, or a verified PIN.

When using a PIN-less scheme, both the server and the card digitally and automatically sign the transaction data used for mutual authentication. Together with the time stamp, the signed transaction produced through the PIN-less scheme could be an evidence to tell which hospital provides the healthcare service, whose card is used and when (audit trails). Keeping



copies of these records informs about the location of the healthcare records in chronological order. All records are kept by the hospital by regulation for 5 years at least.

The PIN-less scheme will be practically used to check the validity of the medical insurance from April 2018. It will be possible to collect the signed transaction in order to tell when and where healthcare services have been received. The HPKI card is also used for digital signatures with healthcare licenses, such as medical doctors, pharmacists and dentists. A dedicated network for healthcare information exchange is planned to be constructed connecting local networks currently under use in the healthcare field. It is supposed to be available by April 2018.

To summarise, My Number Card, a HPKI card, with Internet eXchange inside the healthcare field, will be widely available and practically used from April 2018. Together with the time stamp, the PIN-less scheme produces an evidence to tell when and where we receive healthcare services. Copies of the signed transaction could form PHR. PHR will be launched on a voluntary basis. My Number Card could be also used as a credit card for payment. My Number Card entitles you to receive healthcare services whenever and wherever necessary in Japan, due to the e-ID.

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Q&A

The first question was addressed to **Nagaaki Ohyama**, Tokyo Institute of Technology: How does My Number Card authenticates users?

Mr. Ohyama explained that this is done via a normal 4-digit PIN. Only for applications that don't require a high security level (e.g., checking the validity of the health insurance) in case that the card holder is unconscious, you just have to place the card on a card reader to know the validity of the insurance.

Joe Jarzombek, Synopsys, was then asked whether only big companies are equipped to do security checks.

Mr. Jarzombek referred to the example of the Mayo Clinic. They realised that many of the medical devices companies have 50 employees or fewer. They started evaluating the devices and let the companies know how to improve it, e.g. by changing the software. There are ways, there are mitigations that go with that. And this is of great benefit.

Alexis Normand, Withings, was asked who is controlling the data?

Mr. Normand stressed that an important enabler is to provide some sort of guarantee to the users that their data is safe. What hinders the most this digitalisation of healthcare data is precisely the fact that people are reluctant to share and that they are suspicious of big companies such as Google. There are two ways to answer this concern: The first one is to be irreproachable in terms of following the regulations. But this is never enough to reassure people. Moreover, you have different status of data, you have auditing authorities, and you can show in your terms of consent, in your audits, that you obey. EU rules are introducing additional standards to this. This is another way to ensure people, but the truth is that no one reads the terms of consent and no one trusts the institutions to do their jobs correctly.



Afternoon Keynote Session

Day 1 – Afternoon – Plenary Session

OUTI ROURU, Senior Advisor, International Affairs, Central Administration, City of Oulu, Finland, moderating, welcomed the participants and briefly introduced the topics of this keynote session: Save online access to the government and commercial services, trading online, digital transformation of European companies, and from cyber-quantification to cyber-enforcement.

The expansion from e-government and online authentication possibilities requires properly implemented authentication systems. **ELLY PLOOIJ – VAN GORSEL, Independent Chair of the e-Strategic Council,** the Netherlands, shared some most interesting thoughts on the future of the European digital society.

A future Identity-hub in Europe: a Dutch approach

The past years, people have grown accustomed to the European Union without physical borders. Only few remember the experience of waiting in line for border controls when going on holidays to France, Italy or Spain. A world without the benefits of online services is hard to imagine, whether it is buying clothes, reading a newspaper or buying tickets online. Transactions go online without borders—but speaking about governmental services, the free flow of goods and services between member states is less common.

In many of the currently 28 EU member countries basic government services, like tax returns, social services, or the provision of permits are still largely paper-based. A recent e-government study conducted by the EU shows that only 48 percent of government services are completely digital. And this raises all kinds of obstacles for EU citizens and businesses trying to interact with public agencies in other member states. If you want to achieve a Digital Single Market within the EU, these various challenges have to be overcome. Key is establishing a stable and secure groundwork for cross-border online interaction between governmental bodies, citizens and businesses. This is one of the top priorities of the Juncker administration in Brussels.

In 2014, the EU eGovernment Action Plan has been announced, tearing down regulatory walls and moving from 28 digital markets to one by 2020. The ambition is twofold: Better access for consumers and businesses digital services across Europe and to create the right conditions and a level playing field in which digital networks and innovative services can flourish in both the public and the private sector.

For that reason the eIDAS regulation has been adopted. eIDAS proscribes that all EU member states should mutually recognise their electronic identification systems. This means that citizens of the EU should be able to use their native eID scheme to get online access to



Because eID suppliers operate in competition with each other, they have a big incentive to provide the user with the best user experience and protect the user's identity.

The Netherlands can play a leading part in the establishment of a DSM. The country has come a long way and is ready to open up the EU market to EU citizens all across the world. However, there are still some challenges ahead. Politics often act as a break on decision-making. All too often, we face that politics is more about minimising risks than maximising opportunities. To create a Union without physical and digital borders we need bold and courageous political leaders, not only in the Netherlands but all across Europe.

Digital technologies provide countless opportunities for our daily life, as for citizens, consumers, business owners, and employees. Experience has shown that in order to fully reap the benefits of these developments, policy makers should use the potential of PPPs. Together we can maximise the opportunities and drive the next generation of e-services.

STEPHEN BRENNAN, Chief Digital Advisor, Irish Government; founder and CEO, Centuri Analytics, Ireland, gave the audience a flavour for some of the implementable interventions that governments can make and showed some of the ways in which one can measure the progress in economies, in particular of digital, and its impact.

Small Business Trading Online

A lot of innovation exposed at the Philips Museum was probably dedicated in a small number of individuals that had some brilliant ideas, that had brilliant machineries or laboratories at their disposal and they came up with these exceptional pieces of technology that were deployed throughout the world.

In a digital world though, something very different is happening. Without degrading the idea of having super-skilled people to be able to do things, but digital turns that sort of Information or Knowledge Society pyramid on its head: The ubiquity of digital allows anybody, anywhere to collaborate and take great ideas and bring them to the world.

There are 4 “Cs” in a digital world: These 4 characteristics of each economy all evolved around the first C, which is **C**ommunity—the ability of digital to aggregate and connect together the best, brightest, the talented, the most innovative. What we need to do is to provide **c**onnectivity, **c**apability and **c**ontent to that community to be able to diversify and grow.

In essence, what we need to do as policy makers from an economic perspective, is drive digital—not in the digital part of the economy but in the traditional economy. Analysts agree, that the vast majority of impact that digital will have is around traditional businesses (traditional shops, retailers, traditional manufactures). Actually, the real trick, something that Ireland has been working on very extensively, is how to get people from the digital domain to talk to traditional business people and drive every business to be more digital?

One of the things Ireland did was to produce a so-called “trading online voucher scheme”. It essentially focussed on the key inhibitors for traditional Irish small businesses being and trading online. The inhibitors tended to be 1) expertise, so skills development is very important, 2) knowledge of the owner managers, but most importantly 3) the ambition to understand what their traditional businesses can do in a digital age.



KIRSI EKROTH-MANSSILA, Head of Unit for KETs (Key Enabling Technologies), Digital Manufacturing and Interoperability, DG GROW, European Commission, presented the broader, European angle of

Accelerating the digital transformation of European companies

The global economy is rapidly becoming digital. The modernisation and digitalisation of industry represents a huge opportunity for small and large enterprises alike. That is why the European Commission has set an ambitious single market strategy and the implementation of the Digital Single Market as key priorities of its mandate.

Too many European businesses are still too slow to embrace this change and they don't take up the digital opportunities. To address this, the Commission set up the Strategic Policy Forum on Digital Entrepreneurship in 2014. This is a think tank which is composed of policy makers and academia but mostly of business people. It advised the Commission on the key challenges, but also on the actions to encourage digital transformation. It promoted the development of policy both at a national and a regional level. The group has now finished its work and published its final recommendations last month.

There were four main areas of work of the group: Big data, skills, a digital compass, and the work on ecosystems and cities' and regions' involvement in that.

Big data: According to the Strategic Policy Forum, the opportunities related to big data and digital platforms are enormous. If companies use data to manage resources more efficiently it could bring 600 billion Euros net annual savings for EU businesses. The Forum also estimated that there will be over 100 new digital industry platforms set up. But there is much more potential and if we want to exploit this potential, we need to develop a clearer support of the European regulatory framework; we need to fix the ICT and infrastructure investment gap; we need to pave the road to a secure and connected operational framework; we need to foster standards and interoperability; and we also need to establish successful European B2B platforms.

Another priority is up-scaling the workforce. 9 percent of jobs are at high risk of being substituted by technology and 90 percent of companies indicate that they lack digital skills. The forum proposes to set up a comprehensive pan-European trading strategy to mitigate the economic and social risks that will come from failing to prepare the workforce for the new technological and digital future.

According to the forum it is necessary to develop a specific approach led by the industry and also social partners, which has a strong sectoral focus. Only by identifying the latest technology trends, trading suppliers and financing schemes in a specific industry sector it is possible to devise tailored company solutions able to meet the industry needs.

The third area is what is called a digital compass. There is need for digital leadership. You can leave it to the companies, but you need also the higher policy level and the company CEOs to understand what the digital transformation means. To address this concern, the Strategic Policy Forum devised what they called a "digital compass"—a compass to guide the high-level policy makers in this digital transformation. It is a toolkit that consists of three steps:



Demonstrating the digital technologies to the policy makers. This has been tested last summer at the Competitiveness Council Ministers Meeting, so the Ministers were actually able to see what 3D-printing or a drone or cybersecurity issues mean in practice. There were entrepreneurs telling them what are the products to address these issues. Then, in the second step, the policy makers also have the chance to understand what are the challenges for the entrepreneurs in this area. And the third step is then to see what are the policy implications of the technology and what to take into account in designing the most appropriate policies. The digital compass really helps policy makers to make informed decisions.

The last area of work is about ecosystems. Digital transformation doesn't only enable economic growth, it also brings solutions to great social challenges and improves the quality of the life of millions of European citizens. Here, cities and regions play a strategic role in leading a modern smart transformation of their territories. The forum had a look on 13 different European cities which pioneered in digital transformation and which experienced spectacular economic growth. All these 13 cities were inspired by Dublin.

The forum also defined a set of recommendations addressed to the local stakeholders. What does it take to go digital? You need to develop a smart local innovation system. You need to bring all the stakeholders together and work in collaboration with everybody. You need to have digital talents and entrepreneurs in the region, and you also need to know how to keep them. You need to have access to data. Some cities have opened access to public data and you also need to have access to technology policies to spur innovation. And finally, you need to establish key infrastructures and big cross-border investments.

Many of these issues and challenges identified by the forum have actually contributed to the Digitising European Industry Package, which the EC adopted in April this year. It is a package of many communications. The aim of this package is to help European industry, SMEs in particular, researchers and public authorities make the most out of new technologies. As part of this approach, the Commission will focus on investments in EU's PPPs and also innovation hubs, support the free flow of data and clarify the ownership of data generated by sensors and smart devices. The EC proposes concrete measures to speed up the standard setting process by focussing on 5 priority areas: cloud computing, IoT, data technologies, cybersecurity and 5G. The EC also wants to help coordinate existing and new national and regional initiatives on digitalising industry by maintaining a continues EU-wide dialogue with all actors involved.

The package was adopted in April and the work has started. For the coordination part, the Commission has set up a round table which is consisting of high-level representatives from member states who have already digital platforms in place. Other members states are also participating and the first meeting of the roundtable will be on 20 September. Moreover, a European stakeholder forum has been set up for wider consultation of all the relevant stakeholders. The first stakeholder forum will normally take place early next year.

There are also other actions to support digital transformation which came as a result of the work of the Strategic Policy Forum. That skills work they did resulted in a Blueprint for Sectoral Cooperation on Skills. In June, the Commission adopted a New Skills Agenda and communication on the Blueprint for Sectoral Cooperation on Skills is part of that. The aim is to foster sector skills strategies and the concrete support for six sectors as a pilot.



institutions, and this confirmed that such an approach of risk management (the quantification of cyber risk) is something that needs to be developed in all companies. Today, the work of Airbus Defence and Space is proposed in different institutions in order to have a standard methodology to help companies or institutions in this kind of matter.

To conclude, digitalisation provides a great opportunity to create growth and efficiency. However, this digitalisation can not be done without trust and confidence.



Q&A

Kirsi Ekroth-Manssila, European Commission was asked to elaborate a bit more on the planned action on B2B platforms.

Ms. Ekroth-Manssila stressed that this was one of the work strands of the Strategic Policy Forum. There are a lot of non-European B2B platforms but there are very few European platforms. This is an issue where the EC would like to see more European B2B platforms. B2C is already very well covered indeed.

What the EC is now trying to do as an outcome of the forums recommendations, is to launch next year an action to provide more support and to look into the issue of B2B platforms. However, at the moment it is not possible to say more because it is not yet published. There will be a call for proposals next year to support B2B platforms. It is an issue that requires attention.

Pierre Lafitte, President Sophia Antipolis Foundation, France, added some thoughts about the importance of mobilising against cyber criminality. For instance, there are problems with the distribution of electricity. Currently, the best way to attack a country would be to attack the smart grids. Most of them are connected to a cloud, and a cloud is less secure than many other places in the world. The French and German governments are working closely together to develop new ways of protecting smart grids. If our smart grids are attacked, everything fails.

Steven Lafosse Marin, Airbus Defence and Space, confirmed the importance of helping people getting aware of the issue of cyber. Digitalisation represents great opportunities, but there are also some threats. People have to become aware of this. There were some recent examples of targets in the US or the cyber attack on the French television network TV5 Monde. However, awareness is increasing and now it is important to understand the different kinds of possible scenarios. And cooperation is key—it is an holistic matter and thus needs to be tackled within a global approach.



Session 3

Day 1 – Afternoon – Plenary Session

Cyber & Security

The session's chair and moderator, **STEVEN LAFOSSE MARIN**, Head of Sales Private Sector CyberSecurity, Airbus Defence and Space – Cybersecurity, France, [<http://www.airbusgroup.com/int/en.html>], welcomed the participants and introduced the first speaker.

MICHEL VAN LEEUWEN, Head of Cybersecurity Policy Division, Directorate for Cyber Security, Ministry of Security and Justice, the Netherlands, gave valuable insights in the Dutch approach of addressing cybersecurity policy.

The Netherlands is doing cybersecurity since about 2004, but it became serious from a government perspective in 2011 with the first National Cyber Security Strategy. With this strategy the Netherlands set up a national cybersecurity center and started working on a public-private dialogue. The country set up a national Computer Emergency Response Team (CERT) as well as Information Sharing and Analysis Centres (ISAC's) which are platforms for public-private dialogue and incident information sharing.

In 2012, the Netherlands started working on its second National Cyber Security Strategy—its action plan will be finished this year. Also last year, the Dutch government started working on a follow-up on that and in this process noticed that international cooperation in cybersecurity is crucial. In 2015, the Netherlands also hosted the Global Conference on CyberSpace in The Hague, where the Global Forum on Cyber Expertise was launched. Cybersecurity was also a priority in the Dutch EU presidency in 2016.

The core of the vision of a free and open cyberspace is the balance between economic growth, security and privacy. It is a sort of a triangle which has to be balanced out: the economic opportunities, the security concerns and the privacy concerns. Digital economic growth without a strong security foundation gets us nowhere. In the process of making new policies in the context of cybersecurity, three questions arise:

First, what are the best policies? How do we know what works in cyberspace? Fortunately, cybersecurity research is on the rise, and research needs to be an ongoing part of the work. But cyber statistics are still in its infancies.



Second, ICT is everywhere, but the cybersecurity community remains relatively small. So, how to mainstream cybersecurity? Cybersecurity is not a department anymore, it needs to be an attitude.

Third, cybersecurity is like playing Pong (Atari's first ball and paddle game). That is like cybersecurity policy: The applications innovate fast. In order to be able to anticipate potential threats, our policies need to be about the future, not about the past.

We do not look at the future challenges often enough because it is difficult. It is too much about the cybersecurity problems we face today. But as ICT is growing and rapidly going, our cybersecurity problems will become fast as well. So, how are we going to be able to do something meaningful in securing cyberspace if all our attention is directed at today? Are we really going to help the world with fighting last year's hacks and hackers? That is why it is important to talk about the challenges we face today but also about the cybersecurity future.

The Dutch government commissioned some experienced thinkers in the field of cybersecurity to come up with scenarios for the future. Not only to look at the threats we face today, but also on the challenges we see for the future. And nothing is as difficult as predicting the future, especially in the field of digitalisation. However, they came up with some interesting thoughts:

One threat we probably are going to face in the future is big data manipulation. Where currently data leaks are a primary concern of our organisations, maybe it is the data integrity in the future, that will be a bigger problem. Can we rely on the quality of the data we see in our business processes? This is one potential threat in the future.

Another one is the so-called uncontrolled innovation and application of insecure products. The IoT might spawn a whole new era of little ICT staff going inside our economies, things that are really hard to update or to secure. How to deal with that problem?

The third one, is a super-regulated privacy paradise. What can be a big challenge if we have very intense government policies that will regulate everything we are having inside cyberspace and will kill our innovation. Then, we will be having a very good society—but will we be having all the benefits of ICT as well? Thus, regulation needs to be looked at as well.

The fourth one is a big regulator of all critical infrastructures. If we were able to regulate all critical infrastructures in a cyber way will we then achieve our results? Probably not.

The main conclusion is that this thing will not go away by itself. We will be having at least 5 times more devices in 2021 and at least 3 times more data in 2021 than we have today. And we will be seeing disruptions and perhaps more problems with data integrity. But how do you secure devices and applications you are not aware of today? We are not able to get insights in the incidents happening and waiting to happen. However, it remains important to keep this issue high on the agenda.

Why is this important for the Netherlands? The Netherlands is a highly digitised country. It is number 1 in the world on Internet banking, more than 80 percent of the population does Internet banking. There has been cyber criminality, but the banks were able to counter that and the number of cyber criminality in the financial sector has gone down in really dramatic pace. The Netherlands is second in PC ownership worldwide. It was the third country on the Internet and Amsterdam Internet exchange is one of the biggest Internet exchanges of the



world. The Netherlands is also fourth in online shopping in Europe. This makes the Netherlands a digital gateway to Europe, a highly digitalised country. All combined efforts need to be directed at making the Netherlands also a very secure digital gateway to Europe.

DON DAVIDSON, Chief, Lifecycle Risk Mgt + CS/Acquisition Integration Division, In the Office of the Deputy DOD-CIO for Cybersecurity (CS), US Department of Defense, USA, discussed the challenges and threats to governments, critical infrastructure and industry and practices to manage that risk.

Cybersecurity (CS) (as a Risk Based Approach)

There is this continuous challenge between the Chief Information Officer (CIO) who wants to grab as much IT as possible to enable his enterprise or system to run as cheaply and as rapidly as possible. The Chief Information Security Officer (CISO) has to temper that demand in order ensure that things are done securely.

We need to better understand how to measure cybersecurity and cyber risk. Often people want to know the exact ROI type decisions and one has to provide lifecycle cost and estimates, but it is difficult to estimate the cost to sustain and secure the system over time.

There is a compilation of best practices on cybersecurity engineering coming out from the Carnegie Mellon University: Cyber Security Engineering: A Practical Approach for Systems and Software Assurance, by Nancy R. Mead, Carol C. Woody, CMU 2016.

We are still going through an industrial revolution, a digitisation revolution, in the fact that we went through the mechanical revolution, we went through electro-mechanical, and now we are in this world of digitalisation where everything is enabled by IT, hardware and software, and being networked together at an unprecedented rate.

This helps to understand all the fault mechanisms that are associated with that: The systems are designed sometimes in a clean room environment and they actually are not designed to work in the real world with a cyber contested environment, where people are trying to break things and interfere with processes.

There is a need to develop the science of cybersecurity and we need to better understand how to measure cybersecurity and cyber risk. In this context, the “People, Process, Technology” model is a good model to talk about an enterprise or individual corporation. You have certain technologies that are purchased, that enable you to accomplish something—to execute a process, e.g., design processes. You also recruit people to fill that knowledge base.

The US Department of Defence talks about trusted sourcing. You cannot really test cybersecurity out by buying something and testing the cybersecurity included. You have to build it up-front to live in the cyber contested environments. Some of that is to deal with where you source a product from, i.e., software assurances and hardware assurances. When you outsource entire capabilities it is an assurance services kind of aspect.

The DoD actually established a cybersecurity strategy that engaged the leadership to tell them how they are doing. It doesn't measure cybersecurity. It measures how well the independent organisations are executing the policies DoD has issued. So when migrating



from Windows 7/ XP to Windows 10, it is possible to grade that progress gone through. And this gives a general feel of how well an organisation is implementing cybersecurity initiatives in this arena.

The fundamental building blocks determined are:

- Strong authentication. Who has access and which privileges do they have?...
- Device hardening. How are you configured and managed? Is the software up-to-date and securely patched?...
- Reduce attack surface. Manage external interfaces. Are you monitoring attacks services? If you have isolated networks: do they need to be connected to the Internet?...
- Computer Network Defense Service Provider (CNDSP): Monitoring and diagnostics of the networks.

All business enterprises have to go through these four fundamental building blocks.

Leadership does often not understand the information security standard published by the International Organization for Standardization (ISO) and by the International Electrotechnical Commission (IEC). Confidentiality is ensuring that information is accessible only to those authorized to have access. Integrity means safeguarding the accuracy and completeness of information and processing methods. Availability means ensuring that authorized users have access to information and associated assets when required.

For most people the issue of availability is rather easy to understand. Most of the recent breaches during the past 3 years concerned the confidentiality issue (people are stealing data, whether it is intellectual property, personal identifiable data etc). Actually the biggest fear in this space is the integrity of the data. Someone modifies your data and you don't know it—and integrity of data really does matter from a safety and security perspective.

President Obama issued a directive on developing standards for cybersecurity in a public private domain (EO-13636 & CyberSecurity Critical Infrastructure Protection Framework). This is a serious public-private engagement to develop a framework for talking about critical infrastructure. It has been very well received, not only in the US.

When looking at risk management framework, the risk process as a pyramid, all gets down to the issue that we need to have commercial global sourcing standards at the bottom of this pyramid—for all the commercial off-the-shelf products that are in use, whether it is software, hardware, cloud services, etc. What is the commercial standard we should be adapting for all these things?

When going up this pyramid to critical infrastructure and national security systems, people may actually want to have some national standards, but they should be well-informed by critical infrastructure around the globe. We have to work together in a critical infrastructure perspective.

And you save the very top of that pyramid for your most critical assets.

There current Software Security Assurance State-of-the-Art Report is available at the website of the Institute for Defense Analyses.



Some of the main challenges are the transition from a compartmentalised world to an open world, and in this context especially the Internet of Everything and XaaS (Anything as a Service), as well as the cyber protection of connected transport

With respect to connected cars, we have to think about introducing firewalls, antivirus and antimalware, hypervisor, IDS (Intrusion Detection Systems), and even a decontamination zone. One of the biggest problems will be the security maintenance, i.e., a patch, that has to be done over-the-air. The provision of a secure patch will be a big challenge for the automobile.

At the end, if you take a big system, it will be impossible to strengthen all its individual components. One has also to consider the virus theorem saying that it is not possible to decide if a piece of code is malware. The consequence is that security, or privacy-by-design, is not sufficient. Real time security reactive supervision of these big systems is necessary.

SystemX is working on the development of new functions for Security Operation Centers (SOCs) and interoperability between different SOCs. SystemX also develops inform and seek assistance and alert assistance for automatic countermeasures. SystemX also works on big data to analyse weak signals in order to be able to respond to an attack before it happens. Moreover, SystemX tries to capture a lot of secure data to develop a software that is capable to provide new ways to represent this data to the operators. You always need human operators in these systems.

To conclude, it has been proven many times that humans are the weakest links in the systems. We have to change this paradigm. We have to educate people, that is crucial in order to make people the strongest point in cybersecurity in the future.

CHRIS CLARK, Principal Security Engineer – Strategic Initiatives, Synopsys, USA, discussed the challenge of delivering meaningful security practices, and why it always comes back to software.

Are We Walking Yet?

When talking about policy and how policy is going to be driven, both in the public and private sector, one of the things we mostly forget about is that underlying components that we are dealing with are driven by software. We have to address the particular challenges from a resilience's standpoint as well as a procurement process when we are looking at these devices.

There is a number of challenges that we have heard about in the news. There are a number of issues we face both at a national level and at a business level. But we have to understand that when we see these breaches, these challenges that are out there in terms of confidentiality, integrity and availability of components: each one of those impacts the other.

An example is the MedStar breach that happened in Maryland this year: That organisation not only had to shut down a hospital and lose their capability of delivering services, they also had to call into question the integrity of their devices and the system that provides lifesaving support for their patients.

Everything we talk about from an IoT perspective is driven by software. And when we understand that, we get a much better view of what our connected world looks like. Young



people live in a world that has never experienced a loss of connectivity. They have their iPads, they have connectivity at any point of the day, whether it is wireless, cellular or any other means available to them. They get out and they are experiencing this world. They are very attuned to the potential challenges and threats that are out there and that are affecting them.

When we talk about security, we are thinking about it from a policy perspective. However, when we think about the generations that are coming in now, this is their absolute world that they have to understand and that they have to deal with. This is a very different perspective than if we talk about a connected world—they are living in their digital environments now.

From a technology perspective we are very young: When we look in the early 70s, we were just seeing computers coming to the home. And the early development of hackers—and now much more advanced individuals, what we might call a researcher—they all started in the space very early on. It is interesting to see how the challenges we look at from a hacking perspective are just a slight variance from what a person who is performing research in either an academic environment or for profit as an independent researcher.

We also saw a change with respect to IoT. Devices such as the Raspberry Pi and other embedded devices that are available to us, have taken the technology that was typically represented by a large organisation and moved into the hands of the individual. We have seen a plethora of developments and ideas that have come out of this.

One example is the crowdfunding platform Kickstarter. Here, we have individuals who have come up with projects and who brought a product to market in a very short timeframe and really targeted to specific audiences. We can see very quickly how they can change the market. Another example is Uber—a major disrupter in the automotive field. We will continue seeing this.

We have to focus on 5 key ingredients:

Technology brings new opportunities, but also creates new risks and we have to understand these risks. And this risk is driven by software. We have to do a much better job of ensuring that the software that has been released onto the markets has the resiliencies that it should have, so that it is much more difficult for hackers, researchers or even criminals to take advantage of. Very recently we heard about breaches related to Volkswagen and other automotive manufacturers: Key fobs can be compromised so that now criminals can have access to vehicles much more easily. When we think about that, it all goes back to software and we have to take that into account.

