

CONTENTS



acknowledgements.....	3
programme.....	5
about the global forum.....	19
think tank synthesis report.....	21
contact	198
acronyms & abbreviations	199



ACKNOWLEDGEMENTS

This year the Global Forum went Arctic. The 24th edition of the Global Forum took place on Monday, 28th and Tuesday 29th, September 2015, in Oulu, Finland. The conference was a combination of inspiring keynotes, icebreaking sessions and networking, and we would like to take this time to thank all the persons and organisations who helped us making the Global Forum 2015 another success.

We would like to express our sincerest thanks to the City of Oulu for hosting the Global Forum and providing the excellent meeting facilities. Thank you so much for the wonderful welcome cocktail at the City Hall. We sincerely thank the Mayor of Oulu, Mr Matti Pennanen, for the great hospitality and gave a special thanks to Mrs Outi Rouru for her commitment and dedication.

It has been a great honour to welcome Prime Minister Juha Sipilä at this twenty-fourth edition of the Global Forum.

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.

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

the main sponsors of the Global Forum 2015 for their spirit of sharing, support and generosity:

Qualcomm, elisa, Sitra, The GSM Association GSMA, GPI Group, AT&T, Airbus Group, Nokia, Engie, Fennovoima, InfoCert, Finpro, Synopsys, Regus Kora, Afiliias, SmartDok, Atomproekt, Rosatom, France Génétique Elevage, SecureNinja, ETSI, ebay and DPI Digital Policy Institute.

As well as the supporting sponsors, which are:

Tekes, Fondation Sophia Antipolis, University of Oulu, Education New Society Association ENSA, Ulss 12 Veneziana, Morgan Lewis, Millennia2025 Foundation, ActiveMedia, Public Technology Institute PTI, MEDICI, Extreme networks, FilmMe.tv, Oulu University of Applied Sciences and Worldcrunch.

The Global Forum 2015 has been a great event for us and we hope that it has been so for you too. 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 2015 was realized with the active and efficient support of its sponsors and support partners

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PROGRAMME

 28 September 2015

Welcome Addresses

p 22

.....
1st Day

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

Sylviane Toporkoff, President, Global Forum/Shaping the Future; Founder & Partner Items International; Professor at the Institute of European Studies, University of Paris, France

Opening Remarks

Markku Markkula, President, Committee of the Regions, European Union

Welcome Addresses

Juha Sipilä, Prime Minister of Finland

Matti Pennanen, Mayor of Oulu, Finland



 28 September 2015

Opening Session

p 28

Digital Strategy Visions

.....
1st Day

Chair & Moderator:

Anna Gomez, Partner & Attorney At Law, Wiley Rein LLP, USA

Keynote Speakers:

Mikko Kosonen, President, SITRA – Finnish Innovation Fund, Finland
Digitalization as an Enabler for Sustainable Growth

Anja Wyden Guelpa, State Chancellor, State of Geneva, Switzerland
Secrecy, Transparency, Openness, Closedness, Security...: the Tower of Babel of Our Digital Age

Jørgen Abild Andersen, Director General Telecom (rtd.), Chairman of OECD's Committee on Digital Economy, Denmark

Adriane LaPointe, Senior Policy Advisor in the State Department Office of Communications and Information Policy, US Department of State, USA
Connecting the Next 1.5 Billion People: The Global Connect Initiative

Audrey Scozzaro Ferrazzini, Senior Manager, Government Affairs Europe, Qualcomm Europe, Belgium

Luis Jorge Romero, Director General ETSI – European Telecommunications Standards Institute

Yoshio Tanaka, Professor, Tokyo University of Science (TUS), Graduate School of Innovation Studies, Japan
Toward Outcome Economy



 28 September 2015

Session 1

p 45

The Digital Transformation: IoT & Data

.....
1st Day

Chair:

Kari Terho, Vice President, Internet of Things, Corporate Customers, Elisa Corporation, Finland

Moderator:

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

Speakers:

Harri Kopola, Vice-President Research, Knowledge Intensive Products and Services, VTT, Finland
Towards Digital Paradise

Gerald Santucci, Head of Unit Knowledge Sharing, European Commission

Samuel Laurinkari, Senior Manager, EU Government Relations, eBay Inc. Public Policy Lab EMEA, Belgium

Keiichiro Seki, Head of Research, Center for Strategic Management & Innovation, Nomura Research Institute, Japan
Basic Understanding on Industrie 4.0/ I o T

Denis Gardin, Senior Vice-President, Head of New Technology Ventures, Airbus Group Corporate, France

Antti Aumo, Executive Vice President, Finpro; Head, Invest In Finland, Finland
IoT in Action: Smart Traffic Opportunities in Finland

Shoumen Datta, Research Affiliate MIT; SVP IIC – Industrial Internet Consortium, USA
Large Scale Test Beds

Alberto Di Felice, Government Affairs Senior Analyst, Qualcomm Europe, Belgium

Mariane Cimino, Consultant, France Génétique Elevage, France
Expectations and Connectivity Needs of Dairy Cattle Breeding



 28 September 2015

Afternoon Keynote Session

p 61

.....
1st Day

Chair & Moderator:

Jay E. Gillette, Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, University of Oulu, Finland;
Senior Research Fellow and Institute Secretary, Digital Policy Institute, USA
Information Renaissance Leadership for the Knowledge-Value Era

Keynote Speakers:

Paavo Lipponen, Former Prime Minister of Finland
International logistics networks, markets, population

Donald R. Davidson, Jr. Chief, Cybersecurity Lifecycle Risk Management and CS/Acquisition Integration Division, Office of the Deputy DoD Chief Information Officer for Cybersecurity, USA
Globalization is Good, but... Your technology solution might be my security challenge.

Markku Markkula, President, Committee of the Regions, European Union
Setting the Scene: The Regional Innovation Ecosystem



 28 September 2015

Session 2

p 70

Cyber & Security, New Challenges in a Global Context

.....
1st Day

Chair/ Moderator:

Bénédicte Suzan, Senior Prospective Analyst, Airbus Group Corporate, France

Speakers:

Sakeel Tufail, CEO, SecureNinja, USA

Colin Williams, Director, SBL; Honorary Fellow University of Warwick; Visiting Professor De Montfort University, United-Kingdom

Juha Röning, Professor Department of Computer Science & Engineering, University of Oulu, Finland
Digile Cybertrust

Mike Ahmadi, Global Director of Business Development, Synopsys, Inc, USA
A Call For A Cybersecurity Social Contract

Lasantha De Alwis, Director/Head of Operations Department & Corporate Secretary, CTO – Commonwealth Telecommunications Organisation
Emancipating, Enriching, Equalising, Empowering through the use of ICTs

Louis Granboulan, CTO Senior Expert, Airbus Group Innovation, France
Data Privacy: a new approach may be needed

Petri Vilander, Cyber Security Manager, Corporate Customers, Elisa Corporation, Finland
Cyber vs. Information Security

Philippe Wolf, Cybersecurity Project Manager, IRT SystemX – Institut de Recherche Technologique, France
Some Considerations about Privacy



 28 September 2015

Session 3

p 84

**New Innovation Strategies in a Challenging
Global Environment**

.....
1st Day

.....
Chair:

Bror Salmelin, Adviser for Innovation Systems, European Commission
Challenges for Innovation; How to Respond in Systemic Way?

Moderator:

Jeremy Millard, Director 3MG; Senior Policy Advisor, Danish Technological
Institute, Denmark
*Achieving Greater Societal Impact through Open, Social and Inclusive
Innovation*

Speakers:

Stephane Grumbach, Research Director, INRIA, France

Evgeny Obraztsov, Head of Research and Development Laboratory,
Atomproekt, Russia
Innovative Technologies in Nuclear Modelling and Designing

Audrey Scozzaro Ferrazzini, Senior Manager, Government Affairs Europe,
Qualcomm Europe, Belgium

Michael Stankosky, Research Professor, George Washington University,
USA
Competitive Collaboration

François Stephan, International & Development Director, IRT SystemX –
Institut de Recherche Technologique, France
New Innovation Strategies for Smart Territories



 28 September 2015

Session 4

p 97

Connected and Personalized Health in the Internet Age

.....
1st Day

Chair & Moderator:

Giampaolo Armellin, Head of Research Unit CRG – Centro Ricerche GPI s.r.l., Italy

Speakers:

Carmelo Battaglia, Commercial Director Public administration and Institutional Relations, InfoCert, Italy
Who are you?

Kim Westerlund, Chief Development Officer, Nixu, Finland
A legal analysis: Data protection for digital(ised) human beings

Giuseppe Grassi, Director Cardiology Department, Venice Hospital ULSS 12, Italy
From monitoring to caring

Maritta Perälä-Heape, Director, CHT – Centre for Health and Technology, University of Oulu, Finland
Information Flows

Andrea Sandi, Founder, SINTAC, Italy

Michele Thonnet, International eHealth Affairs Executive, Ministry of Social Affairs, Health and women rights, France

Madis Tiik, Senior Advisor, SITRA – Finnish Innovation Fund, Finland



 28 September 2015

Session 5

p 110

Digital Life/World: Empowering Society

.....
1st Day

Chair:

Steffen Nerdal, Chief Strategic Officer, Ascella AS, Norway
SmartDok: Smart Digitalization of B&C

Moderator:

Julia Glidden, Managing Director 21c Consultancy, United-Kingdom

Speakers:

Tim Kelly, Lead ICT Policy Specialist, World Bank Group
Digital Life and the Sharing Economy

Eikazu Niwano, Producer and Director of Produce Group, R&D Planning
Department, NTT Corporation, Japan
New e-ID card in Japan ~ cyberspace passport ~

Alfredo Ronchi, Secretary General EC MEDICI Framework, Italy
Citizens in the Digital Age: ICTs safety & security

Paul Wormeli, Executive Director Emeritus, IJIS – Integrated Justice
Information Systems Institute; Innovation Strategist Wormeli Consulting LLP,
USA
Information Safeguarding in the Sharing Environment

Ali Kone, Chief Operating Officer/Co-Founder, Coders4Africa Inc, USA

Nitya Karmakar, Professor MQC – Macquarie University, Australia
*Creating an Environment of Innovation: challenges and opportunities in
Australian context*



 29 September 2015

Keynote Opening

p 124

.....
2nd Day

Chair & Moderator:

Timo Katajisto, Executive Vice President, Elisa Corporate Customers;
Member of the Executive Board of Elisa, Finland
Digitalisation is Shaping our Future

Keynote Speakers:

Suvi Lindén, Chairperson for the Board of NxtVn Finland and Vice Chair for
NxtVn Group, Finland
Digitalization from Disruption to Sustainability

Wladimir Bocquet, Head of Policy Planning GSMA Association

Mika Lautanala, Executive Director, Smart Living, Tekes – Finnish Funding
Agency for Innovations, Finland
Digitalization Driving Revolution in Mobility



 29 September 2015

Session 6

p 133

Towards Greater Intelligent Infrastructures

.....
2nd Day

Chair:

Antti Larsio, Senior Advisor, SITRA- Finnish Innovation Fund, Finland

Moderator:

Alan Shark, Executive Director & CEO, PTI – Public Technology Institute;
Associate Professor of Practice, Rutgers University School of Public Affairs &
Administration, USA

Speakers:

Timo Ali-Vehmas, Head of Ecosystems Research, Nokia Technologies,
Finland
Programmable World

Wladimir Bocquet, Head of Policy Planning GSMA Association
4G Evolution and 5G Spectrum Policy

Claudia Selli, Director European Government Affairs, AT&T, Belgium

Basuki Yusuf Iskandar, Head of Agency for ICT R&D and Human Resources
Development, Ministry of Communication and Information Technology,
Republic of Indonesia
National Strategy Development for 5G

Latif Ladid, Founder & President, IPv6 Forum; Chair, 5G World Alliance,
Luxemburg
IP v6 –Based 5G: The Two-Way Internet

Matti Latva-Aho, Chair Professor Department of Digital Transmission
Techniques, University of Oulu, Finland
5G – Enabler for Future Economical Growth

Juha Palve, VP Customer Solutions, Knowledge Intensive Products and
Services, VTT Technical Research Centre of Finland Ltd, Finland
5G and Intelligent Infrastructure



 29 September 2015

Session 7

p 146

Smarter Regulation in the Internet Age:

“A New Policy Toolbox“

.....
2nd Day

Chair:

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

Moderator:

Gerard Pogorel, Professor Emeritus of Economics and Management,
Telecom ParisTech, France

Speakers:

Klaus Nieminen, Communications Network Specialist, FICORA – Finnish
Communications Regulatory Authority, Finland

Margot Dor, Strategy Development ETSI- European Telecommunications
Standards Institute

Sarah – Xiaohua Zhao, Partner Perkins Coie LLP, China

Claudia Selli, EU Affairs Director, AT&T, Belgium

Nigel Hickson, VP, Global Stakeholder Engagement, Europe, ICANN –
Internet Corporation for Assigned Names and Numbers



 29 September 2015

Session 8

p 159

Smart Cities & Communities

.....
2nd Day

Chair:

Alexey Ershov, Vice President, Smarter Cities Europe, IBM, Spain
Smart Cities: from disruption to sustainability

Moderator:

Hugo Kerschot, Managing Director IS-Practice, Belgium

Speakers:

Mika Rantakokko, Chief Operating Officer, Six City Strategy; Vice Director,
Center for Internet Excellence, University of Oulu, Finland
The Six City Strategy - Working Together Towards Open and Smart Services

Eric Legale, Managing Director, Issy-Media, City of Issy-les-Moulineaux,
France
What makes Cities Smart?

Nezar Maroof, Director of Strategy, Business Process Reengineering &
Enterprise Partnership, Bahrain eGovernment Authority, Kingdom of Bahrain
National eGovernment Strategy

Vaino Olev, IT Director, City of Tallinn, Estonia
From Disruptive technologies to Sustainable use of Smart devices

Eikazu Niwano, Producer and Director of Produce Group, R&D Planning
Department, NTT Corporation, Japan
From Secure to Trusted Smart Cities

Hervé Rannou, CEO Items International, CEO Citizen Data, France
Open Data & Big Data in Smart Cities

Godfried Smit, International Policy Director, ESC – European Shippers'
Council, Belgium
Trends in urban logistics (tips and trucks)



 29 September 2015

Session 9

p 175

ICT: The Arctic Region Perspective

in a Global Context of Collaboration and Creativity

.....
2nd Day

Chair & Moderator:

Jay Gillette, Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, University of Oulu, Finland; Senior Research Fellow and Institute Secretary, Digital Policy Institute, USA

Speakers:

Johanna Ikävalko, Ministerial Adviser, Ministry of Transport and Communications, Finland
Arctic Marine Testing, Training and Research Center (ArcMaTe)

Kari Laine, Director, Thule Institute; Vice President of Research, University of the Arctic, Finland
Megatrends in the Arctic

Martti Hahl, President, Barents Center Finland, Finland
The economic outlook in the European High North and Arctic, challenges and opportunities to ICT

Stig Nerdal, CEO, Transportutvikling, Norway
Arctic Logistical Cooperation

Henrik Vuorinen, CEO, Port Luleå, Sweden
Good Infrastructure – a Key to Sustainable Growth

Heikki Autto, Chairman, Rovaniemi City Council, Finland

Esko Aho, Former Prime Minister of Finland; Executive Chairman of the Board, East Office of Finnish Industries



 29 September 2015

Session 10

p 188

Digital Communities

.....
2nd Day

.....
Moderator:

Doyna Zharavina, Project Manager for eHealth, Millennia2025 Foundation,
France

The Women Observatory for eHealth

Speakers:

Anne Petitgirard, Co-Founder Zero Mothers Die, France
Women's health Access to health services

Effat El Shooky, Technical Director, WBDC – Women Business Development
Center, Egypt
Innovation for Community Development: The Egyptian Experience

Indrajit Banerjee, Chief of Information and Communication Technology in the
Education, Science and Culture Section of the Communication and
Information Sector, UNESCO



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**

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 24th edition of Global Forum took place on Monday, 28th and Tuesday, 29th, September 2015 in Oulu, Finland.

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 From Disruption to Sustainability

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 2015 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; Administrator NUMA, France, welcomed the attendees to this 24th edition of the Global Forum and opened the Global Forum 2015 in Oulu.

Hard to believe, but the first Global Forum took place almost a quarter-century ago! It was in 1992 in New York and it was a much smaller group of people. Also, the focus has been very different from what it is today: The key question was, whether or not, there should be competition in the telecom market. Since then, the telecom market has seen phenomenal changes with major economic and societal implications.

But also the Global Forum has grown in size and stature and 24 years later, the Forum goes Arctic – or at least almost Arctic. It is a true honour to organize the Global Forum 2015 here in Oulu, the capital of Northern Scandinavia and definitely one of the most impressive cities in the world.

The experience of the last two decades has shown that cities with a strong international focus profit best from the Global Forum – and vice versa. Oulu has become a benchmark in terms creating an international hub of innovation and a thriving start-up ecosystem. Oulu is a great place to host the Global Forum 2015.

This year's topic, "digitalization - from disruption to sustainability", reflects the complexity and the multifaceted nature of the ICT sector, 24 years after the first Global Forum. During the next two days, the participants will be challenged by excellent speakers, inspired thinkers and leading experts from all over the world.

But in the end—and here nothing has changed since the 1992!—the success of this event will not only depend on what goes on during these coming two days, it will depend on what people take back home with them – new perceptions, insights, opportunities, contacts or partnerships.

On this note, the Vice-President of the Global Forum declared the Global Forum 2015 open.



SYLVIANE TOPORKOFF, President, Global Forum/Shaping the Future; Founder & Partner Items International; Professor at the Institute of European Studies, University of Paris, France, gave a warm welcome to the almost 350 delegates from all across the world.

The President of the Global Forum emphasized the honour and the immense pleasure of having the Prime Minister of Finland, Mr Juha Sipilä, opening the 24th Global Forum Shaping the Future.

She then expressed her sincere gratitude and appreciation to the City of Oulu for the magnificent work and effort that has been done—as well as for the wonderful welcome cocktail at the City Hall, the night before. The Global Forum’s President thanked the Mayor of Oulu, Mr Matti Pennanen, for the great hospitality and gave a special thanks to Mrs Outi Rouru for her incredible commitment and the hard work she put in preparing this.

The President thanked the sponsors and supporting partners. Without their dedicated support none of this would have been possible.

She also gave a big thank you to the chairs, the moderators and the speakers for the fantastic preparation of the sessions—which is not an easy job!

Mrs Toporkoff then stressed the important nature of this year’s Global Forum and the issues to be discussed in the context of “Digitalization - from Disruption to Sustainability”. The presentations and debates will serve to broaden perspectives and, through networking, allow to realize new projects and collaborations. The City of Oulu is open for this and is looking forward to learn more and understand the different points of views. It is amazing how much things have advanced in just the last few years.

MARKKU MARKKULA, President, Committee of the Regions, European Union, welcomed the audience and addressed this opening session with some of the key statements of the Committee of the Regions, representing all European regions.

Officially, through the statistics, there are 272 regions in Europe. The Committee of the Regions has 350 members (mayors, regional mayors, regional ministers) and another 350 as alternates. As an EU institution, CoR is the European body focussing on what needs to happen at the local and regional level, but as well what can happen, what kind of things can be made to happen.

The Committee of the Regions calls for a mindset shift—not just some concrete simple measures but starting with a mindset shift, from unemployment to employment, from problems to challenges and to seeing opportunities. There is a scope for a further push to unlock investment and to create growth and jobs, particularly for Europe’s young people. And there are enormous resources at the moment that one can take effective use of with respect to that.

CoR will use the time in Oulu to get acquainted with the existing good work already done in Oulu. Good work on what? As mentioned, there is this need for a mindset shift and that requires to take the latest technologies in effective use. Not just the latest, but the coming technologies and with respect to that to stress the human mindset. We have to take the digitalization and technology in active use.

The target is to have Oulu as a pioneering region in Europe to tackle these grand societal



challenges and to show how to intercreate better, how to create synergies between the human aspect, this mindset change, and the modern technology and modern urban planning.

CoR has defined its key priorities through the decision of its plenary a couple of months ago: The first one focuses on sustainable development and sustainable growth and jobs. But it was defined in a new way: CoR stressed that the bottom-up movement is needed to stimulate targeted investment into real economy and recur an exchange of best practices. An new entrepreneurial spirit combined with a functioning digital single market and smart specialisation could lead to new skills and knowledge, innovation and employment.

Looking on some of the measures defined on how to get this change to the bottom-up movement done, the following ones fit nicely with Oulu and its surroundings: First, boosting of the research and innovation capacity of the regions and bridging the digital innovation divide between them. Second, boosting the entrepreneurial spirit. Third, creating the right conditions for digital networks and services to flourish. Fourth, removing key differences between online and offline worlds, and, fifth, stimulating leading interregional networks.

This is very much what the Global Forum 2015 is all about. How to combine this modern technology and the development going on there to what we see is needed—not just in Oulu, not just in Finland, not just in Europe but all over the world.

CoR is collaborating very closely with key EU Commissioners; e.g., Carlos Moedas, the Commissioner for Research, Science and Innovation. CoR, together with Commissioner Moedas, will open the Open Days in Brussels in October this year. On this occasion, Commissioner Moedas will announce an new instrument, a knowledge exchange platform. This is done jointly, especially with the CoR and DG Research and Innovation. The target is to equip decision-makers throughout Europe—decision-makers especially coming from regions and cities—to take strong measures and being change agents for this innovation development that is crucially needed.

As Commissioner Moedas said, the new path for European research and innovation policy in a world is open, digital and global. This is what we need to remember. We have these opportunities, and here in Oulu, CoR will review what are the pioneering elements intercreating the 3D-model in regional information modelling with city urban planning and with the new services where the innovation and digitalization are the drivers of the potential change.

The idea is to have Oulu as one of these pioneering regions, especially in the context of the upcoming Dutch presidency in spring 2016, where one of the focus areas will be the renewal of the European urban agenda. What is going on in Oulu is something unique enough, something that really can be scaled-up through a world which is moving towards open innovation.



JUHA SIPILÄ, Prime Minister of Finland, warmly welcomed the participants on behalf of the Finnish government

The Global Forum 2015 touches on several key issues that are also on the agenda of the Finnish government: new innovation strategies, new approaches to healthcare, the Internet of Things, intelligent infrastructure, smarter regulations, cybersecurity, ICT in the Arctic perspective etc.

The new Finnish government took office at the end of May 2015. The government programme highlighted, amongst others, digitalization, experimentation, and deregulation. The government set a long-term objective of ensuring that Finland will make the best possible use of opportunities offered by digitalization. This will require flexible and creative thinking and new ways of doing things.

Digitalization also has to be combined with the dismantling of unnecessary regulation and cutting red tape.

The Finnish government is ready to tackle these challenges. Where does this determination regarding these objectives come from? Because the results of this work will not only bring about more efficient and productive public services, they will also help the private sector prosper. They will make for a better society.

Finland was a global leader in developing ICT and related services in the beginning of the Millennium, and it is still going strong. But the world around has changed and keeps changing. The country must update and improve its knowledge and performance. The Finnish government is committed to pushing this forward—for their citizens, the users of digital services.

This calls for more interaction between the administration and citizens, better decision-making and better management. This calls for a culture of experimentation and a more efficient use of open data.

Digitalization might technically consist of binary digits, but bringing it to life means that you also have to involve your heart and your mind.

MATTI PENNANEN, Mayor of Oulu, Finland, warmly welcomed the participants of the Global Forum 2015 in Oulu.

Oulu, a 401-years old city, is the biggest city and region in the northern Scandinavian area in terms of business, logistics and education. Oulu has 250,000 inhabitants and almost 40,000 students. Oulu has a diversified economic structure from traditional industry, e.g. wood and paper, metal, chemical industry, and then, Oulu has services and high-tech knowledge.

The Oulu region is located near the heart of an extensive growing area of Northern Europe and the Arctic. Oulu region is in the middle of Northern Europe's investment pool. Total investments of over 100 billion EUR have been planned in Northern Sweden, Norway, Finland and Russia in the near future. Actually, investments already started and in Northern Finland, Oulu, 50 billion EUR will be invested in the near future, e.g. in mining, energy and construction.



Political interests are globally increasing in the arctic areas. For the European Union and its Member States arctic is an opportunity.

Oulu region has a long tradition in technology and the mobile sector and a vast amount of know-how in this areas. Oulu region has the background of more than 30 years of technology success stories and the amazing story will continue. One of the world's first 5G test networks was opened in Oulu in May 2015 in cooperation with the University of Oulu, state research and with VTT, Nokia and other industrial partners.

Oulu region is also a region of young, highly educated professionals who have top-skills both nationally and globally. Approximately one third of the inhabitants has a university degree and first-rate language skills. Oulu is an excellent platform for innovation development through the long-lasting cooperation between universities, companies and the Oulu inhabitants. Oulu is like a testing laboratory for many areas. Oulu's cooperation model is called Oulu Innovation Alliance, which means being stronger by combining forces.

Oulu region is one of the leaders in radio-technology, mobile devices and 3D Internet development. The ecosystem covers the creation of wireless products and services from the design phase right up to production. Processes are carried out in an extremely rapid and productive fashion. Due to excellence skills leading companies in mobile technology are investing in Finland and especially in Oulu. 30 new global ICT companies settled in the Oulu region recently.

In spite of the big changes in the ICT sector, there are more than 500 new start-ups in the Oulu area. Oulu's target is to become the world's leading ICT ecosystem by 2020 and digitalization is one of the key elements of this.

But, what about the future? Oulu region has one of the youngest populations in Europe, with an average age of 36.5 years. These young people provide a solid platform for the future growth and the creation of a high-tech ecosystem. The young people are passionate about the new development. The multidisciplinary University of Oulu with 10 faculties, an university for applied sciences together with the companies create an ecosystem building a good platform for the future. Oulu's population is not only the youngest but also very well educated.

However, humans also need inspiring elements. People don't need only work, they also need surrounding inspiring elements—and nature is one of theses. Nature is clean and very closed to Oulu. In 30 minutes you are in the nature. In Oulu people can experience 4 seasons and it is easy to combine nature's creative force to the hardest business in the north. Just outside the city one can experience the wild nature, in addition to multiple outdoor actives, such as ski resorts and golf courses not to mention ice hockey. The water activities, the sea or one of the four rivers in the city region, provide a good platform to enjoy nature and relax. Finland is indeed a country of tens of thousands of lakes and rivers.

Connections are a very essential part of our life. Oulu is not in the centre of the business but has very good connections to Europe and worldwide. Moreover, the Arctic Circle, known for its nightless summer nights and sunless winter days, is only 3 hours by car from Oulu. The Arctic Airlink flights connect the Northern Scandinavian biggest cities, Oulu (Finland), Luleå (Sweden) and Tromsø (Norway). Creating the arctic know-how value. It is a very important network to commit universities and business organisations.

The secret behind the development of the Oulu region in its 401 year old history is the fact



that Oulu is located at the connection point of Arctic, Scandinavian and Barents culture and know-how and business life.

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Q&A

The question of “what does digitalization mean in practice in the Finnish government”, was addressed to Prime Minister Juha Sipilä. **Prime Minister Juha Sipilä** explained that the best tools in the toolbox in this context are deregulation and the reform of the social welfare and healthcare services system in Finland.



Opening Session

Day 1 – Morning – Plenary Session

Digital Strategy Visions

ANNA GOMEZ, Partner & Attorney At Law, Wiley Rein LLP, USA, the chair and moderator, welcomed the participants to this keynote opening session and briefly set the scene.

The digital economy and regulatory policies surrounding it have continued to grow and evolve since last year. Big topics this year were big data, privacy and cybersecurity, unmanned aircrafts or remote piloted aircrafts, driverless cars, the Internet of Things, and disruptive sharing economy applications. The economic imperatives of cost reduction and globalisation are driving business decisions, while regulators are focussing on setting and enforcing rules of the road that allow innovation to flourish—while still protecting privacy and data and freeing up spectrum for the many mobile users that continue to evolve.

Today, more than 80 percent of households in developed countries have Internet access, compared to nearly 35 percent of households in developing countries. 57 percent of the world's population can not access the Internet. Although, the total number of connected individuals grows from 2.9 billion in 2014 to 3.2 billion in 2015. Next year we will see the introduction of an array of consumer robotics models, and enterprises will continue to integrate wearable technologies, whether smart glasses or smart watches and motion sensing devices. Standards around 5G technology are still being developed. Many companies are already conducting 5G testbeds and trials. 5G revenue is expected to exceed 65 billion USD by 2025.

About 80 things are newly connected to the Internet each second and that figure is expected to grow. And the value of global digital content will reach 154 billion USD annually by 2019 with the biggest driver of market revenue from mobile and online games.

With so much connectivity come challenges: And to discuss these many issues there are some very distinguished speakers who will provide us with some interesting perspectives on these and other issues in their respective areas in the world.



MIKKO KOSONEN, President, SITRA – Finnish Innovation Fund, Finland, discussed a huge paradigm shift in the context of innovation and sustainability.

Digitalization as an Enabler for Sustainable Growth

The Western world is in the middle of a dramatic transition from a top-down mass production of goods towards bottom-up co-creation of services with the help of digitalization.

People might say that Finland got 10 extra years of the old paradigm by the help of Nokia—until Nokia collapsed 5 years ago. The winner was not anymore the company that produced the most or even the best products, but the company that was able to attract the best services on its platform, on its ecosystem. The game has changed and this game change applies not only to Nokia but to the whole society.

The biggest paradigm shift or systemic challenge that we are currently experiencing is to increase well-being whilst disconnecting economic growth from the consumption of natural resources. However, this also unveils a lot of opportunities, especially two particular ones: preventive healthcare and the circular economy. Digitalization is the key enabler of both of these great growth opportunities, but also challenges if we don't address them in a correct way.

Finland, as a small well-educated collaborative country, has a an excellent opportunity to become the lead market of both of these trends, because the world needs solutions for these challenges and this is the opportunity for Finland.

Healthcare is certainly one of the great opportunities enabled by digitalization. The new sensor technologies, genomic sequences are providing huge opportunities for preventive care and Finland, having excellent both medical and ICT R&D capacities and skills, has a huge potential here. But, it also requires very consistent coherent action from the public sector. (By the way, both of the two opportunities are similar in the way that they require very deep public-private-people partnerships—not just public-private, but also the people to co-create the services.) We have to make sure that the conditions provided by the public sector for healthcare are in place and set in the right manner. This is a very political discussion at the moment in Finland and the government is just putting in place the new framework conditions for the Finnish healthcare system.

A few basic conditions have to be put in place in order to create a flourishing lead market for preventive healthcare: First, to have a nation-wide transparent steering via common service packages. This provides equality and cost transparency. Second, to have a single channel funding and to move from sub-optimisation to an holistic view and knowledge management from the people and citizen's perspective. Third, to separate service ownership from service production. This is critical for releasing the innovation potential of the private sector. Fourth, to attach money to the patients and customers in the basic services in order to empower people. This is also a requirement in the EU legislation. These are the four conditions that have to be put in place in the public sector in order to release the opportunities for preventives health.

The practical opportunity Finland has in this context of healthcare is open data. Finland has already the health data of 4.3 million people in a national patient repository. Finland also has a lot of population based bio-banks and is currently creating a genome database. These



three databases combined with other data sources, like environmental data and also personal health records, provide an excellent opportunity for Finland to build a kind of data driven innovation ecosystem—on top of which preventive healthcare services can be built. We need the whole chain of activities here, and it is critical to have this intermediary layer of gathering and refining the data and providing it for the different user groups. There is so far no country in the world that has put this in place. Thus, there is a real opportunity for creating a lead market in Finland.

The second growth opportunity relates to the circular economy, a new economic paradigm. Circular economy is a new economic model which generates no waste or loss, and reduces the dependency on virgin natural resources. In the circular economy products, materials and their value remain in circulation instead of linear usage. Added value for products is generated through digitalization and services. Consumer-based business models create added value for consumers instead of ownership.

An example is the French company Michelin, one of the leading tire manufacturers in the world. Michelin is no longer selling tires—they are selling safe driving kilometres. They attach sensors to their tires, those tires are brought back to remanufacturing and the invoicing takes place via services. They have a service-based business model and they reuse the materials all the time. The same business model also applies to the sharing economy building on existing assets and creating growth via services. This is really one way to disconnect economic growth from consumption of natural resources.

Realizing these opportunities requires a new type of collaboration and a new innovation policy. Global competition takes increasingly place on the ecosystem not on the individual company level. Finland, like many other countries, needs visible global references, e.g., in healthcare, in circular economy, in education, for driving new growth and attracting investments.

The creation of new business ecosystems requires setting national priorities for new growth areas. The Finnish government has set very clear growth priorities, both in the health and circular economy areas.

It also requires multi-disciplinary research combined with active experimentation and intensive public-private-people partnership. SITRA, for instance, is currently building, together with the biggest top 10 Finnish companies and the city of Helsinki, a new smart and clean metropolitan area in order to build a new ecosystem and experiment and pilot new solutions. This represents a stepping stone for exports: E.g., China is building smart and clean cities in big scales and if Finland wants to export to China, references are required.

There is also a need for new incentives (taxation, regulation, removing some obstacles...) and, last but not least, innovation driven public procurement to make this happen. Finland spends about 35 billion EUR per year to public procurement and a large part of this goes to innovative procurement.



The moderator followed up with a question about the sustainable growth opportunities for Finland, besides healthcare.

Mr Kosonen referred to some key areas highlighted in the government programme, such as bio-economic, the reuse and better use of forest and wood. Moreover, the metal and machinery industry is one of the biggest industries in Finland with great opportunities for a better use in terms of circular economy and sharing economy. Definitely, Finland can adopt the new types of business models like Rolls Royce or Michelin and others.

However, it is alarming that the big companies don't understand how dramatically and fast the business models of even the largest companies on earth are changing to service-based business models. There are also a lot of opportunities for start-ups in this arena. Not even to talk about healthcare—the Slush event in November attracted some 40,000 people in the Helsinki region and half of those companies were ICT companies dealing with the quantify yourself movement in preventive healthcare. Finland has a huge opportunity in this field if it now opens the data and provide the platforms for building these new applications. Moreover, the public sector has to understand that healthcare is not something that belongs to the public sector, but is an opportunity that needs to be addressed together in order to provide better and more cost efficient healthcare, but also to provide huge growth opportunities.

ANJA WYDEN GUELPA, State Chancellor, State of Geneva, Switzerland, shared some insightful and thought provoking reflections on

Secrecy, Transparency, Openness, Closedness, Security...:
the Tower of Babel of Our Digital Age

Secrecy is security. Closedness is efficiency. No doubt, those two sentences ring to our ears with a sound of disharmony. As if such phrases were taken from George Orwell's utopian nightmare described in 1984—phrases that hurt the intelligence deeply embedded in this digital world of ours in which open source and open data are the new moral imperatives.

Who would seriously utter those sentences nowadays without being immediately suspect of living in the stone age. However, as any moral imperatives, the logic behind these concepts, such as open source and open data, must be confronted to the reality of our modern world.

Two prior remarks have to be made: First, open source and open data are new imperatives that must be considered, if not largely implemented, especially in the public sector. The point of the following comments is to see if they can be put into reality in every circumstances and how. Second, The following observations are largely based on Mrs Wyden Guelpa's practical experience as governmental official responsible for the organisation of the electoral and democratic process in the Canton of Geneva in Switzerland.

The logic behind the open data movement is based on the fact that the state and the government, like private companies, deal with a multiplicity and an important number of data collected on a daily basis. At the same time, it is believed that the state often processes this data inefficiently—if it does process it at all. In areas such as transportation for instance, ministries, regulators, public operators would be, according to this logic, well-advised to share the data collected in order to let innovators, hackers and other geeks create programmes, Apps and knowledge that can be developed for the collective welfare.

Examples in which innovation and value is created by the wide use of data held by public



bodies are numerous. A few weeks ago, the Election Hackdays 2015, organised by an open data group and two serious newspapers, took place in Lausanne and Zurich. During 48 hours about 60 people developed mobile Apps using public data available on the Internet. One of the projects concerned the next national election that will be held on 18 October in Switzerland. The project consisted in providing directly on the mobile phone information pertaining the professional and social links on every candidate to the election.

What stands behind this logic? Why is it beneficial for the public and ultimately for the state? First, apart the fact that individuals, or groups of individuals, process data for the general public at no cost for the state, it introduces innovation that in return can have a positive impact on the governments efficiency. By accepting to share data and knowledge, the government will not only receive added value in return, but the public himself will be co-creator of a public good increasing the probability that is efficiently delivered and well-targeted.

Second, the logic of transparency and openness behind this trend is a driven force that can significantly increase the governments legitimacy and in general the trust into the state and the institutions.

It has become obvious today, that the top-down approach in managing and implementing public policy is bound to fail, especially in Switzerland—the country of the bottom-up democracy and political process due to the extreme direct democracy. In this context, opening the doors to knowledge and expertise to citizens might help to reduce the crisis that many modern democracies go through as illustrated by the low level of turnout in elections or referendums.

Driving on this idea to openness and transparency are elements of trust and legitimacy to open source movements, pleas for the use of programmes, Apps, and digital systems whose code is published on the Internet—for everyone to see, to test and to improve.

Electronic voting, or e-voting, is a perfect example of this case. Geneva is the owner of the only e-voting system that is completely owned and developed by the government itself. CHVote was created, is operated and is owned by the State of Geneva.

Considering the importance of control, security and trust, the Geneva government decided right from the start, 12 years ago in 2003, that the only way to proceed was by creating the system internally. Therefore, not relying or depending on private solutions. In an age in which nations spy on each other with the support of private mega companies, this choice was not only wise but essential when it comes to providing a service that is at the core of a democracy: casting a vote.

Public ownership of an e-voting system is good but one can do more: In 2009, the Geneva parliament passed a law making it possible for any citizen using the Geneva e-voting system, to access the code of this e-voting system. Until now, it has been accessed twice upon a request: once by the Pirate Party and once by academics.

But this is still not enough and this is why the Geneva government submitted to the parliament, one month ago, a law that will make it possible and compulsory, to publish the code on the Internet for everyone to see, to test and to improve. Why is this so important? Because legitimacy, especially when it comes to the democratic process, can only be reinforced by transparency and openness. Who would accept today a highly sophisticated programme dealing with ballots and votes that is not accessible to the public for reasons of



ownership or business considerations of a private company?

In many countries the ballot box is transparent. Why would the e-ballot box be different? After secrecy and closedness comes the age of transparency and openness.

Transparency is security. Openness is efficiency. But is it that simple? Have we definitely got rid of secrecy and closedness? Certainly not. We mainly have inversed the paradigm, but one question remains: Are there still objects, processes or data that continues to need secrecy and closedness?

Again, the democratic process is an interesting example. At the core of democracy lies the idea that a citizen's vote must be kept secret. And in the absence of the secrecy it can be rightfully suspected that the vote is not free. Therefore, when organising electoral processes, and even more when electronic voting is used, the government must publish the source code but at the same time design the security process that renders it impossible for anybody to link the citizen to his vote. Thus, ensuring that secrecy of the vote is not in jeopardy.

In e-government the trend today is to develop systems that provide each citizen with a unified electronic identity, or eID, in order to facilitate the online interactions with the government and its administration. Although this trend is legitimate, it does pose a real problem when it comes to the electoral process, like the example of Estonia has shown. As much as transparency is crucial in such matters in terms of legitimacy and security of the electronic process, this principle can not be implemented when it comes to the secrecy of vote.

This leads to the following three conclusions: First, when it comes to processes and complex digital systems such as e-voting, transparency and openness increase security and trust. Second, some processes and systems must not be left to private operators. Public control and open source increase legitimacy and security. Third, let us not conclude too quickly that secrecy and closedness are dead concepts—if we do, we might as well end up with a “big brother”. George Orwell thought it might be the state, but it could well be private.

Geneva has much experience with the e-voting. The moderator then wanted to know, what other areas were the open data has helped.

Mrs Wyden Guelpa stressed that Switzerland is not so much advanced in terms of open data compared to the U.S. Open data started be used in the transportation sector, which is one of the easiest ways to use open data. There are not very private or sensible data and it is very easy to produce value to the citizens.

However, open source is even more important than open data. Open data creates value but open source in some sensitive systems is just necessary. For instance, e-voting—if it is not open source, you should not do it, it is too dangerous.



JØRGEN ABILD ANDERSEN, Director General Telecom (rtd.), Chairman of OECD's Committee on Digital Economy, Denmark, brought in his rich background of working as Danish telecom regulator for more than 20 years when addressing the topic of this opening session.

What are the most prominent and important elements of a high quality up-to-date digital strategy? What should be included? Is it 100 Mbit/s broadband to everybody or even faster than that? Is it complete geographical mobile coverage to everybody in all countries? When asking politicians the answer is a clear “yes—these are the most important elements of a digital strategy”. Why is that so? Because broadband to everybody and full mobile coverage is what counts—at least it counts when you ask the electorate of the politicians, and politicians want to be re-elected.

However, in a broader context, this approach of focussing only on broadband and mobile coverage when establishing an appropriate digital strategy is too narrow. Broadband and mobile to everybody can never be the final goal, only one of the means to reach the goal—although a very important means.

But what should a digital strategy address? What are the real challenges for governments all over the world to be addressed by a digital strategy? In particular there are three challenges: Innovation is poor, growth is low, and unemployment is much too high.

In recent years it has become increasingly clear that a flourishing digital economy can be one of the most powerful tools to address these challenges. Over the last couple of years, it has often been said in Europe that ICT is responsible for 50 percent of Europe's productivity growth and 25 percent of the GDP growth. That is indeed a very powerful message emphasizing the importance of the digital economy. Similar observations were made at the World Economic Forum in Davos in January where Bundeskanzlerin Merkel and Président Hollande also talked about the digital economy being important as a means to address the current challenges faced by governments all over the world.

There are multiple examples showing the importance of the digital economy. For instance, the U.S. App economy: In 4-5 years after the launch of the iPhone it turned into a 20 billion dollars industry having created between 400,000 and 500,000 new jobs—meaning innovation, meaning growth, meaning employment. And similar figures illustrating the anticipated development within this area in Europe towards 2018 were announced by the EU Commission last year. The trend is very clear.

To understand what makes the digital economy flourish, it is important to recognise that this is not only a question about telecommunications, broadband and mobile coverage. One has to look at all parts of the ecosystem. The most prominent pillars of the ecosystem of the digital economy are the following:

Firstly, e-infrastructure. Broadband networks, be it fixed or mobile, are a key enabler of the digital economy. And we need to ensure open access and an open Internet developed on the basis of a multi-stakeholder driven governance model.

Secondly, e-applications. How to fill the pipes? Attractive services and applications create demand for high-speed networks justifying investments. The intelligent use of big data fosters data driven innovation.

Thirdly, e-security and e-privacy. As our dependency on the Internet increases so do our



vulnerabilities. Trust is vital.

Fourthly, e-skills and e-literacy. The Internet requires new skills and we need a digital skills strategy to accompany key structural changes.

The ecosystem of the digital economy is based on a supply push and demand pull approach where all the four pillars of the ecosystem are equally important to make the digital economy flourish. A holistic approach is needed to be successful. This is why broadband and mobile coverage are not enough. It takes a lot more.

OECD and its Committee on Digital Economy are heavily committed to contribute to a flourishing digital economy. Several initiatives have been taken already and more are underway. Next year in June, an OECD Ministerial Meeting will be held in Mexico. The title is “Digital Economy: Innovation, Growth and Social Prosperity.” Themes to be covered in Mexico cover inter alia benefits of an open Internet, stimulating digital innovation across the economy, global mobile connectivity, the Internet of Things, consumer trust, security and privacy, new markets and new jobs in the digital economy, skills for a digital world. These themes reflect very well the elements of the mentioned ecosystem of the digital economy. The range of themes is very broad and in most countries these themes go across the jurisdiction of several ministers. Accordingly, OECD has emphasised the importance of following a whole-of-government approach when promoting the digital economy.

The following question addressed the issue of threats. What are the most prominent potential blocking stones for a flourishing digital economy?

Mr. Abild Andersen stressed that it is, first of all, very important to recognize that we are talking about a full comprehensive ecosystem, not only consisting of infrastructure. One has to include all the elements—and there might be even more than the four mentioned above.

Another potential thread is that you are not able to establish the necessary level of trust. An example where a lack of trust might be very dangerous is when you want to unleash the full economic potential of data driven innovation. Those companies being able to embrace big data can enjoy an increase of productivity between 5 and 10 percent. If there is lack of trust, if you are prevented from unleashing, it can be very dangerous.

Moreover, the lack of skills a serious thread to the digital economy. The European Commission has calculated that by 2020 there is a number as large as 900,000 jobs which are vacant because you don’t have the necessary IT-specialists. When you look at data driven innovation, the number of data analysts is much too small. Only 0.5 percent of the workforce is actually IT-specialists and the number needed is much higher.

The fourth thread is the thread laying in the fact that governments do not really understand what is needed inside the government for promoting the digital economy. The digital economy is not an issue which is only reserved for an ICT Minister or a Minister of Economics. The digital economy is going across government and that is why a whole-of-government approach to this is needed. There are different models. In Luxemburg, for instance, it is in the hands of the Prime Minister to coordinate the process. This could be a recommendation for all countries: the Prime Minister puts himself in the driver seat. That doesn’t mean that his or her ministry has to be responsible, but he or she should have a very strong coordinating role—if this is not the case, it is not sure that you reap the full benefits of a flourishing digital economy.



ADRIANE LAPOINTE, Senior Policy Advisor in the State Department Office of Communications and Information Policy, US Department of State, USA, discussed how to work together to extend the benefits of the Internet to the 60 percent of the world's population that doesn't have Internet access.

Connecting the Next 1.5 Billion People: The Global Connect Initiative

Everyone in this room can speak to the enormous economic as well as social benefits of access to the Internet—benefits for nations and benefits for individuals. According to the World Bank, for every ten percent increase in a country's Internet penetration, its total economic growth expands by 1 to 2 percent. One recent European study states that tripling mobile broadband penetration levels across the developing world would provide a return of as much as \$17 for every \$1 spent.

But the Internet can only be an engine for inclusive growth if it is available, accessible, and affordable for everyone. With only 5 percent or fewer of people in the least developed countries connected to the Internet, it's plain we aren't there yet.

One barrier to access is affordability. On average, American families spend 1 to 2 percent of their income on Internet access. But a typical family in some countries has to pay 10 percent of their family income for entry-level mobile broadband and roughly four times that for fixed broadband.

To address this, the United States helped create the Alliance for Affordable Internet in 2013. This broad coalition draws on expertise from governments, the private sector, and civil society to assist policy makers in expanding access while keeping prices low. With more than seventy members—some of them here today—the Alliance is the world's broadest technology sector coalition and its statistics-based work is making a difference around the globe.

But of course for some of the least developed nations, and in particular for remote and isolated communities, the problem isn't the high cost of service, but the lack of infrastructure on which service could be provided. This includes a lack of fiber broadband and of infrastructure to support mobile Internet coverage and network access. This state of affairs is at odds with today's reality: Internet connectivity is as fundamental to economic development as roads, ports, electricity and other traditional infrastructure.

It was to address just this issue that Undersecretary of State Catherine Novelli, speaking on 27 September at the UN General Assembly, announced a new initiative led by the Department of State, called "Global Connect" which seeks to bring 1.5 billion people who lack Internet access online by 2020.

To make this goal a reality through Global Connect, the U.S. will partner with other governments—the governments of highly connected countries whose expertise we can enlist, and of course recipient nations. The U.S. will also work with private industry, which has created innovative solutions to connect people in remote areas.

Early next year, the US will bring together governments and other stakeholders to help bridge the digital divide. We hope to develop country-specific strategies that can create enabling environments that spur connectivity and thereby promote entrepreneurship, cross-



border information flows, and open and competitive marketplaces.

At the same time, major U.S. development agencies will begin to make Internet access a top priority in their work around the world. We will urge international development banks to recognize the Internet as an essential element of every country's infrastructure, as the World Bank has already done.

Several U.S. development organizations have already announced significant initiatives to expand broadband access.

The Overseas Private Investment Corporation (OPIC), for example, has taken important steps to open new markets to Internet connectivity and its benefits. OPIC recently announced it will provide up to 250 million dollars in financing for the development of a network of 2,500 telecommunications towers across Burma, one of the last places in the world without widespread ICT infrastructure. In 2011, only 3 percent of Burma's 50 million residents had access to mobile phones. With OPIC's financial support, a local company named Apollo Towers expects to create the infrastructure to enable 75 percent of Burma's people to have mobile access by 2016.

OPIC is making similar efforts in Kenya, financing a local provider of solar-powered wireless Internet so millions of rural Kenyans will have digital connectivity for the first time.

USAID and the Millennium Challenge Corporation are also affirming their commitments to extend connectivity through development assistance.

We are delighted with the support we have already received for Global Connect. The initiative has been endorsed by the Presidents of Estonia and Tanzania, by Jim Kim of the World Bank, and by 10 major technical companies and global NGOs.

We welcome your support and your thoughts about how to move this ball forward. Please reach out to me, or to any of my State department colleagues if you'd like to help.

No country should be left out of the Information age. Technology is advancing even as we speak here today. Going forward, our job is to ensure that this transformative technology is more widely accessible to everyone on earth. We look forward to working with all of you to connect the next 1.5 billion people.

In shifting from an industrial to a digital economy a lot of countries are targeting the Internet of Things as a growth opportunity. Dr. LaPointe was asked to give some background on what the U.S. government is doing in that area.

Dr. LaPointe emphasised that one of the things they are currently doing is attempting to organise themselves to do something. It is a completely new and such a diverse area with so many different players—obviously not just in the IT sector, but also transportation, healthcare... and getting a handle on that is a real challenge. This is done in different parts of the government, but a whole-of-government approach is needed. The challenge right now is to pull that together into a certain coherent strategic vision. This is going to be constantly evolving, it is going to be an iterative process and it is going to take a long time.

Probably in November an informal industry discussion will be organised to get a sense of the real basic concerns and perspectives of the industry on this issue. There is so much we don't



know at this point about what the potential is.

AUDREY SCOZZARO FERRAZZINI, Senior Manager, Government Affairs Europe, Qualcomm Europe, Belgium, [www.qualcomm.com], presented the view of a leading global wireless telecommunications solutions provider.

As far as Qualcomm is concerned, a strategy for economic growth and development these days must be a digital strategy. And any digital strategy must largely be build on the wireless communication digitally connecting people wherever they are.

Billions of people and things will soon be connected. This has an immense potential to be an engine of value creation and future growth. It will be the era of the Internet of everything and it will change the Internet as we know it today. Many industries have already been significantly transformed. We have seen this over the past few years: media, tourism, commerce and distribution. And we have witnessed how companies and systems that are market leaders can become obsolete if they don't innovate and adapt to the business environment created by this new technologies.

But the biggest story is how companies, large and small, can thrive if they adopt the tools that we have now—especially wireless technology. A recent study found the mobile value chain generated almost 3.3 trillion US dollars in revenue globally in 2014 and was directly responsible for 11 million jobs. These numbers may just be the start. In the coming 5G wireless area in which homes, cars and offices and many more is connected, the opportunities will be even greater. But government will need to peruse a consistent digital strategy to achieve this potential.