We also need to have a culture change. The policy needs to ensure that when we look at what organisations are doing with private and public, that they are taking into account what the real factors are. Yes, we want to make sure that what is being brought to market, especially from the public sector, is in the benefit of the public. But at what cost? We have to make a concerted effort to ensure that there is a balance there.

Another ingredient is automate and integrate safety, security and quality. There are tools that are already on the markets to help address many of the challenges that we see. It is a matter of ensuring that organisations have requirements, whether it be regulatory or self-defined requirements. And that they performed that analysis that should be done to minimize the potential vulnerabilities and threats in software.



It is also important to be dynamic. It is not only threats we know about, it is about unknown vulnerabilities.

And, let us adopt the standards! There are many standards out there that help us address the challenges of our time. Especially when an organisation has to deliver SLAs (Service Level Agreements) to their customers. It is important to ensure that they are meeting their agreements with the solutions they are providing.

Which leads us, once again, to being dynamic. We don't want to have a structured environment that is inflexible. When we talk about the types of vulnerabilities that are out there today, we also have to remember that there are a number of vulnerabilities that exist within software devices that are already on the market—that we may not be able to leverage today. But the hackers, researchers and others are looking for new methods, new technologies and new types of ways of leveraging these vulnerabilities. We have to make sure that our core components are as resilient as they possibly can be before they are on the market. That can help minimising that potential impact.

JACQUES BUS, Secretary General DEF Digital Enlightenment Forum, Belgium, delivered a thought-provoking talk on social and ethical aspects of big data and autonomous systems.

The Effects of Big Data and Autonomous Systems on the Individual and Society

The Digital Enlightenment Forum was set up to stimulate the discussion and the development of policy in a multi-disciplinary way. The only way of solving our security problems, and many of the related issues, is in a way where also other scientists are being involved in the development and in the thinking of the risk about it.

During the last years, more and more attention is given to the limits and dangers of the development in ICT. There are fabulous opportunities, but in order to make these opportunities real, we also need to better understand these limits and dangers. Of course mankind has always been developing technologies—this is part of our life. We are living in a world where the virtual (cyber) and physical environment fully amalgamated. Digital is part of our normal life and we have to work with this and profit from this.

What are the consequences for the society of using these kind of powerful technology tools? Nowadays, a human being in the data world is nothing more than a data projection in the government administration, in social networks, in the customer administration of shops etc. And then, there are companies that are combining all this data, also with behavioural data on how people work on the Internet. This produces an even more extended digital projection—but it is still a digital projection. It is not a person's reality or identity. We should always keep that in mind.

Moreover, since the last 2 years, we see massive surveillance, not only by governments or secret services, but also by companies which are using that for advertisement and profit generation.



How are we dealing with these particular things? And, how are we dealing with the complexity that is fast increasing in this particular moment due to the connections that are being made through the Internet but also by globalisation in general?

These developments have specific opportunities, but what is the risk to our autonomy in a world of almost complete surveillance? Will we adapt to the norm of the companies that provide us with only those information we are interested in? Will big data give us the predictions that we want to have? It is indeed proved, that big data use can improve predictions and systems, but even with complete surveillance full complex reality can never be captured. We will never reach more than 95 percent. There will always be a last part where people can be fully unpredictable in particular moments.

Of course it is possible to find out that certain persons have a tendency to be violent and that one should look more after them, but in other situations it is impossible. Moreover, real complex systems, i.e., not just complicated big systems, but real complex systems with emergent behaviour, can demonstrate this fully unpredictable behaviour through connections between subsystems, through cascading, through emerging behaviour etc. It is well known that these things are happening and that you cannot predict such things either. And the more complex the systems become and the more close you are coming to situations of crisis in such systems, i.e., the discontinuities and non-linearity in the system, the bigger the crisis or the problems that will happen will be.

An example: 10 years ago, a ship had to pass under an high voltage line. Thus, the line was switched off after having checked various simulation models whether this would have any negative consequences. Once the line was switched off, some kind of problem in one of the sub-networks far away appeared and from this moment on, the whole of Europe had instabilities in the electricity network. This was completely unpredictable.

Another crucial point is the control of the data. Will it be in the hands of the government or of global companies? What will be the power relation between these governments and global companies? Will it be in the hands of persons and what will be the relation between the individual and the governments? How do we organise power, democracy and individual autonomy and decision making in a systems-controlled world? Would we be able to switch off systems that would guide us and advice us when we are 10 years further? Or do we have to follow them?

Democracy is failing at this moment. Fear in general leads to very bad informed individuals and the engagements of the citizens in a dedicated and well-informed way is not really happening in this world. People can know everything and read everything—but they don't. They just read and get what they like to read. Democracy is really broken. The wave of the day is what social networks are presenting to us.

How will ethics, culture, law and responsibility be embedded in a digital world with automated decision making? Can we still make autonomous systems that consider ethics? Platforms arose where ethics are taken into account—but can the ethics be enhanced and improved through political processes, because ethics is not rigid, neither is the whole social structure. We have to think about how to build the dynamicity of our society into these kind of platforms.



Some suggestions to conclude: First of all, personal data should be under the control of the owner or the subject. This is not a matter of whether the data should always be owned of the individual. Sometimes it should, sometimes it should be under the control of the individual in the cloud, sometimes it should be in the hands of the doctor etc. This is not the issue. But, in addition to the fact that it should be at the right place, it should also be transparent on how it is being used.

Storage can be at many places, the only point is that we then need to make systems being able to combine the data in applications without being obliged to store them first in one place altogether. These are the kinds of things, people are currently working on.

We might also want to have data protection laws less based on collection rules but more about rules on reasonable and justifiable use—not only for the person or the company, but also for the society as a whole. We should be sure that persons have the control over the autonomous systems that advice or steer them. So that the systems enhance us and that we are not the ones enhancing the system. Otherwise, they can overtake us and don't need us anymore.

Platforms need to be developed to incorporate ethical and legal rules. There should be real subsidiarity at the various levels, and we have to make sure that other measurements than only money are being used to measure whether our society goes forward and what are the spaces we can trust. Reputation, happiness, emission, waste etc.—all these things can be measured and taken into account in the kind of feedback systems we create.

Further reading suggestions are the book of Dirk Helbing, “The Automation of Society is Next: How to Survive the Digital Revolution” or “Antifragile” by Nassim Nicholas Taleb.

KOFFI FABRICE DJOSSOU, Senior Sales Director, Africa, ABS – Africa Broadcast Satellite, South Africa, provided the perspective of a young and fast growing satellite operator.

Towards an African Vision of Cybersecurity Governance

From an African perspective, cybersecurity is a shared responsibility that requires everyone to participate in jointly fighting cyber threats.

The government's framework is the key to addressing accountability from a cybersecurity perspective. An important step is that everyone, at different levels from both the private and public sector, should assemble a cybersecurity team. This team includes representatives from the IT department, legal department, human resources, and public relations in order to raise awareness. The Internet is borderless and we have to tackle cybersecurity issues by involving various global stakeholders. The designated team should be skilled and experienced.

The African governance model for cybersecurity requires a cross-disciplinary approach and the recognition that technology, although holding significant risks, can also be a significant competitive advantage. African stakeholders are actually enhancing their risk management skills to ensure that technology risks and gaps are not only understood but also factor in the decisions made by African leaders. The starting point is to understand the many regulations that address cybersecurity risks.



Getting all African teams working together towards the same goal without interfering or duplicating activities guarantees efficiency while maintaining regulatory compliance and increasing regulators confidence at the regional, national and continental level.

Every stakeholders group should also have an incident response plan or team that can be put into action quickly in the event of a cyber attack. Elements of such a plan should include the identification of team members to call upon in the event of a breach, detailing their respective roles, and establishing written protocols in order to determine how to inform users, consumers, shareholders, regulators and law enforcement. One of the most critical steps is to test the incident response plan, as testing is the only way to determine whether the underlying assumption of the plan will work in reality. It also gives also incident response team members the practice needed when working together during a crisis.

There is a need to protect the critical infrastructures which are defined by assets, systems and networks, whether physical or virtual—so vital that their incapacitation or destruction will have a debilitation or an specific affect on security, national public health, education and other important economic sectors.

This government model should work through a functional PPP—a partnership between public and private entities to engage stakeholders for a proactive cybersecurity governance and risk management towards a concrete response. It is critical for various players to forge a consensus on an appropriate investment in cybersecurity risk protection and budgeting this appropriately. Investments that are properly integrated within the IT-framework proved to be far more effective than ad-hoc expenses for security tools purchased in response to a specific crisis across a sector.

There is a need for global governance. First of all, by engaging all the sectors at different levels for a better and coordinated approach. The common element for everyone, indeed all organisations, in managing cybersecurity risks successfully is a governance framework that suits their risk profile.

So, what should we do? Work with the critical infrastructure sectors, cross-sectors to help improve the cybersecurity and to carry out cyber awareness and risk management efforts, foster understanding of cybersecurity risks through education, and bring the research team to the table. For private companies, it is important to know what question to ask to management to ensure that it is safeguarding the company against cyber threats and attacks.

Protecting critical infrastructure is definitely is a shared responsibility. Private sectors own a vast majority of the critical infrastructure. Respect for privacy and civil liberties is essential. Cyber resilience is needed. There is a need to lead a voluntary programme.

The idea is to put in place an African Cybersecurity Agency which will lead the ICT sector in Africa. This will be done on a national level, finding a focal point, bringing this to the regional level and then to the continental level. Various tools are being put in place in order to set up this cybersecurity voluntary programme in Africa.



SHAKEEL TUFAIL, CEO, Secureninja, USA, [<https://secureninja.com/>], addressed the issues of critical investments and the criminality of digital systems.

Crucial Investments in Cybersecurity & Digital Criminality

There is a “human” weakness and there is an “enterprise” weakness which always is the issue with any attack. There are many case studies that we can use these two examples with: like of education for the entire organisation, not just some IT folks, and the fact that the enterprises change quicker than we wan secure them.

Verizon annually issues its Data Breach Investigations Report. While the Verizon Report 2014 stated about 48,000 incidents, the Verizon Report 2016, stated 3,141 breaches and 100,000 incidents in 82 countries. They found that 80 percent of the intrusions took little or no specialist skills—tools that are easily available can be used for attacks. The primary motivation for security breach is still financial and espionage.

Hacking and malware are the number 1 drivers. Verizon started looking at this in 2005 till 2015. Within 10 years, hacking and malware increased exponentially.

We have the most technology in the history of IT and Internet. We have these global companies that are making all these devices to find security problems—yet, the attacks are growing exponentially. And the time to attack is also getting faster. Now the attack surface is minutes, instead of days or weeks. How to compete with attacks that occur within minutes and data is stolen and damage is done within hours.

The compromise happens in minutes, the discovery takes days, sometimes weeks. In fact, every single case study that you look at shows that most companies don’t realise that there was an attack for weeks—and then, there is a disclosure and there is also some hiding, because nobody wants their stock to go down and governments don’t want to be embarrassed, and so it becomes a national security risk and so it is never told to you...

What are we protecting and how are we protecting? The Internet is growing at almost 1,200 percent per year. It has a penetration in first world countries about 70 to 80 percent. Even Cisco is saying that 37 billion new devices will be connected by 2020—the Internet of Everything.

What are we protecting? We always think of data, but it is more than data. It is time, it is money, it is reputation and brand, it is legal. But in today’s world, it is also very heavily used by governments, by the mafia, by terrorists organisations, so it can mean even safety and human life. This makes it even more important than ever.

Every thing in security is detection. There is almost no protection, at least very little, and there is no real understanding of how to protect your organisation. This is like our security operation centres look like: A bunch of monitors, a bunch of people looking at things, trying to detect and analyse. Whether it is a firewall, a router, IDS, some type of web application firewall, some type of scanner or code review—we are always detecting. We are not preventing or solving the problem. That is the first thing we have start doing: to get away from trying to analyse everything—it is needed, detection should be there, but we need to make sure that we also do the prevention and we also educate.



Everything is a sieve. The wholes of the sieves become smaller and smaller, but there are still wholes... So people get through the sieves and we try to protect data that are malicious to not come through the sieve. But we fail. The media commonly referred to 2014 as the “Year of the data breach.” This was stated in Europol’s iOCTA (Internet Organised Crime Threat Assessment) 2015. With record numbers of network attacks recorded, this is a constant trend and the future scenario doesn’t look any better.

The other thing we try to do is red team: “They attack us, so lets attack them”. We teach courses and we are getting more and more organisations asking, how to attack back. Maybe sometimes this is needed. Thus, there are these large military SOCs where we attack back. But did that really had stopped them or did that make their capabilities stronger?

Digital crime is very profitable and the problem is that the laws are not very good. In the industry, especially in the US, security is compliance and checklists. Everybody who had a breach, every single one, was compliant. They all passed their checklists, they all passed their rules and regulations.

The US laws are rather weak and in 2015 the Obama administration came out with a Data Security and Breach Notification Act of 2015. This bill purposes a maximum fine of 35,000 USD. However, this is not enough to motivate any company. Moreover, the law hasn’t passed yet.

The EU General Data Protection Regulation states that “failure to comply with this requirement could lead to penalties equivalent to 5 percent of an offender’s global turnover.” 5 percent also seems a little bit low... Besides, this regulation hasn’t passed yet, either.

The Darknet, or Darkweb, is where people can buy credit cards, stolen information, health records, even intelligence, etc. One of the biggest sites of the Darknet is Tortuga or Barbasso. There, people can buy credit cards from 23 USD to 135 USD. If it has a big credit limit, like 20,000 USD, people might pay 100 USD. If it is a small credit limit, one pays less. These are sites, just like eBay, where people can go and buy credit cards. There are also tools, which check if the credit cards are working, they can also check for passwords etc. People don’t need to be a technologist, they just need a tool.

Hackers are starting to sell service attacks. Customers can select a packet based on the indented usage and pay a monthly fee. Such subscription allows them to attack any side by using this tool. These vDOS hackers made 600,000 USD. vDOS — a “booter” service that has earned in excess of 600,000 USD over the past two years helping customers coordinate more than 150,000 distributed denial-of-service (DDoS) attacks designed to knock Web sites offline. The various subscription packages to the service are sold based in part on how many seconds the denial-of-service attack will last. And in just four months between April and July 2016, vDOS was responsible for launching more than 277 million seconds of attack time, or approximately 8.81 years worth of attack traffic.

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Session 4

Day 1 – Afternoon – Parallel Session

The Digital Industry: The Fourth Industrial Revolution and Societal Challenges

DESIREE MILOSHEVIC, Senior Public Policy and International Affairs Adviser, Afilias, Ireland, [<https://afilias.info/>], chairing this session, welcomed the participants and briefly outlined the topic of the session.

There are some discussions about whether this digital revolution is the Third Industrial Revolution (see for instance the book of Jeremy Rifkin) or the Fourth one.

Fourth Digital Industrial Revolution refers to the term the World Economic Forum, as well as some initiatives in Germany and other organisations, are using: They say that the First Industrial Revolution used water and steam power to mechanise production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. They will all come together in this Fourth Industrial Revolution using all of these elements to create this new brave world we are experiencing right now.

The session is going to tackle how some of these changes are affecting our society—how they are affecting our businesses, our societies and economies. You really don't need to leave the house to shop or to get a taxi. Things are coming to you with all this automation that is happening everywhere at the edges as well as developing certain centres. We also don't need to look further than Marvel comics to know that some people may use technology for their own interest rather than for the interest of the society as a whole.

The moderator of the session, **DAVID LANGLEY, Senior Research Scientist, TNO, the Netherlands**, welcomed the panellists and introduced the first speaker.



DENIS GARDIN, Senior Vice-President, New Technology Ventures & Managing Director, Airbus, France, [<http://www.airbusgroup.com/int/en.html>], illustrated an aircraft manufacturing industry's view on digital manufacturing.

Opportunities and Challenges in Digital Manufacturing

As it is the case in many other industries, the big topic on the agenda of the Airbus Group is digital transformation. As an high-tech industry, Airbus has always been involved in information technologies and uses ICT as much as possible to improve digital operations. However, new business models linked to digitalisation are emerging in all industries—and this is new. All industries are scared that their old business models may be disrupted. At the same time, the Airbus Group also considers this as a new opportunity for the future.

Due to the speed with which new technologies are created and available in the people's daily lives, employees are no longer just passively waiting for the next generation of tools. They also can drive the implementation of new tools, and this is also something new. On top of the usual, expected improvement of the production which is the core business of an industry, we have to add two new aspects of the digital transformation: The involvement of everyone, which is the knowledge and personal use of platforms, and the emergence of new business models which are disrupting industries.

In the end, digital technologies also lead to a cultural change. Industries need to transform their culture in order to enable people to take the full advantages of these technologies.

One of the key objectives of a manufacturing industry like Airbus is to build the factory of the future in order to gain productivity, quality, and flexibility. There are more than 450 initiatives in this domain, mainly about reuse, synergies and scaling up successes. There are also multiple pilots under assessment or deployment in the area of predictive analytics or big data.

The Airbus Group tries to go even further In the virtual world. The aerospace industry already uses a lot of CAD software, but some of the older aircrafts don't have this. Thus Airbus is trying to move all the parts into digital 3D mock-ups in order to implement new technologies such as augmented reality. Such augmented reality consists in superimposing a 3D mock-up over the reality during maintenance works.

Moreover, the notion of paperless becomes even more important and Airbus introduces robots, cobots and connected tools. Other than in the automotive industry, there will always be human workers in the aerospace industry. There is no real mass production and Airbus produces a lot of specific aircrafts. However, Airbus Group wants the workers' tools to be connected to a database so that all the parameters which can be adapted to the environment can be sent directly to the tools. This is the company's IoT in manufacturing.

A few years ago, Airbus has started to connecting things. A significant step was achieved with RFIDs giving a digital existence to moving objects. The benefit of going digital is obvious: The automated, paperless and digital attestation of lifejackets in the A330 led to a time reduction from 14 hours to 26 minutes.

The aerospace industry has very good development tools with all data in 3D. The manufacturing process is much more local: planes are built "bottom-up", one after the other. The big challenge today is to connect all objects and manufacturing tools to the relevant



databases and be able to run real-time factory simulation. Digitalisation means that all the data can be used across the value chain from development to manufacturing and then to maintenance—something that is easy to say but difficult to implement.

The challenge is now to create an aircraft programme, in terms of data lakes, where all data is available, rather than just per silos, per plane or per department in the organisation. This is how the Airbus Group is going to leverage the potential of existing technologies.

MARC VANCOPPENOLLE, Global Head, Government Relations, Nokia, Belgium, [http://www.nokia.com/en_int], provided some valuable high-level perspectives on the IoT.

Internet of Things -- Unlocking the IoT opportunity

We are today at a very critical time, a magical time, where the physical and the digital world are coming together. However, this also poses a number of challenges.

We have to consider where we are coming from in terms of connectivity: 10 years ago, we had 1 billion places fixedly connected. Then, we moved to mobile connectivity and by 2020, we will have 5 billion people connected. We are talking about connecting people and now we are moving to things. This goes exponentially faster than connecting places and connecting people. The interesting aspect is all this data which is being generated by connecting all those things. It is not just that these things are connected and then generating data, it is that this data is being fed into automation loops—and you get into a mode where Artificial Intelligence and becoming predictive on what can be done with the data becomes important. This is a real paradigm shift to what we had before.

All this will bring a lot of societal and economic benefits. This IoT will be able to give us time back and to let us save time. Applications like self-driving cars or everything that automation can do at home should be able to bring us time back. Which, of course, is an interesting perspective knowing that we all lack a lot of time. Of course, it will bring us productivity benefits. We all know examples of that, but many people forget that the IoT will also bring us new business models, and not only efficiency gains but also potential new revenue gains. This is something that is becoming increasingly important. There are no value chains that digital will leave untouched. Every company that is not looking at this value chain from a digital perspective, will become very vulnerable. We see what is happening in the hotel or taxi sector. If you are not careful and not moving forward you can get into trouble. On the other hand it is clear that companies that move fast with digital also have the ability to gain more revenue. Studies have shown that there is a clear link between digitalisation of a sector and the potential to gain revenues.

If you look at the potential business of the ICT sector that the IoT can bring: Various types of solutions getting from the device to the cloud and then having the transmission, the telecom, in-between. Actually, the big potential is not in the things, nor in the telecom network. It is in the cloud and in the analytics. Because when everything is digital how can we differentiate? It is with specific algorithms, with specific AI. This is really where the big business relies in the future and where companies should have a look at.



JEREMY MILLARD, Senior Consultant, Danish Technological Institute, Denmark, added a social scientist's view to the discussions.

Productivity, manufacturing & choices about the future of work

Global growth in GDP per annum is dramatically slowing down. Growth in the West, including the US, Germany and Japan, is lower than the rest of the world. Likewise with productivity growth which is also slowing significantly. With an increasing population, both GP and productivity growth matter; if there is no growth, prosperity slows down and can even become negative. This starts conflicts in the society and in different parts of the world, some of which we are already seeing.

Why do we have low GDP growth? To put it simply, because of the decreasing growth in productivity. Growth and productivity are interdependent. However, there has been an IT revolution for the last 30 years, so why hasn't productivity increased?

When we look at the first two industrial revolutions, first steam massively increased productivity and thus growth. The same happened with electricity 100 years ago. However the recent IT revolution has not so far had the same effect. The reason is—and this is a hypothesis—that in both those first two new industrial revolutions, steam and electricity, were directly taken up into manufacturing. So far, IT hasn't really been taken up to any significant extend in manufacturing. But it is happening now. The next revolution is basically about merging the digital and the physical and taking ICT into manufacturing. Manufacturing is the key to growth.

So, are we about to see the long awaited productivity increases resulting from the application of IT to manufacturing? There are a lot of interesting technologies: advanced robots that apply IT to the production process, additive manufacturing, i.e., 3D printing, horizontal and vertical integration, augmented reality, virtual reality, the Internet of Things, drones, etc. We are now seeing how IT is starting to impact the factory of the future, an important component of which is distributive manufacturing. If you can make things locally, you don't have to make everything in China and then ship them to Europe or Northern America. You can make them in a lot of different places around the world. This has an immense impact on the way we think about manufacturing and the way we understand the jobs associated with that.

In the past, we had a centralised manufacturing production, we outsourced to the cheapest location. What is happening with new ICT tools is that we can bring them closer to the consumer market. Low workers' prices in China will no longer matter in the future. In 5 years, it will be as cheap to produce in the US as it is in China today. This leads to a massive macroeconomic shift. We had the area of mass production in the past, everybody had to buy more or less the same thing that was already on the shelf. Now we are moving towards an area of mass customisation. Using additive manufacturing and other new technologies in the factory, we can actually produce small orders, personalised products, niche products just as cheaply as we can in the old large-scale manufacturing. This is a real revolution.

This is the economic perspective. What about the social perspective? This is having an immense impact on the way people work and are employed. We currently have massive and far reaching choices to make about the future of work. On the one hand, there is a dystopia already happening, according to some prognoses, 47 percent of US jobs are at risk from automation (Frey & Osborne 2013), and robots threaten between 40 million and 75 million jobs worldwide (WEF 2016). There are fewer jobs for people to do in relation to capitalisation



(WEF 2016): In 1990, the 3 biggest firms in Detroit had a market value of 36 billion USD, revenues of 250 billion USD and 1.2 million workers. The Silicon Valley in 2014 had a considerably higher market capitalisation (1.09 trillion USD) generated approximately the same revenues (247 billion USD) but with about 10 times fewer workers (137,000).

What is this leading to? The prognoses are that IT is not just replacing no- or low-skilled workers with automation, but through AI it is now also replacing managers and professionals. Many people aren't doing very well in this context. There is a "race to the bottom" and a growing "precariat" as an emerging global class with no financial security, job stability or prospect of career progression, for example in the so-called 'gig-economy' like Uber drivers.

On the other hand, however, we can also make some good choices here. The following might describe a utopian situation to some extent (however, both visions are extremes, of course): Machines are best at routine, frequent, high volume tasks and learning from past data – as long as this is the "right" data. People are better at tackling new situations and problems—bringing together different strands of competence, e.g., cross/open innovation, business strategy... The question is, is there enough work involved in this to keep everybody in occupation? Machines can improve and support the work of managers and professionals, not replace them. Work involving personal interaction, empathy, understanding, intuition, "common sense" etc. (health, care and education), will not be replaced but enhanced. There is much work in society that now needs to be done, not always in a market context, so how to organise society to enable this to happen?

ADRIANUS MELKERT, Board Director, NxtVn, Finland/Netherlands/Dubai, [<http://nxtvn.com/>], addressed the challenges of the fourth industrial revolution and to what extent this requires a rethinking of political, economic, and social paradigms.

From Disruption to Reconnection

The factory of the future cannot be seen disconnected from the fabric of society; and when we are inevitably talking about disruption it should also be about how to get from disruption to reconnection. Business, politics and society generally should join forces to address tremendous changes in the lives of many people right now and even more so in the years ahead.

Five big questions we need to keep in mind, whether we see it from the public or the private angle:

First, the exponential speed of change is obvious. It is difficult for us to follow or to know everything—let alone those who are much further away, who are bearing the consequences and who often feel excluded. How to be inclusive?

Second, more governance is needed. At the same time however the question is raised - often for good reasons: How to avoid too much government? Because when it comes to digitalization governments can have intentions that are not in the general interest or not in the interest of supporting the developments of the digital society. But it is inevitable that more governance will be needed when we look at all the questions that are out there.



Third, economic growth return: how to deal with the productivity paradox? It might well be that more growth will show in future. But it is also true that there is something literally virtual in what is happening with the digitalisation—invisible, intangible elements that are hard to account for in the usual way of counting GDP. Somehow we lose something underway. We think that lots of things are more efficient through using IT, but somehow it is not reflected in the macroeconomic figures. And that is important because macroeconomic figures, in the end, are also guiding towards distribution, towards relative levels of wealth and all kind of other indicators that they provide.

Fourth, there is a labour market revolution going on. How to combine the increasing independence of people in their work environment with the sense and the need of community on the basis of which collective arrangements were created? That really distinguishes developed from developing societies and we don't want to lose this under way.

The final, and maybe most difficult question to deal with is how the global village interacts whilst making use of the IT facilities that are available to so many people. How to promote “good” and resist “evil” because you can do both things with the Internet.

The issues that are at stake are many. Just to mention a few that are of primary importance:

In terms of inclusiveness: Connecting all, regardless of education, age or gender. That is a huge challenge. Reconnecting the disconnected—because even if you are connected now, you may feel disconnected tomorrow due to the pace of change. Also think of the urgency of connecting Africa, and more generally, poor regions in the world: when you look at the map of the world, it is very clear who is connected in the macro terms, countries, regions, and who is not. And it is not only a matter of government but also of private business. NxtVn is a data centre park investor and promoter to provide multi-tenant open access, connectivity with clean energy, which is an illustration of the way that also private business is actually dealing with what are essentially public goods.

In terms of governance: It is inevitable that standards and protocols will require more government involvement, but government is not neutral. So, for and by whom will they act? Security of the Internet and security through the Internet are two different questions but huge issues.

How can the public good of the Internet and the private business of IT be connected?. We are not thinking so often of roads being purely invested through private companies because it is a public good. But IT has emerged the other way round and that makes it so challenging to really deal with all the issues.

The labour market has been mentioned. Job security disappears. There are no jobs for life anymore. But people have to have a perspective of what job change means. The paradigm of work needs to be discussed. And in a global village, it is all about knowledge and behaviour, individual and collective security, and the huge gap discrepancy between globalisation glamour and local doom—and this explains existing fear of globalisation in a local context. So, how to turn this around and make IT serve local aspirations?

It is high time that the IT world is really trying to see itself more in the broader context of what the implications of all the changes going on are for society at large.



To conclude, two very important examples:

One regarding the labour market: When people are understandably afraid of losing their job because of automation and robotisation, the answer is not how many million jobs are going to disappear because this is zero-sum thinking. The answer is to try to think of a new definition of work. There is a lot of work out there, where no value is allocated to. You don't get a salary, but it can still be very useful, either in business or in the public environments. So rethinking work—some are approaching this from the basic income point of view, another possibility might be to look at it from the basic job angle, that everyone has a place in society to contribute and probably there will be more opportunities from the growth that this creates, in order to award work that right now is not part of the “paid work” paradigm.

Second, it is all about data. Data can be used for many purposes. Using big data for the right purposes, e.g., for promoting the Sustainable Development Goals, to connect the world also through IT, is a great perspective that should us made less pessimistic about what is going on, less fearful, more optimistic with more chances of bringing the IT public good and private enterprise together.

MARIE EKELAND, Member, CNN – Conseil National du Numérique; Founder, Daphni, France, discussed why old business models no longer work in this new economy.

If we see from the European perspective the pace of change being so fast, it is also because we have been in a very stable economy for the past 50-100 years. If you look for example on France, its 40 biggest companies are indexed and listed in an index called CAC 40. The average age of these companies is 105 years. One of the reasons that we really see that pace being so strong is that we are not used to it, because we have been through this very stable economy in the past. In the US, this is very different. If you look at the Fortune 500 and the number of the companies that were not in that index 25 years ago, it is about at least 25 percent.

This doesn't mean that Europe hasn't been innovative. The big companies in Europe are innovative, but they were not innovative in all the different dimensions, such as having an agile organisation, innovating somewhere else than only from the technological point of view, transforming their business from a product to a service etc. All these disruptions that came from the US are actually not that much technological but are really innovating in all other dimensions. One of the things that we should understand, especially in public policies, is that all European public policies today around innovation are centred on R&D. But today, innovation is coming from all the other dimensions, like disruptive business models coming from a products standpoint to a service standpoint, becoming an agile organisation to really be able to create and innovate at a very strong pace. All this is not taken into account in all the public policies around innovation in Europe.

To give an example: There is in France that young innovative enterprise status called J.E.I. In order to benefit from that status (less charges, less taxes etc.), the enterprise needs to have at least 15 percent of its cost dedicated to R&D. When we try to apply this to Facebook in its early years, they were not satisfying this. We are really biasing the way we model our economy, and we are not taking advantage of all the potential the digital economy can offer to a sector by being so much focused on what used to be innovation in the past, which is R&D.



Jeremy Millard, Danish Technological Institute, questioned the issue of giving before receiving. There are solutions to finance this, but it is often difficult for people with no money but a great idea to do that.

Ms. Ekeland agreed, but one of the characteristics of this transformation is that it needs equity, even for old companies. People need to invest. It is also something that needs to be rethought from the beginning. In Europe, and elsewhere, SMEs are usually financed by dept, which means that you have to be profitable. In the digital economy, you are fighting for growth—you are not fighting for profitability. You become profitable after. This is a complete change of mindset, not only in terms of what types of service you build but also how to finance it.

Pierre Lafitte, President Sophia Antipolis Foundation, France, added Sophia Antipolis is currently trying to set up a network/ database of innovative people, innovative and successful business ideas.

Hervé Rannou, Items International, proposed the adoption of open source for small software editors as a mean to finance the aspect of “giving before receiving”. He then wondered whether every company has to comply with this user-centric approach. This might not be necessary in a B2B industry, e.g. for a company like Amazon. The question is, is someone else going to give a better service to your customers than you?

Ms. Ekeland explained that at some point you need your customers to be happy. What Criteo is really bringing is performance, but it brings it through a very strong big data analysis so they know the customers of their customers a lot better. For example, Criteo has a lot of e-commerce sites that are customers. What Criteo is doing is to provide a personalised recommendation advertising to the customers of the e-commerce. For instance, if Zalando customers are looking for a special type of shoes, they know exactly which ad to push to the Zalando customers because they know exactly their taste. Their business is user-centric and they need the customer to be really happy of the performance. The way they were super-user-centric was in the business model because it is Criteo who is taking all the risk and not the e-merchant. The one thing that digital brings in any case is that you are in an international competition. So, if the service you are rendering to your customers is not sufficiently good enough, and this is why there is so much innovation needed, then they will go to somewhere else. You are not competing locally, you are competing with the world.



- Vertuoz is a web based solution for monitoring and analysing energy and environmental efficiency for buildings. When you are a company that has a series of different buildings that you rent out with apartments, you want to be able to better manage this and you want to be capable to interact with different uses. ENGIE, with Vertuoz, uses digital tools and digital devices to capture data, to treat it and then to interact with people—which can go from simulating what is going to happen to providing advices both to building owners and inhabitants with regards to what they should do to reduce their energy footprint.
- SEAS is funded by different European countries. SEAS develops AI so that electrons flows are optimized within buildings. Trying to balance flows manually is to complicated as there are too many objects, too many interactions and too many cases. This is where SEAS steps in, and objects define via AI by themselves how electrons have to flow between them. SEAS basically is going to make sure that all equipments in the home talk the same language, which is the electron language. They can only say how much they need or how much they produce at any given time. Then they share their physical constraints with each other and after that, you start putting some layers of Artificial Intelligence. The objects then will decide automatically when to buy electrons from the grid, when to sell, when to store—and if there is a second house, they can do the same with interacting with the second house.
- The Smart ZAE project is an example for what ENGIE is doing in industrial zones. It tests at the level of an industrial site in Toulouse the combination of wind energy, solar energy, and different solutions of storage. The local smart grid has also the capacity to trade electrons with the main grid.
- The Renewable Energy Integration Demonstrator in Singapore (REIDS) is a multi-partners' project which looks at how to turn islands into an autonomous system with only renewable energy. It is the largest micro-grid demonstration platform in the tropical area. ENGIE will develop and test a multifluids energy solution integrating several renewable energy sources and several storage solutions.

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Q&A

The first question addressed the issue of the future demands of the labour market. Many children today still learn skills that are already obsolete. How to correct that rapidly to minimise employment problems?

Adrianus Melkert, NxtVn, suggested a certain analogy with the “core IT” user approach or user friendliness that you often don’t see in education systems: Kids are often a lot smarter than their teachers. However, many systems are very teacher-based in a one-way transfer of knowledge which is often quite obsolete. It is a mentality, it is a method, and it is not only about children. Learning will have to be through life. We have paid lip-service to this during decades, but this has to be organised now—and this is one of the roles that governments should take on.



Jeremy Millard, Danish Technological Institute, referred to a combination of different things. He gave the example of the Hole in the Wall project in India. (Through a hole, a freely accessible computer was put up for use. With no prior experience, the children learned to use the computer on their own). Children's natural curiosity, especially when they are surrounded by "gadgets" like this, can be an immensely powerful stimulus. But, you also need structures, you need more money put into these issues and start very young. You also have to get the private sector involved. It is important to create an enabling environment. How did Kenya managed to do such amazing things? There are a lot of lessons to be learnt. A combination of bottom-up and top-down with money being put in, but in a senseful way.

The question arose why we don't see this discussion embedded into the society? Why do we discuss such issues in closed rooms? It has been kept like an elite discussion. Is there any chance that we take it to the society?

Marie Ekeland, CNN, Daphni, disagreed. The elite is the one who is not having the discussion. There are a lot of ground movements coming up stating how obsolete politics today are. Digital is part of the usage and is not being theorised. The problem is that there are not enough people thinking what the digital world is. The problem is that neither economists nor so much social scientists are thinking on the questions: What is the world that we want to built? What are the values we want to keep in this digital society? They didn't see the change happening. But that is mostly because the elite was disconnected from what is happening on the ground. We are in a top-down society. For instance, Nicolas Sarkozy didn't know what leboncoin.fr was. Leboncoin is the website where half of the French population is exchanging and selling second-hand objects. The society is structuring itself.

Jeremy Millard, Danish Technological Institute, added that it is not just digital. Digital is a general purpose. He gave the example of the "makers-movement" and the "FabLab" network where people can make their own products. They are using digital to scan objects and design things and then make them in local communities. Such things are also happening in Africa, e.g., in Ghana. The big problem there is that there is waste plastic everywhere. This is an immense business opportunity: Why not paying the kids a very small amount of money to collect the plastic and bring it into a little factory, start recycling the plastic and making things like baskets or flowerpot etc.? You can make an industry out of that. The idea is to couple IT with other things that are happening in the society with real needs at a local situation. And this applies to Europe as well.

The following questions were: Are there any examples of or practices about learning approaches? How to cope with always changing practises and redirecting the knowledge of employees?

Raphael Schoentgen, ENGIE, provided an example of how to introduce new ways to get ideas coming from colleagues. 2 years ago, ENGIE decided to create a venture capital fund and at the same time to push harder on the innovation side. Colleagues were asked about there ideas and what they would like to do. In roughly 2-3 month about 2,000 ideas had been gathered. Not all of them are really ideas that will lead to massive creation of money, but the process was quite interesting. ENGIE started screening them and started innovation bootcamps in order to put colleagues in environments in which they would strive. It is important that large companies like ENGIE engage in open innovation processes.



Denis Gardin, Airbus, added that we are in the middle of learning how to adapt to open innovation. There are a lot of initiatives popping up everywhere. Airbus Group started a few years ago and went through the lifecycle of selecting the good ideas, how to close things, how to manage people etc. There are other companies moving to open innovation. We have to reinvent the way we work in big companies—a way which is not just programmatic and deterministic, but which enables to act a bit more like a venture capital community.

Marc Vancoppenolle, Nokia, added that virtual reality will have a big potential in this context. Putting people in real virtual environments of what new jobs could be and how they will function is something that technology will bring. Of course automation has an impact on existing jobs, but we should not forget that the digital industry is also bringing a lot of new jobs that were not existing before. This has also to be taken into account.

The final question addressed that issue that we have a massive problem in the skill levels and the workforce globally. There has to be a massive retraining effort of the existing workforce. Isn't there a responsibility of government and perhaps industry to think through what it will take to retrain all these people? Don't we need a serious global programme to address this problem?

Adrianus Melkert, NxtVn, answered that one has to be cautious with these big numbers because the bottom line is that you don't want to live in a society where everybody becomes an engineer. Life is more than machines and technique. By creating other ways of work, other machines and other processes of automation, you also create space for other ways of interaction between people. For example, the robots in care: We will see in the coming decades enormously many robots taking care of older people, for all kinds of basic needs. One could say, they replace the nurses and the assistance that there are now. But, you could also say, that they created finally the time for the nurse to talk with people, to reduce loneliness or to organise other activities. There are tons of examples like that if we want to be creative, but also if we are ready to re-allocate resources.. We know, for instance, that labour generally is taxed a lot. So, the more robots you introduce in your company, the more interesting it gets from the point of view of your tax bill. This should change in order to make labour cheaper and to tax added value created by automation.

So the need for retraining is certainly an issue, but it is also part of a paradigm of what is between our ears in terms of what we understand "work" to be. And this will change, sooner than we think we can—but we don't know in which direction yet. That is the uncertainty that many people are grappling with.

Denis Gardin, Airbus, referring to lifelong learning, added that people today learn a lot through Youtube tutorials. Airbus is also moving towards such tutorials as a lot of the knowledge is going to be capitalised in videos. This is a way of teaching many people. We are moving towards the society of knowledge and knowledge will be shared a lot between people. This will compensate much more than any university degree. Students just have to learn the basics of mathematics, language etc., the practical knowledge will be acquired through the technology that is now available.



Jeremy Millard, Danish Technological Institute, called for more optimism. At the end of the 1990s, Jeremy Rifkin wrote the book “The End of Work”. Despite this prognosis, the number of hours we work got up and the number of workers got up since the 90s. People will find solutions to it. However, they need the structures to do this and this has to be discussed.

The chair of the session, **Desiree Miloshevic**, Afiliias, thanked the speakers and the audience for their insightful comments. Before closing the session, she underlined that the participants will take away a good list of suggestions on central topics, including education, labour market and how we are going to improve our societal changes that we are experiencing on various levels.

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Session 5

Day 1 – Afternoon – Parallel Session

Revaluating Policies & Regulation

THAIMA SAMMAN, Partner/associated lawyer/President European Network for Women in Leadership, moderating, welcomed the participants and introduced the panellists.

The session's chair, **JEAN-PIERRE BLAIS, Chairperson and Chief Executive Officer, CRTC – Canadian Radio-television and Telecommunications Commission**, Canada, opened the session by positioning the debate of the conversations to come.

The CRTC is a converged regulator in the model of Ofcom or FCC, except that they don't do spectrum—that is in the hands of a minister. Although Canada is geographically close to the US, the CRTC is positioned somewhere between the European way of doing things and the North American way of doing things.

The CRTC's experience has shown how vital the topic of talking about revaluating policies and regulation is within the context of the successful evolution of the information digital society.

As regulator of the Canadian communication system, the CRTC is constantly in a learning cycle because inevitably some things don't work as expected, technology evolves, how consumers interact with technology also evolves and so regulators have to adapt.

How does the CRTC go about its decision making? Clearly, the outcomes to be achieved are defined by statute. And as an administrative tribunal, the CRTC must act fairly and within the principles of natural justice (which are public laws, very much in British tradition; it is a very much Anglo-Saxon style of public law). In a simplistic form, CRTC tries to search for the public interest and this is done in a public forum with public participation.

To face the realities of broadband technologies and how Canadians interact with them, the CRTC has modernised its regulatory policies since 2012: Connectivity for everyone, everywhere, on any devices is truly underpinning the CRTC's action in the digital transformation. As such, the key will be consumer choice in a multiple platform environment. Over the past few years, the CRTC has undertaken major reviews of its policies for traditional television systems leading to more choice, the wholesale wireline services to re-regulate some aspects and deregulate the others, including requiring mandatory access to fiber networks and access to broadband networks by competitors. Currently the CRTC is in



deliberations for a rather important decision on whether or not broadband is a basic telecommunications service pursuant to the Canadian legislation.

In all its proceedings, the CRTC always follow the “4 Cs”: consultations, coordination, cooperation, and communication. These principles support the CRTC’s policy development which includes developing a plan, designing new regulations and reviewing existing ones, implementing the regulation, constant monitoring and reevaluating. In fact, it is a shorter and shorter cycle.

Consultation is key to the CRTC’s activities. It is a very open tribunal, anybody can participate and the barrier to entry is rather low. The CRTC follows the idea that they can get to the truth in public interest more easily when leveraging the crowd to inform the CRTC’s understanding of what the proper policy ought to be, to deliver its policy agenda.

When the CRTC delivers its policy agenda, the commission reaches out to Canadians through a very participative rulemaking. They even at one point, through their wireless code, did collective drafting with Canadians using digital platforms. But essentially, the CRTC always puts Canadians at the centre of the communication because it is their communication system. That has been an effective strategy for the commission.

The CRTC tries to set a regulatory course that puts Canadians at the centre in order to support public rather than private wealth. This has been done on a number of occasions:

For instance, the CRTC brands its public proceedings in a very accessible way. One of the CRTC proceedings is called “Let’s talk TV”. Another one is called “Let’s talk broadband”. By doing this, it is easier for people to participate. It lowers the barrier to entry. In the “Let’s talk broadband” proceedings, over 35,000 Canadians have been involved in some sort of comment in the process.

The CRTC is also leveraging technology. The new technologies are allowing the CRTC to consult the public in this digital age like never before. Just a few weeks ago, the CRTC undertook an initiative for one of its public hearings; it was about television services. They used Facebook Live to launch the process and Facebook to be the discussion forum. The CRTC then took the comments on Facebook and put them on the public record to become part of the evidence.

Similarly, in a few weeks the CRTC will hold a hearing on differential pricing and again, they will be engaging Canadians on Reddit. Their comments on Reddit and the streams there will be added to the public record and eventually decisions at the end will be informed by this.

The digital world is transforming the way the government approaches regulation and policy making. Institutions now need to ensure that policy and regulations remain pertinent and foster innovation in this digital age.

In order to address the challenges of the digital transformation, cooperation at various levels of government is necessary, and even within governments. In Canada, issues regarding telecommunications and communication in general is federal responsibility, but more and more we need to engage with provincial, territorial, municipal and regional governments. Similarly, continued collaboration at the global level is indispensable as well as on the domestic level.



RADOSLAV REPA, Third secretary, Permanent Representation of Slovakia to the EU; Chair of the Telecom and Information Society Working Party of the Council of the EU, Belgium, provided an overview on what is going on with the DSM during the Slovak Presidency of the Council of the EU.

The Digital Single Market and its Priorities under the Slovak Presidency of the Council of the EU

The presidency of the Council rotates among the EU member states. Every 6 months another member state is taking over the presidency and pushing for priorities in order to have a high working momentum of a legislation.

In May 2015, the European Commission published the Digital Single Market Strategy. The Council of the EU and the European Parliament endorsed the strategy and both called for the quick completion of a functioning Digital Single Market, breaking the silos of the 27 member states. Currently, there is no functioning DSM—each member state has its own rules and legislation.

The Programme of the Slovak Presidency of the Council of the European Union is bringing a positive agenda in these times of economic, security and integration crises. The DSM is estimated to generate 415 billion EUR each year to Europe's economy, job creation and a transformation of public services.

The DSM strategy is made up of three pillars: 1) Better access for consumers and businesses to online goods and services across Europe. 2) Creating the right conditions for digital networks and services to flourish. 3) Creating a European Digital Economy and Society with long term growth potential.

There are 16 remaining initiatives needed to complete the DSM. They have a very broad scope of regulatory approach and they touch very complex cross-cutting policy areas.

The Commission decided to go for a package approach on legislative and non-legislative files—which are mostly Commission's communications, recommendations and guidelines on how to better encompass the whole subject matter. They are divided in 4 basic strands: telecom, copyright and audiovisual, e-commerce and digital. The Slovak Presidency has set out the following priority areas: digital contracts, services portability, roaming, spectrum, geoblocking and consumer protections, parcels, eGovernment, digital platforms, cyber, data, and ICT standards.

The main objective of the first strand “telecom” is to establish a regulatory framework for electronic communications fit for the 21st century.

There are 3 main dossiers: A better spectrum management coordination, timely release of the 700 MHz band to ensure Europe's leadership in the roll-out of 5G networks. The abolition of roaming surcharges by June 2017. A complex review of the telecom rules establishing so called European Gigabit Society (inside: 5G for Europe Action Plan, EU Electronic Communication Code; Regulation on the Body of European Regulators of Electronic Communications; Regulation on the promotion of Internet connectivity).



In the context of the priorities in copyright and audiovisual, the Audiovisual Media Services Directive shall strengthen the cross-border audiovisual market providing enhanced media services—especially focussing on the protection of minors, new commercial rules, protection of EU works, fight against hate speech. The country-of-origin principle is a cornerstone of the directive.

The objective of the copyright reform is to modernize the copyright framework, extending the online content availability across the EU, adapting the current exceptions and limitations to the digital world and achieving a well-functioning copyright market place.

There are two main dossiers in this respect: The first one, the Online Services Cross-border Portability Regulation, addresses the current restrictions in order to allow EU citizens to travel with the online content purchased/subscribed to at home.

The second one, the copyright modernisation framework (2nd wave) brings the EU rules in line with technological progress and with the dynamic behaviour of online viewers. This copyright review brought many controversy on the table. Users and certain SMEs are protesting and saying that it is retrograding something to the analogue world.

Then, there is a package on e-commerce. The main objective is to remove the current bottlenecks and obstacles to foster a dynamic DSM and protect consumers online. Key files are: Digital contracts, i.e., legislative initiatives on harmonised rules for the supply of digital content and online and other distant sales of goods. Guidance to online platforms and identification of areas where action or further assessment is needed. Geoblocking and other forms of discriminations when there can be no justified reasons based on nationality, residence or location. The issue of cross-boarder parcel delivery services and consumer protection cooperation.

With regards to the priority of e-government, there is the European eGovernment Action Plan 2016 – 2020, a tool to coordinate and accelerate the public sector modernisation efforts and resources in the field of electronic public administration. Moreover, recently Council conclusions on cyber security and data have been adopted. The Council is currently working on interoperability and standardisation.

What's next? Some of the initiatives of the DSM Strategy not yet published will be under the spotlight soon, e.g., free flow of data, the e-privacy directive, an interoperability framework, ICT Standards or VAT proposals. In the previous strategy of the Digital Agenda for Europe, completion of the functioning DSM was set ambitiously by 2015, but this was not the case. It is quite clear that certain files will need more time for negotiation within the Council and the European Parliament.



SERAFINO ABATE, Director of Competition Economics, GSMA Government and Regulatory Affairs, [<http://www.gsma.com/>], addressed the challenges of regulating this new digital world from the perspective of the mobile operators.

There is this tension we have in regulation of telecoms between regulation per se, i.e., to govern market power, and thus to address bottlenecks, essential facilities etc., and industrial policy, which is something broader and which usually has a lot more instruments at its disposal.

What the EU is doing at the moment is looking at all the instruments that are at their disposal. The strategies go much wider than what traditionally has been the realm of reforms for the sector—but in this respect, it is very much welcome.

GSMA has a global perspective. It has offices all over the world. Regulatory for modernisation is very much a topic, not only for Europe but all across the world.

What changed in the sector? There was a huge shift during the last 10 years in the way consumers use digital services. We have seen the advent of applications and digital platforms. There has been a lot of innovation and now we are seeing how digitalisation is spreading to the whole economy. And this is going to be the next frontier where networks or the next generation like 5G will play a very important role.

There is a lot more action and reaction in the digital ecosystem than 10 years ago. This means that today we have a much more complex digital ecosystem, a multitude of different actors, a variety of models and trade relations—some old, some new. There are new sources of market power emerging, pushed by powerful network effects. And generally, today's rules, the legacy framework we have because of these changes, because of these new dynamism, are no longer fit for purpose for the era we live in or the digital markets of the future.

In the face of all this change, regulation has to change as well. The central task of regulation should remain very much fixed around how to deal with the economic regulation, with the market power and the essential facilities. The primary objective should be to maintain a competitive balance across the whole ecosystem, across all actors, to ensure the diversity of the ecosystem and support investment in innovation.

To meet this challenge, regulatory policies need to address three issues: First, all services that are substitute in the eye of the consumers should be subject to the same rules. This will create a level playing field among all actors in the digital ecosystem. It would support more innovation and competition in digital markets with benefits for consumers and the economy.

Second, the nature of market power is shifting and so regulation need to adapt. We are going from an era where market power was primarily based on the control of physical infrastructure to one where you have that but also have the control of data, customer relationships, content as key drivers of market power. This change needs new approaches and tools for competition policy to remain effective.

Third, there is the importance of data and its relevance for competition and market assessment. This needs to be fully understood. The ever increasing possibility to collect and process huge amounts of data is becoming the defining factor of our era—the most powerful driver of innovation and progress. Data can be used to create new services, open up new



markets or improve existing products. However, the way data is collected, processed and used has implications for competition and market power in digital markets.

That new dynamics are challenging the way we approach and look at things traditionally and this requires adapting. A future proof regulatory framework should start by doing three things:

First, focus regulation on service functionalities and not only on market structures while substantially deregulating to recognise the competitive nature of digital markets today.

Second, incentivise and support investment in digital infrastructure. This is a very important part of the future success of the digital markets, being able to have access to world class digital infrastructure. Policy makers should make more flexible use of regulations, incentivise investments, make access to spectrum easier and less costly and reduce the cost of rolling out networks, which is still a very strong barrier to achieving digitalisation of the economy.

And third, policy makers should also improve the toolbox of competition authorities. Make them fit for purpose to deal with the new problems we are facing in digital markets and rely on their ex-post powers of intervention to ensure that the whole digital ecosystem remains competitive.

ANTONIO AMENDOLA, Executive Director International Regulatory Affairs, AT&T, Belgium, [<https://www.att.com/>], addressed the importance of predictability as a basis for generating investment and innovation.

In only 15 years, 1.3 trillion USD have been spent in the US one wireline and wireless broadband. This led to huge economic growth—new applications, new players, an entire new market.

History might make people think that this change, this growth, this innovation is inevitable. Well, it is not, because capital does not need to be spent. It was the deliberate result of some specific choices of the regulators, of having a lighter touch approach to the telecommunications market. When you choose smart rules, when you choose the right regulatory environment, this is what you get: Companies will invest. It will attract new players, and it will really foster innovation from bottom-up.

The question is, does this trend continue? How to foster this growth through regulation—if it can be done through regulation? In any case, there is a risk to slow it down with the wrong regulation.

This is why AT&T embraced the efforts of the European Commission. Most of the EU regulators are trying to achieve an horizontal approach to regulation to provide predictability and a consisted approach to regulation and rules in Europe.

Everything changed during the past 10 years. AT&T has seen a lot of transformation in the market, but it has never been like the past 10 years. Entire industry factors totally changed: Legacy phone companies are now offering videos, legacy video companies are now offering voice services. Completely new companies that didn't exist 2 or 3 years ago, are offering both. Everything is changing and this speed is putting a lot of pressure on regulators both in the US and the EU.



From AT&T's perspective, the European regulators are reacting more advantageously than the US regulators are currently doing. Examples are the GDPR and NIS directive. The GDPR (General Data Protection Regulation) regulation which is the overall regulatory framework for the protection of data in the EU. It tends to reach a level playing field and it is a cross-sectoral regulation, which is very good for players like AT&T. The Directive on Security of Network and Information Systems (NIS directive) aims to provide a common regulation for security in Europe. This again, is a very modern approach to regulation in Europe.