First, we need investment in technology. The first and most important part of this strategy should be the incentivisation for companies to invest in the technological development in this next area—both the capabilities of 5G and the technologies that we defined are still on their way from the drawing board to our lives. Government must maintain the strong protection of intellectual property—this has been the biggest incentive for the companies, large and small, and their investors to take on the risky research and development that produces new technologies. And government must then maintain support for the process of industry standards that produced all the magic of the 3G and 4G eras and that we now take for granted. If standards sounds like a dry and uninteresting subject for some people—they are not. We enjoy all these technologies now because all our smartphones and other devices connected by networks all around the world can seamlessly work together—we tend to forget that. Interoperability and standards will become even more important with 5G. The alternative, creating property solutions or silos, in which one company can control content and digital distribution and which devices work or don't work would lock out many industries and players. And this would potentially frustrate growth.

Second, we need strong infrastructures. In recent years, we have seen wireless network investment stay flat as revenues decreased. Europe's mobile revenues were similar to those in the U.S. back in 2008. Today there is a 90 billion euros gap. We urgently need a regulatory environment for companies to invest in the network and bandwidth businesses as well as consumer needs. They in turn will require fair economic return. We need a regularity framework that helps create and fuel the digital infrastructure of the future.

Third, we need to create an inclusive data economy. We and our devices will be generating a wealth of information about ourselves and our environment. We need to create a user-centric



framework where the users' digital life is treated securely and where users have control over their personal data. Such a framework will generate increased trust in digital communication, increasing demand and inspiring innovation and economic growth.

Finally, we should make sure that the citizens have the right skills to be actors of this digital transformation. In the near future, 90 percent of jobs will require digital skills and yet half of the European population today is not properly digitally skilled. A constantly innovating economy generates new opportunities for more creativity and connectivity only if the necessary skills are acquired.

The digital revolution is accelerating and this at an unprecedented pace. It is changing every aspect of our life, profoundly reshaping our societies, businesses, economies and governments. There is a global competition among companies, but also among governments—who will engineer the best technologies that will define this era? All governments, especially in Europe, need to keep up.

The Digital Single Market Strategy of the European Commission is a very timely vehicle to make the right decisions and conduct the required reforms. But to be effective and to create growth, this should be enacted now.

The presentation was followed up with the question “how important is harmonisation of spectrum and governmental policies for a global company like Qualcomm?”

Mrs Scozzaro Ferrazzini underlined that global harmonisation of spectrum is very important, but also standardisation. For the next technology to come standardisation will be even more important—not just for the ICT sector but for many other sectors. We connect cars, schools and everything and all the different industries need to work together to set up this kind of norm that will allow not only to talk to each other, but also to make the network robust and secure. We need to build this way of communication between people and things, but also businesses and governments.

LUIS JORGE ROMERO, Director General ETSI – European Telecommunications Standards Institute, [www.etsi.org/], addressed the important role of standards in innovation and economic growth.

Digitalization is at the heart of ETSI's work. Digitalization immediately matches with ICT and growth. It is responsible for 50 percent of the European productivity growth and 25 percent of the GDP growth, so it seems that we are in the right track. This also means that we need to keep on developing.

People may ask why standards? Everybody is now able to go out there, bringing their own applications together and build a fabulous system that anybody could use and this is almost for free, if not for free. So, why standards, this lengthy boring process that we are all pushed into?

Do you think all these innovations we talk about could have been possible without the infrastructure supporting it? We heard about the four pillars of digitalization, one of these was infrastructure. Then, we are talking about the applications filling this infrastructure, about security and privacy issues, about literacy in using those—but if we don't have the foundation that supports the rest where are we going?



Going a few years back, to the early 90s, late 80s, what has changed so dramatically? If you think of today's world and compare it to the world 30 years ago, there was huge change in everything. There are two basic technologies that have helped this change: one being the Internet, the other being mobile communications.

None of those, neither the Internet nor mobile communications, would have been possible today without standards. In the context of mobile communications, we are often talking about "bit-pipes", sometimes even "dumb bit-pipes"—but nothing would have happened without these dumb bit-pipes...

No matter how dumb these pipes are, all those applications you put on top of them can not be much more clever. Most of the intelligence that is sitting on top of these pipes depend on the capabilities that are enabled by those pipes. There is a lot of effort put behind to make these pipes less dumb, maybe a little bit smarter and provide many more capabilities and enable all those nice and smart applications that today are at our fingertips.

The only way of making this happen in an economically feasible way is by means of standards. Who could seriously imagine today any company saying: "I will do this on my own. I get a new full-fledged system, put it out there, somebody will buy it, deploy it and I will have billions of customers connected. And then, billions of people will be ready do develop applications on top of that system..." It is simply not possible! At the heart of it all are still standards.

In the early 90s, mobile telephony was luxury and only few people in developed countries were able to afford a mobile phone. Today, anyone around the world has access to mobile telephony and more than that. Around the world, people are having access to the mobile Internet. Smartphones have become affordable. Of course, it could have been better and there are lots of things to be done beyond the development of technology, but it is a very good first step—and without this first step nothing of what we know today would have been happened.

It seems that the industries understood this. People are grouping together and are seeing that technology is evolving from GSM. It has been evolving throughout the generations, throughout multiple applications and now we are envisaging the fifth generation. And it seems to be in a very good way because everybody is trying to get together and avoid the fragmentation we experienced some years ago. This will support the economy of scale and the soon development, adoption and deployment of this new technology—enabling more growth, more jobs and more applications on top of that.

We are now talking about the Internet of Things. We are now not just connecting people but also connecting things, and it is getting more and more obvious that collaboration is necessary. Of course many different sectors have already embraced the ICT. They have their own systems, their own applications to be able to connect their sensors, such as big power companies, transport, health, agriculture—but they are developing their own systems. The world that is working on telecommunications and ICT is getting closer to this other world and only cooperation and collaboration will be able to make this Internet of Things a real thing—something that will fly, that will take off and that will have real economies of scale and will get us to a smarter world.

That is the only way that we will try and strive to have our industries going and ETSI will do its best to help them producing the standards that are needed for that. Envisioning this future



of digital economy without standards is hallucination.

With the increased players on the market and the Internet of Things and connectivity, the moderator wondered about how does ETSI deal with the multiplication of actors that now need to be involved in the standard-setting environment?

Mr Romero explained that ETSI is very aware of that and does a lot of partnering. Partnering is a very good way of working and there are several organisations like ETSI throughout the world who are dealing with the same problems like ETSI in the context of the IoT. ETSI has created a big partnership project together its counterparts in Japan, China, South Korea, the U.S., which is called oneM2M (for machine-to-machine). Altogether, oneM2M is trying to develop the system and the layer, but also the accesses that will enable this IoT. Biggest efforts are addressed at trying to get those other industries trying to find solutions to their problems of connecting sensors, and building applications on top of that, so that things can be really interconnected. This is done altogether in a collaborative framework.

YOSHIO TANAKA, Professor, Tokyo University of Science (TUS), Graduate School of Innovation Studies, Japan, presented a most interesting initiative aiming to establish a things and system concept and design and a new business scheme in Japan.

Towards the Outcome Economy

The concept of things and systems is simple but implies a change of business models. The boundaries between technology and service providers are getting more and more unclear. Actually, a service is just a product. Companies have to change their mindset and incorporate the new business mechanisms of the things and systems concept. The proposition is a business design which promotes the cooperation of the things and systems. The outcome economy, where companies create value not just by selling products and services.

With the objective of revitalising the Japanese industry, two organisations have been created in April 2014 together with the industry and national research institutions and universities: The Things and Systems Society and the Things and Systems Consortium. Both are interacting in order to provide a practical case to the society and to make the industry change their business model. Things and System Research Division is located between those two entities.

The project bears relation to the IMS project, a cooperation project between the EU, IBM and Japan realised in the late 1980s.

The Things and Systems Consortium is composed of industry companies (both from Japan and the U.S.). The Things and Systems Society (faculties, researchers, students, etc.) investigates production and process oriented innovation mechanisms.

The Things and Systems Consortium, the Things and Systems Society and the Things and System Research Division meet every month for collaborative discussions. This team studies practical cases provided Things and Systems Consortium.

It is a collaboration between industry, academia and government.



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Q&A

Referring to the four pillars mentioned earlier (e-infrastructure, e-applications, e-security and e-privacy, e-skills and e-literacy) the chair and moderator **Anna Gomez**, Wiley Rein LLP, then posed the question to the panellists, “what do you find in your country, in your region or area, has successfully worked in those 4 pillars and what has not worked?”

Mikko Kosonen, SITRA, pointed to the discussion about governance and the need for a whole-of-government approach because here are the fundamental obstacles for reaping the benefits of digitalization.

As countries, as a EU and as a globe, we are prisoners of our industrial era mindsets and operating models, since those governance models were created for a much more predictable and linear stable environment. It was efficient to organize in these kind of silos which are now preventing us from reaping the benefits of digitalization. This is the root cause analysis of this whole problem because it is not only digitalization but nearly all the problems the world is facing. We are facing great problems that always cut across different ministries and most of them require this kind of public-private-people partnership. However, we don't seem to be able to organise ourselves in a way that addresses the problems.

Another issue is not just this kind of horizontal collaboration but—and this is a big problem in all Western democracies—short-sightedness. Most of the challenges we are facing require strategic longer-term perspective and governments typically have only 4 years to run a country. How could we commit to some longer-term strategic transformation goals?

The new Finnish government, for the first time, adopted a so-called strategic government programme, where the government laid out a longer-term vision which also included digitalization components. They also prioritised five key strategic goals over a 10-years period. These were then broken down to 4-year goals. And those 4-year goals can be further broken down to so-called key projects which will then be organised. It is a corporate-like approach to running a country. All these 5 strategic goals are cross-governmental and cross-societal.

Mr Kosonen also emphasized the importance of cities. It is much easier to experiment and to build these living laboratories at a city level than at the nation level, or even at the EU level. You have to agree on certain standards and other things on a higher level, but the actual work takes place often at a city level. This is where the new solutions and services can emerge from.

The **chair & moderator** reported that the U.S. government has been looking at smart cities initiatives as well as broadband opportunity initiatives. One of the things the Obama administration is trying to do is to collect the data and to open it from the city level initiatives, but the lack of trust in that particular exercise has been one of the barriers to doing something like that. The cities were more than happy to have the federal help but not particularly happy to have the federal intervention.



Anja Wyden Guelpa, State of Geneva, explained that Switzerland achieved a few of the conditions for a digital economy, especially skills and security and infrastructure—but the major threat is political awareness. Most of the politicians, not only governments but also parliaments, don't realise what is going on. It is just not a topic and it is not even discussed. This is the biggest problem in Switzerland and the main barrier to a coherent strategic vision. If it is not on the agenda, we are far away from a strategic vision...

Yoshio Tanaka, Tokyo University of Science, confirmed this point of view. In Japan many smart cities projects have been designed by companies. The government invested in experimental trials but finally without any results, because the government, in contrast to the industrial players, didn't understand the topic of smart cities or the IT-economy in general.

Jørgen Abild Andersen, OECD's Committee on Digital Economy, referred to the recurring and very relevant point of how to establish the necessary incentives for companies to invest.

In his presentation, Mr Abild Andersen highlighted the need for looking at the entire ecosystem of the digital economy, not only at e-infrastructure. There is a good reason for this: When looking at the situation with respect to rollout of broadband infrastructure in Denmark, one can see that between 70 and 80 percent of all households and businesses in Denmark can actually have a 100 Mbit/s broadband connection—if they want. But regarding the take-up, i.e., how many have actually used that opportunity, only 2 percent of all broadband connections in Denmark are 100 Mbit/s. So, there are a lot of fat pipes, but they are empty.

Coming back to the question of getting the necessary incentives to invest: How can you imagine that Telcos should use an awful lot of money to invest in very fat pipes if nobody wants to use them? That is where the role of governments is. You must make sure that people actually know how to use the Internet; skills, literacy is important. They must have confidence in using it; trust is essential. Furthermore, there must be something valuable at the end of the pipe. There must be some useful applications. This is important and that also answers the question whether it is a regulatory environment which is the most important obstacle for this to be successful. Probably it is not. Governments can do a lot more than just doing telecom regulation. Governments can make sure that IT experts are educated at universities, that the level of e-skills among ordinary school girls and boys is at a much higher level etc. And they can open data in order to enable the App developers to develop interesting applications, which can again create some useful content.

The incentives for companies to invest must be there. Governments can do a lot. Governments can also make use of the purchasing power which is neglected to a very large extent.

Luis Jorge Romero, ETSI, added that operators are used to building big pipes that at the beginning are not used and become more and more used over the time. However, if they have no visibility on how the environment will evolve, they are more reluctant to invest.

Another issue is that, since almost 5 years now, people report how Europe is lagging behind the 4G compared to the U.S. or Asia. This is weird because if you look at penetration and commercial deployment it is true. But if you look at how technology has evolved, you will see that many European-based companies are at the heart of the development of this technology. Something is not matching here. Why penetration hasn't grown in Europe that much? It is probably not due to a lack of knowledge and not due to a lack of willingness, something is happening.



Audrey Scozzaro Ferrazzini, Qualcomm, stressed that investment is at the core. Without investment, this growth won't happen. It is not just about money, it is the mindset and it is long-term. Governments have their timeframe of 4-5 years, investment in network takes at least 20 years. We have to keep this in mind, in order to attract this money and build the infrastructure of the future.

Another issue in the context of having an holistic approach for governments, is that sometimes it is not just about regulation, but about what politicians say and how this message comes across in the country, in Europe but also externally.

Adriane LaPointe, US Department of State, emphasised that the secure and stable environment that is necessary, or at least very helpful, to investment and innovation is not just local. We can be as stable as we want locally but we have to have some security and stability internationally. With market-share living in different parts of the world, a company has to feel confident that it can put that money in and get return not just in Finland, even if there is a great take-up, but in other parts of the world as well.

The whole-of-government approach, which the U.S. genuinely lives, has been an enormous help in terms of developing public-private partnerships because they do have the right hand at least being somewhat cognisant of what the left hand is doing. That makes for more constructive relationship and coherent messaging. This whole-of-government cross ministry collaboration certainly contributes to the development of an effective digital strategy.

The chair and moderator, **Anna Gomez**, Wiley Rein LLP, thanked the panellists and closed the session.

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Session 1

Day 1 – Morning – Plenary Session

The Digital Transformation: Internet of Things & Data

JEAN-PIERRE CHAMOIX, Professor Emeritus, University Paris Descartes, France, moderating the session, welcomed the participants and introduced a very distinguished and diversified panel. He animated the session with his usual efficiency and enthusiasm.

KARI TERHO, Vice President, Internet of Things, Corporate Customers, Elisa Corporation, Finland, [<http://elisa.com>], set the scene for the following presentations.

Many of the discussions around the IoT are about connectivity. In the belief of Elisa, the largest operator in Finland, connectivity is not the issue. The consumption of data in Finland equals the same amount of data as in Germany. Finland has 5 million people, Germany has a lot more. The data is not the issue, the 4G is not the issue. There are other things that are important.

We are speaking about the m2m (machine-to-machine) connectivity. It is the device connectivity, it is a remote monitoring or remote control. It is not really an autonomous decision making application.

Big data is past data. And when we are speaking about IoT or IoE, it is the real-time data and the real-time decision making. It is not past data, it is not about the connectivity, it is how you combine the data from the machines to your ERP, CRMs etc. It's a bigger thing than just connectivity. And with that you can make a huge difference for the everyday life, for the consumers, or for the businesses.

The things are not the thing. We will have 1 trillion things online, but having a thing online doesn't work without applications. In the end, it is all about applications. Thinking about today's discussions of "we should do something..." The point is, if you do something in a traditional IT-driven IoT implementation, it takes too long. It will take you 6 months to make plans, then it will take you 6 months of coding, then you are testing ... and you fail. What do you do? Do you start again? The point where Elisa wants to challenge everyone is to really gain the benefits of the IoT to be brave and start testing and start piloting. There is no existing recipe for what is the right thing. You have to test it, it is all new stuff.

A survey has been carried out last spring in Finland where 90 percent of the Finns answered that they can't explain what is IoT. But, when you ask them, would you use smart applications in retail? 72 percent of the people want to receive tailored special offers to the smartphone when arriving in-store. 72 percent are interested to have more



information by photographing the product.

When you ask them, would you like to use a new level of services at the home? 71 percent of early adopters want the possibility to control their lighting via smartphone. 65 percent want to have an intelligent alarm system.

When you ask them, would you like to use new services in healthcare? 80 percent of early adopters are willing to use smartphone connected measurement devices. 67 percent want to use automatically collected information for monitoring their own health.

It is not about the technology, it is about the applications. It is about the usage of information to help our daily life or our businesses.

HARRI KOPOLA, Vice-President Research, Knowledge Intensive Products and Services, VTT, Finland, provided the technology vision of a representative of a research centre.

Towards Digital Paradise

VTT Technical Research Centre of Finland Ltd is the leading research and technology company in the Nordic countries. VTT, with its 2,600 researchers and workers, operates under the mandate of the Ministry of Employment and the Economy.

Sensors, security, connectivity, data analytics and the use of big data are important technology areas. We need building solutions and applications.

In terms of the sensor field, Finland has a lot of know-how to build this kind of wireless zero power sensors and sensor networks. VTT wants to contribute building and manufacturing those trillion sensors in the future.

In terms of connectivity and real world systems, VTT has demonstrated solutions for the harbour of Singapore. VTT built a system to help them handle their autonomous ground vehicles (this is how they call their machineries they have in the harbour), so that they can operate in a productive way and not colliding with each other. Connectivity and safety are very important in this context.

Regarding data analysis and industry, people still want to operate in their own silos or in their own context. We should explode these barriers and start looking at the edge of the cloud and the whole value chains and how to make this more efficient. It is a question of business evolution. What kind of business models? How do we share the revenues etc? This question is crucial in the context of developing applications.

VTT has been very active in the three application areas asset management, together with the industry, connected health and digital society.

One example is the mobile health and wellness service concept dose coach, which measures the level of active medication in an MS patient's blood and analyses the status. The application integrated with the device (iPhone, lab-on-a-chip, optical reader and analytical device) provides advice to the patient, and transmits the results over a smart phone to a cloud service.



Moreover, VTT is building the 5G test network in Oulu. There is a restricted network at the VTT premises and the open network at the University of Oulu. The network is built with the idea to just plug in the different applications to be part of this infrastructure and platform.

Another example is the PrintoCent Pilot Factory. It is printed intelligence and printed electronics. PrintoCent is built as an industry 4.0 case for research purposes and different application testing.

The HILLA programme is a tool to accelerate business creation together with the industry. It aims to accelerate business creation by trying to take better use of research and shortening the time from research to business in the areas wireless ICT, automotive, health, and industry.

The Naked Approach is a vision driven project. It is the Nordic perspective to gadget-free ubiquitous natural hyper-connected environments, which provides us with all the information, tools and services we are accustomed to—but without terminals, without captures. It is the Internet of no things.

GERALD SANTUCCI, Head of Unit Knowledge Sharing, European Commission, summarised the institutional EU approach of the Internet of Things and illustrated some of the questions at stake at the European level.

The Internet of Things has become mainstream.

The term Internet of Things was coined in 1999 by Kevin Ashton, then working at Procter & Gamble. It got lost for a while and came out from oblivion thanks to the International Telecommunication Union (ITU) in 2005 (report on the Internet of Things), then the EC in 2007 (RFID Communication). It has been used for the first time by China in August 2009 and since then, it is frequently conjured up all over the world.

The IoT can provide the best possible feedback on a person's physical and mental health, the best possible deals based on real-time monitoring for resource allocation, the best possible decision-making based on real-time data and information, and the best possible alignments of someone's local providers with a global potential of wider communities.

The Internet of Things is, in essence, the seamless flow between the BAN (body area network, e.g. the ambient hearing aide, the smart T-shirt), the LAN (local area network, e.g. the smart meter as a home interface), the WAN (wide area network, e.g. the connected bike, car, train, bus, drone...), and the VWAN (very wide area network, in particular the "Smart City" as e-government services everywhere no longer tied to physical locations). The Internet of Things is everywhere.

According to IDC, the IoT will expand with yearly growth rates over 20 percent in value between 2013 and 2020. The number of IoT connections within the EU28 will increase from approximately 1.8 billion in 2013 to almost 6 billion in 2020. IoT revenues in the EU28 will increase from more than 307 billion euros in 2013 to more than 1,181 billion euros in 2020, including HW, SW and services. Market figures differ among consultancy firms, subject to variations in definitions and market and competition trends. Ericsson backed away this year from its 2010 "vision" of 50 billion connected devices by 2020 to a more reasonable – and



consensual – “prediction” of 26 billion. What matters more is the nature, variety and rapid growth of IoT-driven services pervading the whole economy and society. It is also the emerging combination of IoT and Artificial Intelligence establishing an important distinction between “enhanced humans” and “smart machines”.

The acceleration of the marketability of IoT technologies and applications is impressive. Today, whoever ensures traceability, sustainability and security linking up the gateways is *de facto* and *de jure* the new power. We are seeing Google trying to achieve this with glasses and lenses, the Google PowerMeter, Nest etc. This is all good, but at the same time it is in my opinion crucial to create a public competitor to these gateways to ensure that the future will be democratic, open and inclusive. It is very positive that the private sector is investing massively in IoT, but we must ensure true competition and the presence of the public sector in order to guarantee fundamental principles and human values.

In terms of the vision by 2020, the EU considers that the full deployment of the IoT will take several years as a lot of testing is required. The 2016-2017 Horizon 2020 ICT Work Programme will earmark a total of 100 million euros for IoT large-scale pilots in a number of key areas such as living environments, water management, farming and food security, wearables. Furthermore, the IoT should not be considered an isolated island but instead a vision that must be articulated with associated developments such as cloud computing and big data.

Connectivity and intelligence have been added to products. New sources and value added digital services exist, such as smartphones and their App stores. IoT is coming into the factory, into transport, into healthcare... One key question arising out from the fact that connectivity and smartness are today integrated in the product is the following: where will the value come from in the future?

The European Commission has addressed the Internet of Things since 2005, initially in the context of its work on RFID, on the one hand through the Framework Research and Innovation Programmes (FP6, FP7, now H2020) and, on the other hand, through exploring relevant policies in a few key areas (identification, architectures, privacy, security, ethics, standardisation, governance).

Standards and interoperability are extremely important. ETSI has been working since July 2014 on standardisation gaps analysis in the field of the IoT; first results will be coming soon. ETSI is also very much involved in the Working Group No. 3 of the new Alliance for Internet of Things Innovation (AIOTI) which has just published twelve comprehensive reports on the future of the IoT (<https://ec.europa.eu/digital-agenda/en/news/aioti-recommendations-future-collaborative-work-context-internet-things-focus-area-horizon-20-0>). As regards standards, a lot of work has to be done to avoid a harmful proliferation of *de facto* standards from various organisations and associations.

In terms of what the European Commission will address in the near future, after the successful H2020 call and evaluation that took place in 2015, the next Work Programme (2016-2017) will support a so-called Focus Area in which IoT will be addressed together with other emerging R&I domains and with a number of Societal Challenges. As I said earlier, a strong focus will be on testing and demonstration in the context of large scale pilots.



We should not aim at getting big results soon, but it is time to start with a large number of experiments and if we maintain the current momentum in research and innovation, we can expect to reach significant achievements within the coming 5 years.

In terms of policy actions, Europe is working on trust, security, and privacy and on building an ecosystem around IoT in the EU, also thanks in particular to the Alliance for IoT Innovation (AIOTI).

The recent scandal over VW cheating pollution emissions made it clear that what matters is not only to work on data, standards, research, or on guaranteeing privacy; it is also to realise that the data may be wrong at source. If the data is wrong from the beginning, everything we do on the data (data will be analysed, shared, processed...) will lead to a decision-making that is done on a wrong basis. We don't only have to look at the reliability of the data as we get it, we also have to verify that the data at its very source is correct. And hopefully the standards bodies in the world will look at this issue.

Finally, the EU has to continue to work hand in hand with other governments in the U.S., China, Taiwan and other countries. It is important to collectively make sure that there will be eventually one Internet of Things, and not multiple siloes of Intranets of Things.

SAMUEL LAURINKARI, Senior Manager, EU Government Relations, eBay Inc. Public Policy Lab EMEA, Belgium, [www.ebay.com], delivered a talk on what the Internet of Things and the sort of the development from products to products as services means for the retail industry, and specifically for online platforms like the online marketplace eBay.

Today, eBay is no longer this sort of online flea market it has been in the 90s. Most of eBay's business nowadays is business to consumer, mostly small businesses selling new products at fixed prices to consumers. Only in Europe the eBay platform is leveraged by hundreds of thousands of European small businesses to access consumers and other markets in Europe and globally.

The driving force of creating a platform and growing it, and reaching the level where eBay last year enabled 84 billion dollars of commerce on its platform, has been to create an open platform that allows everyone to participate in global trade. eBay is institutionally opposed to any kind of barriers to trade; anything that prevents businesses and consumers to sell products to other people. In the 20 years of the history of eBay, eBay has encountered a number of ways people try to prevent other people from trading, whether there are legal barriers, such as customs, duties or prohibitions to sell certain things online or different product rules or contractual barriers, e.g., manufacturers limiting the resell of their products online or limiting the resell of their products in certain territories or having some sort of technical measures to prevent further resell of the product.

This brings us to the Internet of Things and the perspective eBay is looking at it: the development of when goods become services.

Last year, Tesla noticed that something in the adapter causes excessive heat when it was charging, and the authorities wanted Tesla to recall cars because of this dysfunction. What Tesla did was to send an update to the users, asking them to update their software and the problem was fixed. There was no need to take the car to the garage, having it fixed and



taking the car back—the problem was fixed with the software update. This is a great consumer experience. But imagine, you want to sell that car, and Tesla says, they don't want you to sell the car, they want that other person to buy a new car from Tesla. If a product was upgraded it can also be downgraded... They could switch off the software or disable some functionalities. Basically, the connectivity that comes in the world of the Internet of Things at the control over the goods has huge impact on the way we understand ownership in things and that transferability of ownership.