In contrast, in its latest privacy proposal, the FCC in the US is taking over the FTC's role as traditional regulator of privacy for broadband companies—and this has consequences on the classification of ISPs. Instead of, as it is happening in the EU, striving towards a unique regime for privacy and data protection, they are splitting reasonability in the US. The FCC was then expected to replicate the, up to then, very successful framework that the FTC enforced, but this didn't happen. The FCC came out with a new proposal causing uncertainty in the market.

And this is what companies do not ask for. Companies ask for predictability. The new rules, the DSM, will help to create and achieve predictability. Predictability will help drive investment, and new investment of the companies will help deliver new benefits to the consumers.

RENÉ ARNOLD, Head of Department Markets and Perspectives; WIK-Consult, Germany, presented two studies that are concentrating on the issues of OTTs. Both studies, one on communication services and the other one on streaming services, are very interesting in the light of the proposed new European Electronic Communications Code.

It is important to really put consumers in the spotlight of designing new regulations and think about the ways we are conducting and making policies. Because in the end, we are making policies for consumers and we are trying to regulate the market to create positive conditions for consumers. Still, in the standard regulatory process and standard process of policymaking, consumers are vastly overlooked at this point.

When we look at the directive that has just been proposed last week, we see that the EC seeks to broaden the scope of regulation on communication services. The question here is: How do you want to delineate the field of what you want to regulate, and what sorts of regulations do you want to apply?

The problem with these new OTT services is that they are a moving target. They are very innovative, they add new functions as we speak, and it is currently the idea to delineate not only on the similarity of functionality, so that anything that would enable people to make a phone call, anything that would enable people to communicate in some way, would fall under this directive. Moreover, the EC explicitly mentioned online games already in this proposed directive as a possible issue that might fall under this new regulation. This backs the questions: Where is this going? Is this really what regulators and policymakers wanted? Because, if we broaden the scope that far, we will have to also consider Tinder or anything else that allows people to communicate as a communication services. This may have an inverse effect on innovation. But it also may have an effect on the daily work of the regulatory agencies and authorities in Europe and burden them to an extent they might not be willing to accept.



The other question is, what do we really want to apply? Do we want to make this an issue of legal intercept? Do we want this to be an issue of encryption (which is the main direction of the discussion right now)? Is it an issue of emergency calls? Do we really see consumers expecting to make emergency calls from WhatsApp or Tinder or an online game? Is this what regulators think consumers are going to do? If so, this might actually be the right way to go.

Finally, interoperability issues. At the first look it might sound like a positive idea to have every service being able to communicate with every other service. However, research at WIK, on the basis of a representative survey plus qualitative interviews, has shown that consumers actually do use the seams between different communication services very proactively to manage different social ties, to manage different levels of intimacy, to manage different levels of emergency, simply by choosing one communication service or the other. That would be swept away if we would make them completely interoperable.

The overall question here is, what is the political or policy objective. Do we want to stifle innovation or do we want to push innovation with a sort of hands-off approach.

With regards to the level playing field debate and the question whether the legacy services may profit from the OTT service, WIK realised the first study (based on a representative survey) providing scientific evidence that telecommunication services will profit from both the streaming trend as well as the trend even to the new communication services as consumers use them very intensively. They are willing to pay more for Internet access and are purchasing new Internet accesses with higher quality at higher prices.

SUVI LINDEN, Chairperson NxtVn Finland, [<http://nxtvn.com/>], explained why regulators sometimes walk a tightrope between innovation and people's desire for keeping things unchanged.

The Broadband Commission is trying to help developing countries to understand the greatness of digitalisation. It starts from the message that access to broadband should be for everyone. Unfortunately there are still billions of people who don't have access to the Internet. However, once all these people will be accessing the Internet, many things are going to change as this will also challenge the businesses, regulators and networks.

First at all, decision makers, politicians and governments have to understand. When talking about technology and digitalisation, we oftentimes forget that there are still a lot of decision makers who don't understand what that means. Sometimes it is really important to try to simplify things and to give examples.

Many governments still deal with ICT in separate ministries, instead of dealing with it through all ministries. There is one minister dealing with ICT, another one dealing with social and health etc. They don't understand that digitalisation is part of every sector of life.

For example, in developing countries there is this great goal to have access for everyone, but at the same time, the telecommunications sector is the golden egg for governments in terms of taxation. E.g., in Bangladesh there are over 60 percent extra-taxation in the area of telecommunications, and this means that, at the end, the consumers are those who pay. They just can not afford to access. Understanding is really the keyword for governments. They have to consider networks as important as traditional infrastructure; they need to



NIGEL HICKSON, Vice President, UN and IGO Engagement, ICANN, added the view of the Internet Corporation for Assigned Names and Numbers to the discussions and highlighted the upcoming debates related to the coordination of namespaces.

ICANN came into existence in 1998. It has a sort of coordinating function for the top-level domains (TLDs) of the Internet. ICANN is not a regulator in the current sense, it is a coordinator of the TLD system, which is generic TLD names (gTLD), like .com, .net, .org etc., and country code names (ccTLDs).

The approach that ICANN takes in terms of TLD system is to accredit registries that give out the names. Registries are the bodies that hold the register of domain names. Probably, the most famous registry is VeriSign that holds the .com registry. And then, of course, in different countries, different organisations, often private-public, have the responsibility for the registry for country codes (.eu, .uk, .ch, .nl etc.).

Recently ICANN has been involved in an expansion of the gTLD space. Until 2012, there were only 22 gTLDs. In 2012, an application phase was launched where anyone willing to pay 165,000 USD could apply for a gTLD. 1,932 people did. Now, in the root of the Internet, there are over 1,080 gTLD. All names—geographical names (.brussels, .paris., .berlin, .london etc.), community names (.bank, .news, etc), lifestyle names and also a lot of brands (.cocacola, .mcdonalds, etc.). All these are the new generic names.

Before ICANN went out to this application process, there has been a debate on regulation. The debate was: if you was a registry, if you are giving out domain names, then should you obey by certain standards—and what should that certain standards be? There was no European Commission, no FCC or other regulator to tell what these standards would be.

ICANN had this community process that the organisation is operating under. ICANN is a community of users, 169 governments, civil society etc. They all came together and they decided that for these new registries there should be some regulation. So, if you are a registry for one of these new generic top-level domains (.news, .london, etc.), then you have to obey by certain standards: you have to be honest, you have to have someone you could complain to, you have to obey by local laws, you have to have a point of contact for abuse etc. A number of standards are laid down and therefore those registries, when they issue domain names, they have to comply with those standards.

Just to make the point: ICANN doesn't regulates the content of website. Website content is outside of ICANN's scope and authority, but they do lay down standards that the registries should obey by. This is going to be one of the debates of the future, because we get back to what the people want. When you ask what people want in terms of regulation of the Internet, they might talk about competition, they might talk about universal services, they might talk about some of the things the Commission is looking at. But many would say that they don't like hate speech on the Internet, that they don't like child abuse on the Internet, that they don't like certain types of hate propaganda on the Internet. People are concerned of the content of websites. And this is something that has to be debated. Not necessarily for ICANN to lay down the standards of what the web should be, but this is a real issue of the future. It is an issue for ICANN in terms of the gTLD and it is an issue for governments, because governments regulate country code domains.



New opportunities in big data industries, especially for cloud computing, data transmission and protection, and cybersecurity-related advanced technologies.

China's new five-year plan of 2016 states that Chinese investment in foreign countries will reach approximately 720 billion USD, that is 200 billion USD more than the amount invested in foreign countries in the previous five years. A big portion of the investment will be spent in the big data industry.

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Q&A

The first question addressed to the panel concerned the fact that regulations are complex, address lots of issues and take too much time. How to become agile enough to become leaders again?

The second questioner stated that the process of making legislation is complex and lengthy. Often, legislation tends to become obsolete before coming into real life. The panel was asked whether they think that time has come to change the process of making laws by having the Internet in mind since the beginning?

The moderator asked the panellists to either answer to one of the two questions or to give short conclusion to the session.

Referring to the first two questions, **Radoslav Repa**, Chair of the Telecom and Information Society Working Party of the Council of the EU, stressed that first of all, it is important to work on the quality of legislation. First, there are the processes. Here the question arises how the Commission does impact assessments. Then it goes to the Council and the Parliament. The higher the quality of the text, the lengthier the procedures are. This long process is the price for the democracy. Everybody has the right to talk on the same issue and everybody has enough room to say something on that. And of course stakeholders and businesses should be ready; they should act and think digital in order to implement it into the real solutions.

Serafino Abate, GSMA, proposed to more and more stick to principles, whether it is consumer protection or economic regulation. There are principles that do not change necessarily with new technologies—they are more widely understood as basic principles on which our societies are built. Let's go back to basic principles and really stick to those as far as possible and limit very prescriptive rules which take a long time and come obsolete very quickly.

There is a clear particular challenge for Europe. We haven't found the right way yet. It is a big gamble, economically and politically, to take Europe to the next stage. In face of the complex current challenges, institutions are adapting as well as the rules themselves. Maybe there will be something about the legislative processes, maybe it will be the way we engage with the consumer. Maybe we don't need any rules made by governments in the future. Consumers are not stupid—if you give them information, many digital platforms are very good at solving problems themselves, they don't need governments to tell them.



Antonio Amendola, AT&T, highlighted that it is not only a problem of governance or of procedures. After all, the procedures enable regulation, and directives are what keep a complex system like Europe together. We need rules because otherwise the system would fall apart. But, we need an efficient system. It will be much more important to achieve all together a flexible set of rules. It don't really need to be updated every 2 or 4 years because due to the democratic system etc. it will take years. This is more than ever a time where government, policymakers and industry should come together, sit down around the table and to work together towards a flexible environment.

Uber is a perfect example—and this is a message for policymakers: You have to be very careful what you wish for. If you continue to ask for innovation and disruption in the market, you have to be ready to accept it. Innovation happens, in contrast, it takes time for rules to happen. Innovation is much faster than the rules. If you ask for innovation, you have to be ready to accept, otherwise you loose opportunities for your companies, for your citizens, for consumers.

René Arnold, WIK-Consult, referred to the level playing field metaphor. What should regulators and policymakers do about a level playing field if the sport that is actually played is constantly changing. We should take more of a spectators seat and move consequently from a ex-ante approach to a more ex-post approach and looking more on the fundamental principles on how we think sports should be played in general, instead of trying to make very specific rules for each and every level playing field that we think exists.

Suvi Linden, NxtVn, advocated not too detailed legislation and technology neutral legislation. Moreover, legislators should be able to change the way of doing legislation. It is very conservative, old-fashioned, takes a lot of time, and doesn't use the enabling tools of the digital world. Why do we have to have hearings in this old fashioned way, and why do we have to have the Council meetings where everyone has to come to Brussels? We could arrange distant meetings. We have to do things differently.

Nigel Hickson, ICANN, gave the example of the Audiovisual Media Services Directive. People really did their best to craft something that was reasonable, but the technology moved on. It is much better to have a more flexible approach, where you embed principles, and then you can change some sort of second degree legislation. Europe is getting much better in this regard. He agreed with the comment about Uber. Everybody wants innovation at the edge and new services to come along, and sometimes we have to be faced that disruptive services are the services that take us forward. Think about Skype. The mobile players did not liked Skype for years. There have been real battles in many countries and now Skype is generally accepted.

Sarah Zhao, Faegre Baker Daniels LLP, agreed with the other panellists. China has so many layers of regulators; this has to be simplified. Because the market grows so fast and the government wants to have rules governing every step. So, they issue many rules and after 1 years after, they are already obsolete. The good news is that they sometimes keep a very flexible approach, and hopefully it will be even more flexible in the future. Ideally the technology pushed the whole industries and countries to such a high level that they all would use the sale rule.



The chair of the session, **Jean-Pierre Blais**, CRTC, thanked the panellists and concluded this session on reevaluating policies and regulation.

We have to let things go. Oftentimes we think everything is so important, we want to get it done and control the outcome. Regulation is a very poor substitute for a competitive functioning marketplace. We need to let it go—not the lot, some things are very important, but not everything.

We also tend to regulate driving forward looking through the rear-view mirror. One has to look at what the ultimate outcome is—it is a broadband world, broadband home, broadband businesses, what is the ultimate state we are going to?—rather than focussing on what the current state is and how we can bring it forward. This is a completely different mindset when you starting to think “what is the future look like” rather than “what is the present and how to get to the future”.

The old ways of doing things, where you have a lot of prescriptive, regulatory rules, maybe need to be changed by replacing ex-ante with ex-post, but also more informal coordinating functions, that allow for that constant course correction which the very structure of the web inspires us. It was designed to move packets from one place to another when a part of the network falls down. Similar here: if we can use other coordinating functions to get to the issues that are common—without going to citizenship, like privacy type issues, but the ones governments might want to let go—just let the coordinators of these functions deal with it.

The challenge in a nutshell is that we may actually have to reinvent how we do, what we have done in the past to achieve outcomes for our citizens.

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Keynote Opening Session

Day 2 – Morning – Plenary Session

JAY E. GILLETTE, Professor of Information and Communication Sciences, Center for Information and Communication Sciences, Ball State University, Indiana, USA, Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, University of Oulu, Finland 2014-2015, welcomed the delegates and set the scene for the second day of the Global Forum by addressing the challenging question:

What We Need to Know Now: Essential Learning for People and Organizations in the Information Economy

The Knowledge Society, the context of our era, is driven by an Information Economy. However, what is it to have a Knowledge Society? The Knowledge Society requires things of leadership. The programme of the US is a leadership programme. The delegates of the Global Forum are leaders. But, what is it one needs to know as a leader? There are four points: Analyse the problems, synthesize the solutions, add knowledge-value, and differentiate through leadership.

Analyse the problems: People expect leaders to solve problems. The higher you go in an organisation, the harder the problem to solve. How do we deal with problems? The Greek has helped us with the term “analyse” to separate that whole into its component parts. It comes from a word like “loosening up” when you think of a problem as a sort of knot. Gradually pull the thing apart and see what the parts of the problem are—analyse the problems.

Synthesis means to put together. Problems lend themselves to analysis. Solutions lend themselves to synthesis. Take the problem apart and then put together a solution. Synthesis is the source of creativity. We take something from another area and put it to the problem we have now. For instance, it is said that the steam engine in 19th century Britain was essentially suggested by steam pumps that pumped out water from coal mines. They took that technology from mining and put it in transportation and got a real break-through.

Synthesise the solutions—but add knowledge value and differentiate through leadership. We expect people to know things, but what is it to know things and to add knowledge value?

Information on a scale of knowledge: you start from the bottom from a phenomena on the physical layer—like a scientist or an engineer in the physical world—and you work from there to facts and up to data, information, understanding and wisdom.

A phenomena is a perception of what appears to be. These perceptions of phenomena constitute knowledge. Facts represent and signify phenomena. Then data are organised facts. These three things constitute the foundation of science.



Information is essentially an idea, a concept in the consciousness of the perceiver. Data are selected, filtered, and used to make a decision or reinforce the user's position. Information is applied data. Information is "news that you use". Information value is intrinsically relative to user, e.g., stock prices.

Finally, understanding is to recognise, comprehend, surround and select information. Sometimes information is so complex, that this can not be done by one individual alone, but by a group or a team of individuals. "None of us is as smart as all of us".

Wisdom is discernment. It is to make judgements, to make a choice based on differences. Wisdom guides understanding and understanding informs wisdom.

Leaders seek and deploy information in a way a general would deploy his or her soldiers. People use information to make choices and deploy their wisdom based on knowledge. Followers add knowledge value. The best leaders are followers. They have to add knowledge value on anyone of the 6 levels (phenomena, facts, data, information, understanding and wisdom).

Everyone must use information in both directions: we come up from what we perceive in the world, or we come down to information, from our wisdom and the choices we need to make. Information is like a door swinging in both ways. It is "the key to the battle".

CHRISTIAN BUCHEL, Deputy-CEO, Chief Digital & International Officer (CDIO), ENEDIS; Vice-Chairman of EDSO, France, provided an insight in the digital issues and challenges of the energy sector:

Smart Grids for Energy Transition

ENEDIS is the French electricity grid operator. In Europe, grid operators have to be neutral, i.e., they have to be unbundled from power generation, compared to the suppliers which are in competition. Thus, the grid has become a real enabler for energy transition.

The energy sector is confronted to fundamental changes due to all the digital trends. Big data, block chain, new business models, photovoltaic and wind, and the IoT are big trends that transform the sector's activities. In addition to that, the power and grid sector is facing technology breakthroughs, especially in the area of power storage, decentralised power storage and decentralised generation. An example is electric vehicles. Electric vehicles are both generating and storing power.

At Enedis, a big digitalisation programme has been launched. Its main topics are 1) Asset management: How to use digital trends? How to use big data to better operate the asset management? 2) How to improve the dialogue with the territories and local authorities, with customers and generators? 3) Big data: The digital trends, and especially the use of big data, represent huge opportunities in the energy sector. An example is the creation of a Digital Factory with more than 40 data scientists. They really transform energy data in value—value for the territories, value for the empowerment of the consumers, value for the company. So the goals are asset management, dialogue with territories, data knowledge, and 4) the question of culture. Because the companies of the energy sector evolved from monopolies, digital is also a cultural change. And, last but not least, there are all the questions related to open innovation.



In France, and all over Europe, smart grids have been progressively implemented as demonstrators, testing use cases on flexibility for the consumers, flexibility of power generation, and value creation. Other use cases were related to the reduction of the CO₂ footprint, the creation of new jobs and new services, and most importantly cooperation. In the 10 coming years, the borders between grid providers and ICT companies will change. There are many important links, in particular between ICT and energy companies, and there are many opportunities for cooperation — but not only between grid providers and ICT companies, also with start-ups and within new business models.

The next step now is to leverage transformation on a European level. In this context the Smart Grid Interflex Project has been launched. Interflex is an EU cooperation project funded within the H2020 programme of the European Commission. A first meeting between Enedis, Enexis (a Dutch Distribution System Operator), ElaadNL (a Dutch innovation centre in the field of charging infrastructure), and the research organisation TNO, took place yesterday in Eindhoven.

The project will realise demonstrators in different EU member states, e.g., electric mobility as flexibility will be tested in the Netherlands, flexibility in local structures will be tested in Sweden, storage systems for services will be tested in France, and regulatory issues will be addressed together with colleagues from the Czech Republic.

JULIA GLIDDEN, General Manager, IBM Global Government Industry, USA, delivered a great talk on the possibilities cognitive technology can bring to human society.

Improving Society One Citizen at the Time

IBM has been essential to governments for decades. As once stated by Gene Kranz, the Apollo 11 Flight Director, “without IBM and the systems they provided, we would not have landed on the Moon.”

Today, IBM’s Watson will change the world. The era of cognitive computing—some people call it Artificial Intelligence (AI), but it is not AI, it is super-intellect. This is what the IBM Corporation is bringing to the world and how the IBM Corporation is changing the world.

We are living in an era where technology is transforming industries and societies. We are living in the 4th industrial revolution. We know that we are facing a data tsunami. There is so much data, we almost don’t know what to do with it. What do we actually do with this data tsunami and how to put it in perspective?

Instead of the Internet of Things, we will live in the Internet of Everything. There will be 20 billion interconnected devices by 2020. Each one of these connected devices will generate new data. More knowledge, more data has been created during the last 2 years than in all of human history. For every website that Google indexes, 500 websites are offline—the Darknet. There has been more surveillance and more video cameras. What do we do with all that data? Watson takes the data on the web, the structured and the unstructured, the open and the dark—and turns it into actionable insights.



There is much Watson does in the defence area. What if we take the 80 percent of the time that a military researcher or a police analyst would have to do sifting through video analytics and we free up that time to do what they do best, which is to think? What if we take the social worker who is drowning under paper, under a data tsunami, we free up his or her time, to actually look at the child, to think about what that child really needs, to draw insights into that child? The power is exponential.

Where is IBM going with Watson? Watson is all about transforming the data, the knowledge, the insights into actionable intelligence that people can use. Watson is helping children. By monitoring websites, anonymised data, and then combining it, structured and unstructured, with the data that social services have, Watson can help predict which child is likely to commit suicide. Just by the content of the tweets, by voice analysis when they are talking to their social workers. Saving lives, turning data into actionable insights—not replacing the human brain, but enabling humans to do what humans do best: humans analyse, humans draw insights, and most importantly, humans emphasise.

The IBM Corporation is also partnering with the TV show Sesame Street to take 45 years of data about how children learn and turning it once again into actionable insights. What does that mean? This partnership is empowering parents and teachers to do individualised learning paths for students. It is interactive and then Watson is anonymizing the data and creating even larger volumes of data to literally transform knowledge and education in a human way, in a personalised way, so that people can do what they can do best, which is interact with each other, think and emphasise.

GWENAEL PRIÉ, Telecom & ICT Project manager, Lead Digital Specialist, AFD – Agence Française de Développement, France, provided an insight in how the French Development Agency supports and leverages digitalisation to help developing countries.

Accelerating development through digital technologies

AFD mission is to fight poverty and promote sustainable development. In order to do that, AFD uses financial tools, mainly government loans, in all sectors and leverages an network of 75 offices all around the world.

In the last 10 years, things have changed in the world AFD is working in. Digitalisation has lead to a global transformation. It concerns access, services and data—every country in the world is affected, even the less developed. It provides the opportunity of digital leapfrogging, where ICT provided shortcuts for development. A great example comes from India where 850m Indians use a digital identity and will never need a paper-based ID like citizens in Europe still do. This explains why ICT is recognised as a development issue, for instance, in September 2015, improving access to Internet was recognised by the UN General Assembly as one of the Sustainable Development Goals.

There are huge opportunities but also a number of challenges ahead. To point out three of them: First, the rising of digital inequities: Connectivity has exploded over the last 10 years, however, while the Western world improves its infrastructure, deploys IPv6 and clouds, and adopts new digital uses, plenty of people stay in the developing world don't have access to the Internet, don't understand the opportunities, are not offered relevant content and are left alone facing the risks of cyber crime.



One of the basic assumptions of this industry was that waste is okay: “It doesn’t matter if I rent a rack and I don’t use it. It doesn’t matter if I pay for electricity that I don’t consume, and it’s okay that I generate a high carbon footprint. We can afford to do this...” The ground of this industry and its growth is based on certain facts. One is the fact that these assumptions no longer exist. Nobody can afford waste any longer, not just from the environmental point of view but also from the cost perspective.

The second point is the way data centres have been built: They have been built like hotels corresponding to a specific standard. Everybody can go to the hotel with expectations according to the standard. The new data centres are not like that. They are built for specific uses. Moreover, the idea of building a general level of data centres that fits all is a myth. This doesn’t work anymore. Another aspect is cyberphysical security, although the cyber security always takes its glamour due to of the technology side. Physical is very important. We are living in a world where threats are eminent and real and there are a lot of crazy people to take down whatever we have accumulated in terms of civilisation. Therefore the physical security is very important.

The companies that have chosen to critically review everything they do and to restructure, rebuild and reinvent themselves are the ones that will survive.

NxtVn is currently working with Engie to bring the utility grid of the energy efficiency, the energy production, and digitalisation to the cloud industry. Nobody can afford doing that alone. NxtVn’s data centre park is a shared economy. NxtVn builds massive data centres in cooperation with companies like Engie and then shares the created benefits, i.e., financial benefits, reuse of energy, the reuse of heat, efficiencies, and cost reduction, with the whole industry.

One vital issue that has to be mentioned is the issue of submarine cables and the intercontinental connectivity. The orphan subject of how countries are connected, the territories nobody is claiming authority of—is a very serious issue. The discussion about the development in a given country, whether wireless or wired infrastructure, is excellent and needed, but we need to seriously talk about how we will connect countries. The simple notion that somebody will do this does not work. The patron of that part, which used to be the telecom companies, is no longer interested. They are busy with auctions and how much they will pay for the frequency inside a country. They are busy to get their market shares. They have other serious things they are busy with. And they have raised the appetite of their investors to an extend that investing into infrastructure has to be lucrative. Infrastructure to connect countries is needed and connectivity between countries is a serious subject that has to be addressed.



YOSHIO TANAKA, Professor, Tokyo University of Science (TUS), Graduate School of Innovation Studies, Japan, presented an initiative aiming to revitalise the Japanese industry by “Things and Systems”.

Changing Industry Architecture by Things and Systems

In 1945, after World War II, Japan started from almost zero. After that, due to low cost mass production, the Japanese industry has been extremely successful in terms of optimised quality, cost and delivery. Japanese products, especially textile, steel, TV, cars, IC, and VTR, have reached very high market shares. Companies like Sharp, Toshiba or Sony had almost historical market successes. An exception was computer software.

However, the analysis of the current situation shows that Japan is lagging behind in terms of combining things and systems. How to change the Japanese industry? A new concept, the so called “Things and Systems” combined concept has been launched in 2008. The concept is very similar to the concept of Open Innovation 2.0.

The Japanese industry should evolve towards new business mechanisms. The proposition is a business design which promotes the cooperation of the things and systems. However, it is not a new goal, it is a new scheme to change from a product based business model towards products (or things) plus services and system—from a things oriented model to a system with new business design.

Apple, as an example, reached a huge market share with the iPhone and iTunes ecosystem. Japan needs to change from a “just product” based industry towards to a kind of system architecture, otherwise it will fail.

Japan has generated an ecosystem which continuously evolves. The final goal will be the IoT. The Things and Systems Society (faculties, researchers, students, etc.) investigates production and process oriented innovation mechanisms. An example is a textile company which is now in the home care domain by offering oxygen inhaler plus health insurance and others.

The Things and Systems Consortium has set up three new working groups in the area of implementing the concept (Things and Systems As a Enabler), design thinking (Trial at Virtual Company), and education.

Moreover, there is a need to change the traditional industrial architecture from product silos to transversal ecosystems.

The Things and Systems Consortium is supported by a large number of large companies. It is a collaboration between industry, academia and government working on the reinvention of the Japanese industry.



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Q&A

The first question addressed the issue of what kind of knowledge is needed in the future. How to learn and how to find existing information?

Julia Glidden, IBM, underlined that what is fascinating about what the Watson computer does, is that it doesn't have to be programmed. The computer is programmed to learn like the human brain—so the information gets “digested” by Watson. As the computer learns it interacts, for instance, with school children. It actually learns how children learn. Watson is taking this data and is turning it into knowledge that academics, teachers and parents can use to transform and deepening their understanding—in this example the understanding of the way children interact with the world. And this transformation process is ongoing. It is almost mind-blowing because the super-intellect can do things at an exponential speed that none of us can.