Another example is Amazon. They have the product Kindle and ebooks. Some years ago, a lady purchased a book on her Kindle and after paying for the book it was suddenly removed from her Kindle catalogue because it was placed in the catalogue by a third party who didn't have the rights to distribute the book. This is like going to a bookstore, buying a book, putting it in the shelf and the next day someone comes and wants the book back. This is another example how the control of a thing remains with the manufacturers or the distributor.

Ownership in things becomes like some sort of licenceship. You don't own things in the world of the Internet of Things. It is like software. You don't own software. You are licensing it for an unlimited period of time usually. It is basically like buying something, but you don't buy it because you can't resell it.

In the next years, consumers will probably have to adjust the idea that they don't have that kind of control and ownership of the things they have purchased, like they used to have in the world of purely physical products.

In terms of the policy challenges, that means that on the one hand, you have the challenge of ownership. How do consumers perceive ownership? Can they resell the products that they have brought? Can they change them? Can they borrow them?

The other challenge is distribution. When the control over the thing remains with the manufacturer throughout the lifecycle of the product, it gives the manufacturer complete control over the way it is being distributed, which basically means monopolies in the distribution or in the retail sector.

There is a certain need to address further public policy focus on these concept ownership and distribution in the context of the Internet of Things. And there is really important work in terms of the interoperability and standardisation that contributes to making sure that the economy stays open in the distribution chain also in the years to come.



KEIICHIRO SEKI, Head of Research, Center for Strategic Management & Innovation, Nomura Research Institute, Japan, addressed the structural change of the industry through the digitalization of business processes.

Basic Understanding on Industry 4.0/ I o T

Big data, IoT and industry 4.0 became very famous buzzwords. However, people understand them so differently that they are talking rather at cross-purposes. In addition, there are many misunderstandings in terms of IoT and Industry 4.0.

The concept of Industry 4.0 is so big that someone may focus on data created in manufacturing processes and others may focus on standardisation. People may see Industry 4.0 differently depending on their position, such as end-product manufacturers or parts manufacturers. Just as Julius Caesar said in the ancient Roman Empire: People just see what they want to see.

IoT means things are connected to the network, but what does IoT realises? Although many people see Industry 4.0 as a cyber-physical system, the real purpose is to realise scalability and an open-close strategy all over the world.

There is a conflict between the group seeking standardisation and openness, and the group seeking de facto strategy or vendor lock-in.

IoT evolves into “micro IoT” (level of products, equipment and parts) and “macro IoT” (level of business processes). IoT has three categories, “Internet of Products”, “Internet of Parts” and “Internet of Processes”.

IoT will evolve into an “aggregation of equipment and parts plus network” (networked business process) in macro direction. “Internet of processes” is the direction towards Industry 4.0

At an early stage, things are connected and added value by networking. This evolution is called “from goods to services”. Some people like Ferrari or Lamborghini. They find the cars’ own value. But most people use cars as a means for transportation. Networks can provide more value to customers.

A business process is composed of devices and machines, managed by human workers. Connected devices will be gradually installed in all business processes (not only the manufacturing ones). Product manufacturers may contribute to user companies’ efficiency by using the data generated by each apparatus and equipment. Mechanical parts (hardware) and control parts (software) of will be separated. As a result, maintenance, management and even the improvement of products will be operated by data analysis through network.

The “modularisation of each business process” and “standardization of interfaces between modules” will enable a quick start of business operation in new emerging countries: companies can use package services consisting in “plug and play/ plug and produce” and a remote control from the home country.

All industries will be organised horizontally into digitalised and connected business process modules and change into something like PC and semiconductor industry.

Standardisation and interoperability among apparatus and equipment used in a business



process will increase competition among the manufactures of such products. This change will occur not only in manufacturing, but also in agriculture, retailing, distribution, medical treatment, financing and other service industries.

This trend is caused by the change from implicit knowledge to explicit knowledge and may facilitate factory expansion and outsourcing in emerging markets without disclosing the intellectual properties. This may considerably change existing management systems and organisational structures.

In an network to business process environment the holder or controller of the big data will play a critical role. End-product manufactures may want to keep the data generated in their factories. Part manufacturers may want to correct data through their products deployed in the user area (factory).

ICT companies like Google or Amazon also want to use such data via their crowd services. Manufacturing companies and new ICT ones will compete severely with each other on the data usage initiative.

In the context of structuring system layers, there is no communication standard yet among the two lower layers (control systems). Siemens, Beckhoff and Rockwell are global giants in this market.

Policy challenges to realise such structural change through the IoT: Governments are required to improve the environment to promote such structural changes, by e.g., rulemaking on not only who and how to use big data, but also how to protect personal data and how to take industrial espionage countermeasures (such as the protection of company secret) through some forms such as legislation, guidelines, codes of conducts, model contracts etc..

Governments also have to focus on how to ensure cybersecurity and a safe working environment among machines conducted by computers and robots. They also have to put priority on network deployment for IoT such as frequency and device ID allocation, communications mode and protocol, power saving etc.

To provide company leaders and CEOs with a better understanding, governments have to visualise IoT's merits quantitatively and qualitatively. Governments have to encourage standardisation among the interested groups. Moreover, CEOs have to review existing office organisation and authority distribution. Governments have to support retraining and continuous learning to prevent a mismatch of labour.



DENIS GARDIN, Senior Vice-President, Head of New Technology Ventures, Airbus Group Corporate, France, [www.airbusgroup.com/], illustrated how a European multinational aerospace and defence corporation is implementing IoT technologies and big data.

Airbus Group (140,000 employees) is the new name of all the activities that used to be part of EADS. Airbus Group produces 600 aircrafts, 500 helicopters and about 10 satellites per year. There have been 6 Ariane launches last year. Airbus Group is an industrial group working on small series, but not as much industrialised as the automotive industry.

Airbus Group understands the potential of big data and IoT, but in terms of implementation it is still at the very beginning of the road. As many big companies, Airbus has started last year a digitalisation initiative. It aims at grouping the hundreds of projects running inside the company, mainly in order to improve products and customer experience, but also to use internal operations to be more efficient and to improve the company's organisation and culture. Like other big industrial companies, Airbus faces the challenge of attracting new talents for the future and the new generation wants to work in an environment where they have tools at work which are at least as appealing as the ones they use at home.

In terms of technology fields, Airbus Group deals with big data and advanced analytics, Internet of Things, 3D everywhere, augmented humans and robots, and social and collaboration.

The future growth and value generation for companies like Airbus will come from the diffusion of digital technologies which will increase efficiency percentage by percentage. And at the end of the day, this might be an important amount in terms of value gains. For instance, the air transport industry is a 700 billion euros industry. Each 1 percent increase of efficiency corresponds to 7 billion euros per year. By connecting everything along the value chain, this 1 percent after 1 percent can be made—the question is how, this is the big data challenge.

Airbus generates more and more data. One example are the flight test data that are collected for the certification of aircrafts. It started with 10 GB for the A320 in 1987 and increased to 500 GB per flight in 2013—everything is connected and there are more and more data produced. This data produced at the birth of an aircraft can be used to improve production or to help optimising the maintenance 30 years later.

However, this requires new competences and data analysts are not so easy to find. They need to have the scientific background but also have an understanding of the industry. Moreover, there is the big issue of data access over the value chain, i.e., suppliers (about 70 percent of the aircraft value is bought outside), aircraft manufactures, airlines. The question of who is owing what is a real challenge. Another issue is the storage and management of massive data sets over a long time (ideally more than 40 years), but also the ability to retrieve previously stored information, as well as technical issues such as the manipulation and correlation of huge data series.

Airbus is still implementing RFID even if this is a rather old technology. It is still implemented because the improvement gained is considerable. Because Airbus Group is a safety critical industry, everything that is done has to be traced. This is part of the regulation under which the company operates. There is a lot of paper and the group is now moving from paper to RFIDs for the traceability of all parts. This led to an explosion of RFID tags deployed, the number increased from 100,000 in 2014 to 1 million in 2016.



Many business cases are developed around that, for example the digital check of life jackets in aircrafts. The benefits are significant: The introduction of automated, paperless and digital attestation of lifejackets in the A330 led to a time reduction from 14 hours to 26 minutes.

Another technology approach developed is connected and augmented workers. The data is brought to the worker, so that he doesn't have paper anymore. Airbus Group was one of the first companies deploying this technology, which is based on augmented reality, 3 years ago. Basically, it is a tablet displaying the 3D mock-up of the aircraft and a small camera is looking at the reality of what the worker in the assembly line does. The connected tactile tablet is superimposing the 3D mock-up over the reality and defects are detected immediately. Before, it took 3 weeks to perform the quality inspection of the thousands of little brackets (between 80,000 to 120,000 brackets per aircraft depending on the model), after, the inspectors were able to reduce the checking time to only 3 days.

In the future, Airbus intends to even go further in terms of use cases in difficult environments and to employ smart glasses to enable the worker to have its two hands free. However, this tool is not yet mature.

Collaborative robots are another technology deployed. Small lightweight robots with a single arm, capable of autonomously moving around inside the aircraft, are supporting the workers by doing precision tasks, e.g. to install brackets in the fuselage.

For Airbus Group, IoT means putting more sensors everywhere and collect the data. The issue to be solved is to ensure that the system put in place is not itself requiring more maintenance than the savings that can be created by the monitoring.

Airbus Group also contributes to the development of next generation IoT networks. The company is trying to converge with companies like Sigfox to develop low-data-rate machine-to-machine communication using new earth-based and satellite technologies. This allows seamless and constant IoT-connectivity between continents and over the oceans.

ANTTI AUMO, Executive Vice President, Finpro; Head, Invest In Finland, Finland, [<http://www.finpro.fi/>], showed that significant changes may derive from a clever digital management of public services like transportation. There is a great opportunity to develop, test and pilot services in Finland related to smart traffic. He particularly reviewed the unique facilities of Finland and what they mean to intelligent transportation.

IoT in Action: Smart Traffic Opportunities in Finland

Finpro's key role is to enable international businesses success in and with Finland and with Finnish companies. Finpro is a governmental player and a service organisation.

In the bigger picture of IoT, one global trend is the digitalization of people moving around. Intelligent vehicles will have a lot of electronics, a lot of communications with the outside world, and all this technology must work reliably in any weather conditions—when it is dark, when it rains, when it snows, when the roads are icy and slippery. And the margin error is very small.

Winter tires have been tested in Finland for decades and Finland is also the perfect test bed for the advanced electronics of an intelligent vehicle. If it works in Finland, it works everywhere.



The weather is a competitive advantage for Finland, but Finland also has a favourable legislative climate. Finland is the only country in the world to test autonomous vehicles on public roads.

With the future of autonomous cars, do we really need smart traffic as a service? If you sit in a traffic jam for three hours, having a self-driving car is not the solution if you need to be in a customer meeting in one hour... And can car-only based smart traffic systems really guide the peak times and the flow of traffic so much that such a traffic jam can be avoided? With large cities continuously growing around the world, more time will probably be spent sitting in a stationary car than moving around with a car.

Transformation towards smart traffic must go beyond cars. Finnish innovation has created a revolutionary idea where the whole concept of people moving around, their mobility, is executed as a service. It is called "mobility-as-a-service". The first incarnations of this are already in use and Finland will start the world's first mobility-as-a-service operator pilots very soon.

This is another nice aspect of Finland for groundbreaking new IoT initiatives: the perfect sizes of the market to pilot new services. There will be about 10 of these operators to pilot the mobility services in Finland. Essential element of this mobility-as-a-service pilots is the service scenario. Renting the car by the minute or even car sharing is not the solution if the streets are congested. Public transportation often is not flexible enough.

Many pilot projects in Finland will explore hybrid service models, where different modes of transport are seamlessly combined—trains, busses, subway, taxi, car sharing, etc. If your mobile phone subscription has a certain number of call minutes and a number of GB of data per month, what if you had a monthly transport subscription, covering several types of transport options and the freedom to chose the best combination for each day of your life?

Imagine, if one day you drive your car to the subway station, you park the car, you ride the metro and than you jump on a taxi that has been specifically waiting for you. The next day, you start with a car sharing service and then you jump on a bus. All of this seamlessly planned, managed and optimised in real time according to your schedule. You control it with your smartphone and you pay for it from your monthly transport subscription.

Building this solution and the business case requires open data. A partial solution or closed system will not result in a consumer experience that is good enough to attract a high volume of subscribers. In Helsinki, all key transports, trains, busses, subway, trams, taxis, will offer open data in real time next year. Combine this with Finns who as a nation are driven by mobility, are fascinated with new service concepts, you have a perfect test lab for smart traffic service platforms. And this platform is available to any innovative company. We welcome international companies and investors to participate in building new services for Finland or using Finland to build and pilot test services for international markets.

But to successfully create new IoT services, for example in smart traffic, you need one more thing: the ability to utilise world class talent. Due to the mobile industry structural changes in Finland, a number of amazing mobile professionals are available, with deep experience in designing and developing mobile services. There isn't a mobile challenge mountain that they have not yet climbed.

The journey has begun, revolutionary mobility-as-a-service pilots will be rolled out in Finland



to help people in their daily challenges of moving around. These pilots will benefit from Finland's open infrastructure, innovative talent, formability and its practical problem solving ability. But Finland has an open door policy. Visionary companies from anywhere in the world are invited to join for this amazing ride.

SHOUMEN DATTA, Research Affiliate MIT; SVP IIC – Industrial Internet Consortium, USA, brought a video taped evidence that the U.S. President expressed his personal interest for digital systems able to deliver a safer, cheaper and better health services to the general public.

Large Scale Test Beds

*[A video illustrating the achievements of MIT in IoT-technology was displayed
The video shows a MIT team presenting "Emerald" to President Obama at the White House
on 4 August 2015.]*

Emerald tracks the 3D motion of a person from the radio signals reflected off her body. Similar to a WiFi router, Emerald works even if the person is in a different room than the device. There's no need for the individual to wear any sensor or modify their behaviour in any way. Emerald exists in the background of the home. The movement pattern associated with a fall is unique and detectable by Emerald's software. The data can also provide information about how a person's mobility is changing and even for gait analysis to help predict when a person's risk for a fall is increasing.

ALBERTO DI FELICE, Government Affairs Senior Analyst, Qualcomm Europe, Belgium, [\[https://www.qualcomm.com/\]](https://www.qualcomm.com/) discussed the issue of getting a seamless and natural experience in the IoT, while at the same time protecting security and privacy.

When we talk about the IoT we are talking about how the world will look and feel like in the near future. We are talking about a world where we will move from PCs, 10 years ago, to mobile computing now, where we access the Internet basically through smartphones and tablets, to a world where things will be connected to one another, to the web, into us. And that will feel as natural as tapping on an App icon on your mobile device.

You can call it in different ways. For the industrial part, for manufacturing and logistics, you can call it industry 4.0. In terms of connectivity, the different flavours of the IoT will be part of the parcel of 5G. The idea of 5G really explains that the experience of what it will feel like for the people will be seamless. This is indeed the idea behind 5G.

This can be seen that in a number of fields, for example healthcare. Healthcare is really one of the societal challenges that the IoT will likely help to solve. It is a very slow process, but we are starting to see healthcare systems, particularly in the developed world, that are already reacting to the concept of integrated care. We see forms of tele-monitoring, remote monitoring, and data analytics that are starting to be applied. However, the real way in which this will actually change healthcare delivery in social care, we haven't really seen that yet. But it is one of the interesting areas where we will see mobile connectivity and big data deliver value for both industry and society more at large.



To make the experience seamless and natural to us, there is a number of things that need to happen. With regards to connectivity, there is a great deal that needs to be done in terms of harmonizing spectrum. We are in a good place, but future needs will require us to evolve even further from that.

Furthermore, we need to continue develop existing standards, and we need to create new standards for the various connectivity needs that things will have. And certainly we will continue to invest in networks. The networks that we have today may be sufficiently deployed and sufficiently diverse to care for our needs right now, but we need to care for extreme variations of service requirements for the different things that will be connected. That applies to both the standards and the networks that are based on those technologies.

Another very important point is privacy and security, which is high on the list in terms of attention from the public and from policymakers. The obvious challenge is how do you make sure that you get user consent when you are using a device that does not even has a screen to show you an app you can tap on.

These devices will need to collect data, sometimes about you, sometimes not necessarily directly about you. They will need to access data from your smart devices—and how do you manage this transition from one device to another? That is a very interesting question. We can't necessarily look at it from a purely legal standpoint. Data protection is a fundamental right, at least in Europe and a number of other geographies, but legally looking at these things will not automatically solve the issue. We need to look at what are the different technology options to make the experience natural for us, and that means both intuitive and meaningful. We are discussing a number of industrial processes, but what it means for the end-users is that it has to deliver value for the users. It will be user-centric on many levels.

The IoT effectively will make our everyday lives easier. We will be able to access a range of personalised services. But we need to know that we are in control of the services, that we will be in control of the transition and how my data is created and accessed by the different services.

There is also the issue of ownership. The concept behind it is that you understand what is going on and that you feel a certain level of confidence and trust with what is going on. Trust is very important in terms of the other aspect of privacy which is closely interlinked and oftentimes confused with privacy, which is security. It is hard to talk about one without the other.

We are already starting to see signs in the mobile space of what it will mean as well as the challenges and possible solutions. We are seeing smartphones becoming increasingly smarter. In the mobile computing arena, we are already seeing a lot of solutions. Our multiple devices have already interactions with other devices, with the things and the infrastructure around us, e.g., stores. We are already seeing how we, as persons, and our different devices are connected to one another and to the infrastructure. These things starting with our smartphones and we will be able to understand who is and what is around us, what we need from the things that are around us. They will be able to anticipate our needs in an increasingly secured way, in a way that gives us what we want, in a timely manner.

However, the challenge around is that as we increase the amount of things that are devices, be it a smartphone or the other things that will be connected, these things know things about us and how do we make sure that they are able to access and treat the information in a way that is not oblivious to us?



There is a number of important security solutions developed by Qualcomm to create more robustness and convenience around that experience. It is about seamless identification, preventive protection from malicious attacks, and broadly spoken, the end goal is to enhance user privacy.

Looking at this from a European standpoint, we are living in a time where a number of consultations have been launched around the Digital Single Market. The reason why we have so many consultations about what is needed for the Digital Single Market—a big part of which will be the IoT—is the fact that the topic is so complicated, and there are so many interactions, with not just technology but policy areas, that we really need to think about how best do we do it in terms of policy initiatives.

MARIANE CIMINO, Consultant, France Génétique Elevage, France, <http://fr.france-genetique-elevage.org/> summarized the many and diversified consequences of digital applied processes to breeding practices, traceability of agricultural products and cattle management.

Expectations and Connectivity Needs of Dairy Cattle Breeding

There are a number of economic and structural changes in the agricultural sector: the end of quotas (e.g., milk), the expansions of farms and the aggregation of small farms in larger units, as well as a decrease of salaried work. At the same time, there are new societal demands related to an improvement of working conditions, animal welfare, environmental issues, the quality of products etc. Moreover, there is a trend towards precision farming, using sensors and automatism, and this means that there is a need for increased connectivity.

What are big data for the agricultural sector? The data value chain in agriculture comprises the different stages of food production. “From farm to fork” traces the data channel of the food chain system, from the producer to the consumer. It is a sector that produces a lot of data—at the beginning it was mainly financial and management data related to the farms, but gradually there were more and more technical data, environmental data and data related to animal genetics. Today, the data value chain also includes consumer trends, e.g., do people want to eat meat, do they want to consume milk etc. Having this kind of information in the big data analyses is very important. However, it is difficult to get information of the entire data value chain because it is very fragmented between the different producers.

A qualitative survey has been carried out. It is based on inquiries in 30 farms in the western part of France—but it could have been in any rural area. Rural areas represent almost 40 percent of the world territory; in terms of population, rural areas represent 50 percent of the world population—up to 70 percent in very poor areas of the world.

Moreover, connectivity tests have been carried out in 19 farms to evaluate the connectivity quality in the buildings, boxes etc. This was followed by a quantitative survey of 4,000 dairy farmers (about 800 responses).

The survey was realised jointly by Orange, a French telecom company, Evolution, a cooperative mainly dedicated to genetic animals (artificial inseminations, sensors to monitor calving etc.), and the French Livestock Institute, an agricultural R&D institute.



In order to learn more about the characteristics of the breeder and the livestock, a questionnaire has been elaborated. The questions concerned the connected equipments used for breeding and telecommunications. The breeders were also asked about how they use the telecom equipment, if they were satisfied or not with the connectivity, and what kind of evolution they envisage for the future in term of livestock and equipment.

13 percent of the farmers are equipped with milking robots, which are very big and very costly engines. 1/3 of the requested farmers are equipped with automatic food dispensers, automatic weighing or other automatism. 1/3 of the farmers are using embedded sensors (heat monitoring, calving monitoring, rumination monitoring). 1/3 of the farmers are equipped with fixed sensors (milk meter, cameras to survey a cattle, sensors to survey milk composition etc.).

IoT in the agricultural sector is a reality, and 67 percent of the farmers have at least one connected tool (87 percent for larger cattle). 38 percent of the unequipped breeders envisage to equip themselves in the short term.

As to telecom equipment and connectivity, 88 percent of the farmers are equipped with a fixed PC, 47 percent are equipped with a laptop, 10 percent are using a pocket PC. 61 percent have a classic mobile phone, 50 percent have a smartphone and 25 percent are equipped with a tablet. As to satisfaction regarding connectivity, half of the breeders are not really satisfied with Internet speed and mobile connectivity.

The answers have been grouped in different categories in order to get a better picture of the market. Half of the requested people are not interested in connectivity. They don't want to have more connected tools, they don't want to invest. But the other half of the breeders want to invest and to be equipped with more sensors and services. The most interested breeders are the ones with middle to large herds. They are already very well equipped and want to invest more to increase the quality of working life and to invest in their farms. They consider it important to be equipped with more robots, with drones, and with capture sensors everywhere.

For telecom companies or public collectivises it is important to consider these rural areas. They are a source of new services and new data which are very interesting, not only for agriculture but also for education. If you want to attract young farmers, there is a need for connectivity to provide solutions for their children, the health of their parents etc., but also solutions for the tourists visiting a rural farm. Nobody wants to go to an area without connectivity.

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Q&A

The first question addressed the issues of open data, security and the management of different conflicting interests. How to find a balance between the various interests linked to openness and IoT?

Kari Terho, Elisa Corporation, explained that open data is an interesting question. We are speaking about open data, but the data is closed today. Everyone owns their own data, so you don't share the data. For instance, Elisa, as an operator, has 4.6 million mobile subscribers; over 500,000 households are connected with fixed broadband in Finland and there are 5.2 million people. Elisa knows exactly where the people are, what they do, what websites they are browsing, but Elisa does not own the data. There are a lot of customers



who would like to buy this data. Where are people going, from what point they are starting, where do they go etc. But regulation forbids the sharing of this data. When we are speaking about IoT, we are speaking about open data. This is a big challenge. Then you come to the idea of “my data”. This is a question we have to solve soon to run open IoT solutions.

Denis Gardin, Airbus Group Corporate, added that big data is reallocating the value of different elements of the value chain. The current strategy of industrial groups in terms of how they organize their supply chains is based on what they used to know and the contracts define issues related to the ownership of data. Now they see that they can generate new value from the data which is coming from parts of the value chain, thus, all this has to be redefined in contracts and the strategy of every actor will have to evolve.

Alberto Di Felice, Qualcomm, emphasised that it is not necessarily about open data. A lot of the data that is process to the IoT can also be personal data. However, the question can be about the commercial interest behind the data coming from devices and the people. As far as openness is concerned, openness may not necessarily be always the issue. The issue is how do you access and how do you give consent to the fact that companies access your data. This is a very interesting angle to look at when it comes to personal data: how do you give access and how do you know who is accessing your data?

Samuel Laurinkari, eBay Inc., underlined that there are two things, which are personal data and non-personal data. Personal data is a much more sensitive area, and a lot of data is not clearly personal even though it is connected to a person. Therefore the legal framework needs to have more flexibility in terms of allowing the processing of this non-personal data. And when it comes to the openness, data is—especially in a certain Internet company context—the trade secret of a company. Data, and especially what you do with this data, are hugely important for running a business. One has to be very careful the way you manage the openness objected in this discussion.

The second question related to liability. In the context of cars, we have a liability based on the driver and in other sectors we see more and more product liability, e.g., in air transportation. What are the developments?

Antti Aumo, Finpro, answered that there is also product liability related to cars. Ask anyone working at VW about that... When we talk about IoT and transportation, if the vehicles and the different transport modes, trains, busses etc., operate normally, then you have the normal liability related to their performers. Really the genius idea is how do we make better use of these resources, and how do we reduce the complexity. It is really putting intelligence on top of an infrastructure that for a big part already exists.

Kari Terho, Elisa Corporation, chairing, closed the session by highlighting that everyone shares the opinion that IoT and data will be the future. It will be important for all of us. Elisa has its IoT solution since five years now. There are 5 million active devices that Elisa is monitoring. The company handles hundred of thousands of events per second. It is really all about data. With the data Elisa can serve its customers and everything they provide is as-a-service. You don't buy from Elisa a router or switch. You buy a bandwidth, service-level agreement (SLA) and quality of service. Elisa also consults its customers as-a-service. Elisa could not be a successful operator without the IoT.

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Keynote Session

Day 1 – Afternoon – Plenary Session

JAY E. GILLETTE, Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, University of Oulu, Finland; Senior Research Fellow and Institute Secretary, Digital Policy Institute, USA, moderating, welcomed the participants. This session sets the scene for the afternoon parallel session and as such the panel has a strategic and big-picture orientation. Thus, discussions around leadership, and especially knowledge and thought leadership and vision, are at the centre of the session.

PAAVO LIPPONEN, Former Prime Minister of Finland, talked in particular of the strategic opportunities in the arctic north.

International logistics networks, markets, population,

Oulu is a great success story, naturally with ups and downs. Nokia's mobile phone has fallen, but not Nokia. Nokia is striking back. Most of the employees that became redundant have been employed, and those unemployed have a good prospect of finding employment. The labour force here is world class in knowledge and experience and the University of Oulu is number 2 in research in Finland, doing well in international rankings like Shanghai. The city leadership is dynamic and active in Arctic and Northern European cooperation.

A lot of things are happening in the Arctic and in Northern Europe. The Arctic Council with the American chairmanship is more active now. Reports on Arctic cooperation have been made in Finland and were given to the Prime Ministers of the three Nordic countries. There is much material for the politicians to get things done. The Finnish government will most likely use these reports as a road map for Arctic development.

The Arctic region contains 17 percent of the world's known mineral reserves, 25 percent of global oil and gas reserves. Its mineral deposits are among the richest in the world, including those on Finnish territory. The five Nordic countries have a combined population of 26 million and constitute together the world's 10th biggest economy with a total GDP of 1.4 trillion euros. The biggest investment growth driver in Europe is in the Norwegian and Swedish Arctic. The already announced investment plans amount to 200 billion euros by 2025. This month, tenders in Northern Norway and Sweden amount to 1 billion euros—one month only, what an opportunity.



Major assets in Northern Scandinavia also includes nuclear power, water, and marine harvesting opportunities. Logistic connections make the Nordic Arctic, and particularly Finland, a global hub with potential to grow much bigger.

There are excellent international logistics networks. A new railroad from Russia to Beijing, via Kazakhstan and the Silk Road, from China through Central Asia to Europe will be built. This is already real in air traffic.

Finland is connecting distribution networks and international investments. Looking at the hub-function of Finland, with Helsinki as the biggest northern hub, is another way of looking at this region.

We need to think global although we are in a region in Northern Europe. The next and the last logistics frontier is closing the missing link in the European infrastructure, that is the connections to the Barents Sea through Finland by constructing a railway from Rovaniemi in Finland to Kirkenes in Norway. This would complete the European North-South connection from the Mediterranean to the Polar Ocean. However, this is a European mission. The immediate task is to upgrade the road connections from Oulu to Tromsø and Kirkenes.

Another logistic structure of great importance is the Bothnian corridor from Luleå to Oulu. The plan announced last week to start passenger traffic from Luleå to Oulu is good news. Of course, this corridor should also be seen in connection with Tromsø. This corridor offers great opportunities including the coastal region with its world class big engineering, metal, chemical and paper industries. The city of Oulu deserves support in its effort to develop the Bothnian corridor.

The cable from Germany to Southern Finland, further to Kirkenes and all the way to Asia would give an opportunity to create a communications hub that could use know-how in this region and Oulu university research.

Logistics investment can spur economic growth, as an example take the Øresund Bridge, now 15 years old. Infrastructure can act as a catalyst for development by attracting investment and business. Rail traffic reduces CO₂ emissions and can help create industrial activity. Not to forget that the northern plants can play an important role in urban development, such as along the Bothnian corridor with the aim of improving quality of life. It is time that companies and individuals in Northern Finland and in the whole country understand the opportunity in the prospects of hundreds of billions of investment and growing demand for labour in the Arctic region. This is a challenge, not only for Northern Finland, but for the rest of the country as well, and a European opportunity—an opportunity not to be missed.



DONALD R. DAVIDSON, Jr. Chief, Cybersecurity Lifecycle Risk Management and CS/Acquisition Integration Division, Office of the Deputy DoD Chief Information Officer for Cybersecurity, delivered an excellent talk entitled

CIO vs CISO:
“Your Technology Solution Might Be My Security Challenge”

Today's Chief Information Officer (CIO) seeks to bring value to an organization's mission by embracing innovative technology solutions while the Chief Information Security Officer (CISO) endeavours to identify and manage IT risks to the organization. While this seems like competing priorities, by using industry based standards, they can effectively work together to reduce cost and risk while improving enterprise performance, using visibility into their supply chains and partner relationships.

The CIO and CISO must work together on this task because globalisation has become the standard for all aspects of IT, and almost all businesses depend on IT in some respect to carry out their missions. From sourcing and assembling hardware products to coding software solutions and hosting business services, there are many benefits to a globalized supply chain and market, however, it also opens the door to new challenges that we must remain vigilant against. Our (DoD? Fed Govt whole of USA? or other national & global critical infrastructure) supply chains are deeper and more dynamic than most businesses can afford to realize, yet they hold the promise of an increased potential of supply chain vulnerabilities and security risks.

In order to attempt to meet the business need for innovation and mission support with the cost of globalized, supply based risk, the CIO and CISO need to examine how they can impact the balance of the cost-schedule-performance triangle, integrate and manage the people, processes, and technologies in their own organization and their partners, as well as make informed risk based decisions regarding which IT products to “make or buy”; and once they've decided to buy, how do they make the “fit-for-use” determination for the specific COTS product selected.

Cost/Schedule/Performance

Traditional management practices often choose to focus on the cost and schedule for selecting integrating solutions and operations at the expense of lifecycle sustainability and security. An organization's willingness to save upfront on costs and implement brand new technologies or services quickly, can end up costing the business much more in the long term.

A key challenge to balancing the triangle of cost, schedule, and performance is to educate the users who are putting these products into the enterprise, which often includes the CIO. The fundamental lesson to learn is that there is often a downside to cheaper products, including a lack of testing and vetting, poor quality processes, craftsmanship or materials (with inherited vulnerabilities), or even worse, the impact of maliciously inserted vulnerabilities- for potential exploit in the future. These could all lead to major performance and security implications when the product is embedded in the enterprise. This situation is further clouded because we are often limited in resources to fully understand the full risk profile, yet pressured to make a quick decision for near term business gain. In many organizations this short sighted cycle is often rewarded, and we only see the downside once something catastrophic has occurred.

Products are often purchased and applied to systems for purposes other than originally



intended, or overtime their purpose is modified. This may impact the performance of the product and can cause built-in security measures in the product to fail in unknown ways. If a product is not fully tested in the enterprise environment, these vulnerabilities remain unknown, but still very real for the enterprise. While there may be short term schedule “gain” by doing minimal testing, the long term implications (and costs of mitigations) could be much greater once a vulnerability or weakness is realized. Post deployment re-work and testing could cost more than if the organization had done comprehensive due-diligence sourcing and product testing from the start. Post fielding mitigations /re-work can also take the system down for periods of time, negatively impacting the user experience and overall mission.

People, Processes, Technology

Every organization consists of people, processes and technology. Spanning multiple organizations, the supply chain is no different. To develop and manage the processes, people need to be trained and educated to perform organizational processes, while tools and technology are selected to assist and improve their performance when executing those processes. This people-process-technology model needs to work not only for the organization, but for partners of the organization, linking people, processes & technologies of supply chain partners. What we often forget is that the standards for interoperability have to be complemented by standards for security, protecting organizations and their relationships and products.

Organizations now rely on a globally interdependent supply chain, and we are ALL dependent on that supply chain. Often, critical components are built into an enterprise without any knowledge of who built the hardware, who wrote the software, and who is providing the services to us. Improved visibility into that supply chain is critical to better management of enterprise risk.

Make or Buy

In the supply chain world, one has to make a “make-or-buy” decision: Do I want to make a custom product on my own, or do I buy a COTS product bought from the normal/common supply chain, not necessarily built for my enterprise use? If I decide to buy from the normal/common supply chain, I have to make a “fit-for-use” determination: Does this product really answer the needs that I want to address? Then, one has look at enterprises or sets of systems that are composed of both commercial and custom products. How does an organization identify and build assurance levels in a custom/COTS hybrid environment, or how can an organization cost effectively identify risks when evaluating a solution, or upgrading a system?

COTS solutions are built to answer the most common demands, however as demand signals / requirements grow they might become apportioned / separated into smallest of COTS products. Take the example of a laptop: Today, countless laptop computers are in the market with unique features and different functionalities, to operate in different environments. However, the original laptop developers built a laptop computer with relative portability compared to their larger desk top model counterparts. At the request of field engineers computer developers then built portable laptops with ruggedized specifications, to operate in a field environment. They built it with different specifications and for a different environment. These different laptops are still both COTS-products. Today, we are seeing an increased demand signal for more secure hardware and software. It is unclear at this time if that increase in assurance will impact all COTS or be a new unique apportioned requirement for a new COTS product. We have to better address these new requirements and increase the dialogue between acquirers and suppliers.



From the mid-1980s to today, enterprises (in the U.S. and across the globe) have undergone drastic transformation. In the 80s, nearly 80 percent of products were bought and built into the enterprise were custom development. Today, that number is reversed, and nearly 80 percent of all our enterprises are composed of commercial off the shelf (COTS) products while only about 20 percent are customized for the enterprise's unique/specific needs. This raises a number of questions: Do we really know if that COTS product was designed with my enterprise requirements in mind, or did the manufacturer/supplier make trades somewhere in the design and manufacturing process or in the supply chain sourcing to service a wider demand audience? Organizations should be cognizant of developers that may have traded off security applications that may not be considered / required by another target audience.

Meeting the Challenge Together

What do the CIO and CISO need to do? Develop and use commercially acceptable global sourcing standards, addressing both interoperability and security, to ensure they (and their business partners) are implementing or following a comprehensive set of best practices. These practices will help ensure a balanced input into the people, processes and technologies required to identify and mitigate the risks associated with a business dependent on IT from a global supply chain.

The US Department of Defense continues productive dialogues with its mil-to-mil partners, such as NATO and other multi-national organizations as well as with, our bilateral partners. Together, these partners are working out a range of uniform demand signals, but this is still a very weak signal in the context of COTS products because a significant portion of the consumption, especially in terms of ICT chips, are driven by the communications, media & entertainment world of telephones and electronic gaming. Increasing the demand in the context of protecting governments and critical infrastructure across the globe will help drive the development of smart chips and software. If there is a dialogue about requirements (especially in the context of smart grids, smart cities & critical infrastructure protection) there could be a more uniformed demand signal for secure COTS products. Only where commercial standards fall short of enterprise needs should governmental organizations develop more specialized standards or even more rare, specialized / unique government requirements.

The best standards and practices for interoperability and security continue to emerge from the commercial sector. As a result, the US Department of Defense advocates the lightest touch possible from the perspective of regulation. Everyone benefits when the industry develops their own standards and their own best practices for both interoperability and security. These same standards and best practices are critical to the success of CIOs and CISOs in the areas of IT risk mitigation.

As we along with our global partners develop better visibility into the global supply chain and improved trust in the products we consume or use, we will be able to develop needed assurance levels composed of both custom & COTS products supporting more resilient system designs. Progress in the area is critically related to the partnership of CIOs and CISOs, as well as enterprise considerations of standards and best practices, especially when it comes to trades and balance of the cost-schedule-performance construct. This progress will move us from a “risk response posture” to a more proactive, “risk prevention, risk mitigation, or even risk endurance posture.”



MARKKU MARKKULA, President, Committee of the Regions, European Union, spoke on the regional innovation system and linked this to open innovation platforms, entrepreneurship and start-up activities. The question is what cities can do to tackle these challenges and be at the forefront of the development?

Setting the Scene: The Regional Innovation Ecosystem

The report “Cities in the spotlight” by Lambert van Nistelrooij, MEP, will be published very soon. The report reviews how to link the smart cities development to regional innovation strategies based on smart specialisation—an instrument that has a very strong impact. Part of the report’s message is that cities and urban areas are in fact the drivers of change.

Nearly $\frac{3}{4}$ of 500 million EU citizens live in urban areas; but also problems and societal challenges often accumulate in cities. Not to forget the rural areas. Here, we need to renew the city processes and especially the new role of the city as an enabler of business-based collaboration, more focussed on using the modern technologies including the digitalization which is the driver of change.

Talking about the ecosystems, and especially bringing that to the city planning and urban development, is rather complicated. CoR is simplifying this by looking at three different layers:

First, the smart region. That includes not only city areas or just the nearby villages, but much larger areas where the major city is having an impact.

Second, the regional innovation ecosystem, a focus on orchestration and speeding up the change. An ecosystem is where people collaborate, communicate very heavily, share the same development interest and mobilise the acting elements, the factors for their effective use.

Third, the city innovation. This is where a certain group of people are focussing their work either through the public sector, the private sector or the combination of both.

All this requires this deepening and collaboration between businesses, universities and other research institutes with the city. The role of cities are getting more and more important.

Some examples:

The Berlin region as a city is not only one ecosystem—it is, when we look at it from the innovation perspective—about 10 different ecosystems, each of them having their own activity and specifics, either the feature that they are based on or their focus area. One is focussing on cleantech, one is focussing on medicine, etc. Adlershof has become the role model for Berlin’s 10 places of future innovation. These „Zukunftsorte“ feature 51 non-university research institutes, 10 business incubators and 2,000 high-tech companies. Berlin-Adlershof has become a unique SciTech cluster in Europe. It is a typical example where a science park boosted business development. What is still missing there is how to get the normal people together.



Another example is the subway extension (8 metro stations) to the west from downtown Helsinki that will open in fall 2016. Helsinki Espoo is a large development area in Finland and the extension of the metro will have a huge urban impact. It brings residence activities to what used to be to be high-tech industrial areas and university campus areas. There are a lot of heavy investments planned. The driver of this is this metro line, but this is not the big thing—the big thing is what happens with the urban development.

We are moving from a single project towards extensive mega-endeavours—groups of different projects which are operating as regional innovation but as well as test-beds. That is conceptualised in the research realised at the Aalto University. There are certain criteria for the planning: Ecosystem, external collaboration, knowledge triangle, and moving from a the Triple Helix concept to regional innovation ecosystems.

We need to create much more synergies with ongoing global research having similar interests, i.e., building European partnerships and using the already ongoing regional development activities. Furthermore, there is a strong cultural change from managing a project or several projects as separate towards orchestrating and doing that jointly as a mega-endeavours.

Innovation camps are one example of how that kind of development is used. For instance, ASCI (the Aalto Camp for Societal Innovation) is an instrument for addressing societal challenges. It provides a concrete programme for developing breakthrough ideas and insights, combined with an entrepreneurial process aimed at producing real-world impact. The ACSI Camp 2015 was organised in conjunction with the EU Open Innovation 2.0 Conference in June this year in Espoo.

We need to need to create better use of digitalization with this kind of development. An example is FIWARE, which is both an open platform and an ecosystem, for the development and global deployment of applications for the Future Internet. It is especially developing the instruments that fuel open service platforms and open innovation ecosystems

The journey to innovation is a play with 3 acts: The first one is to audit where you are. The second is how to plan, what is the global context, and what are the best partners to move on. The third act are the concrete steps to be taken to move towards this ecosystem. Or, with other words: entrepreneurial mindset, deeper understanding of what is innovation and inter-create all that in concrete measures, both European-wide and globally.

More on “Orchestrating Regional Innovation Ecosystems” can be downloaded at urbanmill.org



JAY E. GILLETTE, Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, University of Oulu, Finland; Senior Research Fellow and Institute Secretary, Digital Policy Institute, USA, moderating, continued from the previous remarks of the panellists to talk about leadership.

Information Renaissance Leadership for the Knowledge-Value Era

Peter Drucker, an Austrian-born American business theorist, said: “What we call the Information Revolution is actually a Knowledge Revolution... The key is not electronics; it is cognitive science.”

To put this in the innovative context of our era, one could say: “Welcome to the Information Renaissance”. It is a new era, a knowledge society driven by an information economy. It is not a feudal society driven by an agrarian economy, it is not a mercantile society driven by an industrial society. It is a knowledge society.

It is a challenging innovation—yet not unprecedented in human history. It is like the European Renaissance, driven by the information flood, driven by the information technology of Gutenberg printing; e.g., in Italy about the time of Michelangelo, in Britain about the time of Shakespeare, and then unfolding and following regionally and worldwide.

Is it the information revolution? Revolutions are short and bloody and no society can have a perpetual revolution. Thus, the answer is no, it is a post-revolutionary era. In the American context it is not 1776, the time of the revolution against the British King, but 1803, when Thomas Jefferson and the revolutionaries are in the White House—getting ready to send out Lewis and Clark (Corps of Discovery Expedition) to explore the territory that has been already bought but not yet explored. This is where we are today, we are going to explore the territory that we have bought, but haven't yet explored.

What are the characteristics of an Information Renaissance? The positive ones are rapid, great human progress. The negative one is the clash of paradigms that generates major social conflict.

The irresistible force (the new paradigm) meets the immovable object (the old paradigm)—what happens? At the end of the story, the irresistible force always wins, but the immovable object changes its vectors (like the Grand Canyon changed the course of the Colorado river even if it continues its irresistible way to the sea).

We have this time of great clash of paradigms. We are living in Renaissance times with lots of conflicts and lots of progresses. Renaissance and reformation (progress paradigm) generates a counter-reformation, which uses the techniques of progress (printing press, Internet...) to counter the new paradigm. It results in upheaval and change: top to bottom at the leadership level and at the popular level bottom to top.

We need some kind of leadership, but what are the characteristics of leadership—what is management, what is leadership? Management is about consistency and order, leadership is about vision and change. However, people and organisations need both—but how much? Looking at the U.S., the American business, military and academia today has too much management and not enough leadership—there is lots of constancy and order, but not enough vision and change.

Renaissance times call for leadership vision and change. People and organisations need



leadership vision and they will change if they can see what is going to happen in a visionary way.

How to succeed and prosper in this information renaissance as a person or as an organisation? Succeed as a person just by being a renaissance man or woman and as an organisation just by adding knowledge value to everything you touch.

An example of a renaissance man is Leonardo da Vinci, an example of a renaissance woman is the Italian noblewoman and poet Vittoria Colonna. But, how to be a renaissance person? Just be a “T-person” (a person that is built like the letter T), a person that is both broadly comprehensive (T-crossbar) and deeply competent (T-base).

Breadth of comprehension has always been the goal of liberal arts education and the depth of competence has been the goal of professional education, but today we need to be both. Breadth leads to adaptability for changing times, but utility is the competence that allows us to add value to our societies (find a need and fill it).

Succeed as an organization by adding knowledge value to everything you touch. This is based on a concept from the Japanese theorist Taichi Sakaiya, who wrote the book “The Knowledge-value Revolution, or, A History of the Future”. In this book he says, in this area you have to incorporate knowledge-value in all products and activities, in whatever it is you do.

As an example the Hermès scarf was given—a scarf that costs 2-3 times as much as an ordinary scarf. It is not from the material or the quality of the silk, it is the design, the knowledge built in that determines the price. Another example are the Mercedes-Benz or BMW vehicles. People buy these cars because of the knowledge value built in, not because of the quality of the car.

To conclude, the knowledge revolution is here now. And now our species comes into its own: Homo sapiens, “humans who know”, have confidence in this future; lead innovatively with this clarity and vision for our time. Humans have seen and done this before. Have confidence and lead innovatively with confidence, from the clarity of context. Morale, the spirit of the people, the spirit of the times, is itself a strategic advantage.

Succeed as an individual. Renaissance times call for renaissance men and renaissance women—a challenge we can meet. Take the lifetime you have to be a renaissance person.

And prosper—build organizations that add knowledge value to everything they touch.

And finally, be homo sapiens. Use information networking to leverage the knowledge we have and can discover.

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Session 2

Day 1 – Afternoon – Parallel Session

Cyber & Security, New Challenges in a Global Context

The chair and moderator of the session, **BÉNÉDICTE SUZAN, Senior Prospective Analyst, Airbus Group Corporate**, France, [www.airbusgroup.com/] welcomed the participants and expressed her delight at a great panel with great panellists.

She explained that this year's session on security and privacy will approach the issue of cybersecurity in a rather different way. It will be more about a new social contract to be renegotiated, about democracy, surveillance, the protection of privacy, as well as consumer and citizen protection.

SAKEEL TUFAIL, CEO, SecureNinja, USA, [<https://secureninja.com/>] shared his thoughts on security issues and the future of privacy.

The CyberSecurity Experts

The valuable properties of anything is considered an asset. There is a number of things we are trying to protect on a digital scale as assets of any organisation, whether it comes from the government, military or commercial space.

Data is probably the most common asset to protect; we have to protect confidentiality, the integrity, the availability, privacy, or accountability that are used for data. We also have time—and any type of delays and latency is detrimental to many organisations. There is also money, transactions, as well as reputation and brand—you don't want your website defaced, or your company information leaked. Legal—compliance, contractual regulation—we have more legislation than ever when it comes to digital systems. And there are unique issues in government with regulations, compliance, military, intelligence and mission critical systems.

All these are related to money, but many of them go beyond just money, they could mean lives. We have to protect our digital systems, that is the number one concern, but in today's world data is becoming even more important. Data is the new currency.

We all heard about the Internet of Things, with all these keywords some years ago: Advanced Persistent Threats (APTs) or “bring your own device” (BYOD). But the cybersecurity challenges that we have today are far beyond those keywords. Today, we have 7 billion people in the world and over 3 billion people connected to the Internet at any time. We have more and more connectivity with the Internet of Things. We also have increasingly complex systems. Applications are getting bigger and more distributed faster than ever. The



very first Windows was about 3 million lines of codes. Today, we have 70 million lines of code and more in the newest Operating Systems.

Moreover, there is an increasing risk of external vendors and 3rd party software. Today, when a developer writes an application for an enterprise, less than 20 percent of the code is owned by the company. The rest is third party, open source, and commercial-off-the-shelf (COTS) software. We don't even have control of our software and when you put it in the cloud, you even have less control.

Then, there is too much reliance on compliance and standards but also a lack of education when it comes to cybersecurity as things change very quickly.

Hacking Team is an Italian-based company that sells malware to governments and organisations to hack into anyone's accounts, i.e., software allowing to break into other peoples' private information.

Remote Control Systems (RCS), also called Galileo, was a product that was used by governments and organisations all over the world, and there were standards and morals and ethics and contracts written that said that they would not sell the software to organisations and governments that shouldn't have this type of software. And then they were hacked. The company was breached in Summer this year and from that breach we found out that Hacking Team had been selling software to more than 70 customers, mostly military, police, federal and provincial governments, that used the software to spy on their own citizens. Among those customers were organisations in Iran or North Korea.

Privacy is something that can not be completely controlled in today's age. It is even more difficult when different governments and organisations have their own policies and their own regulations. There is no global standard. There will always be commercial companies selling exploits to governments that are using it for good use, e.g., finding criminals or looking for terrorists in the world—but it can also be used for spying on citizens or for intelligence and finding information from other countries. This will never stop, because it is something that has been done before digital systems and it is going to be even easier to do it in the future.

Zone-H is a website where different attackers and hackers can go and exchange about the sites they have hacked.

When we look at the underground, it is an area that is uncontrollable. Hackers are constantly researching for new vulnerabilities and attack vectors. They have copious time and patience. The only way we can control it is to be proactive. Everything we do in security today is detective. Everything we do in our network infrastructure (firewalls, intrusion prevention systems, surveillance, scanning etc.) is detecting.

With the knowledge, the technology and the intelligence that we have today, the detection mechanism is not working. We have to understand this underground and think like an attacker.



COLIN WILLIAMS, Director, SBL; Honorary Fellow University of Warwick; Visiting Professor De Montfort University, United-Kingdom, delivered a great talk on how cyber is transforming society.

Homo sapiens sapiens are the apex predator, the apex species, on planet earth—not because of our muscular and skeletal strength, neither because of our capacity to operate as a predator. In fact, we are remarkably ill-specialized as predators. Neither because we are particularly resilient. In fact, individually, we are remarkably easy to kill.

Once we get to the mind and the body, then we begin to get somewhere close to the differentiating characteristic of homo sapiens sapiens, but even that is not enough. Actually, it is our capacity to organise into societies. This is what makes us what we are.

Our relationship to information is definitional and existential. We are based upon information, each person represents the encoding of a sequence of information. Information is intimately bound with the human condition. Our societies are based upon the ability to store, accumulate, analyse and transmit information. As our societies become more complex and more sophisticated and cities take on the dimensions of what was once nation states, these imperatives become more, not less, pressing. We know from the evolutionary theory that open systems are adaptive systems, adaptive systems are survival systems, closed systems ultimately die.

The Internet, the world wide web, are components of cyber. To understand cyber, we have to understand its proximity and relationship to the human condition, therefore to information. The technical dimensions are part of it, the globalisation is part of it, its extension from the Internet of information to the Internet of Things is part of it. By themselves these are necessary but not sufficient conditions for understanding and explaining cyber. Cyber is about a set of relationships between humans and machines. The tools of the industrial revolution augmented human muscle. The tools of the cyber age augment the human mind. There is the profound difference.

Cyber is a story about humans and machines operating in symbiotic relationships. How much of the meat goes into the machines, how much of the machines goes into the meat, before the boundary between the two becomes effectively obsolete? Cyber is transforming our relationship to information, it is transforming the very nature of the human condition itself.

Some might think that the term cyber came to us from the fictive imaginings of William Gibson. Actually, it did not. It came to us from Norbert Wiener, an American mathematician operating in the second half of the 20th century. He wrote some good old fashioned books: “Cybernetics: Or Control and Communication in the Animal and the Machine”; the popularisation of those ideas exploring the new science of cyber and cybernetics and its connection to human society in “The Human Use of Human Beings: Cybernetics and Society”; and “God & Golem, Inc.” in which he identified the three characteristics of a cybernetic system: Machines which learn, machines which reproduce themselves, and the coordination of machine and man.

In 1517, the Ninety-Five Theses were written by Martin Luther. These theses were printed and 300,000 of them circulated across Europe. A century later, in 1617, this produced the reformation centenary broadsheet. When you transform the human relationship to information and when you transform the power structures around the human relationship to information, you transform everything. That broadsheet was produced on the eve of the Thirty Years War, which produced the map of Europe as we know it now. More than that, it



produced the notion of Westphalian sovereignty, the sovereign nation state.

Today, we face an adversary for whom the nation state is not merely a irrelevance, it is a blasphemy to be swept away. This adversary is cyber enabled.