Christian Buchel, ENEDIS, added that we also should trust the power of crowds. Learning is also testing and having confidence in this power of crowds. France recently opened data in the energy sector and suddenly there was innovation coming from sectors no one had imagined being on this topic. Crowds linked to social networks represent a huge lever to transform and to learn.

Khaled Sedrak, NxtVn stressed that it is also related to the infrastructure. The lack of having a scalable infrastructure could cause tremendous gaps, especially in the submarine cable and connectivity between the content providers. As much as this gap is always attributed to the third world, people would be surprised that there are some Northern European countries that will fall into this gap if we don't look into the infrastructure side. The idea that the cloud will live on its one, or that somebody just will build it, doesn't work. The industrial revolution is happening here because there has been somebody investing in the power generation, into the distribution and the building of this infrastructure. It is the same situation we are now facing in the context of the cloud. Everybody is talking about the top level of the notion of clouds, but the basic layer is still to be challenged.

The next questioner from the audience asked whether IBM has created is a new super-computer that makes mankind irrelevant very soon?

Julia Glidden, IBM, explained that it would be lying to say that there was no danger in where supercomputing is going. That is where business as usual, regulations and laws, 20th century ways of looking at things are not good enough. It is up to us to control the machines and we have to stay ahead of where technology is going. The technology is here. However, a machine will never emphasise. We have to maintain our regulation and legislation so that humans can do what they do best.

The last question concerned the application of Watson in the area of military intelligence. For instance, can Watson help a captain prepare a military battle against terrorists capitalising on the different courses of operation already seen in the last few years?



Julia Glidden, IBM, explained that Watson is being applied to every area of life. Watson just discovered some of the undiscovered genes in Diabetes last week. Watson can read the hundred thousands oncology articles that are published every year and give theorems for researchers. So, it is altogether possible that Watson can analyse past defence procedures and see what has worked and what hasn't worked. But humans will always be the generals or the defence analysts will be at center of the decision-making.

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Session 6

Day 2 – Morning – Parallel Session

Innovation / Open Innovation in a Digital World

MARIANE CIMINO, CEO of Group Homecare, Expert in health digital transformation ITG, France, moderating, opened the session and introduced the panellists.

BROR SALMELIN, Advisor to DG for Innovation Systems DG (CONNECT Communications, Networks, Content and Technology), European Commission, chairing the session, welcomed the participants and introduced the topic of the session by addressing the issue of

Modern innovation - drivers and challenges

Innovation is making things happen, it is doing things in a different way. Science based linear innovation is not mainstream anymore. The innovation landscape has been moved from something linear to something parallel—a mash-up where we have a lot of interesting things “cooking” between the borders of disciplines, the borders of stakeholders. This requires courage and a mindset change.

We are not interested in slight improvements. What we need are radical transformations, very much driven and enabled by ICT. We really need to look at new business models, new work models, new behaviours or patterns we see in the society, and mixing that to seek the new.

When we are looking at sustainability in innovation, it is full of disruptions—again, related to the courage. Sustainable innovation is about value choices. We need to do experiments to see what is working and what is not. It is an entirely new attitude.

The paradigm shift is real. We are moving from something linear, science based, to something that is more collaborative, i.e., the open innovation first generation, and then we are moving to something bringing all the components together and breaking boundaries. We don't have any sandboxes. It is not just playing across sandboxes—we don't have them anymore. And here a mindset change is definitely needed.

The Open Innovation Group has spoken about really setting the people in the centre. You need to have the people in the centre when you are creating new markets. You need to have people in the real world settings in order to see which ideas work and which do not, in order to scale up fast (or fail). This is a new behaviour or pattern.



We are speaking a lot about the platform economy. We see the technology is coming there, we see the circular economy. It is not a linear extrapolation of the past! We have plenty of technology enablers. Related to those, linking that to applications, we will have different types of ecosystems in which we can develop the business models and the values for the society, for the citizens, but also for the old stakeholders. The big question for regulators is how to regulate/deregulate/interfere in the pain points while being as proactive as needed in this transformation?

With respect to the role of the public and private sector, citizens, enterprises and academia, we clearly see a short market creation cycle, where, for instance, public procurement can be important in creating new markets together with the behavioural changes of citizens. But then, we are also speaking about a slower cycle, longer cycle, where the public sector very often has a critical role in creating the right framework conditions to support the creation of right infrastructures for the new innovation processes.

At the end of his talk, the session's chair challenged the panellists to provide one actionable recommendation at the end of each presentation. "What do you want someone (or yourself) to do for this changed landscape?"

GIULIA BARBAGELATA, International cooperation, Stam, Italy, presented:

The INCONET – GCC 2 Network:
Strengthening EU & Gulf Countries cooperation in research & innovation

INCONET-GCC2 is an International Cooperation Network between the EU and the Arab Gulf countries. The project started in February 2014 and has a duration of 3 years. It is funded within the EU 7th Framework Programme for Research.

The main goals of INCONET-GCC2 are to support and strengthen institutional bi-regional policy dialogue in science, technology and innovation, as well as to strengthen bi-regional cooperation between research and innovation actors in the EU and the GCC.

The project consortium is composed of 20 members. As the project is composed of partners mainly from the EU (France, Greece, Italy, Switzerland, Sweden, UK), and Turkey, but also from the GCC countries (academic institutions, governmental bodies, private sector representatives from the entire GCC, except Saudi Arabia), it is a rather different kind of project compared to the usual EU-funded cooperation projects.

INCONET-GCC2 focuses on energy, in particular smart cities, and on health, especially chronic non-communicable diseases like diabetes.

The project organises clustering activities in the selected area in order to enhance capacity building in the GCC. This is done through training and mobility of researchers. INCONET-GCC2 also organised summer schools: one about energy in Greece; another one about health took place in Qatar this year.

INCONET-GCC2 builds on the results of previous cooperation activities with the GCC. The elaboration of roadmaps and a white paper will show how to further continue in the future.



The project carried out events in almost the entire GCC (Oman, Qatar, Kuwait, Bahrain, UAE and Yemen). The project realised workshops on both smart cities and health, but also organised multiple Horizon 2020 Infodays in Oman, Qatar, Yemen, UAE, Bahrain to inform about this EU Research and Innovation programme.

Activities in 2016 comprise the elaboration of a roadmap and white paper for future research activities with recommendations to the EC, GCC and the national regulatory and funding authorities in order to enhance bi-regional cooperation. Moreover, there has been a Summer School on health in Qatar. The 2nd International Conference INCONET-GCC2 “EU-GCC Research & Innovation cooperation: The way forward” will be organised in Brussels in November.

The moderator then wondered how the priorities of the project had been chosen.

Ms. Barbagelata explained that there was a previous project (INCONET-GCC) focusing on identifying societal challenges of mutual interest. The project identified ICT, energy, health, and water and environment as potential areas of cooperation. As it was not possible to address the entire spectrum of issues within a 3-years project, INCONET-GCC2 then selected the topics of health and smart cities—last but not least because GCC countries are very focused on smart cities and because a partner in Kuwait was very advanced in diabetes research.

The following question was about the benefits of INCONET-GCC2 for the EU countries and the GCC countries

Ms. Barbagelata underlined that, in contrast to the GCC countries, Europe has a long history of research and funding instruments. GCC has a lot of resources and interest for research but they still do not have the structure of funding. Cooperation in this context can be fruitful for both sides.

RAPHAEL BRINER, Chief Marketing Officer & Co-founder, Knowledge Plaza, Switzerland, presented five perspectives and toolkits to think about innovation layers, knowledge and business models.

Innovative alliances in a connected world

The toolkits presented in the following are neither the Business Model Canvas nor the Ten Types of Innovation. They are about accelerated growth factors, customer values, collaboration types, conducive knowledge, and connectivism (not connectivity).

The big question is: is innovation all about technology or is it about making the right alliances and having the right partners? Do we have to innovate with technologies or alliances?

The first model is the Pentagrowth, designed by Javier Creus. In 2013, 50 start-ups were analysed for their growth factors during 5 years. The following 5 levers to accelerate growth were found: knowledge sharing, connections, collection, empowering users and enabling partners.



The fifth model is the Knowledge Sharing Canvas. Because nowadays Knowledge Sharing is done through enterprise social networks, such as Jive, Yammer, Chatter, Slack, Knowledge Plaza, the Knowledge Sharing Canvas has been created to help project managers understand the key building blocks of knowledge sharing and realign employees to invest more than just sharing files in folders... Connections need to be done, silos need to be broken and for those two critical leadership challenges, it is vital to empower employees to put key information into the right containers, feel supported to come with stories and embrace a healthy feedback loop.

To conclude, Open Innovation 2.0 is embracing diversity and uncertainty to find new ways to solve the right problems. Maybe Artificial Intelligence will help us to retrieve new customer/citizen values, to connect further people and objects, to find new ways to collaborate and do business. Meanwhile we have the choice to do it today by enabling people and ecosystems with platforms, co-creation, learning, co-strategy, design-thinking and collective knowledge.

To answer the chair's challenge question: Create connections and networks, but not in a fractured way. Think about what George Siemens called "connectivism" and understand connectivity in another way than just infrastructural.

As Pokémon GO was mentioned on the slides, the question arose, how Pokémon GO can embrace innovation.

Mr. Briner put Pokémon GO in the Pentagrowth as an example for a very accelerated growth company. It's impact was mind blowing and it is just a beginning. Just imagine if they open the API to new providers. Maybe we will see new behaviours! In terms of regulation, we must think about how to manage thousands of young people running on the streets... We have to know how to deal with that. It is not a question of whether they will do it, it is a question of when they will make it.

JULIA GLIDDEN, General Manager, IBM Global Government Industry, USA, [<http://www.ibm.com>], shared some inspiring thoughts about what IBM is doing in the innovation space.

Open innovation: Improving Society One Citizen at a Time

Without the human element, without the face-to-face, open innovation can almost become noise, because we can't connect these people to truly understand the transformative power.

The IBM Corporation has so much technology and is doing so much. It is transforming so many parts of the world, that most of us don't even know about it. IBM is a company with 400, 000 people in almost every country in the world. It is almost impossible for all these people to keep track, so a variety of tools were built to generate internal conversations and to provide a way these people could co-create as IBMers within an IBM ecosystem—that at that time was open: It happened before social media, it happened before Twitter or Wikis. And now, as the world has exploded to open, the big challenge is to use these tools to not just talk to each other, but to talk to the world. To create this bigger open ecosystem. That is one of the huge challenges of the 21st century and the era of social media. There is so much ability to innovate and co-create that we almost can lose touch with the human in the real.



The proactive use of social media provides an excellent way to keep track and to follow what is happening around the world with a global team, or with industry.

In order to really bring all of the knowledge around government in place, the IBM Global Government Industry team is doing culture jams. They are using Slack to talk to colleagues around the world about “what would really made the team or the company better, more human, more wise, more creative? How to use technology to create a new culture that is people centred and that takes advantage of all the great things the people are doing every day?”. What are those little things to do to make this big company more human? It is really exciting to be seeing open innovation happen in a very human way, how to actually be better colleagues and better people together.

There are many examples of IBM's commitment to open innovation: From making Bluemix open to the world of developers, running Hackathons, to the IBM Watson university App creation.

Another example is the OpenZika project, which is using the IBM's world community grid to enable people to donate free computer time, to bring together over 4,000 years of supercomputing, and to make it available to 50,000 people have been experimenting on it. This has been 20,000 experiments to address the Zika virus—one of the most threatening disease epidemics of our time. This is where the power of open innovation can really come through. Moreover, IBM is launching a Hackathon so that people can crowdsource information about where outbreaks are happening. That kind of Hackathon can save lives. That is truly transformational and is really bringing the power of open innovation into something very meaningful.

At the IBM Corporation, open innovation is probably used to be better people, to communicate more, to put the person back into the technology. And then, IBM is sharing the vast amounts of resources, knowledge, expertise and technology to help solve some of the worlds biggest problems.

This raised the question on how such a huge company can do innovation with research institutions that are not embedded in its own structure.

Ms. Glidden underlined that one of the things that makes the company so transformative in the 21st century is the power of IBM research institutes and IBM driven and funded research. The Corporation is very concerned for research to be pure and it is a constant day-to-day understanding that we do nothing if we don't leverage the data, turn it into knowledge and drive insights. The partnership with academics, researchers, policy makers, all those stakeholders is essential to everything the IBM Corporation does. The challenge for any IBMer is to use the collaborative tools, the communication tools, and the innovation tools to understand all the things the company is doing in order to be able to leverage it and take it to a new height.

The following question addressed the issue of managing the different time schedules—while research is a rather long process, IBM has some short term results to deliver.

Ms. Glidden stressed that the pace of change has never been faster and there is a problem not just with the academics but with traditional research. For instance, UN statisticians want



their data to be perfect, but by the time they get it perfect, it is outdated. Our notions of time and space and expectations are changing. It used to be that things had to be perfect because, for instance, everybody was acting on the UN statistics. But now, if something is wrong, Wikis correct the factual inaccuracies in a matter of minutes. It is a question of opening up our minds and changing the paradigm. Academics, to stay relevant, are going to have to open up to new ways of working, to new ways of publishing, not always getting it right and not always having everything footnoted. They have to remember the central mission of academia, which is knowledge. That's where academia comes from and if academia doesn't keep pace with change it will be irrelevant and then the technologies will take over—and that would not be good.

Another question was about the sharing of Intellectual Property between IBM and its partners?

Ms. Glidden explained that this is rather simple in the understanding of open data, open innovation and open government: If a person invents something and he or she shares that, they still own it, because they invented it. But by putting said innovation out into the open ecosystems, colleagues can add to it *and* take it to another stage that the inventor didn't think of it. Once you put it out there, the whole becomes greater than the sum of its parts.

LAURENT JOURNAUX, General Secretary Inter-professional Association for Genetic improvement of ruminants, France Génétique Elevage, France, <http://en.france-genetique-elevage.org/>, presented the leading global provider of guidelines, standards and certification for animal identification, animal recording and animal evaluation.

ICAR: a Professional NGO involved in standardisation in the field of ruminants production

The International Committee for Animal Recording (ICAR) is a professional NGO involved in standardisation in the field of ruminants production.

The organisation has a long story of using data in the field of animal production (ruminants): since the 1950's with genetic purpose, since the 1970's with traceability, since the 1990's with input for management and since 2010 with genomic selection and precision farming. Thus, ICAR is used to manage a large data volume.

An example of the French genetic annual input for ruminants: There are 31 million of tags for animal identification and 20 million of cattle movements recorded. With respect to performance recording (cattle), there are about 26 million milk recordings each year, 7.2 million artificial insemination yearly and 3.2 million certified parentage per year. Recording started 30 years ago.

Since 2010, there is a huge increase in SNP genotyping. Chips with 10,000 to 60,000 SNPs (single nucleotide polymorphisms) per animal are used. This represents an enormous amount of data.



However, from an open innovation perspective, the main objective is to link enabling technologies, such as 5G, with cities' and companies' real needs and to jointly creating new solutions for a mutual benefit.

The Six City Open Innovation Platform consists of a wide variety of platforms: There are physical testing environments, i.e., sites under development in each of the six cities and these sites will be opened as a testing facility for companies. Instead of having one test facility in one city, it is possible to provide this network of cities.

The Open Innovation Platform also consists of Living Labs in different contexts, such as schools, shopping centres, libraries etc. Moreover, it includes 5G test networks and interactive virtual and 3D environments to enable companies to test and develop something new. The Open Innovation Platform also consists of end-user communities, in order to get real world feedback from people of all ages and different social classes involved.

One should not underestimate the role of people, also as part of the coordinating aspects and in bringing things forward. In this context, facilitation is an essential part of the platform activities. That means that it is possible to provide better services for the companies using the platforms and to promote platform collaboration. There is the risk that single platforms could stay in a silo, but with the help of active facilitation this risk can be minimised. The Open Innovation Platform also comprises the development of tools for the platform development itself and cross-sectoral activities—the best chance for new innovations.

We are evolving towards a networked society and in this context smart cities will become a sort of networked activity hub, where people and companies can link all their activities and find all they need—be it employers or employees, services, or social interaction etc. Digitalization allows to create tools for this development, to make future cities more people-centric, and to give people more to say about where they want to live and what they want to do.

This collaboration should not be restricted to only the six participating cities. The idea is to extend this network to other European or non-European cities.



JYAN-YI (JEREMY) SHEN, Economic Counsellor, Taipei Representative Office in the Netherlands, Taiwan, demonstrated how Taiwan addresses the question of open innovation.

Open Innovation in Taiwan

The open innovation model is widely used in numerous application fields in Taiwan since many years.

Just two give two successful examples: the first one is related to bicycles. In the early 1990s, the Taiwanese bicycle industry launched a so-called voluntary open innovation platform in order to face a severe low-cost competition from the neighbouring countries, especially from China. This platform, called the A-Team, has successfully helped the industry to create innovative, high value bicycles and transform the organisation of bike products through a new way of cooperative competition. A-Team is an integrated core innovative network. The network is composed of major bicycle assemblers and part suppliers. According to some observers, the success of the network could be attributed to the following key factors: 1) A strong awareness of industry risks and prospects, 2) trust among key network members, which was built through long-term interactive relationships, 3) the desire to learn more, and 4) they had very intensive communication, including substantial face-to-face communication.

Another successful application in open innovation is the unique business model of a virtual firm created by Taiwan Semiconductor Manufacture Cooperation (TSMC). The company set up a platform for TSMC online in 1997. All TSMC customers could monitor the exact manufacturing stages of the chips they ordered or make necessary modifications in time through the platform. In 2008, TSMC launched another open innovation platform. Through this new platform IC design houses can work with TSMC on the new chips in pipeline before finalising the design.

With the help of open innovation, the Taiwanese bicycle industry and TSMC have become the world leaders in their respective fields.

In the context of open innovation model application, Taiwan has innovative programs in two major application sectors: One is in the manufacturing sector (the Smart Machine Program), the other in the service sector (Living Lab Taiwan).

The new Government, elected in May this year, has launched, together with related stakeholders, a new initiative called the Smart Machine Program. The project intends to apply intelligent technologies to the existing precision machinery industry in Taiwan. The backbone of these initiatives is a platform called Open Innovative Manufacturing Service (OIMS) Platform.

The goal of the initiative is not only to create various individual smart machines, but also an integrated smart factory for Taiwan's coordinated integrated smart machines for targeted industries, such as food, textile, ICT or even the machinery industry itself. The OIMS Platform was established in July this year and is still in its early stages. However, many prominent research institutes, machine tool companies, ICT companies and automation leading brands are already in the loop. Taiwan's Minister of Economic Affairs as well as related industrial leaders are sitting in the steering committee of the initiative. Through this open platform Taiwan hopes to push its machinery industry to the next level of factory automation.



Living Lab Taiwan is an example from the services sector: Living Labs feature collective open innovation through user participation. Many communities in various countries and cities already use the concept of Living Labs to promote intelligent living technology and develop innovative social services. The Living Lab in Taiwan was kicked off by the Institute for Information Industry (III) in June 2008 in Taipei. III Living Lab joined ENoLL in 2009 and became effective member in 2013.

Since the launch of Living Lab Taiwan thousands of projects, such as interactive digital signage (the inMedia kiosk), a senior citizens' house monitoring project, or a smart electricity consumption too, had been offered in communities of 50,000 people. Moreover, useful big data collected through the Living Lab has helped start-ups in Taiwan to create hundreds of new Apps.

The chair of the session, **BROR SALMELIN**, European Commission, thanked the panellists for their inspiring presentations and concluded the session by summing up some thoughts.

The presentations all spoke about people and about doing things differently. We are requiring a new kind of guts to tackle things. We are in a big transition where we see values driving the innovation; we see entirely new configurations driving innovation, we see platform economy coming there, we see circular economy coming there.

However, in practice what we see are a lot of marginal improvements. The real question is: Are we solving the right questions, or are we too modest? We are getting AI to an entirely new level, we are moving to a knowledge society where the jobs are very much in transformation. We see entirely new phenomena coming up which we are traditionally not prepared to. We are losing a lot of jobs, we are gaining a lot of jobs, we see this kind of societal transformation as well. Do we really tackle those issues to create the new stable society? Do we have the people involved? Do we have a value offering for all those quadruple helix players in the society? It is not just that we can expect everyone to be fully employed for the foreseeable future. We probably see organisations transforming themselves even more radically to virtual companies, fractal factories, etc. We see our own salaries being changed to several sources. Can one of our citizen salaries dream be us providing data based on our behaviour or the devices we are carrying with for someone else to monetise and then we could get a small share?

The challenge is not the linear extrapolation to think small, but how do we jointly create a sustainable society for well-being in the longer term.

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Session 7

Day 2 – Morning – Parallel Session

Workshop: Cyber and Supply Chain

BÉNÉDICTE SUZAN, CIS, R&T and Innovation Coordination, Airbus Defence and Space, France, [<http://www.airbusgroup.com/>], moderating, welcomed the attendees to this supply chain panel.

DON DAVIDSON, Deputy Director CS/Implementation & CS/Acquisition Integration, Office of the Deputy DoD CIO for Cybersecurity, USA, introduced the panellists and set the scene for the following presentations.

Supply Chain Risk Management (SCRM)

We live in this globalised supply chain where we don't see very well into it—tier one, tier two, tier three. And we often make decisions on our IT products based on cost and schedule. How fast can I get it? How cheap can I get it. We don't balance it very well for sustainability and security. We have to bring that triangle into balance when we make our decisions.

In the 80s, most of the enterprises in the US were based on custom type products. They built things in a customised way and only about 20 percent was commercial off-the-shelf (COTS) hardware or software. Today, that number is reversed, and nearly 80 percent of all our enterprises are composed of COTS products while only about 20 percent are customised for the enterprise's unique/specific needs.

Moreover, it is important make informed risk based decisions regarding which IT products to “make or buy”; and once you have decided to buy, how do to make the “fit-for-use” determination for the specific COTS product selected.

“RS264-1 – Product Integrity Concerns in Low-cost Sourcing Countries: Counterfeiting within the Construction Industry” is a good example of specifications that were issued in the early 2000 by the Construction Industry Institute. This is not an IT product, it is for fake concrete. There was so much bad concrete in the supply chain, that they had to issue standards in this arena so that people weren't buying bad concrete.

This is the same concept we have today. You have to see into the supply chains in order to not to get bad software.



DoD faces the challenge because of this outsourcing. How to build systems that are reliable, that are dependable in their faith of cyber adversaries? Don't always think about this from a national security perspective, think about this from your intellectual property, for your own organisation. You want to protect that information. It is your personal life, your privacy. Who has access to your data? Where did you get the locks for your doors? Etc.

The approach of how DoD does its trusted sourcing can be used as reference material. As DoD builds these components, the organisation built trust in its systems, some custom products, some commercial products and DoD built very well defined assurance levels.

The fundamental building blocks of SCRM are hardware assurance, software assurance and assured services. If you are buying hardware products: Where do they come from? Who built it? Who designed it? If you are buying a software product: Who wrote the code? What testing did it go through? And sometimes you outsource an entire portion of your enterprise, e.g., cloud services, data storage, computing etc.: What does this impact your mission? What are the product's components? Etc. Critical analysis, i.e., classic system engineering: What is the likelihood and what is the impact of that capability? You have to develop mitigation processes to bring it down to an acceptable risk.

SCRM standardisation requires a public-private collaborative effort. SCRM believes commercially acceptable global standards must be derived from commercial industry best practices.

SCRM is fundamental to critical infrastructure protection: Who builds your hardware? Who wrote your software? Where are you doing assured services? Use the best business practices in the world and sort out the counterfeiters and bad software guys. Commercial standards should drive those people out of the enterprises who use those standards well.

However, the commercial world is not will not find those nation state bad guys, those terrorists. This is where nations have to get together and have to share all sorts of intelligence information to chase those players out.

That is two different avenues we have to look at and how to leverage the information in both of those arenas. If you don't do a good job with the commercial standards, then the US, the EU and nation states waste those precious assets of intelligence chasing the simple counterfeiters and the simple business practices rather than use those for terrorists.

DoD developed a model for reference purposes: Commercial standards should be used everywhere. What are your national governmental standards that should be used on national security issues? And then most importantly, what is your most important critical assets and that is where you write special policies to work in this field.



COLIN WILLIAMS, Director SBL, United-Kingdom, illustrated that the idea and the reality of security are both relative, contingent and ephemeral. There are no absolutes of security. A great deal depends on your location in time and space.

The idea that security somehow conflates the confidentiality is an overhang of the cold war. Actually, there are many circumstances in which the security of the system is entirely the opposite of confidentiality. This has to do with the capacity to spread. Therefore, security is obtained when the system does what you want it to do, as and when you require it to do.

UK faces its own challenges with the supply chain and the globalisation at the moment. They have just decided to build a nuclear power station (Hinkley Point) using French engineers, using Chinese money and Chinese technology. They have been compelled to this by geopolitics, by societal necessity. There is no choice.

What would happen to China and the middle class if China had lost its ability to trade with the rest of the world? If we know that to be true, how can we model that news into our advantage?

Humans are emergent systems, we display emergent properties, we exhibit emergent behaviour. You cannot model us or our behaviour on the basis of a single carbon atom; anymore than you can model the operation of the universe on the basis of a single atom. Therefore, can you gain assurance of good outcomes from a complex system by assembling assured components? The answer is “no”.

Look at the building blocks of software. With this we build applications, we build many. We mix them together and we end up with a system which is in effect chaotic. What happens in chaotic systems? There is an effect obtained, but in a non-linear, non-sequential fashion which is dissociated and dislocated in time and space. How do you manage and deal with complex chaotic systems? By observing behaviour.

“The intergalactic computer network”, by the way a direct quote from a US Department of Defense memo, was the original name for the Internet.

In the period after WWII, the British company J. Lyons & Co. grew enormously. They sold tea, cakes, luxury. They had thousands of employees. They decided that they needed a computer, they built one for themselves. It was called LEO -- the Lyons Electronic Office, the world's first purpose built computer. They had vast factories, they even had tea and coffee plantations. They were vertically integrated. That world has gone and it is never coming back.

Our thinking is locked in the industrial age and our language is the same way. We talk about this supply chain—linear, sequential, one link connected to the next link in a nice, ordered, structured, deterministic way. That is not the way the world works. It is a supply nexus, it is a supply matrix, a supply chaos.

We know about chaotic systems: The linear command and control systems don't work. It is an entirely different set of moral, ethical and political standards. An entirely different basis for societal organisation.



We have to change the way we think about this. We have a problem. The problem is massive. It is probably worst than most people understand, but we will not deal with this by recursively analysing the system down to component level. Time to start thinking like the system actually is, not like we would wish it to be.

JOE JARZOMBEK, Global Manager, Software Supply Chain Management, Synopsys Software Integrity Group, USA, [<http://www.synopsys.com/home.aspx>], talked about the importance of managing software supply chain risk with practical cyber security procurement language to increase enterprise resilience.

Procurement Language for Supply Chain Cyber Assurance

Everything we do, everything our society relies on is actually enabled and controlled by software. People say, “I don’t buy software”—they actually do, they just don’t realise it.

When we talk about critical infrastructure, it is everything that our nations or society rely upon. Most people think of that in terms of the key resources that we see in form of water, public health, energy, transportation—they look at the physical infrastructure, but fundamentally it is enabled by cyber infrastructure. The cyber infrastructure which is from industrial control systems to software for life essential systems, businesses, and financial systems. It is all software that enables and controls this critical infrastructure.

The problem is that the software is faulty. We are living in an ever more connected world. Everything of this critical infrastructure is now interconnected, and the problem of that is that there is this growing lax of security with this whole IoT that basically enables it from vehicles, smart cities, healthcare medical devices.

What we are seeing is evidence. It is this sloppy manufacturing hygiene that is compromising our privacy, safety, and security—simply because we want to get out new technologies faster and quicker, but they are not paying attention to how it puts people at risk. From a consumer safety and protection perspective, we are seeing the risks that have come from financial exploitation, from privacy exploitation. That has been highly inconvenient, even if we see millions of dollars being stolen almost daily. But now, we are starting to see cyber exploitation with physical consequences. There is an increased risk of bodily harm from hacked devices. So people’s lives are at risks. It is no longer just an inconvenience.

The evidence of this comes from a survey of the Barr Group earlier this year. Barr Group interviewed the engineers of the companies who produce these embedded IoT devices. They interviewed the engineers, not the lawyers of these companies, and the engineers said that polydesigned embedded devices can kill. 22 percent of the responses said “our devices can kill”, that leads to human death. They said that their companies are not paying attention to the safety and security of the products that they are producing.

We have had the shift of our concerns from quality, to quality and safety (there are a lot of regulatory authorities and guidance dealing with safety), but now in today’s world, you cannot assert something is safe unless it is secure. You cannot assert that something is private, that supports privacy unless you can show that security. Safety, security and privacy are very important in all of this.



We have to look at the supply chain, this is where all comes into play. Because, at the enterprise level we think of risk in terms of regulatory compliance and changing threat environment. We have to make a business case. We know that it is not everything that we want, but we have to be able to make these trade-offs. But in all cases we turn to those in our supply chain, we turn to our purchasing organisations, who turn to a supplier.

If you really look at it, you have to understand that you are not buying from a supplier, but your purchasing organisation is indented differently than your enterprise, even though they are part of that. When you look at that supply chain, people reusing old technology, they are repurposing it. This is viewed as a good system in software engineering tactic. However, you have a lot of unintended consequences that come from it, because it wasn't fit for use for the new application. And as you follow the supply chain, you realise that there are people in your supply chain who you wouldn't allow to your building, but you take their products and install them.

The reason is their level of risk when talking about cost, schedule and performance. There is no liability associated with those in the supply chain. All the liability is realised on the use side. Who is making your risk decisions? Who is determining the fitness for use or what is technically acceptable? And, who owns the residual risk? It turns out that you own all the residual risk and you have little information to make a truly informed risk decision.

About 90 percent of all the reported security incidences result from exploits against defects and software. We actually have standards for understanding what those are. There are standards, e.g., issued by ISO, IEC, or ITU-T, that deal with common vulnerability exposures, common weaknesses, common attack patterns. Have you even tested your products against these? There are over 300 products and services globally that can actually do this for you. It is easy.

Exploitable weaknesses, or more the fundamental root causes of those, but even malware—suppliers are just passing those on. How did a product become an approved product if you didn't even know that it had malware in it? These are non-conforming products but unfortunately many people just accept that.

However, people can do something. Synopsys works with Underwriters Laboratories on their Cyber Security Certification Programme. They provide an independent testing and certification of IoT products and anything that is network connectable.

Enterprises of software reliant IoT systems should be demanding safety and security be built in as a responsibility of the suppliers. It shouldn't be all up on the using side. And you can do something about this to your contracting. Synopsys gives away sample contract/procurement language. This is something people can do to explicitly state that this is important.

We have to be more demanding. Because, when we are silent about this, why should we expect our suppliers to do anything about it?



GÉRALD SANTUCCI, Adviser for Cross-cutting Policy/Research Issues, DG CONNECT, European Commission, provided a more holistic view on supply chain security.

The Directive on Security of Network and Information Systems, the so-called NIS Directive, was adopted in July this year. The member states have 21 months to put it into effect. Even if this is a rather fast process, as you know the cyber security world is changing very fast. Europe needs high-quality, affordable and interoperable cyber security products and solutions; in order to achieve this, we need to realise the full potential of the Digital Single Market (DSM). No single EU country alone can overcome the current fragmentation to help the industry achieve the economies of scale on a European level.

With respect to what the Commission is doing that touches upon the issue of supply chain security, there are three keywords: security, detection, and digitalisation.

First, security in the broad sense: It is the security research carried out under the Framework Programme known as “Horizon 2020” (H2020). There is one specific part in H2020 which is called “Secure Societies”. The EC is committed to ensuring the security of the society in terms of the security at the border level. This is something that is going on. The difficulty is to transfer the knowledge gained from the research, i.e., the projects, into evidence that will inform the policy makers. This may sound very easy, but in the real life is not as easy due to a number of legal obstacles.

My colleagues who are involved in the management of a programme, or parts of it, are currently not allowed to share with others across the Commission services the data generated from the research project outputs, which among several implications means that policymakers in the Commission are not made aware of the full scientific, technological and socio-economic evidence that might help them make better decisions.

I consider it very important that any Commission service could use all the relevant knowledge from research and innovation projects' outputs in order to improve its policy-making. This will probably be the case within the next few years.

Second, the EC is involved in supply chain security because of the requirements on the facilitation of trade. In order to create trusted trade lanes, the EU customs need a lot of technology related to detection, in particular for auto-detection in data flows, e.g. by big data analytics; auto-detection in the physical flow of goods; innovative sharing of information between the border authorities; innovative sharing of information between the customs and companies; and innovative enforcement, which is not often the case today. Detection technology represents a significant part of the work carried out under H2020.

Third, digitalisation. We need to digitalise, to enable transport and supply chain optimisation in order to make the supply chain more visible, more efficient, and more resilient. This is not an easy task as it has to be done at lower cost, with less administrative burdens and new business opportunities. However, there are a number of problems: The standards are non-interoperable, there is a lack of interconnected systems for the exchange of information, and we need to take care of sensitive information and the quality of data. The research is underway in the Horizon 2020 programme, but the target is moving.

Finally, in order to ensure the security of the supply chain, we must tackle two major trends: We need to get new data from the sensors because this is the link to the IoT, but also from new scanners and from the devices in container security. But we also need to better use the



European union, with the lead of the research and innovation, to create more freedom of manoeuvre for the critical sectors in Europe.

Situation for the management of the supply chain in that context, is that you must choose your partners carefully and with special attention on the strategic relations with the state you belong to. To create a long term trustful relation, it will require more and more the intervention of states to regulate their level of security requirements at an equivalent level as in Europe.

The situation in the EU is equally difficult. The EU has a cybersecurity strategy. The difference is that it is a problem of “technical security first”. According to the European Court of Justice there is member state sovereignty in security matters. For instance, France has a civil organisation to defend its systems. This is not an organisation that depends on the department of defence, nor an organisation that depends on the department of homeland security. It is just an administrative service that has specific contracts with critical infrastructure and administrative services. It is a civilian organisation just as the Internet.

There are some essentials about levels of trust, such as basics about state obligations. States have the duty to protect their citizens especially their fundamental rights. They have to ensure people and goods security, peaceful social relations and organize the access to economic prosperity. Cybersecurity is part of the means for states to modernize society. But the level of complexity of technologies involved in the digital age, depends on industries' capacities. States have to ensure that they are compliant with their strategic allied at the international level and that their industries have trustful partners to consolidate their competitive position in the sector of information and telecommunications.

There are also basics about EU industrial requirements. It is critical for the EU industry to get access to US public tenders and to sale high quality cybersecurity products. As a matter of contract practices, time has come to elaborate new clauses that cover the entire cyber risks through the supply chain, but also all contracts concerned by a the information technologies from the service level agreement to the cyber insurance contract via the maintenance contract they all should be revised to comply with national cybersecurity requirements.

Technologically, cybersecurity is part of the management of quality through the supply chain. The sensitive issue of cybersecurity in the supply chain lies in third parties to the main contract. But at this time, critical sectors have already their own system of compliance and control. At this level, cybersecurity control will be included and the tiers would be accountable to adopt these measures and procedures of control. Because the impact of a cyber incident on the supply chain management is not predictable, we can anticipate the revolution of contract law at the cyber age, as a renewal of security and defence doctrine on their essentials.

Then, there are basics about civil society rights in cyberspace. We are connected altogether and both as citizens and as professionals we have to assume duties, responsibilities and accountability. Let's trust each other to think about what we have to do, through our contracts. Because it is not the last supplier who is responsible for that. We have to take the time to think about what is critical in the supply chain and to have a strategic plan to solve the problems at each level. What is acceptable for the civil society? They want jobs, future, knowledge, and they want peace. The industry wants to innovate, they want to be the first— but in the EU especially it is forbidden to create big groups, which is not the case for GAFA



(Google, Apple, Facebook, Amazon). A provocative question: Is it compliant with international commercial law that Google exists?

The supply chain is extremely critical, but today we have reached the turning point where engineers and legal advisers have to think together about security by design.

PHILIPPE WOLF, Project Manager, IRT – Institut de Recherche Technologique SystemX, France, addressed the importance for all the actors of the supply chain to have best practices in cybersecurity.

Cybersecurity Best Practices

Best practices are standards, methodologies, procedures, or processes enabling a society to be better protected.

There is the theory of marginal gains in sports, saying that you have to improve all the parameters by 1 percent to win a gold medal. Applied to cycling, this led to a great dominance of the British team during the last Olympic games.

Does this also work in cybersecurity? The answer is no. It is not sufficient in cyber defence against a determined and prepared opponent. 50 percent better protection does not reduce the risk by half (weakest links, domino and butterfly effects).

Cybersecurity needs radical changes. It requires optimisation of employee behaviour, business and technology processes. With regards to best practices in a global approach, compliance levels must exceed a few percent the requirements of existing standards and they have to cover the entire supply chain.

What framework to use? There is one interesting framework, which belongs to the ISO family, but the documents are protected and not public. Thus, the following 3 public frameworks have been compared:

The NIST Cybersecurity Framework (NIST CSF) is a very recent framework proposed by the US Commerce Department's National Institute of Standards and Technology in 2014. NIST CSF has 22 categories and 98 subcategories.

The French Public Cybersecurity Framework, inspired by ISO, is mandatory in the French public administration. The framework consists of 34 objectives and 183 rules.

The French Framework for Critical Infrastructure Protection. France is the first country to have a law that is applicable to all the designated vital operators of critical infrastructures in France. The 249 vital operators of critical infrastructures (water, food, health energy and transport) have to implement this framework to improve cybersecurity. It consists of 20 domains and 71 rules.

Matching all three frameworks has shown that they are perfectly compatible. This is an important aspect for transnational companies. All three frameworks cover the necessary changes in a global approach and they all seem to be complete.



However, concerning the supply chain a lot of work has to be done to make these frameworks applicable through the entire supply chain, i.e., contracts, efficiency (audits, control), liability, sanctions, and education...

FLORENCE NNANGA-DUPRÉ, Security Policies & Compliance Manager, Airbus Group, France, [<http://www.airbusgroup.com/int/en.html>], focussed on the contractual perspective of securing the supply chain.

Building Trust & Confidence in the Supply Chain

Risk management is key in the context of supply chain security. There are real business opportunities in the supplier layer model, but there are also increased risks, risks that are changing in their nature. This has to be taken into account and we need to find the right balance between those risks and the potential business advantages.

How to develop security assurance in the supply chain and how to build trust with the suppliers? First of all, there should be a risk assessment. This has to consider the security functions which are embedded in the service or the product that we want to buy. For example: What are the functions for traceability? What about access control? What about authentication, identification etc.?

Then, we need to think about the assurance levels, certification levels, but also the supplier's skills and expertise to deliver what we want him to deliver. What about the service-level agreement? What are the security information the supplier can provide before the contract is signed? You have to think about the security processes, key performance indicators, and any evidence that the supplier has the appropriate expertise.

The entire contractual framework is of crucial importance. In general, you set up your contract when everything goes well, when there is no problem. But the contract is there to protect you when things go wrong. The contractual framework is the main tool to start building a trusted relationship.

How to implement this in the real world? There are the policies and directives which are internal security requirements that are built in the buyer's company. Then, on the other side, there are so-called other security requirements, e.g., external requirements coming from a law, a regulation, or national security specific requirements. All the policy and directive requirements are put in the so-called "master agreement", a top-level agreement. All specific security requirements are put in another agreement, the "workpackage agreement", where we make sure to include everything related to reliability, suppliers, as well as the different suppliers of the number one supplier etc. You also include how the liability and responsibilities are cascaded, because, for example, if you have a data breach notification obligation you want it to be regulated in the contract that your supplier could have its own suppliers. It is a legal obligation imposed by the NIS directive and the General Data Protection Regulation.

Then, you need to put in place the appropriate governance. Information sharing is key in this relationship and in building trust with the supplier. The sooner the supplier knows about your security requirements, the better it is to have a trustworthy ecosystem working properly. It is also the best way to select, because you have to do that before selecting your supplier. You then put in place the appropriate team with different skills in order to not leaving your



procurement team alone. They need to have lawyers and security experts at their side in order to discuss each and every important clause in the contract.

And then, you need to check compliance and here, the audit is one of the key elements. However, it is something which is very difficult to achieve when negotiating that kind of contracts, especially with regards to cloud computing services etc.

Things become worst when you have multiple suppliers. Sometimes you don't even know the suppliers of your suppliers and you have no contractual relationship with them. How to ensure that all the security and cybersecurity clauses that are important for you are embedded in the contracts with the cascade of suppliers? The only way to do that is to have a specific clause in your contract, saying that the supplier has to cascade all the security obligations that are included in the contract. The same has to be done for intellectual property and confidential information. Liability is a difficult issue. All this makes it very difficult to ensure that you are going to be compliant with the law throughout the whole contract lifecycle with your suppliers, and that there won't be any breach of law.

However, it is not possible to anticipate and prevent everything. Thus "monitor and check, detect and react" is the best way to build a trusted relationship with the supplier.

Trust is required in the supply chain, this is key. Moreover, new procurement delivery models are challenging today's businesses, but the CSO's role remains important due to the residual risk for the business. So let them decide, based on their risk evaluation.

YANNICK FOURASTIER, Innovation Manager, Industrial System Design, Cybersecurity, Airbus Group Corporate, France, [<http://www.airbusgroup.com/int/en.html>], addressed the issue of cybersecurity from the perspective of requirements definition and control mechanisms.

Vendors assessments--Cybersecurity goods & services support

Cascading liability in the contractual chain translates into defining requirements on the technical level. And defining requirements calls for control. There are many buyers doing such cascading with their suppliers and in general, a supplier has multiple customers. Therefore, the supplier has to deal with multiple questionnaires—or more concretely, the supplier is overwhelmed with questionnaires. This results in a decreasing quality of the answers and instead of lowering the risk, the risk increases. This is counterproductive. Too many assessments kill the assessment. Moreover, the cost is key when dealing with additional requirements that are not directly business related. Thus, one has to deal with integration of security into the business as well as to secure the security assessment.

It is about questionnaire harmonization. Today there are vertical frameworks and standards, such as PCI for the payment card industry. They are adapted to the need within each vertical, but when changing the industry, they are no longer adapted. Generally, a vendor is supplying multiple verticals.

Another problem is related to cross-standards, i.e., standards across the verticals, e.g., NIST, SANS, etc. They are not adapted to the industrial needs—it is just a "sexy" approach and quite easy to implement.



All of these frameworks led to tons of questionnaires. There is a need for assessment interoperability, cross-recognition of the questionnaires, cross-assessment, and cross-recognition of a framework.

What do we want to assess: It is on one hand the cybersecurity management system, how the cybersecurity is implemented, how the cybersecurity is maintained and how the cybersecurity evolves over time.

Overwhelmed by questionnaires, a small group of vendors associated to create the VSA initiative (the Vendor Security Alliance initiative)—a vendor approach to simplify the problem related to the questionnaires. It is a rather young initiative and the first questionnaire will be available in October 2016. However, it is just a patch to the problem, it doesn't solve the problem itself.

The industry wants to be sure about the efficiency of the mitigation plan, and this is about implementing security controls. It is about the automation support for security control assessment. There is a cross-standard framework, inspired by NIST, that is already going in this direction.

It is about assessing well implemented security controls. The security controls result from services on goods and are required by the vertical standard. What products? The catalogue of qualified ones (security efficiency). Which services? The ones implemented/ operated by qualified providers.

There is a need for cybersecurity countermeasures that answer to a definition at some assurance level. This also has a value for the cybersecurity insurance. When putting a security measure in place, this is done according to a cybersecurity measurement system. Just as for physical goods, there is a need for countermeasures at some assurance level in the digital world according to a certain practice.

All of that deals with recognition of the countermeasure definitions, of the practice and of the assurance level. All this represents security control. Once the security control is implemented, the job is done. There is no need for further questionnaires. However, the supplier has to use the right countermeasures dealing with the right assurance level and with the right practice. All of this checked, the product is accepted correct. Thus, it also concerns third party audits in order to ensure the practice.

What is at stake now? The industry asks for a valid "ticked box" no matter whether cross or vertical. "Cross" means security controls' harmonization no matter what vertical. "Vertical" means vertical standards; each vertical selects out of a catalogue security controls those applicable to its specific characteristics. It configures the parameters of the security controls and this is the standard of the vertical. But, everyone shares a common language and this is needed for the vendors. This increases their agility and cost effectiveness and simplifies the assessment.

Dealing with the harmonisation means not dealing with equalisation. It is important that the definition does not specify technologies in a too restricted way. It is important to enable creativity. Standardisation leads to interoperability and all of that leads to trust.



ALAIN RIBERA, Senior Manager Cyber Security Program, Airbus Group Corporate, France, [<http://www.airbusgroup.com/int/en.html>], talked about current challenges and urgent questions.

Q & A

Industries that are working globally have to cope with many things that are not globalised, such as different national strategies, different visions on how business can be run, difficulties in terms of standards, different frameworks etc. Even if there is today a much clearer view on standards, this now needs to be turned into policies and control.

Industries have to ensure to be legally compliant, but industries working worldwide do not always know the specific legal framework they have to cope with—especially in the cyber world where the frameworks are evolving fast. This needs to be assessed and controlled.

There is a need for a kind of recognised framework: How to better understand the cascade of legal aspects to be applied depending to the markets and countries where companies sell, buy or build goods and services? Depending to the countries where they are based, how to better control liability risks taken by companies through their sites or subsidiaries? How to ensure compliance to existing and evolving international, regional and national cybersecurity policies and standards?

Cybersecurity incidents sharing is a very sensitive topic in the context of self-protection and the protection of supply chains: How to share incidents while at the same time protecting confidentiality with the supply chain, in compliance with data privacy regulations?

Another question related to cybersecurity regulation through policies and directives is the question whether compliance to the French approach to Critical Infrastructure Protection brings an competitive advantage on external markets?

Other questions are related to big data: The financial value of data is growing fast. How to cope with that in the supply chain? How can each supply chain actor protect its own valuable data for its own competitive advantage when data exchanges between actors enable them to flood their own data lakes? How to ensure compliance with personal data privacy rules?

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Q&A

The session's chair, **Don Davidson**, Office of the Deputy DoD, stressed that cybersecurity is an extreme challenge. He referred to the immature science of cybersecurity. It is an important construct when talking about those controls; there is a natural tendency for all of us to want that checklist: Have I done these minimum requirements? We have to address this as a risk based approach, because some of us will pay more to build that security in than others.

There probably needs to be those minimum standards and the science of cybersecurity is maturing. There is a variety of commercially acceptable global sourcing standards out there today, e.g. in the ISO community or in some of the individual organisations like ITU or the Open Group. Lots of standards organisations are working in this arena.



At least the industry is coming together, sharing best practices. It is the adoption of the standards that is most valuable. When governments pick a standard and put it on contract, they are forcing that standard down to the industry. Rather, we need the industry to adopt that standards, and those standards that they are adopting and using are the ones which governments wish putting on contract, because that are the ones that match their profiles and products. There they are not trying to shape a product to meet a standard, they are developing a standard that already matches the products they have.

In the food and drug world we are able to manage these supply chains: There are people with allergies and we manage to produce food that don't include specific allergenic ingredients and market them appropriately. Another example where we do very well on a global fashion is drugs. There are certain drugs that are legal in some countries but not on others and they go through a processing. The drug manufacturer knows which drugs cannot be sold in specific countries due to liabilities. And they manage this on their own.

If you are buying the product or the service, you are paying for that you can see into your supply chain.

Joe Jarzombek, Synopsys, underlined that the customer side has to be demanding.

Does anyone believe that if you buy a product from somebody and that product has known vulnerabilities, exploitable weaknesses and/or malware in it, that this should be considered a conforming product? Of course, we all have the law on our side, we don't have to accept that. But the problem is that we don't have any inspection and we don't demand of our suppliers that they inspect for. The standards mentioned earlier are ITU-T standards, part of the 1500 series Cybersecurity Information Exchange Techniques (CYBEX). These are internationally recognised standards. Why not using them? They are available for everyone. Do you even ask your suppliers, did you check for these? How do you check for those? It is very hard for you to implement your security controls when you have received potentially insecure products. It is hard to secure that. You have to know, what did your suppliers do to eliminate those known vulnerabilities. That is low-hanging fruit!

Yannick Fourastier, Airbus Group Corporate, stressed the importance of putting in the contract all the requirements according to the liability one has to deal with. Airbus Group asks for independent testing of the products in order to ensure that the products are conform. It is important to implement the relevant procedures.

Colin Williams, SBL, noted that we are dependent upon critical dimensions. Software and hardware are the most critical infrastructure without which our society cannot exist. It would be naïve to assume that bad stuff is not planted at some level of abstraction in this equipment.

How do we then defend ourselves against this? This entire question of law and regulation and contract is a red herring, it is the wrong way to approach it. You can't see into the supply chain beyond a certain level of abstraction. You can impose requirements on your subcontractors to impose requirements on their subcontractors etc. It is not a question of if that chain breaks, merely a question of when. Legally, you have inured yourself by setting limits to liability as a commercial operator. Well done you.



We cannot just rely on the legal side and the contract. We have to leverage it up as much as we can. There is an extreme forcing function in this arena. This may be in the healthcare sector with medical devices for safety, but it is not the most driving technology in the space right now.

The driverless car industry will be one that will force the supply chain issue. When an insurance company insures you as a driver today, they ensure your driving record as an individual. When you buy your first driverless car and you take it out of the auto shop, is the insurance agency insuring you as a driver or the software that is driving the car? That will be an extreme decision point for the insurance agency because it will force the liability discussion, it is forcing the car manufacturer who will ask whether he is now liable or is it the software company who built the software for the car manufacturer? How does it work? Those are all supply chain questions.

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Session 8

Day 2 – Morning – Parallel Session

Smart City & Region

The session's moderator, **HUGO KERSCHOT, Managing Director, IS-practice**, Belgium, welcomed the attendees and introduced the panellists.

The session is synthesising the smart city realisations of the last years to see what kind of smart things the citizens can obtain, work with and use in this moment in our cities.

GABY RASTERS, Strategic Advisor, City of Eindhoven, the Netherlands, described how Eindhoven is preparing its way towards a smart society.

Introducing Smart Society Eindhoven

Eindhoven is rather becoming a smart society instead of being a smart city. Currently, the city is in the phase of reflection. Eindhoven is a place where the people want to be open to everyone and everyone can live and work everywhere from any place he/she wants. However, there are a lot of open questions in this current phase.

Eindhoven is a very open city and has a kind of “9 bullet points” to frame the city. Bullet point n° 6 is “bipolar creativity”, referring to the fact that ICT is very important for Eindhoven, just like the design part. Mixing both streams is very important to the city. It makes the city a living lab, a place where people want to experiment and where they are daring to do things.

As Eindhoven's former mayor put it: “You are allowed to make mistakes, you are allowed to fail as long as you try”. This is something in the genes of Eindhoven and in its long history, e.g., when the city was fighting the crisis and came up with a brainport mentality. Collaboration is very important, but when collaborating with different companies, universities and cities, a lot of different questions are coming up. The city is now engaging in extended discussions with all of its stakeholders about important questions like open data, privacy etc.

One of Eindhoven's prominent living labs is a famous very small street with a concentration of about numerous pubs in the city centre. Many young people are going there to drink and have fun, and sometimes they drink too much and fight... The question was, how to change the attitude in this street? Could, for instance, changing the colour of the light make them more peaceful? This is one of the experiments in this living lab. However, it is nice to have a living lab, but then, a lot of questions arise. E.g., if you are sensing everyone who is walking down the street, does this attack privacy? Is it safe to do that? Eindhoven is now in the process of answering all those questions and this cannot be done alone as a city, it requires the help of the universities, the companies and the citizens.



technocratic. The City of Brussels tries to focus on the right way, i.e., to be problem-driven and using open data, open processes, and open systems. Data is a public asset and have to give for free to everyone. Moreover, shared standards and services is something very important. The city is a platform where top-down meets bottom-up, and it has to be a democratic process.

Brussels' Open Data Platform is one of the current big projects in Brussels. The Open Data Platform is already existing. Now, each administration is asked to put their data on the Open Data Platform. It is a very complex and complicated process, as there are always reasons why people don't want to put data on the Open Data Platform.

Another project is bloTOpe (building an Internet of Things Open innovation ecosystem for connected smart objects. This H2020 project is about the interconnection of platforms, the use of combined set of data from different platforms and the creation of application building blocks. It is about standards and interoperability between different IoT platforms from Helsinki, Lyon and Brussels. It is a very profound and structured project. The City of Brussels will do three proof of concepts on mobility.

CRISTINA PRONELLO, Professor Interuniversity Department of Regional and Urban Studies and Planning, Politecnico di Torino, Italy, emphasized the importance of attitude and behaviour assessment.