The state has lost its monopoly over the control of the means of exchange. The state has lost its control over access to capital. The state has lost its control over the production and exercise of the means of lethal force.

Capitalism has changed. The nature of the means of production and access to the means of production has changed.

In a democracy, the concrete exercise of lawful peaceful protest is absolutely critical. You don't have that, you don't have democracy. What is the manifestation of the exercise of lawful and peaceful protest in the cyber domain? Protest does, by definition, even if lawful and peaceful, cause disruption. It is discordant and it upsets.

Should DDoS (distributed denial-of-service) be defined as a riot or as the exercise of lawful protest? However, it might be alarming that the people who are making the running in this argument are anonymous and not us.

The crypto wars is the unofficial name for the US government's attempts to limit the public's and foreign nations' access to cryptography strong enough to resist decryption by national intelligence agencies. Today, we are probably seeing the opening of the second crypto war as the British Prime Minister David Cameron wants to restrict the citizens access to strong cryptography. Is access to the Internet a fundamental human right? If it is, it is. If it isn't, it isn't. You can't have it both ways.

The state lives in fear of the cyber enabled citizen; the citizen lives in fear of the cyber enabled state. For a democracy to exist, the state must live in fear of its citizens, not the other way round. For democracy to exist, the state must be able to exercise surveillance. For a democracy to exist, the state must be able to exercise force—externally and internally, including lethal force. Democracy depends upon the rule of law. Democracy depends upon the limitation of the power of state by law and the exercise of accountability through democratic processes. These are difficult and challenging questions.

When someone takes a private and sensitive communication and seals it in an envelope, this person invokes a contract between himself and the state, at least in the UK. The state has the power to breach the envelope and read even the most secret and sensitive of the communications, providing the rules are followed. The strength of the contract and the invocation of the contract comes not from the strength of mechanism of the envelope; it comes from the existence of semiotic philosophical constructs.

In the context of privacy being possible or impossible on the Internet in the cyber domain, we have to forget the technical dimensions. They are largely irrelevant; what matters is what goes on inside people's heads.

Our claims to the legitimacy of democracy and democratic legitimacy are neither uncontested nor uncontestable. We now have to set about the task of refreshing and renewing our democracy and its legitimacy—not with blood, but with bits and bites.



JUHA RÖNING, Professor Department of Computer Science & Engineering, University of Oulu, Finland, introduced

Digile Cybertrust

The Department of Computer Science & Engineering of the University of Oulu is internationally known for its work on security issues and vulnerabilities found in SNMP (Simple Network Management Protocol) implementations, used by most core components of the Internet. 146 vendors have been affected so far, each with several products, latest in 2008. A test suite was developed within in 3 months, a test generator was developed between 1999-2001.

The results of the research, the discovery of the vulnerability, have even attracted the attention of the White House.

The Department of Computer Science & Engineering started its work in the 1990s. Today malware represents a big industry. There are thousands of workers who first collect the requirements of users, then develop a product and sell it, they even collect information on how satisfied the market is—and they are selling malware. There are 3,000 to 4,000 people in one organisation.

Finland has launched a new project called Cyber Trust. Cyber Trust is the leading research programme of Cyber Security in Finland and one of the biggest in Europe. It utilizes an industry driven public-private-partnership model. The programme consortia includes 9 SMEs, 10 large industrial organisations and 9 research institutes and universities.

It was planned as a 4-years programme and started in spring this year. The vision of Cyber Trust is that in 4 years, Finland will be a globally recognized hub for trusted and trust enhancing digital services based on top level cybersecurity solutions and services actively developed and maintained in international cooperation by leading experts and companies.

The main breakthrough target is to return privacy and trust in digital world and to gain a global competitive edge in security-related business by 2019.

Other breakthrough targets for the next 4 years are defined as follows: A new proactive model of information security that is driven by knowledge of vulnerabilities, threats, assets, potential attack impacts, the motives and targets of potential adversaries. Novel and effective tools and methods to cope with challenges of dynamic risk landscape with self-healing. Furthermore to enable seamless cyber security integration to every-day life. By efficiently utilizing tools and methods provided through this program, stakeholders can cooperate while protecting their privacy, they can create more sophisticated security policies, media publicity can move from threats to opportunities and public mindset and understanding will move towards accepting cyber security as natural element of connected world. As a result, Finland will be recognized opinion leader in cyber domain.

A number of successful spin-off companies have been created by the University of Oulu, e.g., Codenomicon which has been established from earlier work of the University.



MIKE AHMADI, Global Director of Business Development, Synopsys, Inc, USA, [<https://www.synopsys.com/>] addressed some alarming realities in the context of known vulnerabilities:

A Call For A Cybersecurity Social Contract --
A request to software companies to act more responsibly

The software security company Codenomicon was acquired by Synopsys in 2015. Codenomicon is especially known for discovering and reporting the infamous Heartbleed bug.

Heartbleed is a zero-day bug. It was discovered by Codenomicon while implementing a feature in their flagship product, a security testing tool which looks at malformed inputs.

A zero-day bug is a previously unknown bug. They are particularly challenging because they are a big unknown. There is this gap of time people have to react to it. Almost 1½ years later, people are still dealing with Heartbleed and they will probably continue dealing with it for a long time.

Zero-day vulnerabilities or unknown vulnerabilities are a very big problem, but known vulnerabilities are a huge problem.

When you look at a product today, approximately 10 or 20 percent of the code is native, and between 80 and 90 percent (or even more) is third party.

The example of a medical system with multiple devices was given: This hospital central monitoring system is widely used throughout hospitals, including government hospitals. When testing the system 1,683 known vulnerabilities were found. 378 of these vulnerabilities are in one (Java) runtime environment, meaning that just updating the version would fix 378 vulnerabilities.

Another example is SCADA (supervisory control and data acquisition). SCADA is a huge industrial control system mostly used throughout Europe (airports, water management systems...). SCADA has over 20,000 licenses worldwide. A lot of their customers are listed on their website—which is rather alarming, because the following vulnerabilities have been found: 702 exact match vulnerabilities in 10 components. 374 vulnerabilities in 1 Java runtime; over 150 of them are listed critical in the NIST CVSS (Common Vulnerability Scoring System).

“Critical” in the context of the NIST Common Vulnerability database means that it can be executed remotely with no authentication. And just in Java there are over 150 ways to do this... This means that there are potentially at least 150 fairly trivial ways to exploit the system.

Metasploit is a free tool that can be downloaded from the Internet. If you know the IP-address of a location, and you would point Metasploit at the location and just randomly start using Java exploits that are found for free in this tool, you would probably be able to take over the above mentioned control system.

When graphing the data concerning the vulnerabilities of a system over time, one often can observe a massive increase in known vulnerabilities when comparing the oldest component on the software and the newest component on software.



Why can't we have a software bill of materials that can be given to customers when they buy an application so they can know what they are consuming? Everybody talks about risk management, but do you have the information that you need as a consumer to make a risk-based decision?

Opposition arguments of the software industry are diverse: We already do this..., a bill of materials means giving up proprietary information, impossible to control the supply chain, too much work... What the software companies are really saying is: We don't want to know about it. We don't want to tell anyone about it. We don't want to fix it. ...but we still want you to buy it. The software industry is the only industry that can exempt itself from all liabilities by simply stating so in the license agreement!

The CSO of a large software company recently published, then quickly deleted, a blog post admonishing organisations that analyse their code or hire others to do so.

Cyber-insurance is a big deal right now. The Californian company Cottage Health System got breached and forced to pay a class action settlement of \$4.125 million dollar. The insurer files suit in court for a Declaratory Judgment against Columbia for Cottage's "Failure to Follow Minimum Required Practices." At the same time, it must be said that "following the minimum requirements" is impossible without the possibility to audit third parties or to perform due diligence.

It is really within everyone's power and control to put pressure on the software industries. We have to start asking for a cybersecurity bill of rights. We should have minimum things that we should require organisations to provide us as consumers of a software. This could give some level of assurance and the information we need to make a risk-based decision

LASANTHA DE ALWIS, Director/Head of Operations Department & Corporate Secretary, CTO – Commonwealth Telecommunications Organisation, shared his valuable experience in the context of ICTs for development across the Commonwealth.

Emancipating, Enriching, Equalising, Empowering
through the use of ICTs

The Commonwealth is an association of 53 member countries around the world. Among those are 7 low income countries and 16 lower middle income countries.

It is home to 2.2 billion people; 60 percent under the age of 30—early adapters of technology.

The Commonwealth Telecommunications Organisation helps Commonwealth countries to leverage ICT through development.

What are the conflicts when talking about cyberspace? On the one hand, we see a great opportunity, but on the other hand, we also see dangers and threats.

If you look at it from the government's points of view, cyberspace is a tool for development. This means, it has to be safe and secure. However, a large number of countries is outside the mainstream of cyberspace. For the government, the key challenge is how to engage with this mainstream cyberspace, which means giving the insurance that their cyberspace is safe and secure. For governments, safety and security are of prime importance.



If you look at it from the users' points of view, especially the 60 percent under 30 years, they want to enjoy the cyberspace; they want unfettered access.

This is the friction that has caused conflicting demands.

Social contracts mean that that individuals consent to give up a part of their freedom for the assurance that their rights will be protected. For a society to work perfectly, the interests of both parties have to be aligned. In the case of cyberspace, the right people want to see protected is the same freedom that is sought to be given up.

Observations made by CTO in the Commonwealth countries are the following: Privacy and cybersecurity are usually considered separately. There are more Commonwealth countries working on cybersecurity than on data protection and privacy. In national cyber-policy making, the engagement of the civil society is rather limited. And, even at a global level, the engagement of the civil society in cyber-policy making is limited to very few committed people.

As regards future developments, there will be an increasing demand for a greater degree of privacy and control of own data, in terms of both privacy and the commercial value of the data.

There will be a continuous friction between security and liberty—which aspect of the two will take precedence over the other will be determined by the scale of economic development.

The practice of democracy will change due to cyberspace. ICT facilitates citizen engagement in democracy. There is the possibility of an increased civil society engagement in the democratic process. However, global cyber-policy making may not be as broad-based as required due to resource, knowledge and commitment constraints of the countries.

PHILIPPE WOLF, Cybersecurity Project Manager, IRT SystemX – Institut de Recherche Technologique, France, discussed the challenge of protecting privacy in a connected world.

Some Considerations about Privacy

Privacy has become a buzzword in recent cyber debates. Ongoing discussions on that subject often ignore the digital fact.

To determine if a program is a malware is undecidable. Good news: cybersecurity analyst is therefore a job for eternity. Bad news, the open market of offensive tools will grow at a compound annual growth rate of 4.4 percent to account for USD 521 billion in 2021, according to a recent market study. There are no estimations concerning the black market.

By 1999, Sun Microsystem CEO, Scott McNealy declared: “you have zero privacy anyway. Get over it”. In 2010, Marc Zuckerberg asserts that “public is the new social norm”. Nothing to hide implies nothing to fear... In 2013, Vint Cerf, suggests that privacy is a fairly new development that may not be sustainable. “Privacy may actually be an anomaly”. He explained that privacy wasn't even guaranteed a few decades ago: he used to live in a small town of 3,000 people.

The speaker's proper experience in a small French town is rather different: intimacy remains



a strong social request. We have here an illustration of a deep cultural gap. In an article of 2004 entitled “The Two Western Cultures of Privacy: Dignity Versus Liberty”; James Whitman gives the fundamental philosophical and sociological reasons of what he calls the transatlantic clash.

Our basic concern is about Personally Identifiable Information (PII). PII is the information that can be used on its own or with other information to identify or locate an individual person. Google, the employer of Vint Cerf, is the biggest private data cruncher in world history. Google has said that its goal is to store 100 percent of a user’s data inside its utility, allowing it to achieve what it calls transparent personalization.

Let us come back to everyday services. A study conducted by the French organisation CNIL, the independent “Commission on Information Technology and Liberties”, showed that geo-location data is the queen of data in the smart devices ecosystem. Nevertheless, the most striking element found was the access frequency. Indeed, a social network service application has an average of 1 access every minute of geo-location.

In the connected world, a constant risk is about social engineering and Snowden documents provide a harsh light on the possibilities of manipulating connected people. First, through the so-called social networks which draw a new human geography. The NSA Synapse program is designed to collect and store, for each user, 94 identity criteria in order to correlate 164 types of relationships. This is what the NSA defines as “digital identity”.

A course given by the British Government Communications Headquarters reinvents the MICE concept around this “extended digital identity”. In that course, they are detailing various techniques of cyber-manipulation: how to target people on networks, how to discredit or deceive them, how to direct a businessman to a “SIGINT friendly” hotel ...

We have to face, with the Internet of Things, a fundamental paradigm shift on the Internet. We are moving from a “publishing Internet” to an “emitting Internet”. The privacy concerns are the following: identity theft, determining personal behaviour patterns, determining specific appliances used, performing real-time surveillance, revealing activities through residual data, targeting home invasions, providing accidental invasions, activating censorship, causing decisions and actions based upon inaccurate data, revealing activities when used with data from other utilities.

Solutions can’t arise uniquely by regulation. Let us examine existing technical responses to privacy requirements. Since their first edition in 2000, the common criteria for information technology security evaluation (ISO international standard 15408) defines a class of “Privacy” Security functions. The 4 security functions of the privacy class: Their combination provides, theoretically, the flexibility to specify the desired privacy behaviour, even of complex systems.

The following privacy requirements provide a user protection against discovery and misuse of identity by other users. Users are, it has to be noticed, either human or IT entities like sensors, machines, robots, humanoids, animaloids and other digital gadgets.

The first function is “anonymity” which ensures that a subject may use a resource or service without disclosing its user identity. A possible path to follow, referring to the work of the French start-up CryptoExpert concerning anonymous signature schemes first defined in 2005. The goal of anonymous signature is to show that systems of attribute-based credentials can support both secure authentication as well as privacy, for instance in



connection with electronic ID cards (eID), computer-supported polls, surveys, etc.

The second function is “pseudonymity” which ensures that a user may use a resource or service without disclosing its identity, with two categories: reversible pseudonymity and alias pseudonymity. Reversible pseudonymity is essential in e-health, for example, to retrieve via a third party, a patient after an “anonymized” medical cohort study revealing an orphan disease.

The third function is “unlinkability” which ensures that a user may make multiple uses of resources or services without others being able to link these uses together. Unlinkability differs from pseudonymity because, although in pseudonymity the user is also not known, relations between different actions can be provided. The Tor network illustrates the largest system aimed to offer on-line unlinkability. The free technology of the so-called “onion routing” can be used to build private networks able to better protect user activity.

The fourth function is “unobservability” which ensures that a user may use a resource or service without others, especially third parties, being able to observe that the resource or service is being used. Some classical example here is steganography which can be used far beyond hiding text in images. The existence of secure steganographic protocols based on computational indistinguishability has been proven in 2002. In cryptography, a private information retrieval (PIR) protocol allows a user to retrieve an item from a server in possession of a database without revealing which item is retrieved. So far, there is no practical use of these theoretical results.

But there is a huge problem. Among thousands of products (2020 exactly) which were common criteria certified, there is not even one which implements these functions. Why? Is there an existing market or must we consider that privacy is negligible for consumers in comparison with all the promises of new services? Is there an economic model, beyond publicity, to finance technical viable products? Is it possible to build confident solutions with proprietary software?

The privacy vs. security paradox is often mentioned. These privacy functions make it more difficult to solve the attribution challenge of cyber-attacks. False debates are very active. Nevertheless criminals will try to use these functions. Trapping the security mechanisms will give them easier access to protected systems by exploiting intentional weaknesses. We have to believe Stephen Hawking when he declares that: “The development of full artificial intelligence could spell the end of the human race. [...] Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded”. Honest people need more and more protections against future robots, as helpful they might be. More research and developments have to be conducted to develop and deploy both robust and usable privacy solutions.

As a conclusion, we can come back to the Universal Declaration of Human Rights proclaimed in 1948, by the General Assembly of the United Nations: “No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation.” For the French government, privacy is also an economic asset. The Prime Minister Manuel Valls declared in December 2014 that: “Europe must make the protection of personal data an argument of attractiveness and competitiveness. The user must make choices on its own data with full knowledge. This conveys a huge economic potential”.



LOUIS GRANBOULAN, CTO Senior Expert, Airbus Group Innovation, France, [www.airbusgroup.com/] proposed a new way to approach the problem of privacy.

Data Privacy: a new approach may be needed

Currently, privacy is mainly seen as the protection of sensitive personal data. Means to provide this protection are usually either regulations or self-defined policies.

There are many technical aspects that are not easy to solve. E.g., the definition of what is a sensitive personal data? The religion of people is generally considered as a sensitive personal data. Are IP addresses sensitive personal data? Are voice templates sensitive personal information? Until now, there were no complaints from the people using Siri which takes voice templates of iPhone users...

The definition of sensitive personal data is an issue. Each time there is a new information that can be used by commercial or non-commercial entities we know that it is sensitive because of the way it is used. It is not a a-priori definition of sensitive—it is sensitive because it can be used in a way that can breach privacy.

Most of the research on privacy has been driven within a medical context: Medical information is considered as one of peoples' most sensitive data. This has led to many interesting theories, e.g., the concept of personally-identifiable information. But all these results of the theoretical research on privacy did not achieve concrete results on protecting the information that stays in big databases. Big failures have shown that each time a personal database with anonymized personal information leaks, re-identification is usually easy; see e.g., the Netflix challenge back in 2006.

What if we had it all wrong? We can not provide privacy because data analysis is progressing faster than regulation and anonymisation techniques. The other big problem is, that people are happy to give away some privacy in exchange of lower prices or better services. People accept to lose "some privacy".

Another issue is that the main focus is on protecting the privacy of individuals (or entities) but sensitive data often lies in mixing elements from various sources. Example: A person wants to protect his/her own privacy, but there is a lot of information someone else has about this person (the neighbour, ...). The sensitive information we want to protect when we care about privacy is not only the information that we own and that we know of, but all the other information that lies everywhere. Another example is, how can a company protect its organisation chart? It is not one information; it is composed information which can not be defined in the usual way we do with privacy and personally-identifiable information.

Your identity is not what is on your identity card, this is rather uninteresting information. What is important is not to protect your legal identity, but the information that may be used to take decisions impacting you (such as behaviour, feelings...).

A new approach should be to empower people—not in protecting their privacy, but to enforce the right, for anyone, to know what can be deduced from the data available/ the data that leaks everywhere. Fighting against the availability of the data will fail. Even medical data will leak, genetic testing is becoming so easy. For instance, a fingerprint should not be considered as personal sensitive data because we "leak" fingerprints everywhere.

Personal data is not something that can be defined because it will evolve. The thing we



should look at is to give the people the knowledge of what is done with the information they leak and how people make decisions about what they are, how they behave, based on the information they have. The main issue with privacy is not privacy itself, it is the misuse of the knowledge they have on people.

PETRI VILANDER, Cyber Security Manager, Corporate Customers, Elisa Corporation, Finland, addressed the topic of cyber defence.

Cyber vs. Information Security

Information security acts as a safeguard for the individual organisation and knowledge, while cyber is associated with securing the functions of society as part of a broader cyber defence field. Cybersecurity is therefore a question of preparedness, risk management and in particular cooperation with the company's external stakeholders, such as public authorities or service providers. Without these cooperation one can not cope with cyber-wars.

In Cyber-defence is essential to have threat detection capabilities and to understand the risks in today's networks, proactive measures and right processes in place, in order to know how to act correctly in the case of a cyber-attack.

Technique is not the solution when dealing with cybersecurity, we have to focus on processes (30 percent techniques, 70 percent processes).

There are a number of new security challenges: First, threat diversity will increase: Due to the variety of objects adversaries can target, many of which are in insecure locations, attackers are able to devise new methods the cybersecurity industry has yet to face and blend sophisticated techniques to accomplish their mission.

Second, remediation will become more urgent and more complex: When an attack does happen organisations can't necessarily isolate a system because the cost and implications of shutting it down may be greater than the cost of an infection, presenting serious tradeoffs between protection and continuity of operations.

Third, the attack surface will constantly expand: Just take the case of the Internet of Things—with billions of new devices connected to the IoT (including smart meters, heating and air conditioning systems, health monitoring devices, remote sensors for gas and oil lines, etc.) and more devices connecting all the time, the ability to gain visibility into these attack vectors, let alone close them to malicious actors, is increasingly difficult.

With regards to democracy and the protection of privacy, we have to make a deal: We have to give something to get something, i.e., if we want to have a protection, we have to loose some privacy when we are dealing in global networks.



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Q&A

The Q&A was opened by **Latif Ladid**, IPv6 Forum, with a question addressed to Philippe Wolf. When can we expect the ISPs in France to allow onion routing?

Philippe Wolf, IRT, answered that the problem has to be seen in the context of “security by design” which is much more effective than securing systems which have no security mechanisms themselves. In the beginning, there was no security in IPv4 and there are very few mechanisms to provide security on the Internet. There is TLS (Transport Layer Security), a protocol which is not so bad when it is well-used, or IPsec.

Concerning the new Internet IPv6, it will be crucial to build security in the design of the future Internet. This could be onion routing or something like this—at the same time there is the security and intelligence services’ fear that an Internet that is too secure hampers the ability to lawfully intercept.

Louis Granboulan, Airbus Group, added that there is also a financial issue. Onion routing means that the information does not take the shortest path—shortest meaning not shortest in time but shortest in cost. Onion routing goes against this and the public will probably not agree to pay more in order to be able to use onion routing.

Referring to the fact that data is collected when people visit websites, **Latif Ladid**, IPv6 Forum, claimed that the ISPs normally should provide privacy as a service—paying 5 EUR more for this per month should not be the problem. The darknet is based on this privacy concept and it is for free.

Louis Granboulan, Airbus Group, stated that 5 EUR might be a good estimation. There is the French authority Hadopi that controls users who download movies and music illegally. There are services proposing privacy which cost about 5 EUR per months and people pay for it.

Colin Williams, SBL, added that the conversation illustrates very well the problem that we have suffered from. It moved incredibly quickly from a conversation about the right thing to do to doing the thing in the right way. We embark on a conversation about privacy before we established where the boundaries should be between the citizen and the state. Actually the first thing to do is to establish where those boundaries should be. If we don’t, the rest of the conversation is meaningless. Similarly with anonymity. We might like the ability to bring an accusation of lawbreaking and wrong doing against anyone of our fellow citizens and yet remain completely anonymous in the process, but in a well governed country with a good legal system we don’t permit that to happen. The ability to face your accuser in court is an integral part of the protection that is afforded to a citizen. Nowhere in a democratic society is there an absolute right of total privacy in all circumstances under all conditions.

Are you entirely content with the situation in which there is one modality of communication completely invulnerable to scrutiny by the state? Do you really want a democracy based on the fact that the state cannot at all under any circumstances intercept a certain category of communication? Before we start to figure out how we might incentivise the ISPs, there are all these questions. They are relevant until we decide collectively, societally what these new boundaries should look like. Decisions about the extension of the franchise into the cyber domain should not be made by cryptographers but by society, philosophers, by political



scientists but most of all by the citizens.

Latif Ladid, IPv6, stressed that European Commission has already set the rules of privacy and every single European country is against it. It is in the debate now and will go to the parliament. However, there are things one can do: You can still give the governments access to data and at the same time giving privacy to people.

Petri Vilander, Elisa Corporation, added that people who don't want to be part of the Internet or part of something should get the possibility to be left alone and to have this privacy on their own. It should be their own decision and not someone else's decision.

Mike Ahmadi, Synopsys, emphasised that the issue is that we have to have personal responsibility. We push everything towards the government and others. Having your own IP address would be great, we have an own ID and no one should be able to take that ID—if they do they are breaking the law.

However, the issues are far greater than that. What happens is that in the IoT all of our data is on our personal devices, and clients, and in the cloud. When we go to a bank and we take money out or we get something of sensitive nature, we are in charge of protecting that and if somebody breaks the law by stealing it from us, then we contact the justice department or the police etc.

We can't protect our client devices—any client device can be breached. This is not in our control. The controls should be on the server side or on the company side and if we do give them access to private information, there should be the same rules and regulations as if you rob a bank or breach any organisation. Nothing on the IoT can be protected.

Every breach until now has been solvable. Every breach has basic issues that were broken. When you protect your (physical) house, if you want to have higher security you put more layers of security. Most of our breaches occur because we have one or two layers of security and we are not looking on all the facets of the openings. Every single breach has not occurred through the front door. The good thieves will come from through the backdoor, the basement or the attic or HVAC system. For instance, Target was breached through their HVAC application. The basic tenant of security was broken, because they did not segregate the sensitive data from the non-sensitive data. So a company was able to connect into any Target retail store worldwide and through their HVAC application, get card records, emails etc.

All of these issues are solvable. We have to look at what we have existing and use those as platforms to push it into a global scale.

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Session 3

Day 1 – Afternoon – Parallel Session

New Innovation Strategies in a Challenging Global Environment

BROR SALMELIN, Adviser for Innovation Systems, European Commission, chairing the session, welcomed the audience and provided a short introduction to the topic.

Challenges for Innovation; How to Respond in Systemic Way?

It is really about innovation and forgetting the buzzwords. Innovation is probably one of the most misused buzzwords today. We have to put proper thoughts on what it is all about.

Another buzzword we often hear from politicians fluently using hypes is momentum. Do you know anything more static than a momentum?

And, we very often hear how people are incredibly proud of quantum leaps. However, do you know anything smaller than a quantum leap?

The society has changed. Can we predict the future by viewing in the rear-view mirror? Probably not, because the society has changed. It has become VUCAional—volatile, uncertain, complex, and ambiguous. It is a world where we have entirely new drivers for innovation, we have the connectivity and open interaction, and when you are looking at the processes where innovation happens, it is more organic. It is not controllable, but you can create the right environments for the growth.

If we are looking at organisations, many people face not an organisation but an organization, an organisation which changes its shape based on what it is always doing, what is needed to being in capture in terms of external and internal competences.

In terms of innovation, networks and innovation constellations, we are interested in finding those kinds of environments where companies, public sector, private sector, and citizens can contribute and create together. The Lego environment is a rather simple example: Lego has around its company a huge community of users. If the users are coming up with new designs, they can propose it on the Lego website, and if the users community is voting for this product idea, e.g., the idea gets 10,000 votes, it gets into production. The person who had the idea receives not only a recognition, but is also rewarded, and Lego knows that the community created a new market. It is really a win-win game, using the power of crowds.

We have to look at the power of crowds in the context of prototyping and experimenting. When you ask experts, policy makers, industrial people, you will get a good convergence of answers, but these answers are linear extrapolations of the past, because by definition we



have asked those who are experts. We haven't asked for the unexpected. You get a good bet—but you get an old bet.

There are very interesting studies on asking crowds about solutions. Of course, you get a wider distribution, but you find more higher value solutions, if you look at the crowd than if you look at the experts. Of course, then you need a filtering process. How do we filter from the very broad spectrum of ideas the best ones? How do we filter out the crap? And there we come to several elements: First of all, to use the experts. But also to use to a very large extend fast prototyping in real world settings to see what is scalable or what is totally stupid. Prototyping costs have declined rapidly. So, we can afford to have entirely new models of discovering the new innovation space.

The paradigm change is real. We need entirely new competences, we need new professionals, so-called bridgers, those who are inherently curious about absolutely everything and who have the knowledge and the guts to connect the knots which even seem crazy, to discover the new innovation space and to make it happen.

JEREMY MILLARD, Director 3MG; Senior Policy Advisor, Danish Technological Institute, Denmark, welcomed the panellists and briefly reminded the essence of the session. The session tries to explore what we mean by innovation. As mentioned by the chair, innovation also means all things and all people. That doesn't devalue what innovation is, but we need try to understand it better. There is a great panel, ready to explore the different perspectives.

STEPHANE GRUMBACH, Research Director, INRIA, France, addressed the role of intermediation platforms in innovation.

Innovation is a word that is used more widely every day. However, it seems that the word innovation is completely disconnected from purposes or goals. What are the problems we are trying to solve? The more we speak about innovation, the less we know where we are going.

It seems that we are talking about innovation because we are anxious about the world we are living in. We are trying to built new systems, which can maintain the growth of our societies, but without precise purposes.

The question of data is at the heart of current innovations. Our society has drastically changed in recent years because of data. Data is power. The production of large amounts of data changes the balances of power between existing entities. There are new entities arising, which are creating a lot of data, Google for instance, while there are old entities, that had, until recently, a large share of the available data, and which now see their share decreasing tremendously. These old entities include in particular states and public administration. In the 19th and 20th centuries, governments developed capacities to get more and more data by census, by statistics. States increased their capacity to govern because they had an increasing amount of data of increasing quality and relevance. Today, states have less data than some of the major Internet companies, such as Google or Facebook for instance.



Are our governments trying to promote or to foster innovation? It often seems that they are afraid of innovation. On the one hand, governments are trying to foster innovation, but they don't know in what direction, and on the other hand, they are trying to stop the disruption effect. Uber is a very interesting example in this context. Some of the applications that Uber is offering are forbidden in many countries, but if you look carefully at the reasons why governments, or justice bodies decided to ban them, they will not last for long. They are somehow ad hoc reasons, which are not taking into account and anticipating on the way the society changes.

The people who have the largest quantity of data are not producing goods, they are not producing services, they are intermediating between people and services. This development of new ways of intermediating between people is a fundamental aspect of the evolution of our society, which has become possible because people are all connected, and not only people, but also devices. At the same time, beyond the connection, there is a kind of virtual world, mirror of the physical world, on which they can work. Intermediating between people and services, between people and transportations, between people and medical services, etc. can be done in the virtual world on data and it can be done globally.

By doing so, you destroy the old intermediaries which were mostly local intermediaries, e.g., cab companies, newspapers, etc. Some of the departments of our public administration, including very essential ones, will be destroyed more or less the same way by intermediation companies. Either the governments will be able to develop such tools or private companies will do the job.

The intermediation actors are all platforms, they have created ecosystems, they have plug and play services, allowing every industry can plug in and offer its services through their ecosystem.

Interestingly, there is a kind of Metcalfe's law, which explains why there are extremely large intermediaries now. Other interesting aspects concerning the disruption are worth remembering: The intermediation actors always work on a two-sided market, where you have producers of services or goods and consumers of services or goods. They make it possible to go from one side to the other side (e.g., could be driver or passenger in a transportation service). These platforms are abolishing the distinction between service providers and consumers.

Another aspect is that while they offer a basic intermediation service, e.g., the search engine which connects people to essential information or knowledge, they have externalities and most of the time the disruption on the externalities is more important than on their initial services. The search engine, for instance, didn't really disrupt people at the beginning, but it revolutionised the advertisement industry, and the same is probably true for most of the services. Uber, for instance, will disrupt much more than the transportation services.

If you think about the public administration, it is extremely difficult to take decisions, as these decisions might have consequences that are going against the anticipated interest. An example of such a complex phenomenon, is the decision of the European Court of Justice to impose the implementation of the right to be forgotten, e.g., the right to be dereferenced from Google. This actually contributes to increase the knowledge of Google about Europe, due to the fact that European citizens have to apply if they want pages to be dereferenced. This gives a tremendous amount of information to Google about some European citizens.



AUDREY SCOZZARO FERRAZZINI, Senior Manager, Government Affairs Europe, Qualcomm Europe, Belgium, [<https://www.qualcomm.com/>], spoke about patents as incentives for inventors to take risks and effective tools to drive innovation, growth and employment.

Innovation is a magic word of today's economy. It is promoted as a secret to success, no matter where you look. How often do we hear that companies must innovate to survive and countries must innovate to compete. Everybody loves innovation, and while you cannot regulate your way into innovation, governments can create the right conditions for innovation to occur—specifically in a sub-sector of innovation, which is invention—the product of inspiration, hard work, investment of time and money, that has the power to change peoples' lives.

Invention is an expensive and risky undertaking, usually with no guarantee of success—and success does not just mean whether it works, but whether it is accepted by the market place. In the context of the Digital Single Market (DSM), we need companies and research institutes to develop the groundbreaking 5G and the Internet of Things technologies to make the DSM possible. How do we get people and companies and their investors to take these risks? How do we create incentives for inventors and invention companies, not only to work hard and create something new, but to share the secrets of their inventions in order to enable others to utilize these discoveries and keep up inventing after that?

The system of incentives that fuel growth of the wireless technology, that changed our lives and which is at the heart of Qualcomm, is the patent system.

The patent system incentivises inventors to take risks. They know if they succeed in their R&D development efforts, they will own their right to the invention for a limited time and make the invention public through a system that protects their intellectual property. But patents are not a guarantee of market success. It is only a right to try to commercialise an invention.

Most people probably don't care much about patents. However, most people probably do care about investments, jobs and growth.

Start-ups are 2.5 times more likely to achieve success within 10 years after receiving venture capital investment if they hold patents before that investment. And this link between patent ownership and success is particularly strong for start-ups related to software and biotechnology.

Patent-intensive industries contribute to 13.9 percent of the European GDP, and on an average pay their employees much better (64 percent higher than in IPR industries).

There have been attempts to weaken patent protection in some countries over the last years, which would jeopardize job creation and investment in the cutting edge industries that are so much needed today.

The EC's strategy on the DSM is characterized by a rather forward looking approach in understanding both the policy decision and legal safeguards required to help Europe leap ahead in the next digital area. The strategy particularly stresses the importance of intellectual property for incentivising investment: "In the digital economy, standard essential patents (standards that are based on patents as proprietary rights) are an increasingly important feature in standardisation and an important element of the business model for many industries in terms of monetising their investment in research and innovation."



If businesses are to invest billions of euros in R&D needed to develop the resilient, robust and secure technologies and contribute with their best technologies to standards and the evolution of valuable technologies underlying the DSM, they need to know that success will yield a fair and reasonable return on their investment.

The new European political agenda is a very encouraging step. Patents may seem to most people just a legal contract, a dry piece of paper. But they are not, they are the most important legal and economic tool a free and democratic economy has to encourage innovation. They are a fundamental ingredient for boosting growth, creating jobs, and bringing societal welfare and they are a strategic tool for our innovation-driven economy.

As to the question of discovering the unexpected, Qualcomm is striving for that in its everyday business. Qualcomm's answer to this question would be: taking risks, being disruptive—but being disruptive in the way you think and work. But in order to do that, there is a need for a certain degree of legal certainty in order to be able to take this risk.

MICHAEL STANKOSKY, Research Professor, George Washington University, USA, talked about competitive collaboration, the new paradigm that is critical to innovation.

Competitive Collaboration

In a traditional way, companies innovate by themselves, and protect their innovations with patents. However, innovation is not only very expensive, but also too long for any realised tangible benefits.

Competitive collaboration is not a completely new strategy, but is really taking off today. Instead of going it alone, companies are teaming with their competitors to research on significant issues for their respective industries. There are probably hundreds of major corporations, like Philips, Toyota, BMW, that are cooperating in the same sector. They are doing this because going it alone is too expensive.

One example of this are automobile companies. Where it is too expensive and risky to do research on the next evolution of the gasoline and electric engine, they are now collaborating with all their resources, i.e., people, know-how, money. BMW and Toyota, for instance, are sharing costs and knowledge for electric battery research. The results will be shared, and their competitive advantage will remain in how they integrate the engine with all the other aspects of the car: design, safety, features, marketing, price, maintenance, etc., as well as their brand names.

There are many other examples, to name a few: Coca-Cola and Heinz collaborating to develop more sustainable containers, Philips collaborating on multiple fronts, GMV and Lavina using cross-sector know-how to advance neurological rehabilitation, or Reebok and Marvel, where athletes meet superheroes. It goes across the whole area of life.

That is the new strategy that is emerging—however, it is not that the old strategies aren't going to continue. Innovation is as multi-faceted as the colours of the rainbow.

It was Ghandi who said "Live as if you were to die tomorrow. Learn as if you were to live forever". Today we should say, innovate today, as if you were live forever.

Most ideas happen at the convergence of boundaries. Most discoveries happen when people



cross an uncomfortable boundary—that is where all sorts of exciting things happen. Unfortunately our whole university system is all stove piped in silos. We have departments and faculties that specialise. STEM was always the big thing: science, technology, engineering and maths. Steve Jobs, before passing away, wanted to change it to STEAM, i.e., science, technology, engineering, arts and mathematics. We need people who can think creatively. STEAM needs to be the new buzzword.

Everybody says, if it ain't broke, leave it alone. That is wrong, because if you don't break it, you don't go to the next level.

Newton said, I could see further because I stood on the shoulder of giants. He was acknowledging that his great discoveries were because of his collaboration, not physically but in a virtual world—and in those days he read books. Today we have a new virtual world with Google and Facebook to collaborate and also to search knowledge.

And finally, when you talk about innovation it is all about luck.

EVGENY OBRAZTSOV, Head of Research and Development Laboratory, Atomproekt, Russia, [<http://www.atomproekt.com/en>], showcased the use of innovative supercomputer technologies in the design process of nuclear power plants.

Innovative Technologies in Nuclear Modelling and Designing

The joint-stock company Atomproject is the leading company of the Russian state nuclear energy industry corporation Rosatom. Atomproject was created in 2014 as a result of the merger between Atomenergoprojekt and OAO VNIPIET institute founded in the 1920s. Atomproject inherited both companies' expertise in designing nuclear facilities, conducting scientific research and the development of new-generation nuclear power technologies.

Atomproject JSC conducts integrated designing of nuclear power facilities, performs scientific research, and develops new generation technologies in nuclear power engineering. The company designs new radiochemical factories, research and nuclear power plants with all types of reactors, conducts design supervision of nuclear facilities at all the stages of their lifecycle and takes part in the "Breakthrough" project—a complex of closed nuclear fuel cycle technologies with fast-neutron reactors—and acts as a chief designer of Hanhikivi NPP-1.

The work has now been completed on the site of the nuclear power plant. The specialists of Atomproject JSC have participated in the follow-up control procedures and the technical approval of this work. Before the end of 2015, a significant number of documents will be submitted which are related to architectural and technological solutions.

The design of nuclear facilities requires being referential in terms of solutions. Nevertheless, we should introduce and use innovative technologies in order to keep our projects competitive; this is why the specialists of JSC Atomproject pay special attention to the development of modelling and design technologies, the director of the R&D laboratory at Atomproject Evgeny Obraztsov said.

Evgeny Obraztsov presented a report "Innovative Technologies in Nuclear Modelling and Designing". How high performance calculations can be used in the design? Over the last few years, Atomproject has been gradually developing a specific set of connected tools and calculation algorithms that allow to simulate various physical processes related to a nuclear



power plant.

Atomproject had achieved significant results in the feasibility study of technical solutions and safety of designed nuclear facilities due to the creation of the complex simulation suite "Virtual Power Unit of NPP" and the use of supercomputer technologies.

In October 2014, Rusatom Overseas, a general supplier of Hanhikivi NPP-1, and Atomproject signed a contract for the development of a complete design package for Hanhikivi NPP-1 (VVER-1200). The Saint-Petersburg institute will develop all the design documents that will allow a project owner – Fennovoima to obtain a license for the power unit construction.

The use of supercomputing technologies in innovative design processes allows detailed modelling, feasibility studying and a clear understanding of the work of power unit systems in various situations. Moreover, supercomputing technologies make it possible to avoid excessive limitations in design and costly experiments. It considerably increases safety and competitiveness of technologies on a global market. And finally, an innovative design process should be associated to supercomputing technologies, detailed and precise simulation, and computer diversifications.

The follow-up question addressed the issue of taking into consideration the human behaviour in that kinds of complex environments. Is there any simulation experience on that?

Evgeny Obraztsov explained that there is a model control board, a kind of virtual control room, allowing to verify where humans can interfere in the model and how it affects the entire picture. Of course, these situations are taken into account.

FRANÇOIS STEPHAN, International & Development Director, IRT SystemX – Institut de Recherche Technologique, France, addressed new innovation strategies for smart territories to achieve sustainability and security.

New Innovation Strategies for Smart Territories

Smart Territories is this kind of buzzwords that are appearing now. Smart Territories describes the digitalization of territories which can be as small as a single city and as large as a whole continent.

Why smart territories, why digitalizing these territories? There are three key issues to be addressed within a digitalization strategy for territories: 1) Sustainability: this is about resources management, but not solely. A territory can live a long time and develop itself very smoothly. Digitalization can support this. 2) Security: security is one of the major needs of the people living in a territory. Cybersecurity is part of this, but also security against natural disasters etc. Digitalisation can support and enhance that. 3) Attractiveness: we are living in a small world and territories are competing with each other, not fiercely, but to attract people and talents.



System X is cooperating with a number of partners, large companies, small companies, civil entities, such as transport or energy operators, and communities.

Some of the very complex questions raising in the context of smart territories are: How to guarantee confidence and security of data management? How to model and simulate smart territories with all scales integrated? How to design sustainable architectures for the territories' evolution? How to operate systems interoperability and performance within a territory? How to develop platforms supporting services for all actors?

Smart territories are a complex system and very difficult to manage as a whole. A smart territory is a set of different systems—a “systems of systems”. This requires a very holistic approach. You have to have different ways of apprehending the complexity and trying to solve some of those issues with digital technologies and within some kind of new innovation paradigm.

The key question to be answered is, how can we solve this the most efficient way with innovation? What are the keys enablers for smart territories innovation? In terms of smart territories, we need to go to open innovation 2.0.

Speed is a very important enabler because time is an essential resource for everyone. When we talk about innovation, we also talk about competition. If we look at the attractiveness factor of territories, the territories that are able to go faster than the others will win. This has also to apply to the process of presenting new values and new functions for territories. Innovation must be associated to speed and acceleration.

Another important key enabler is interdisciplinarity. This requires to associate different types of approaches—mathematical approaches, engineering but also social and human sciences, like sociology, physiology, everything about the human factor. Especially for smart territories, this approach seems to be very efficient and necessary to innovate.

Cross-sectors cooperation means that different economical sectors should work together. In SystemX different sectors, e.g., rail industry, aerospace industry, energy industry, are working together on the same subjects. They share the same kind of challenges and they want to share subjects. In some projects, there are even competitors working together in a competitive collaboration approach. Since digitalization is really transverse, different sectors should share the challenges they face, the ideas they have, the innovation they have in mind and take the opportunity—and then they compete in the other phases of their service or business development.

Another important aspect is the association of different types of private entities, very large companies working with very small start-ups. There are a lot of large companies having their own incubators or launching big-data challenges for start-ups. This is an example showing that this is a way for innovation to develop in a new paradigm in this kind of field. Smart territories are a very good field to work on data and innovate.

Mixing academic and industrial research is another important aspect. Academics are very science-oriented; science then leads to new technologies that then has to be applied—and sometimes this gap is very difficult to fill. An innovation process trying to fill this gap is by making academics and industrials working together in the same physical place. Such co-location work is very efficient.

SystemX is one of the French technology institutes that were created 3 years ago on the



initiative of the private sector and the French government. SystemX Research Institute is part of the Paris-Saclay Innovation Cluster.

The session's moderator, **JEREMY MILLARD, Director 3MG; Senior Policy Advisor, Danish Technological Institute**, Denmark, shared his insights in achieving greater societal impact through open, social and inclusive innovation.

Achieving Greater Societal Impact through Open, Social and Inclusive Innovation

Social innovation is quite well established by now. The EC is investing a lot of money in this field. Social innovation is meeting a social need in new ways which also collaborates with, and empowers, the beneficiary, rather than just doing something to them; i.e., you are involving the people who will benefit from innovation.

Inclusive innovation is doing social innovation inclusively, i.e., reaching the poorest and most vulnerable or excluded (unemployed, people in the third world, etc.). It is based upon Prahalad's Bottom of the Pyramid approach. And there is a lot of massive value, including market value, in the bottom of the pyramid...

Frugal innovation is inclusive innovation done frugally to maximise the performance-price ratio: getting affordable excellence. Frugal innovation is characterised by affordability, sustainability, quality, access for the excluded population and significant outreach.

Frugal innovation arises from the Global South, it is an Indian tradition. We don't have the monopoly of innovation in Europe or in Western countries. There are a lot of good things coming from other parts of the world, deriving from the needs of those societies. The new Sustainable Development Goals actually are universal; they are also for Europe, they are also for the U.S. or Finland. In Denmark, for instance, there is 3x more poverty that there was 15 years ago.

"In Our Back Yard" is an example of social innovation from North America. It's local online crowd-sourcing and crowd-funding with website, social media, mobile and traditional activities.

"In Our Back Yard" is using very simple ICT to galvanise and source ideas, people's time and enthusiasm, and of course finance, to do local projects. The average donation is only 35 U.S. dollars. And the average distance between the person who donates and their projects is only 2 miles. This is local, enabled by ICT. It is innovating around people's local needs, such as building parks for children, creating local jobs, cleaning up a graffiti, starting a green park etc. The social innovation here is grounded at local level, using grassroots donations and volunteers. It is innovation from the bottom.

"Mission Leben" from Germany creates and provides real work to people with learning disabilities and mental illnesses, improving life and self esteem; people who wouldn't otherwise be included in the labour market. ICT adapts traditional work-places to the needs and capacities of individual workers with easy interfaces, plus automation tools. "Mission Leben" has created 700 sheltered work places and 280,000 jobs across Germany.

The inclusive innovation here is creating valuable work for people who are otherwise discarded. ICT is used for personalisation.



An example of frugal innovation is the “Narayana Cardiac Care” in India, the biggest cardiac specialist hospital network in the world. Only 8 percent of the global population can afford heart surgery. Narayana Cardiac Care does cardiac surgery for less than 3,000 U.S. dollars per operation (compared to 50,000 U.S. dollars in New York). And the quality at Narayana Cardiac Care is better.

Narayana Cardiac Care is inspired by Walmarts, McDonalds and Starbucks’ assembly-line quality with highly trained staff. They got the assets, they got the hospitals, buildings, machinery, equipment and trained staff. They maximise the use of those by business process reengineering and 24-hour workflow innovations.

This is frugal innovation. They are dramatically reducing the cost, not reducing the quality, and providing healthcare to a thousands of people. It is affordable, sustainable, excellent, providing healthcare to people who otherwise wouldn’t be able to get such care. It is “affordable excellence”.

One of the links underlying all 3 examples is the continuous asset squeezing. “In Our Back Yard” uses people’s time and enthusiasm and little bits of money. Identifying these assets, bringing them together and using them to create value is asset valuation. The same goes to all those 3 examples.

One of the perspectives of innovation is how to find out what these assets are across society? There are not just in the traditional places, not just in the banks, in the large companies, or in the SMEs or in the IT sector. They are in principle everywhere. How do we use those assets and bring them to bear, so we can all have a better life?

This can be linked to the circular economy and the circular society. The linear economy is about taking, making, consuming and disposing assets. The circular economy and society is about reusing things, not wasting assets. It is something that is so-called waste that is used somewhere else, in the same factory or system. This is a new paradigm.

On the supply side, we are moving from 20th century mass consumption and production to 21st century mass customisation. We are moving from Porter’s “shareholder value to shared value, and from abundant to constrained investment capital and resources.

The amount of innovation done across the commercial sector actually remains unchanged, despite the business booms and busts, but the quality does change. Those businesses and projects set up during bust-periods, when resources are constraint, on the whole do a lot better in the long-term than the others. Thus, throwing money to a problem is not always the answer. We are squeezing our assets also in that sense.

On the demand side, we are moving from the ownership and exclusive use economy to new forms of shared and collaborative consumption. Access is more important than ownership, e.g., through leasing: using a service rather than owning a good (mobility rather than car). And we are moving from consumers to pro-sumers and co-creators. We are moving to exploiting the assets in a new and better way.



Making this circular link, not just in the economy but in societies as whole. Innovation is not just about creating monetary wealth, it is also about creating community value, social value and environmental. This is one of the basis of Sustainable Development Goals, it is also embedded in Europe 2020.

Un-squeezed and un-valued assets equal wasted assets equal voiding huge environmental, social and economic benefits.

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Q&A

A comment from the audience referred to the presentation of Jeremy Millard, Danish Technological Institute: The city or regional level do very little in terms of squeezing assets, so there is duplication upon duplication of the same types of services etc, even by governments. That could be squeezed and money released to be much more productive.

Bror Salmelin, European Commission, stated that the Open Innovation Group had made a report exactly on that. The thought is to combine public sector services following the life cycle of a human being—where the services are meeting at events of your life and not based on the structures of traditional service providers. Take the example of when you are moving from one place to another. What is actually needed? Your identify, the time when you are moving and the place you are moving to. Absolutely only that, because all the rest of the data exits. Imagine, you were moving now. You would need to fill up a huge amount of e-documents to make your life comfortable. But the problem is that you, as the citizen, need to know too much.

The same if you get hospitalised. What is merging? Your identity, some existing medical data, some insurance data, some other financial data. And you as a patient, you need actually to take care of all those processes. And those kind of processes, elements and events are repeatable in Europe hundreds of millions of times per year. Why don't we think about having the citizens and the life events in the centre of designing next generation services?

Jeremy Millard, Danish Technological Institute, added that it is all about personalisation. People have different life events which cannot be always predicted.

“Squeezing assets” is a word coming from the commercial world. We are doing this on the supply side but not on the demand side. In the sharing economy, the collaborative economy and all the other economies, we are starting to do that on the demand side as well. But don't let us squeeze people.

The next question was about user generated content in the innovation process.

Bror Salmelin, European Commission, underlined that this component is part the ecosystems. In ecosystems you have the public sector, private sector, the people, the academia all working together in one. You can look at user generated content as a specific point, but when taking the users involved and active from the very beginning of the innovation process you are also stretching the boundaries for creating new markets. You really need to look at the user involvement very strong when you are looking at modern



innovation processes in the context of ecosystems.

Nonetheless, one interesting question is, what is the user's right in the data which he or she is generating automatically? We assume that you have copyright to your life, but does industrial enterprises assume that as well?

Jeremy Millard, Danish Technological Institute, added that it depends on what do you mean by content. Content also can include people's time and skills and efforts and money. It is co-creation when we do that between different actors and different places. There is data and this is the big thing now, but there are many other things as well. And in the public sector we don't just share data, we also should be sharing buildings, resources, all sorts of things.

Another question was "what would be your main message for educators, especially those of the higher education, in order to foster innovation?"

Michael Stankosky, George Washington University, gave the advice to challenge, to be curious, never take anything for granted, and to break it.

Stephane Grumbach, INRIA, stressed that academic institutions will be like taxi companies. The intermediation between students and teachers will completely change the education model, so that people can make a curriculum not by going to the university where they have to take the classes, select the professors and then get a degree from that university, but in a free way where they can follow classes and work with people from all around the world and validate what they have done on intermediation platforms.

The way the business model of education is organised today will probably disappear in the next 20 years. It is going to be slower than for taxi companies, but the principle is the same.

Bror Salmelin, European Commission, recalled what Jay Gillette, Digital Policy Institute, said in a former session. He spoke about the T-shaped competences. We need to have the broad competence and then we need to some specialisation area.

We will clearly need two types of new professions which are not supported by the current curriculum. First of all, the bridger. The bridger who really is a selected breed, you cannot train this. It is a selected breed of inherently curious people who are curious about absolutely everything, and who have guts to talk with absolutely everyone. And secondly, we need to have curators. Curators who, like in Art galleries, put together a coherent exhibit of knowledge and are responsible for the quality of that knowledge and a certain competence to be used by the bridgers. And that is a major challenge to our modern monolithic academic structures where you get credits for publications only.