How much the multimodal real time information are effective on travel behaviour change? A case study in Europe – the OPTICITIES project

People are continuously inventing new technologies, but nobody asks whether they are really useful and which kind of effects they will have on the people.

One of the scopes of the European OPTICITIES project is to improve mobility of people and freight in an urban context with very high level information and traffic management services.

The smartphone application TUE TO (Torino's multimodal real-time transportation App) is part of the OPTICITIES project. A similar application has been developed for Lyon, Gothenburg, and Madrid.

The application allows users to find in real-time the best combination of transportation modes providing the quickest trip while avoiding traffic jams. All possible transport modes are displayed according to the geographic location of the user. The application takes into account real-time transit information, road work, traffic congestion, parking availability, bikes available on bike-sharing stations and suggests alternative trips to the users adapting minute by minute.

The fact that the suggested optimal transport mode is adapting minute by minute and thus may change (because a bus has just left the station and therefore it would be faster to take the metro etc). is not evident for every user. It is not always easy for the user to understand the logic behind the suggested fastest trip.



At the beginning of the project, a sample of 150 people has been selected to carry out surveys, based on quantitative questionnaires and 24 focus groups with those people during the three project phases. In the very beginning, the question asked was “what do you expect from this App?” and according to the inputs given by the people TUE TO has been developed.

User needs, expectations, potential behavioural change—that is the final scope of administrations. The cities generally think that just providing new technologies is enough to make people becoming more sustainable and that they will change their behaviour thanks to the provision of real-time information on all transport modes. Well, this is not really true.

TUE TO has been developed and tested during a 4-months test period. Now, the project is in its final phase evaluating the effect of the application on the users. Did they really change behaviour? In order to understand the effects of the application, statistical and mathematical models as well as a GEB (general ecological behaviour) questionnaire were used.

The results then have been displayed from the easier-to-engage item to the most difficult one, and it came up that there are several habits related to transport. Here, changing behaviour is really challenging, because changing habits is probably one of the most difficult things to do.

There are many different variables affecting people’s behaviour, there are attitudes, preferences, opinions etc. It is also important to remember that facts and opinions are two very different things. Often, people think that opinions are facts. This creates confusion. The final decisions on our actions are mostly based on opinions rather than facts.

It is important to identify the most important variables affecting behaviour and then to decide on which variable it is possible to work to try to change the people’s behaviour. Two important factors were identified: Utilitarian and convenience. Utilitarian is more related to what people need or want for their own benefits, such as speed, flexibility and independence, reliability of the travel time, comfort etc. Convenience is cost, pleasure to use a certain mode of transport, or respect towards the environment.

The results allowed to identify three clusters, i.e., people having certain profiles. This allows to understand on which kind of profile one can work and what are the profiles that will never change.

The first cluster are the neo-luddites opportunists: They value whatever they can benefit from. Neo-Luddism identifies people that follow a desire for a simple life, where technological tools are restrained to their minimum. These people have a negative attitude towards technology and will never change. This group of people is of no interest for the TUE TO application.

The second cluster are the hedonic techy ecologists: They are in favour of technological use with a higher score on the convenience compared to the utilitarian transport value. They prefer cheap and pleasant trips rather than fast and efficient ones. This group of people expects that technology will solve many problems, including transport-related ones, and is aware of the need to pay in order to benefit from a service such as the multimodal navigator. They can represent the main source of revenue in a business model assessment.



The third cluster, representing a large part of the society, are the neoclassical agents. They really want to optimise their benefit. These people have a higher score on the utilitarian compared to the convenience transport related value. At the same time, they are characterised by a low score concerning the measure of attitude toward the environment. It is the *homo economicus*, an agent who will tend to maximize its own short-term utility without consideration for the others or the environment. Even if they may benefit from the multimodal navigator, it is unlikely that they will shift from their most favoured mode until economical constraints will force them to do so.

The results show that it is not so easy to achieve behaviour shifts. Technology is fine, but not enough. Without an excellent public transport network, a very good frequency and high level service, people won't really change. We have to pay and invest in transport—once this is done, technology can be helpful. Technology alone is not the holy grant.

EIKAZU NIWANO, Producer R&D Planning Department, NTT Corporation, Japan, described some fascinating initiatives arising around the Olympic games in Tokyo.

Tokyo2020 and Scenario-based Totalized Smart Cities

What are the drivers for smart cities in Japan? First, “Society 5.0”—a policy promoted by the Japanese Government to create a super smart society, in addition to the manufacturing industry. To realise such society, the government refers to a common platform which supports IoT, big data, artificial intelligence and the integration of multiple systems.

Second, the Olympic games held in Tokyo in 2020 are important and many companies have started the preparation of ICT-based solutions for this event.

Third, since 2014, the Government of Japan has started local creation projects to foster regional vitalization. The intention is to establish a virtuous cycle to counteract both population and economic decrease.

The vision of NTT is “Toward 2020 and BEYOND”. “NTT and Beyond” stands for comprehensive services and collaboration with partner companies. “Telecom Network and Beyond” will offer trusted, safe and beneficial services, regardless of the connection environment by using various network technologies. “Today and Beyond” is to provide a timeless legacy in Japan and worldwide.

In order to realise this vision, NTT has established Tokyo2020×Local Creation Projects with NTT Group companies, including an energy management and urban development company. Aiming to solve various issues of local governments and regional enterprises by utilizing ICT, projects of NTT Group are proceeded. NTT has stratified deployments in the various fields and will support everybody's activity for regional vitalization with solutions using the full power of the NTT Group.

Examples of the NTT R&D's activities for Tokyo2020 and the local creation: migration route suggestion based on a behaviour analysis; voice clarification providing intelligent audio signs even in noisy surroundings; angle free object search to have information on a smartphone simply by pointing it; “Buru-Navi” is tactile information presentation by perception illusion; “Kirari!” provides immersive telepresence and can display players by means of a hologram at remote places; “hitoe” is about sensing fabric and can be applied to training support.



In June this year, NTT Group has launched the commercial Wi-Fi multicast service Smart Stadium at the NACK5 Stadium Omiya stadium. The idea is to provide a business model based on smart sports. Smart Stadium offers a new way to enjoy the match through innovative technologies. Fans can see live stats or view instant replays of goals. Smart Stadium offers a new way to watch the match whether inside or outside the stadium, and helps using sports to stimulate local economies via digital marketing. New fans will be attracted via marketing opportunities outside of the stadium provided through smartphones, tablets, and digital signage. The project will work with communities, businesses, and tourist attractions in order to mutually refer customers as well as encourage fans to support local industry and trade.

What are the issues to be addressed in the context of smart cities and regions? We should gradually evolve from single smart cities towards integrated and totalised smart cities.

JOHN G. JUNG, Executive Director ICF Canada (Toronto); Chairman & Co-founder Intelligent Community Forum (NYC); President, Intelligent Community Forum Foundation (NYC), Canada, addressed concept of smart mobility.

Smart Mobility in Smart Communities

Even though we have specific criteria about creating our intelligent communities, there are a lot of things that we just don't know about. One of the most important things that creates prosperity in our communities is the ability to move around, to be mobile, to be agile and able to create opportunities for transport for trade, for the ability to meet people and to do business. Hence communities are undertaking much data about mobility and analysing it to make evidence-based decisions about the state of their mobility and options for its improvement.

What we have are some examples leading to new best practices: For instance, in Toronto, the Intelligent Community of the Year in 2014, mobility has become a great concern. Every community has challenges and one of the biggest challenges they face right now is mobility, the ability to deal with their congestion. The CD Howe Institute indicated that the Toronto region has a considerable amount of gridlock that is impacting the area at 11 billion USD per year. A region-wide group called Metrolinx, was formed to deal with the issues of mobility—i.e., everything from transit to even the opportunity to walk or to cycle—to look at the city in a very complex manner but also to give it some rationalisation and a strategic direction. Money is being put to this, and providing the resources is a very important piece of being able to deal with these strategic directions.

In many of the smart cities there is a young population, and in many of the city centres, like Toronto, we have a Millennial population that is beginning to influence the way things look, feel and work. The key tool of these young people is the smartphone. They don't necessarily want a car. They want a really good smartphone and they'd rather put applications on it and pay for them on the smartphone than put gasoline in a vehicle.

In July 2012 “moovel” was launched in Stuttgart—a pilot project designed to make life simpler for the city's residents and show them alternative routes. The application figures out what is the best option to go from A to B. For many of the people in smart communities, they are looking at the kinds of options that are available to them over the day. Maybe the best



thing to do is to rent a bicycle because it is nearby. Or maybe you just go to one of the car rentals that are available at a local pool not far from where you are standing. Or maybe the best thing to do is to actually walk from A to B today because there are all sorts of congestion that is happening in different parts of the community. The Millennials are giving us a different kind of evidence in terms of how to move forward.

There is another aspect to smart mobility and that is an idea called intelligent transportation systems that are being built into our infrastructure. That includes everything related to technology, but also in how we deal with plain road surfaces such as providing bus rapid transit lanes. Smart communities do not only have to exclusively take advantage of technology, whatever level it is. But they have to be interested in making these things actually work to improve mobility in their communities.

We need to look at all of our technologies, whether it is low-tech or high-tech and figure out whether or not we are going to undertake a mindset change to adapt them into our communities. Which then leads us to another question: are we really prepared for the kind of technology that is going to happen around us in the next 5 years? For instance, it might be possible to drive around with driverless cars. But are our urban planners and our decision makers ready for this? We are going to have so much transformation just for the vehicle itself that is going to be driverless. For instance, Singapore is testing a driverless taxi system. Eindhoven already has a driverless bus. Ontario has already legislation permitting them on provincial highways.

However, in many of these Intelligent Communities transformation will not be easy. Remember for instance the Segway? Why aren't we driving around in the city with a Segway? Because it is not allowed. In most places, the use of Segways are restricted to amusement parks or an area of special tourism interest. Is that where the autonomous car is going to wind up? Or will they only be permitted in a very specialised environment or segregated to a lane with high curbs because we don't trust them? Transformation and trust in that transformation is a very important piece of this discussion. And unless we are not able to adapt as society to the technology we are using in our smart cities, we won't be able to move ahead as quickly. Ford has just announced that they will put hundreds of cars out for mass production to be used as part of our shared economy, i.e., as taxi systems. Google and Uber are doing the same thing. We are going to see transformation, but we are also going to be testing it as robustly?

One community that ICF has helped along the way just recently is Columbus, Ohio. The Columbus Deputy CIO said "The Columbus Department of Transport win [of a competition between 79 cities in the US] gained momentum through being recognized by ICF as the Intelligent Community of the Year in 2015 because of its foundational work on broadband infrastructure, focus on neighbourhoods, and a strong public-private partnership eco system." Columbus was able to win 40 million USD from the US Federal Government, which was then matched by other means and now has 140 million USD to put forward to test the autonomous vehicles in Columbus.



Pilsen is now going to communicate the results to its citizens to make them aware of the traffic jams to come.

The project is currently in a proof of concept phase and the platform is open to use for any interested city.

JEAN FRANÇOIS SOUPIZET, Scientific Counsellor, Futuribles International, France, shared some valuable conclusions.

Smart cities: a few questions for a starting point

The concept of smart cities is a rather fuzzy concept, but with a strong demand.

The smart city has new responsibilities towards its stakeholders. There are challenges, technologies, initiatives, issues, tensions and questions.

Just a few challenges: It is not only traffic, some cities have to face a problem of resilience that could be related to demography, environment, economy, social or security aspects etc.

As regards technologies, we are going through a very rapid succession of technological waves. It is not completely new, but nevertheless we will come back to this concept. Most of these technologies have their special interest in the context of cities or territories. This is obviously the case for geo-localisation but also a lot of new recent diffusion technologies.

There are multiple smart initiatives: There are very few new cities. A lot of existing/ historical cities are going through a process of smartisation, and this is an interesting process because it means that there is the intention to go through a global approach. However, in fact, what we see is mainly mushrooming of smart projects.

There are six main areas: smart governance, smart economy, smart mobility, smart environment, smart living, and smart people. Again, a real problem of priorities. Nobody is in a position to start public actions in each of these areas.

Important issues are mastering complexity, blurring of borders, irruption of new actors, the question of managing data and geographical scales. The smart city is not limited to borders.

There are a number of tensions related to competencies in the public realm. But also environmental, territorial, social (digital divides) and ethical tensions, as well as tensions related to security.

Three questions for a starting point or questions that should be considered at a certain point of the process:

1. How the smart city will contribute to face the new responsibilities of the city? E.g., being local (traffic), being global (environmental) etc.
2. How the changing environment created by the smart city will change the relations with its partners? I.e., new contracts, experimentation, flexibility, pilot projects, the right to make errors etc.
3. How the smart city will modify the relations between the city and its inhabitants?



As the French philosopher Pierre Teilhard de Chardin said: If you heat water up to a hundred degrees it evaporates. In the context of smart cities, we could say that, to a large extent, for instance through incremental changes and projects, we are starting a process of changing the true nature of the city.

The session's moderator, **Hugo Kerschot**, IS-practice, shortly introduced the ECIM project. ECIM (European Cloud Marketplace for Intelligent Mobility) is a European project that just came to an end. The project built a platform for smart mobility. In every city, every day, new smart applications are popping up. ECIM is putting them all on a platform, a marketplace, where people can, similar to Lego blocks, then build these parking Apps, public transport Apps and other applications together. There are also applications where people can search for the best mode of transport to use at this moment. ECIM built around that a unique user ID and a unique payment solution in order to create a one stop shopping concept for smart mobility.

The window of opportunities that is opening more and more. This summer, BMW invested a lot of money in the streets of Brussels with 300 shared cars and a nice application. Yesterday, BMW announced for Brussels the Zipcar, a shared electric cars service etc. All these applications need to be put together in one solution—even if there might be some time needed, and probably also a lot of sociological research, to get the right user interface to convince everyone to use it. In most of the European cities, the early adopters are mostly young families who banned their cars. They use public transport to go to work and only use the shared cars for the week-end in the cities.

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Q&A

A comment from the audience referred to the possibility to use telework to take cars off the roads and to have a reduced carbon footprint. This is an option that is severely underused since more than 20 years (less than 3 percent in North America).

The question addressed to **Mika Mannervesi**, City of Salo, referred to the street lighting programme of the city as this technique might be a problem for emergency vehicles due to the fact that the sensors for the lights don't react quickly enough.

Mr. Mannervesi explained that the City of Salo has no experience on that specific matter yet, because the experimental areas have been such that those conditions won't happen there. But it is certainly an important question that need to be examined.

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Session 9

Day 2 – Morning – Parallel Session

The Data Revolution

Hervé Rannou, Président CityzenData, France, chairing, welcomed the audience and opened the session by briefly setting the scene.

Big Data has become a buzz word. For many people, it is not necessarily positive. Some see big data as merely a new marketing strategy to sell more technology to IT Managers, while others see it as a major risk for privacy.

One of the reasons for this is the confusion that comes from the variety of data. Depending on a person's personal and professional background data can refer to population statistic data, financial data, corporate data (including HR, finances, goods ...), public service information, health data, sensor and machine data ...

Beyond understanding the type of data, public and private organisations are facing a large variety of issues: IT technology for data management, data collection, data access, legal landscape and regulation, data governance (who can do what type by type of data?), privacy, security...

The key question for the future is how to manage this complexity?

ITEMS International works with its public and private clients to provide a greater understanding of these issues. In addition, I run Cityzen Data that proposes a disruptive technology that aims to manage all data related to events, and to consider that any process can be reduced to people and things, events, and applications. By extension, the technology developed by Cityzen Data is extendable to any business process. It is a disruptive approach in managing the complexity of data including technology, governance, security ...

Cityzen Data is an illustration among others of the future of Data when others organisations are going to point out access to data, open data, social data.

That is the objective of this session: to emphasize the diversity and importance of data issues in the perspective of the digital world.



Data issues & questions

The session's moderator, **JEREMY MILLARD, Senior Consultant, Danish Technological Institute**, Denmark, introduced the panellists and moderated the session with great ease.

He also introduced the topic of BOLD (Big Open Linked Data) as an attempt to specify how big data can become more useful as a driver of research and innovation in both public and private sectors. Innovation generally requires, on the one hand, diversity of contexts, actors and evidence, and, on the other, interaction between these through various forms of experimentation. Thus making big data open increases its reach and relevance whilst making it linked (to other data sets and other media) makes it much more usable and flexible. Innovation can take place deductively in a designed and top-down manner directed by a particular need or objective, or more inductively, open-ended, bottom-up and emergent (as in complex adaptive systems). Although the former is more common as innovation with or for a directed purpose, the latter can also make important contributions.

Developing more proven practices of BOLD needs more research into the array of specific roles it can play in these two contexts to drive or support innovation, for example by developing real life scenarios which recognise that the context, purpose and perceived benefits of use are highly important. In turn, this will likely rest on the recognition that non-BOLD evidence and inputs are also both unavoidable and necessary. BOLD is unlikely to achieve high impact or meaningful innovations on its own, for example how should and can it be combined with other types of evidence in specific contexts, such as qualitative, intangible, value- or vision-driven, as in the case in most real world contexts.

Different scenarios or use contexts might focus on one type of actor or sector, whether government, private or civil, a range of innovation trajectories including deductive and inductive, and/or different needs and objectives. The contextual conditions for these need to be examined, including organisational, legal and governance factors, but also behavioural, cultural and trust issues which always surround any innovation even in strictly so-called scientific contexts. BOLD is not simply an esoteric exercise but potentially has huge practical benefits and implications in a world of big and open data, and where societal challenges are recognised as increasingly complex, multi-disciplinary and which need to be addressed over relatively lengthy time horizons requiring robust monitoring and measurement which BOLD can also support.



SCOTT CUNNINGHAM, Associate Professor of Policy Analysis, Delft University of Technology, the Netherlands, provided a practical look at the big data revolution.

Scenarios for the Big Data Revolution

Scenario exercises can help us prepare the future—futures where the IoT takes the lead or futures where regions and cities are paramount. Preparations might include software, training, organizations and workflows.

Scenario analysts help decision-makers think broadly and comprehensively about the future.

Two possible futures in a quick and impressionistic form:

Scenario n°1: The Factory, where a carefully planned new industrial economy shapes how data is created and shared. It is increasingly a world where machines are talking to machines. In this scenario we have cracked the problem of creating good models and knowledge bases, but we still don't know how or to what purpose we apply our models.

Scenario n°2: The Souk, where a variety of different social segments, regions, perspectives jostle for limited attention. In this scenario the data miner is preoccupied with sorting, separating and locating distinct voices. It is the future scenario for brokering meetings, finding markets, establishing truth from fiction and facilitating learning.

When decomposing these futures to describe a specific confluence of trends or forces, i.e., the scenario logic—we notice that the “factory” scenario opens perspectives for transparency and accountability, openness and big data in the society. Whereas the scenario of the “souk” very well describes the shaping of public opinions, the emergence of a new regionalism and how social networks work.

The BYTE project, funded by the European Commission, assists European science and industry in capturing the positive impacts and diminishing the negative impacts of big data collection and processing. BYTE moves beyond current practices to consider how big data will develop to the year 2020 using foresight tools to identify future practices, applications and positive and negative impacts.

The BYTE project analyses seven case studies on positive and negative externalities in the use of big data. The case studies correspond to the domains of crisis informatics, culture, energy, environment, healthcare, maritime transportation and smart cities. The project will evaluate common forces affecting all problem domains as well as the three trends shaping the big data policy agenda for Europe: the transition, hegemony and regime of big data.

The big data transition describes the speed and extent to which big data technologies are adopted by European industry and government. The big data hegemony describes the extent to which big data technologies are controlled by a few big governmental or industrial actors. The big data regime describes whether big data will be governed in a system where privacy and proprietary knowledge is protected.



SANDRO ETALLE, Professor Head of Security Group, TU/e – Eindhoven University of Technology, Netherlands, talked about similarities between data and money.

Where is my Money Data?

What do money, data and cyber-security have in common? Everything: data and money are becoming increasingly interchangeable and the key to this is cyber-security. Taking a lesson from computer security, it is clear that ultimately cyber-attacks are impossible to detect. There are two reasons why this is so. First, because present systems are becoming so complex and this makes it increasingly hard to monitor them. Second because we miss the situational awareness of data, i.e. we cannot use let alone really understand data unless we know a large number of things about it, including its provenance, who, why and how it was developed, its purpose and how it is being used.

This might be illustrated by looking at situational awareness in finance where this is tackled by attempting to follow the money. When this is possible, it solves problems, and businesses and citizens become better protected. Obfuscation leads to fraud and failures, so auditability is crucial. Applying situational awareness to big data given that data has financial value, a similar lesson might be drawn. Here, following the data might provide a key to protecting businesses and citizens. In the same way, data should be subject to similar auditability requirements given that obfuscation leads to fraud and failures. This is really not a new idea but it remains largely theory given it is hardly being done. The emergence of blockchain technology as decentralised databases might be a way forward, e.g. for legitimisation, registers, participatory decision-making, automatic taxation, social security, counteracting fraud and corruption, fighting crime, etc. However, there are also dangers inherent in the fact that blockchains are, in effect, an impenetrable black boxes which might themselves contribute to obfuscation, and how secure are they really?

STEPHANE GRUMBACH, Research Director, INRIA, France, discussed key political issues related to the data revolution.

Political issues

The world is changing fast: Brexit, Trump, what is going on and what's next? There are two possible types of answer. First, perhaps the easiest and what we'd like to think, we just need to tune our data a little; a few tweaks of the modulation dial and what is happening will return to focus. However, the second option seems the most likely, i.e. that we have to change our data and how we use it very dramatically.

Data is anyway changing: who owns it, creates it, controls it and uses it. The old adage that data and knowledge are power is even truer today than ever. The so-called "democratisation" of data, in the sense that everybody is involved, is something of a myth. Closer to the truth is that the ownership, creation and control of data is shifting from government to big business, especially American, rather than to everybody. Think of Facebook, Google, Amazon, and increasingly automobile companies, banks and retailers. This presages a fundamental power shift towards greater privatization which bypasses the citizen, rather than greater democratization, and a real risk that data, at least the most valuable, is becoming increasingly closed.



ALI KONE, Chief Operating Officer/Co-Founder, Coders4Africa Inc, USA, presented an EU and African cooperation action targeting sub-Saharan African countries.

Waziup: Open Data Innovation

The WAZIUP project, namely the Open Innovation Platform for IoT-Big Data in Sub-Saharan Africa is a collaborative research project using cutting edge technology applying and co-designing IoT and Big Data to improve the working conditions in the rural ecosystem of Sub-Saharan Africa.

WAZIUP is an ambitious program that involves innovation spaces, universities, SMEs, IT systems architects communities, business developers and businesses with various technological expertise. These makers, with various skills sets, will all contribute to the creation of the open source platform WAZIUP which should allow developers to conceive and create new applications destined to the rural through data treatment transmitted by captors placed on the connected objects and deployed on urban and rural sites.

The goal of this program is to validate the business potential of IoT and big data in Africa. The platform's content will be validated through use cases and a series of events that will be organized by the African innovation hubs taking part in the project, among which CTIC Dakar. These events will be involving the developers and other stakeholders.

WAZIUP will deliver a communication and big data application platform and generate locally the know how by training by use case and examples. The use of standards will help to create an interoperable platform, fully open source, oriented to radically new paradigms for innovative application/services delivery. WAZIUP is driven by the following visions:

- Empower the African rural economy. Develop new technological enablers to empower the African rural economy now threatened by the concurrent action of rapid urbanization and of climate change. WAZIUP technologies can support the necessary services and infrastructures to launch agriculture and breeding on a new scale;
- Tailored IoT and bi data technology. Offer smart sensor and data-driven applications and services addressing the end-users needs and requirements (understanding users requirements and preference delivering towards more personalized and easy users interfaces and applications)
- Value-added cost and energy efficiency. IoT application and services based on WAZIUP open IoT-big data platform will focus on ease of maintenance and low cost of solutions;
- Lower entry level. Provide to application developers a mature platform, as well as tools and standards that are inexpensive, easy and relevant.

In order to achieve the above aims, a strong dissemination and exploitation effort of the project will be dedicated to a) strengthening linkages of end-users with industries, b) engage innovation space and living labs to accelerate innovation coaching/training/start-up activities (e.g., community-driven development paradigms), c) promote value-addition to business outputs, d) challenge the value-chain of African agribusiness through technology for value increase.

The proposed solutions will be tested for a set of real-life use cases covering several countries. At higher level, WAZIUP will implement a regional innovation platform, where



SMEs could continue to develop/plug-in solutions using the technical elements and the open data provided in the project. The ultimate target is to create large African industries, SMEs ecosystem, and induce a network- effect.

The consortium of WAZIUP involves 7 partners from 4 African countries and partners from 5 EU countries combining business developers, technology experts and local Africa companies operating in agriculture and ICT. The project involves also regional hubs with the aim to promote the results to the widest base in the region.

Erik Rehben, Senior Consultant Animal Traceability Development and Valorization, Institut de l'Elevage – French Livestock Institute, France, presented a pioneering reference platform in the agricultural sector.

A new actor in data revolution in agriculture in France:
API AGRO

Today, everybody is using a connected device—PC, smartphones etc. More than two out of three farmers are using applications specific to agriculture.

The design and the operation of these applications require more and more capabilities and functionalities: For instance, remote updated data, such as weather, commodity prices and forecast etc., and remote high value services such as big data analysis. More and more relevant data for agriculture, e.g., weather, satellite images, are available through open data portals.

The French public policies strongly support the development of open data in general and in particular with a data portal project dedicated to agriculture.

The problem is, how to make data and services relevant for agriculture, visible and available both for research and development of new applications as well as day to day operations of applications?

The solution proposed is more than a search engine, it is a key technology: Application Programming Interface (API). It is a unique, open API platform providing services to facilitate R&D of new innovative process and applications; the publication and the monetization of API by their producers; the uptake of API by their users; the meeting of both user needs and producer solutions. A dedicated team dealing with the platform has been set up.

The main principles of API AGRO are the following:

Each data or service producer defines the terms of uses, whether it is public or private, free or paid, etc.

Before any integration, a moderator checks the API quality in terms of technical description, data or service quality, update process, ...

All APIs are registered and described in a harmonized manner by a central open repository.

API AGRO is based on collaborative management by the stakeholders.



every day. Local administration CCTVs or private safety cameras follow you within shops or residential buildings even inside the elevator.

Unless we decide to move to the mountains renouncing to nowadays technology, some tiny data that describes our behaviour and us will probably be tracked. No matter you may say, we have nothing to hide, but what about the use, abuse or misuse others may do?

Data and Ownership

The concept of "data" as it relates to people's everyday life is still evolving. We inherited the concept of copyright and we more recently faced the concept of privacy. Copyright and privacy, it seems reasonable that both derive from the concept of data ownership. I take a nice picture, put a watermark on it and publish on my web page, if someone else download my picture crop the watermark and posts it on his/her website, it's a copyright infringement. Nowadays open data is one of the buzzwords most popular, if a public authority will release different sets of "open data" apparently anonymised but the combined use of them may lead to identify your personal behaviour that's a form of privacy invasion or perhaps violation.

Following the same fil-rouge on the borderline between licit and illicit activities, simply consider an unseen observer that follows you and take notes about all the different places you visit and the time of your visits, he does nothing with this information, simply store it in his notebook, he is unseen and you will never face him and discover his activity, basically in doing so he didn't broke any law. His behaviour is unconventional but still legal. If you act in public spaces or visible by public there are no laws that state that you are the sole proprietor and owner of the information regarding your public life, the collection of this information doesn't violate any right. If we look in law the closest legal offence in such a situation is stalking even if this offence usually is directly connected with harassment but the unseen observer does not ever interfered with you so no harassment, no stalking even because the unseen observer is your smartphone and it can't be convicted of stalking you.

Cyberspace is really a Black Hole?

Some people probably consider cyber space as a kind of "outer space" no man's land not subject to human's material desires and malicious behaviours. Voluntary or involuntary personal data dissemination it is not a new phenomenon, before the Internet it was less evident and limited to some specific domains: credit card companies, travel agencies, real estate companies, car dealers, etc. etc. basically people officially owning your personal information being in a position to suggest new opportunities. Later on it was the time of "fidelity cards" and the explosion of CRM1. The mass diffusion of the Internet ignited the real blast of personal information collection and data harvesting. You fill up a form to install a new APP and suddenly you receive a bunch of offers and advertisement often claiming that you subscribed that service. Yes you subscribed the form to install the APP but thanks to a kind of letter chain the company in charge for collecting the forms to install the APP is the same company that manages dozens of business companies and you unintentionally subscribed the full service. Your personal information are now shared among a number of companies and you will never be sure that they will disappear from on-line data base. This last aspect, "never disappear" take us to another relevant point. Introducing the concept of data ownership we make reference to the copyright concept. If my data are mine I can even delete them isn't it?



Copyright and copyleft are two sides of the same coin, they both pertain to the intellectual property of something, but which is the most relevant... if any? Traditionally, copyright and copyleft have been regarded as absolute opposites: the former being concerned with the strict protection of authors' rights, the latter ensuring the free circulation of ideas. While copyright, which seeks to protect the rights of inventors to own and therefore benefit financially from the new ideas and products they originate, thus encouraging further product development, is associated with a vast amount of legislation globally (leading to corresponding applicative complications), few studies have been made of copyleft. Indeed, a commonly held belief about copyleft is that it begins where the boundaries of copyright end, spreading over a no man's land of more or less illegal exploitation.

If we specifically refer to the intellectual property from the "continental" standpoint apart from the "economic" rights we find, even more relevant, some moral rights like paternity, adaptation, modification, ... "withdraw". The author has the moral right to "withdraw" his work of art from private or public environment. If we keep the similarity in the field of personal data we must claim for the right to withdraw them from the "digital universe", this right is usually termed "right to obsolescence" or the "right to be forgotten". Viktor Mayer-Schönberger, the author of "Delete: The Virtue of Forgetting in the Digital Age" traces the important role that forgetting has played throughout human history. The book examines the technology that's facilitating the end of forgetting: digitization, cheap storage and easy retrieval, global access, multiple search engines, infinite replications of information, etc. etc. If it is true that our ancestors survived to the evolution process because of their ability to transfer to future generations relevant information thanks to primitive forms of writing the dangers of everlasting digital memory, whether it's out-dated information taken out of context or compromising photos the Web won't let us forget is as well evident and already creating troubles. The supporters of a "natural" approach propose an expiration date for digital information or a progressive vanishing of data as it happens in the human world. Other experts propose to apply the moral right of the author/owner to "withdraw" his data, and here it comes the first crucial point: author, owner or subject ... ? A vanishing memory offers the ability to make sound decisions unencumbered by the past, offers the possibility of second chances.

Laws and Regulations

As it appears from the previous paragraphs ownership of data is not yet a well-defined legal concept. We all agree about privacy and intellectual property infringement but personal data even if clearly belonging to the same "galaxy" are not properly identified and protected.

If this represents the state of the art in general it might not always be the case. Individual nations and international organizations are attempting to establish rules governing who can collect what data and what they're allowed to do with it. Germany, in fact, has a legal concept known as "informationelle Selbstbestimmung" or informational self-determination. What does informational self-determination mean? An individual has the right to decide for him or herself what information can be used by whom and for what.

UNESCO Information for All Programme (IFAP) invested some resources to better focus ethical aspects with regard to the information society; the outcome of such studies is the definition of Infoethics. Quoting UNESCO IFAP: "The international debate on information ethics (infoethics) addresses the ethical, legal and societal aspects of the applications of information and communication technologies (ICT). Ethical principles for knowledge societies derive from the Universal Declaration of Human Rights and include the right to freedom of expression, universal access to information, particularly that which is in the public domain,



the right to education, the right to privacy and the right to participate in cultural life. One of the most challenging ethical issues is the inequity of access to ICT between countries, and between urban and rural communities within countries.

Along with the benefits of a digitally connected world come the threats of misuse and abuse. Already countries are building mechanisms to protect their people against these risks, for example to ensure the safety of children on the Internet, but clearly a lot more needs to be done to address the ethical implications of the information society. In collaboration with its partner institutions, IFAP seeks to do so.”

The threats of misuse and abuse are again one of the major concerns. More recently personal information ownership and ethical aspects connected to open data represented one of the key subject on the occasion of the UNESCO IFAP International Conference Media and Information Literacy for Building Culture of Open Government, held in Khanty-Mansiysk, Russian Federation, on 7-10 June 2016.

Some of the most relevant legal implications explored on the occasion of the Khanti Mansiysk event were interaction among stakeholders requires related competencies such as reliable information access and retrieval; information assessment and utilization; information and knowledge creation and preservation; and information sharing and exchange using various channels, formats and platforms. To be effective and fruitful, such interaction should be based on trustworthiness of governmental information; mutual respect and compliance with standards of ethics; and privacy and security. Though these essential competences are brought together by the concept of media and information literacy, no agenda has hitherto spotlighted the duty of using available R&D achievements to make open government more effective. EU

Data Protection Directive and personal data re-use

In recent times (April 2016) the European Commission has issued a data protection Directive. One of the improvements is the geographic coverage of the Directive. The new regulation will apply if the data controller or processor (organization) or the data subject (person) is based in the EU. Furthermore (and unlike the current Directive) the Regulation will also apply to organizations based outside the European Union if they process personal data of EU residents.

An additional interesting aspect is represented by the definition of “personal data”. According to the European Commission “personal data” is any information relating to an individual, whether it relates to his or her private, professional or public life. It can be anything from a name, a photo, an email address, bank details, “posts” on social networking websites, medical information, or a computer’s IP address. This is a relevant step forward in privacy issues. As clearly stated in the title of the Directive a specific focus concerns data re-use. Nowadays on line applications, APPs and open data represent the typical environment for data re-use.

What laws and legal implications may occur to “entities” re-using open data? This question pertains the problem we can summarise as “Transparency & Openness v/s Privacy, Security & Ownership”. If we take into account a governmental organisation we can refer to ethics and Integrity within the organization. Usually speaking about governmental bodies we assign them high ethical standards, respect to dignity and organizational integrity.



Data re-users' main concern is rights and dignity of others. Majority of open data re-users are NGOs who often declare missions that are directly linked to rights of certain social groups. Having responsible data policies send a clear signal to all stakeholders that organization does in fact care about its affected groups, especially those vulnerable. More in general taking into account both governmental bodies and data re-users an additional aspect concerns reputation in front of donors, partners, and customers. Institutions and organisations having data re-use policies in place does send a clear signal to donors, partners, customers and other stakeholders that the organization treats its activities with care and high ethical standards.

Internet “prosumers” initiative: My data belongs to me

Concerns about data ownership and potential re-use do not only pertain international institutions or governments, it is an issues coming even from the grassroots. In 2014 the World Summit Award (WSA), an organisation closely linked with WSIS grouping hundreds of “digital authors” coming from more than 170 countries around the world, launched “My data belongs to me” an initiative through its global multi-stakeholder network to push forward personal data ownership and big data issues at UN discussions. On the occasion of open discussions, such as the one held on he occasion of WSIS Forum 2014 in Geneva, the WSA invited participants to share views on issues with the current system of data use, the need for permission-based access, and steps for further action. This initiative underlines the consciousness about the ownership of personal information too many times shared among social platforms and business services.

Responsibilities in data re-use

Waiting for a sounding definition of data ownership it is worth to consider the responsibilities in data re-use. Re-using data organisations have the duty to ensure people's rights to: consent, privacy, security and ownership during the processes of: collection, analysis, storage, presentation and re-use.

Consent is a relevant “keyword”, it means to explicitly provide the consent to use and manage private information provided in order to access a specific service. The request for “consent” must incorporate a clear and complete description of the use and aim of such data collection. Such a request may incorporate the description of future re-use of such dataset. If the potential use and re-use of data is articulated in different aims and steps the consent must be requested in the so called “granular” way that means that the platform will request a sequence of different consent that should be provided or not care of the citizen, in the field of APPs this is usually known as Warsaw Declaration on "appification of society" (September, 2013).

How is usually ensured the right to consent? One of the typical approaches is “informed consent”; this is the mechanism through which people agree to provide information for research or data collection projects. The informed consent policy it is very well known in the medical sector, you read and sign the informed consent form before a surgical operation or a specific therapy but even more frequently when you apply to download eHealth APPs that will collect some physical parameters to perform their duties.



Informed consent find is basis on three components:

1. Disclosure of research objectives and any risks or negative consequences of participating capacity of individuals to understand the implications of participating voluntariness of their participation;
2. Informed consent includes plain language, easy-to-understand explanations of the types of data to be collected;
3. The purposes of collecting data, the intended and potential unintended uses of that data, who has access to and control over the data, risks of data leakage to third parties, and any benefits to participation in data collection.

Once data are collected and utilised for the specific proposes stated by the request for consent it might happen that the same data will be useful for different purposes how can we manage? Even if people use to think that once available data is re-usable without limitations, re-use of data collected for a different scope basically requires a new requestfor consent specifying the new purposes.

This is a real problem that affects major part of open data collected by public bodies and not only them. Imagine extending that same principle of specific consent to anything that anyone is able to “capture” regarding your life. Suddenly, you'd have to sign a legal release every time you swipe your credit card, take a taxi or walk through a store equipped with security cameras.

The question of who owns your data is not an easy one to solve. It becomes particularly problematic because you potentially create “public” data (whether or not it gets recorded) every time you leave your house entering “public” space. The number of steps you take, whether you look ahead or at the ground, what types of clothes you wear, and any number of decisions you make in view of other people are all potential data, this happens when airports security activate passenger's shadowing or free Wi-Fi connections asking for your identity, e.g. typing your mobile phone number to gain access to the Internet, track your position.

This looking from the perspective of privacy but at the same time public institutions must respect the values of transparency and openness. The contraposition of such duties, transparency & openness versus privacy, security & ownership, finds its solution in the ethical and responsible re-use approach. This contraposition of duties may be schematized in a very effective way considering the right to privacy patrimony of those without “power”, while the need for transparency and openness is for those who have “power”.

So in extreme synthesis we have some principles: transparency & openness together with do no harm! The main concepts to be considered are: the right to consent and the respect of privacy, security & ownership. The concepts of privacy, security, commercial or state secrecy can be secured following the “do not harm” principle. Data re-users must do all within their powers to not cause any harm to any of the stakeholders that can rise as a direct or indirect result of open data re-use. To conclude if we consider the process from the data stages point we find: collection and storage, analysis and presentation.



The role of Privacy and risk related to breaches

Responsible and ethical data re-use is around the concept of privacy, legal requirements, risks and mitigations associated. Privacy is concerned with control over information, who can access it, and how it is used.

Privacy has many dimensions, from concerns about intrusive information collection, through to risks of exposure, increased insecurity or interference in their decisions that individuals or communities are subjected to when their 'private' information is widely known. Privacy is generally linked to individuals, families or community groups, and is a concept that is often used to demarcate a line between a 'private' and 'public' sphere. Article 12 of the Universal Declaration on Human Rights states "No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation"

Let us take into account more closely privacy risks and their mitigation, key risks related to privacy are: disrespect to privacy can cause humiliation, embarrassment or anxiety for the individual, for example from a release of health data, it might be concluded that an individual accessed treatment for a sensitive sexual health condition; can have an impact on the employment or relationships of individuals; can affect decisions made about an individual or their ability to access services. This specific point might lead for instance to: their inability to obtain insurance; result in financial loss or detriment; can pose a risk to safety, such as identifying a victim of violence or a witness to a crime.

As usual when we have to deal with risks we analyse them in order to find mitigation actions. Let us start taking into account a basic privacy risk assessment determining any specific unique identifying variables, such as name, cross-tabulation of other variables to determine unique combinations that may enable a person to be identified, such as a combination of age, income, and postcode. In addition acquiring knowledge of other publicly available datasets and information that could be used for list matching. Of course this procedure will not ensure 100% privacy because new data sources might be open to public access completing the puzzle. As an example think about the typical concerns related to some on line personal feedback or better on line vote, how to ensure single vote from right holder citizen and at the same time disjoin his/her identity from the expressed vote.

Risk assessment: mapping

We all know that security and privacy are subject to risk as already stated thus it is important to identify and mitigate risks associated with privacy and security concerns. In order to reach this goal, as a first approach, we can perform the following steps: identify the persons at risk in the event of personal information exposure (not restricted to the data owner or collector), identify knowledge assets that can be extracted from the data collected (discrete data points, meta analysis of data points, mash up of the collected data and external data sources); evaluate the importance of each knowledge asset to the potential goals/harms (little or no relevance, significant relevance, crucial). This approach, many times, will lead us to identify the crucial nodes that, if adequately protected, will ensure no harm. The level of privacy risk will be dependent on the likelihood that identification could occur from the release of the data and the consequences of such a release. Anyway mitigation is many times linked to de-identification.



Aspects connected to Security

In the previous paragraph we mentioned non-only privacy but even security. Security is somewhat linked to privacy, adapt security protocols and tactics to encompass:

- 1) Digital information security;
- 2) Physical and operational security;
- 3) Psychosocial well being required for good security implementation.

Nowadays the key concept is “holistic security”, a “global” approach to security integrating all the different aspects and problems. A specific interest is devoted to digital security. Digital security is more than focus on software or tools; integrating emotional well-being, personal and organizational security. Good implementation of digital security tools and tactics requires attending to the practitioners’ psychosocial capacities to recognize and respond dynamically to different threats to themselves and to participants related to project data collection and communications (intimidation, social engineering.)

Open Source Intelligence (OSINT)

Lastly let us consider a particular use of the information gathered, OSINT is the acronym of Open Source Intelligence and refers to intelligence collected from publicly available sources. In the intelligence community, the term Open indicates overt and publicly available sources, in opposition to covert or clandestine sources and it is not related to open-source software. It is important to notice that OSINT is distinguished from research; it applies the process of intelligence to create tailored knowledge supportive of a specific decision by a specific individual or group.

OSINT includes a wide variety of information and sources:

Media: newspapers, magazines, radio, television, and computer-based information.

Web: web sites, web communities, user-generate contents, video sharing sites and blogs.

Metasource Engines: MetaCrawler, Ixquick, Dog Pile, etc.

Deep Web: no index web sites, reserved information and illegal contents.

Social Networks: Facebook, Twitter, LinkedIn, Instagram, etc.

Software OSINT: Foca, Maltego, Shodan, etc.

We already took into account Social Engineering that of course represents a relevant risk no matter how good is cyber security, the weakest link of the security chain are humans.

CONCLUSIONS

Arguably, we haven't even discovered every type of data that can be recorded. At the same time today we have only a limited idea and vision on potential risks due to “data leaks”, in some way we are still in the digital Middle Ages both for positive outreaches and drawbacks. Anyway back to “my data” until the legal infrastructure changes, though, none of that will change this one simple fact: you don't "own" data just because it's about you.



ARJAN VAN DEN BORN, Academic Director, Jheronimus Academy of Data Science; Professor Creative Entrepreneurship Tilburg University, discussed the question of how to turn data into value.

Creating value with data -- Overcoming the Hype

Unlocking the value of data means understanding the five Vs: its Volume, Variety, Velocity, Veracity and (of course) Value. There are various ways to extract value from data: first improved customer relations, second, effective and efficient processes, and third new products and services. The current focus is mainly on improving customer understanding, so what is needed is the new process of data science which is critical to future prosperity and employment.

Data Science is the next big thing; it seeks to use all relevant, often complex and hybrid data to effectively tell a story that can be easily understood by non-experts. Data science is predicated on creating data value in every phase of the data value process. However, data value can also be destroyed in every phase of the data value process. Without potential value, there is no way value can be created. Key to unlocking potential value is the data-driven organisation which has a combination of four assets: data technology, data processes, data governance and data skills plus data culture.

Most organisations today have a very low data science maturity level but this can be changed by developing a new data science business model which, in contrast to traditional



business models, asks a number of questions related to data. These include: who is the data customer, what is the product or service, what is your pricing model, what is the price, and where is your added value?

A “triple pathway” approach should be adopted, i.e. harvesting customer insights, examining process information and focusing on product innovation. In this way, data science will, and already is, creating new professions. For example, data regulatory officer, online data business strategist, consultant in data concessions, and web-data entrepreneur. Every profession becomes a data science profession, such as in health analytics, marketing analytics, HR analytics and accounting and finance analytics.

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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 2016 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 2017 edition of the Global Forum.

Please make sure to check our website regularly for updates.



ACRONYMS & ABBREVIATIONS

ADHD	Attention Deficit Hyperactivity Disorder
AI	Artificial Intelligence
API	Application Programming Interface
BD	Big Data
B2B	Business-to-Business
B2C	Business-to-Consumer
CAC 40	Cotation Assistée en Continu 40
CAD	Computer Aided Design
ccTLD	country code Top-Level Domain
CDO	Chief Digital Officer
CDR	Call Detail Recording
CEO	Chief Executive Officer
CERT	Computer Emergency Response Team
CIO	Chief Information Officer
CISO	Chief Information Security Officer
CNDSP	Computer Network Defense Service Provider
COE	Common Operating Environment
CSIRT	Computer Security Incident Response Team
CSV	Comma Separated Value(s)
cPPP	contractual Public-Private Partnership
CVE	Common Vulnerability Exposure
CYBEX	Cybersecurity Information Exchange Techniques
DDoS	Distributed Denial-of-Service
DG	Directorate General
DII	Defence Information Infrastructure
DNS	Domain Name System
DoD	Department of Defense
DSM	Digital Single Market
DTT	Digital Terrestrial Television
EC	European Commission
e.g.	for example (exempli gratia)
eID	electronic ID
eIDAS	electronic Identification And Signature
EMEA	Europe, Middle East and Africa
EMR	Electronic Medical Record
ENoLL	European Network Of Living Labs
EUR	Euro
EWBS	Artificial Emergency Warning Broadcasting System Intelligence
FCC	Federal Communications Commission
FDA	Food and Drug Administration
FP7	7 th Framework Programme for Research and Technological Development
FTC	Federal Trade Commission
FTTH	Fiber to the home



GAFA	Google, Apple, Facebook, Amazon
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GEB	General Ecological Behaviour
GeoJSON	Geographic JavaScript Object Notation
GIS	Geographic Information System
GSM	Global System for Mobile Communications
GPS	Global Positioning System
gTLD	generic Top-Level Domain
G7	Group of 7
HD	High Definition
HPKI	Healthcare Public Key Infrastructure
H2	Hydrogen
H2020	Horizon 2020
IC	Integrated Circuit
ICANN	Internet Corporation for Assigned Names and Numbers
ICAR	International Committee for Animal Recording
IDS	Intrusion Detection Systems
IEC	International Electrotechnical Commission
IoE	Internet of Everything
IoT	Internet of Things
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IPR	Intellectual Property Rights
ISAC	Information Sharing and Analysis Centre
ISDB-T	Integrated Service Digital Broadcasting-Terrestrial
ISO	International Organization of Standardization
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunication Union
ITU-T	ITU Telecommunication Standardization Sector
IOCTA	Internet Organised Crime Threat Assessment
IX	Internet eXchange
JEI	jeune enterprise innovante
KML	Keyhole Markup Language
LEO	Lyons Electronic Office
LoRA	Long Range
LTE	Long-Term Evolution
NASDAQ	Originally: National Association of Securities Dealer Automated Quotation system. Today: largest electronic equities exchange in the U.S.
NCD	Noncommunicable disease
NGO	Non-Governmental Organisation
NIS	Network and Information Systems
NIST	National Institute of Standards and Technology
NIST CSF	NIST Cybersecurity Framework



OASIS	Organization for the Advancement of Structured Information Standards
Ofcom	Office of communications
OGP	Open Government Partnership
one-SEG	one segment
O2	Oxygen
PCI	Payment Card Industry
PHR	Personal Health Records
PIN	Personal Identification Number
PPP	Public-Private Partnership
Q&A	Questions and Answers
RFID	Radio Frequency Identification
R&D	Research and Development
SANS	SysAdmin Audit Network Security
SLA	Service Level Agreements
SME	Small and Medium-sized Enterprise
SNP	Single Nucleotide Polymorphisms
SOC	Security Operation Center
SRIA	Strategic Research and Innovation Agenda
TLD	Top-Level Domain
TSMC	Taiwan Semiconductor Manufacture Cooperation
TV	Television
UAE	United Arab Emirates
UHD	Ultra High Definition
UK	United Kingdom
UL	Underwriters Labs
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USA	United States of America
USD	US Dollar
VAT	Value Added Tax
VIP	Very Important Person
VSA	Vendor Security Alliance
VTR	Video Tape Recorder
WEF	World Economic Forum
WHO	World Health Organisation
WiFi	Wireless local area network
WLAN	Wireless Local Area Network
XaaS	Anything as a Service
3D	3-dimendional
3G	Third Generation
4G	Fourth Generation
5G	Fifth Generation

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ANNEXE 1: GISCO
THE GLOBAL INNOVATION STARTUP COMPETITION



In Collaboration with **ActiveMedia** Digital Partner of Global Forum

Global Innovation Startup Competition (GISCO)
TUESDAY 20th September 2016
Evoluon Center, Eindhoven, Netherlands

GISCO, Global Innovation Startup Competition at Global Forum 2016 in Eindhoven

The 2016 Global Forum featured many innovative speakers on digitization. It is the 25th Global Forum, befittingly gathered in Eindhoven, the Brainport of the digital eco - system. The conference featured an inaugural, collaborative event. There is no innovation without startups - so GISCO, the Global Innovation Startup Competition was added to the agenda.

17 companies competed. The jury consisted of pioneers in the startup industry in the EU and the US (Silicon Valley), including distinguished Global Forum speakers and steering committee members.

The winners are: LocaidMe (Prague/Silicon Valley), a safety app to detect threats in real time in public places in an actionable format. Second place went to Strategic Security (Virginia, USA), a network vulnerability scanning solution. Third place went to Semiotic Labs, an Amsterdam based equipment failure detection and monitoring solution company that works with private sector and government entities.



Jurors (in alphabetical order)



Armando Castro - Partner at Pillsbury Winthrop Shaw Pittman LLP, USA (via Skype)



Don Davidson - Deputy Director CS/Implementation & CS/Acquisition Integration, Office of the Deputy DoD CIO for Cybersecurity, USA (At the Global Forum in Eindhoven)



Randall Mark Foster - Venture Capital, Investor, Strategic Connector, Tech Entrepreneur, and Startup Advisor, USA (via Skype)



Jay Edwin Gillette - Professor of Information and Communication Sciences, Ball State University / Senior Research Fellow and Institute Secretary Digital Policy Institute, / Fullbright Nokia Distinguished Chair in Information and Communications Technologies, University of Oulu, Finland 2014-2015; USA (At the Global Forum in Eindhoven)



Pete Justen - CEO at Five Plus and Chairman of the Entrepreneurship Ecosystem, USA (via Skype)



Eric Legale - Managing Director Issy Media, City of Issy-Les-Moulineaux, France (At the Global Forum in Eindhoven)



Pierre Laffitte - President Sophia Antipolis Foundation, France (At the Global Forum in Eindhoven)



Julie Levenson - Partner and Co-Founder La Honda Advisors, USA (via Skype)





Sébastien Lévy - Vice-President Global Forum/Shaping the Future;
Associated Partner of ITEMS International, France
(At the Global Forum in Eindhoven)



Ewout Mante - Corporate Strategy & Innovation Management,
Netherlands
(At the Global Forum in Eindhoven)



Diana Rothschild - Founder of NextKids and CEO of Nextspace, USA
(via Skype)



Niki. V Santo - Director at Brandman University, Chapman University
System, USA (via Skype)



Michael Stankosky - Research Professor George Washington
University, USA
(At the Global Forum in Eindhoven)



Sylviane Toporkoff - President Global Forum/Shaping the Future/
Founder & Partner Items International, France
(At the Global Forum in Eindhoven)



Paul Wormeli - Innovation Strategist Wormeli Consulting / Executive
Director Emeritus, Integrated Justice Information Systems Institute –
IJIS, USA
(At the Global Forum in Eindhoven)

AWARDS

GOLD MEDAL

Aakash Ravi Co-Founder and COO, locaid.me, USA

Prizes, Opportunities, and Resources First place winner:

1. Invitation to participate as a finalist at the **CES Matchfest business matchmaking and startup competition** in Las Vegas, January 2017, including full CES participation (**3 persons**).
Sponsored by the European American Enterprise Council and ActiveMedia.
2. Invitation to **pitch to the US Angels Investment Board**.
Sponsored by US Angels Network and the fundraising firm Crimson Growth Partners.
3. **One month business development support**, including any relevant market entry subjects, including business plan editing and writing, business development, competitive analysis.
Sponsored by the European American Enterprise Council and Virtualincubator.us.
4. A **digital footprint review**, including search engine visibility, social media footprint, online reputation management.
Sponsored by ActiveMedia.
5. A legal **review of your venture**, including advise about corporate structure to meet Silicon Valley expectations, IP review and transfer, and immigration roadmap to start operations in the US.
Sponsored by Pillsbury Shaw Pitman's Venture group and Virtualincubator.us.



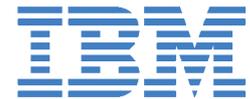
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