Jeremy Millard, Danish Technological Institute, put some concrete words on what has been said: MOOCs (Massive Open Online Courses) and open education resources. Anyone can do anything anywhere today. The dangers are accreditation and the quality; these are important issues that hadn't been solved yet. However, health and education are two huge sectors where innovation takes place.

The last question from the audience was how can a society reach the state of being a kind of barrier-free or interest-free space to nurture innovation and at the same time do circular



innovation, where personal interests are not limiting innovation?

Bror Salmelin, European Commission, referred to open innovation 2.0. The starting point is really about creating a common vision, a common idea of the future. And then creating those environments where ideas can collide, ignite and develop further. And again, the ecosystem thinking, having all the stakeholders on board, can be a tool to create the greater good. Each of us has multiple roles in this ecosystems so we can be more or less egoistic in the different roles, but this is just a human factor.

Michael Stankosky, George Washington University, emphasised that innovation is not altruistic. People are not equal—they have equal opportunity, but all of us are different and we all have a different set of emotions and interests and alike.

Most businesses who innovate do so for their stakeholders that are relevant or focussed. Governments in a sense innovate for their public sometimes, but a lot of times they don't. And the history of mankind doesn't argue in favour of selflessness.

One has to accept the reality of that we all have different interests. If you find people who converge on those interests you might get something done. If you don't, you have like in America party systems that don't work. To quote Mark Twain: "No man's life, liberty, or property are safe while the legislature is in session."

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Session 4

Day 1 – Afternoon – Parallel Session

Connected and Personalized Health in the Internet Age

The chair and moderator, **GIAMPAOLO ARMELLIN, Head of Research Unit CRG – Centro Ricerche GPI s.r.l.**, Italy, [<http://www.gpi.it/>], opened the session and set the scene by addressing some relevant aspects concerning healthcare management and particularly focussing on what happens in the age of Internet

We are experiencing exponential growth in terms of available technology: According to Gartner, over 1 billion of smartphones (sold versus used—growth is slightly slowing down); wearable sensors (over 40 percent of new smartphones with biometric sensors embedded by 2016); the Internet of Things (over 26 billion objects connected by 2020).

The Internet is revolutionizing the science of medicine. A new ecosystem flourished and enhances innovative processes. The Internet is changing the way we think about health services, nevertheless humans are in the focus of health services. We have to think about knowledge management, information sharing and best practices. We have think about new (mobile) services for healthcare, and we have to focus our attention on the relationships and roles in these services. Technology is not the ultimate goal, it can be an enabler. Taking care of people means to focus on relationships and care and to use technology to improve relationships and quality.

CARMELO BATTAGLIA, Commercial Director Public administration and Institutional Relations, InfoCert, Italy, [<http://www.infocert.org/>], addressed the issue of how to make sure that digital information is properly owned, stored and made accessible only to the right users and for allowed purposes.

Who are you?

InfoCert is the first Certification Authority in Italy, and, with the chairmanship of the DTCE (Digital Trust and Compliance Europe) association, a European Trust Service Provider.

InfoCert designs and implements high-profile IT solutions for document dematerialization in different industries and countries. The company strongly believes in the benefit of the digitalization of processes, whether they are legal, private or public sector.

InfoCert has issued and managed more than 5.5 million qualified certificates of digital signature. The company is also a market leader for trusted services such as electronic archiving and long-term storage, with more than 600 million of documents archived, and registered e-mail with 1,5 million accounts managed.

In 2016, the eIDAS Regulation (electronic identification and signature) will enter into force.



This is an important step for Italy and Europe and represents a real breakthrough in the management of online dialogues between citizens and governments in all European countries. In this context the Italian government will launch the Public Digital Identity System-SPID, a public system using unique credentials related to the identity of each citizen to allow them to access all public services, including health.

Because of the social and economic importance of this initiative, InfoCert supports the role of Identity Trust Providers through the implementation of a system for managing digital identity in a secure, compliant and interoperable way. To achieve this ambitious goal, InfoCert, in partnership with other Italian companies and funded by the EU, has realised a project called Pro.CID.A (project for certified identity in the digital agenda).

Managing the digital identity in the context of healthcare includes managing a lot of highly sensitive information related to the patient. The tools that can be used in Italy to manage health information are the following: 1) the Electronic Health Record (EHR), which represents a set of digital documents and data relating to health, generated by existing events about the client covering his or her entire life. 2) The recently introduced Digital Patient Dossier, which doesn't cover the entire life of a patient, but only the relationship with one single healthcare provider. By combining these two instruments, InfoCert has created a tool to cover the entire process from data production to the storage in the EHR and the continuous sharing of this data between the patient and the healthcare provider.

In collaboration with the Venice Hospital, InfoCert has created a digital system to handle EHRs, which supports the most important processes of dematerialisation in healthcare. Specifically, InfoCert relied on the standard application that enables the management of individual clinic information using a documentary repository guaranteeing full interoperability between different companies. The process that has been dematerialised starts with the production of a diagnostic image and a medical report. Subsequently, such information is stored in a customer repository which is integrated with the InfoCert platform LegalCare.

Thanks to this integration, the documents are automatically sent to storage in accordance with the law. Then, the customer, through a specific interface, has the ability to easily access the document, use a search function and show responsibilities. By integrating this process with the management system for digital identity, healthcare facilities can interact with the patients.

But best practices are not standards. Despite the experience acquired in dematerialisation it is not possible to talk about a general standardisation of this process in healthcare. In fact, in various projects initiated by InfoCert, the company claimed that there are a number of critical factors related to data management. Such critical issues include the possibility for the patient to select the data to share, the rules or criteria for the storage as well the right about assess to this information by the healthcare professional who interacts with the patient.

EHR is a priority for 52 percent of the health structures, but there is no knowledge about cloud and interoperability. Moreover, there is no culture of digitalization of healthcare; 83 percent of the citizens don't even know what an EHR is. Only 1 out of 3 healthcare organisations has started a digitalisation project, e.g., online reservation. There is a normative lack in relationship between government and local administrations in defining standard models.

To find a system solution, it is necessary to act on the entire e-health journey. That includes the following 5 important aspects: The administrative processes; the patient's digital life; the



digital relationship introducing more and more initiatives, such as digital reservation; the integration and the interoperability with the public administration thanks to a unique and certified digital identity; and finally leveraging of cloud technology to facilitate the real-time sharing of information to improve efficiency and effectiveness of medical treatment.

To conclude, thanks to the eIDAS regulation, the digital identity will enable doctors and medical staff to improve assistance and patient care through the use of tools like EHRs, with certain guarantee of identification. The sharing of health information will be more effective and safer, allowing the patient to digitalize his or her “health life” with several benefits in terms of speediness and accuracy of diagnosis, but keeping control over the time.

A number of issues remain with respect to data retention as there is no European regulation on the cloud, just recommendations. There should also be a model of universal access authorization data, which must be given by the patients who should be able to revoke it in compliance privacy statements policies.

Trust Service Providers such as InfoCert will support the digitalization of health processes, being the “trust third part” able to guarantee the certification of identity and data sharing

KIM WESTERLUND, Chief Development Officer, Nixu, Finland, talked about security and privacy standards and the driving force behind cyber crime. How to ensure the cyber security of that data, for example from being hacked and stolen? Medical records can be extremely valuable to cyber criminals.

A legal analysis:
Data protection for digital(ised) human beings

Nixu is Nordic’s largest cybersecurity consulting company.

Technology itself can not inherently treat privacy and security. It is how we use it.

Cyber crime is a growing business. It is estimated by several studies that cyber crime has reached the size of the narcotics business. At the same time, people still think that there is only a very small chance that this could ever affect them—this applies to private persons, IoT-manufacturers, critical infrastructure, healthcare...

Criminals have always been good in monetizing whatever they can get their hands on, but they will go for the low hanging fruits. In cyberspace it has been, so far, mostly credit card records—this was the easiest way to make money. Lately, it is more and more ransomware. There is even a vivid ecosystem with successful businesses in helping starting cyber criminals. A drive-by download web toolkit, which includes updates and 24/7 support, can be rented for between 100 and 700 euros per week. DDoS attacks can be ordered from 10 to 1000 euros per day. Credit card details can be bought starting from 50 cent per card.

How much can you earn from stealing health records or sensor data? The following scenario, using fictive names, shall illustrate this:



Lets go to Chisinau, Moldova and meet Vlad. Vlad is interested in hacking and security. He has access to all the information he needs thanks to the Internet. He was only 16 when he learned to hack into less protected servers. He wants to make his dream come true and make his first million, which is 44,000 euros. Thus, he plans an attack against “My Health up Ltd.”. He has got many options to do it. Without going to deep into device server, trust relationship, privilege escalation, and lateral movement, he chooses one very easy and simple way. He develops a malware that gives him full access to Windows machines—which is not too difficult with modern exploit toolkits, such as Metasploit or BlackHole. Now, all he needs is to find a suitable target. With a call to the helpdesk and some LinkedIn-browsing he finds some outsourced helpdesk users of “My Health up”. One well-crafted email with a link to a web server, whose only purpose is to place the malware on the helpdesk users’ machine, and a few hours later, Vlad gets notified that his target is infected. Through the helpdesk users’ desktop, with stolen credentials, he finds his way to the “My Health up’s” data base.

How to turn this into cash? His weapon of choice is extortion. After getting the database sorted on his computer, he starts searching for some VIPs, where LinkedIn and Google help a lot. He selects 10 suitable targets, i.e., people who have probably something to hide, such as impotence, depression, alcoholism, cancer,The next step is to utilise a free ransomware toolkit to approach the target with some ransom letter and payment information—personalized letters with very private health, location, sleeping habits, information that gets the intention of those ten targets and that makes them pay a ransom of 5,000 euros on Vlad’s untraceable account. Vlad got his first million—but does he stop there?

How could that have been prevented or at least made harder? Service providers, IoT-enabled device manufacturers and cloud providers are not taking the risk seriously enough and there is not enough public pressure. It would take too long for the public opinion to consider data and privacy protection as an important safety attribute. Consumers will not have the ability to verify, they just want to have the trust. So, could regulations patch this lack?

The U.S. Health Insurance Portability and Accountability Act (HIPAA) is antiquated and inadequate. It doesn’t regulate online entities like Google or Facebook, which collect health data (intentionally or not) and could become major custodians of health data in the future. Despite HIPAA, 29 million U.S. health records were compromised between 2010 and 2013.

We don’t have the authorities to regulate IoT, big data, cloud, etc., but if every country invents their own standards and regulations, this becomes a heavy burden for start-ups and innovation.

Standardisation, open source libraries and public sector spearheads on the other hand nourish teams that aim for global markets. Privacy can not be assured only by compliance with legislation and regulatory frameworks. Privacy assurance must become an organisation’s default mode of operation. Standards should support initiatives, such as privacy by design. Insuring privacy and gaining personal control over one’s own information, and for organisations gaining a sustainable competitive advantage, may be accomplished by practicing the seven foundational principals:



- 1) Be proactive not reactive; preventative not remedial: Privacy by Design comes before-the-fact, not after.
- 2) Privacy as the default: If an individual does nothing, their privacy still remains intact. No action is required on the part of the individual to protect their privacy – it is built into the system, by default.
- 3) Privacy is embedded into the design and architecture of IT systems and business practices. It is not bolted on as an add-on, after the fact.
- 4) Full functionality – positive-sum, not zero-sum: Privacy by design seeks to accommodate all legitimate interests and objectives in a positive-sum “win-win” manner, not through a dated, zero-sum approach, where unnecessary trade-offs are made.
- 5) Having end-to-end security – lifecycle protection: Privacy by Design, having been embedded into the system prior to the first element of information being collected, extends securely throughout the entire lifecycle of the data involved.
- 6) Visibility and transparency: Privacy by Design seeks to assure all stakeholders that whatever the business practice or technology involved, it is in fact, operating according to the stated promises and objectives, subject to independent verification.
- 7) Respect for user privacy: Above all, Privacy by Design requires architects and operators to keep the interests of the individual uppermost by offering such measures as strong privacy defaults, appropriate notice, and empowering user-friendly options. Keep it user-centric!

We are the ones who have to set the baseline and make security an enabler for new innovation. It can be done, but not with ignorance and hoping that the industries will figure it out by themselves.

GIUSEPPE GRASSI, Director Cardiology Department, Venice Hospital ULSS 12, Italy, described the importance of using technology as an enabler to establish relationships and to provide services for inpatient, outpatient and at home in a seamless way. Maybe the term “telemedicine” is getting out-of-date and we should rather speak about “accessible services to care people”—and those services are accessible even from the management point of view.

From monitoring to caring

Venice is characterised by the historical centre and a myriad of islands which are more or less populated.

In other parts of the world, people use subways, cars or motorbikes. In Venice, transportation is not that easy, you have to take water busses, water taxis or water ambulances.

Moreover, there are no elevators in the old buildings which is a problem for the mobility of elderly people.

A city with so unique and challenging conditions has to look for innovative technological solutions.

In accordance with the strategic management, the Cardiology Department of the Venice



Hospital ULSS 12 has been selected to test all technology innovations that can contribute to improve the patient's healthcare, both in the hospital and at home.

The Cardiology Department of the Venice Hospital ULSS 12 uses a software system for the prescription of medicines. ePrescription of medicines has been consolidated, reducing both prescriptive errors and pharmacological interactions, as well as allergic reactions and misdosing of drugs.

Dispensing of medicines is also automated. Thanks to a dedicated software application and computerized trolleys the patient is identified (by a bracelet) and the proper medication and the right time of administration by the automatic opening of a specific drawer of the trolley.

The cabinet to store medications enables the robotic recognition with fingerprints, ensuring the precise identification of the drug, its expiring date and its storage.

Patients can be home-monitored after hospital discharge by supplying them with some digital devices that can measure critical parameters, such as EKG trace, body temperature, blood pressure, heart rate, SpO₂, or weight.

All these parameters are routinely assessed by a dedicated nurse and submitted to the doctor, who can modify the therapy without the need for the patient to go to the doctor's office for examination.

Venice with all its islands has been wired in almost all health districts; this allows digital health devices to perform evaluations of implantable devices such as pacemakers or defibrillators. For the new generation devices, a home-console is provided at the time of hospital discharge.

MARITTA PERÄLÄ-HEAPE, Director, CHT – Centre for Health and Technology, University of Oulu, Finland, addressed the issue of personalised connected health issues and personal data flows among users and applications.

Information Flows

CHT is one of the innovation centres in the Oulu Innovation Alliance which is a unique collaboration concept where the public and private sector is collaborating to raise innovation on personalized health.

A remarkable healthcare transformation is going on in Finland. Finland has a political attitude towards citizen-centred data-driven healthcare. The Finnish Government has stated that Finland will strengthen the citizen's right to monitor and control the use of their personal data and, at the same time, guarantee the fluid exchange of data between public authorities.

An efficient transformation of the healthcare field requires sustainable data practices. This requires three players to be in place: the end-users, the healthcare sector and the industry. People are very active in looking up health related information on the Internet and, at the same time, in quantifying and measuring themselves. There are initiatives ongoing in Finland, the UK and Switzerland to give citizens the ownerships of their data. One example is Datam.me in Finland.

There are more and more new players showing up—new companies that haven't been in the



field before. These companies have a very positive attitude towards the creation of new and more personalized services, but at the same time they can use data as a currency. Insurance companies are already piloting to even reduce the prices of insurances according to activity data. Furthermore, third party public authorities and public organizations are developing heavily new platforms and online self-management platforms.

But there are also challenges, especially in terms of security and privacy of the data. People are afraid that their sensitive personal data is abused by a data industry selling their lives. And, there is the risk of human errors and the risk of data being hacked.

At the same time, with all these data coming out from the various devices, we have to ask, whether the specialized public healthcare sector is really using the power of personal data, and whether organisations are really aware of the power of the digital services.

However, as the customers are willing to measure themselves and to share even the data they got from consumer services such as “23andMe”, healthcare providers have the problem to identify what data is validated and how this data can be feed back to the individuals. At the same time, there are new and very intelligent ways of analysing data, such as IBM Watson. So, the future will be very challenging and we have to reflect on how we will build the future.

How to make personal data really part of the services of the future? Seven Finnish organisations are currently working on the Digital Health Revolution Programme trying to put humans at the centre of controlling their data. Digital Health Revolution is a unique model allowing to find new ways of secure data transfer between services and across the sectors. The initiative also tries to simplify the API ecosystem where more and more services are created with different types of contracts between different organisations.

It is important to develop means of how to share the data in an easy format. Digital Health Revolution drives human-centric personal health data management and re-use by developing the MyData Architecture principles and implementing them in a concrete functional personal health management system.

With the data from different sources, people should be able to get a rich personal data profile of themselves and this data profile should be easily transferred across the services. This doesn't exist today.

The initiative selects service scenarios in order to identify the challenges, regulatory and privacy issues to be addressed. Another part of the research done is designing the services together with end-users and healthcare providers. This type of MyData model will create new global business opportunities for companies.

The analysis of the personal data and a learning healthcare system will be a new opportunity for the public and the private sector. This domain solution can be created more rapidly thanks to a novel architecture called MyData architecture as well as analytics, visualisation and knowledge tools which are by default open source libraries.

In terms of the benefits of the MyData approach for the 3 key players, i.e., the end-users, the healthcare sector and the industry, individuals will get better ways to interact with companies and public organisations and at the same time, the personal data is exploited in new care models. Moreover, new businesses are created based on end-user needs.

The initiative is also creating easy-to-use tools for personal data management and new tools



for decision-making based on rich data. It is also providing the industry with tools to integrate third party complementary services into core services.

Individuals will get increased privacy and transparency when using the data; the healthcare sector will get new risk management tools; and the companies are getting more business because they strengthen consumer trust and engagement.

ANDREA SANDI, Founder, SINTAC, Italy, provided concrete practical examples of how digitalization transforms the healthcare sector.

Tailored is better

Issued from a family of goldsmiths, Mr Sandi started with the creation of jewellery, using computer-aided design (CAD) techniques and Selective Laser Sintering (SLS) machines. He ended up tailoring medical devices.

Medical applications for 3D printing are a growing challenge. Customized medical devices, prosthetics and implants, can improve the quality of everybody's daily life or might even be life-changing.

[A short video presenting the potential of this technology for the creation of surgical implants and prosthetics was shown]

Mr Sandi explained how showed how to define a physical model to craft a personalized prosthesis by a 3D printing

Starting from digital images, innovative 3D printing allows to create customized, patient-specific implants and prosthetics. Thanks to the technology the patient will be able to live a normal life.

Tailoring will no longer be only for few people, it will be accessible to the general public thanks to this technology.

MICHELE THONNET, International eHealth Affairs Executive, Ministry of Social Affairs, Health and women rights, France, discussed the opening data to evaluate and improve quality and performance of healthcare services. Many issues still last when services require coordination and data exchange across borders.

Opening data and borders

Despite the different national health care systems, most countries are facing the same challenges: Increasing health demand, increasing complexity of situation due to more and more non-communicable diseases and poly-pathology patients, but also due to a lack of appropriate medical staff—not only in rural areas. Moreover, health is a very complex sector with number of actors involved. And last but not least, health is subject to financial restrictions.

We always speak about the complexity of health and the various difficulties, but we should not forget that healthy people live better, are able to work and contribute to economic growth. Moreover, the health sector is an important employer all over the world.



Regardless of how we name it, e-health, telemedicine, connected health, etc., people have very high expectations of technology, e.g. improved quality of life, better quality and access, secure practices, the use of innovative tools and services. But this is not that easy. The first problem is to involve all the actors at the right moment and the right place, not only patients and health professionals, but also the industry and the payers.

The question of openness, open data and open borders, has definitely be answered with 'yes' for openness. This could be data but also the sharing of codes and coding systems. It could also be about a standardized platform, as we need m-health Apps etc. Yet it is not always a question of technology, it is more about an open mindsets of the actors and their willingness to co-operate.

With respect to ownership of data, ownership is probably not the question. It is more about the control in order to be able to allow access or not, and for which usage. And how to deal with the consent of the people, both as patients and as citizens? Because if you change your position you might have a different behaviour regarding consent or regarding privacy. You will probably not react in the same way if you are healthy or ill. There is not one way of handling the consent process for one person. . In any case (but especially in case of reuse of data), traceability is key. And finally, everything is about liability, confidence and trust.

Open data is not sufficient. We need to connect not only data and objects but also people. Therefore we need to be aware of what we can do and what others are able to do with the data, which requires a mutual understanding. This is related to the issue of semantics— semantics between different languages, between specialists and GPs, between hospitals and private care etc. People have to understand each other either directly or (able to exchange information) through “machine to machine” readable unambiguous mechanisms

It is also about willingness and interest. Because the ones who conceive and develop a product are not always aware of the evolving needs of the one who is supposed to use it. Especially in healthcare, at least in France, the payers are not the beneficiaries and the user is not the one who pays for. This could influence the way products have to be conceived and used.

Sharing data (even across borders) data could bring many advantages because not only citizens and patients but also health professionals are mobile.

Another element is transparency. Open data means more transparency; it allows to benchmark hospitals, specialists, doctors etc. But if your health system permits to design and /or report medical acts in a way that allows some hospitals to get more money , there won't be real transparency.

Another argument is the improvement of quality. EHR, PMR increase transparency and it is good if the medical doctor could share information. However, the record's summary often contains the personal notes of the medical doctor who don't want to share this with others, including the patient.



The same goes for the reuse of data. Reusing the data requires to have some kind of rules in place regarding

- confidentiality, security, accessibility to authorised parties for a given usage (with patient/owner consent), availability, usability,
- but also a trust environment (validated sources,..), a common framework to avoid misunderstanding and allow to gather/analyse/compare the data.

Why is it so difficult? Because healthcare is a very complex and specialised system where goods are alive and unpredictable.

This is the reason why European countries decided, some years ago, to cooperate trans- and cross-border, even if health is a national concern in Europe. As the EU has no possibility to regulate anything in the health sector, they tried to support and co-finance some kind of cooperation. The EU also tried to facilitate the adoption of international standards for interoperability, however not specifically for health, because the health sector could use and re-use existing horizontal standards when apply. For instance, identity is very important for health and the eIDAS regulation on electronic identification and signature paved the way for more security in (e-)Health. Trust is definitely a very important enabling factor.

If you want to be cared outside your own country with the same quality as if you were in your own country, countries have to cooperate at all levels—not only the technical level, but also the semantic one, the organisational level and the legal level, because Interoperability is key at all levels and especially important “on the fly” someone has to be liable if some kind of unexpected event happens.

Identification is not enough. You have to identify and authenticate all the actors, not only the patient but also the healthcare professionals. If you go on internet and ask for a medical advice or travel to another country and someone claims to be a medical doctor, this might be true or not...

There is a very important prerequisite: It has to be sure that the data are available and authentic. Thus, it has to be verified that the data is valid, integer and unambiguous.

With regard to the data transfer, it is very important to have international standards but also profiles, i.e., a set of standards applying to specific use cases or scenarios. The so called ISO house model was transformed in a similar one dedicated to Health—incorporating and building upon (not health specific) transversal building blocks (needed for the infrastructure), while others are designed to be health specific at a national, European or international level, prerequisites (to guaranty cross border interoperability) to be discussed at a European or international level. The use of the diverse components of this Health model will be customised by each country depending of their own respective priorities derived from their e-health strategy.

Despite the fact the health is a national concern, efforts are underway to deal with some kind of governance on the EU arena as most of the countries are facing the same challenges on top of the increase of the citizens mobility across Europe.

Within the framework of a 3 years multi-work programme, some guidelines and best practices, including the corresponding standards and profiles on cross border patient summary and on e-prescription, have already been adopted at the EU level by the official eHealth committee composed of the Member States ministry of health representatives.

This policy agreement is to be followed by an operational phase. The operational



involvement of each Member State will be driven by the establishment of a national Contact Point for eHealth (NCPeH) which will be liable and guaranty the trust and interoperability needed to exchange securely personal health data between countries.

This will pave the way of a global ecosystem based on a common agreed framework. Such long-term rules have to be maintained by an independent and neutral body in order to be sure that the rules are the same for everyone and evolve with respect to the upcoming needs.

It is important to verify the integrity of the authentic sources and to build upon in-use adopted standards and profiles. This has been already tested at European level on different use cases and within large scale pilot projects involving all the different players.

Transversal building blocks, e.g., for e-identification and e-notification, have already been designed in order to be able to reuse tools and data in different domains and services. It is envisaged to establish 5Ps (private public people patients partnerships) and also to design new basket of incentives to innovate in procurement.

To be able to reach a consensus and implement such a global framework, an evolving and iterative process is needed, which is neither top-down nor bottom-up but a balanced process involving each and all the stakeholders as design and implement in the eHealth European interoperability Roadmap (see the clepsydra model of CALLIOPE.eu 2010).

MADIS TIUK, Senior Advisor, SITRA – Finnish Innovation Fund, Finland, [<http://www.sitra.fi/en>], underlined the need to think outside the box. Properly communicated healthcare policies, effectively spread prevention and good practices enable a universal health vision, that could be enhanced by welfare initiatives developed by private companies and institutions.

Knowledge on health

The Finnish Innovation Fund is not a fund providing money for the realisation of projects, even if there are some pilots supported by SITRA. SITRA has realised a number of concepts and white papers and is doing a lot of lobbying.

We have to understand that health is not only the care. Only a very small amount of our health (10 percent) are determined by what we can do in healthcare. There are many other determinants influencing our well-being: environmental and social factors (20 percent), our genetics (30 percent) and of course our lifestyle and behaviour (40 percent).

SITRA has built the concept of the “virtual clinic” and service flow as an example of what can be done with data:

Imagine 1000 citizens. Within one month, 800 of them have some health related concerns. In today’s environment, 329 of them are entering the healthcare system as patients, but 406 are finding solutions on their own. How did they solve their problems? Did they google, or went to their neighbourhood? We simply don’t know, because we don’t collect these data. As professionals, we don’t care. We haven’t thought that maybe there could be some hint of how to solve the problem—not the symptom, but the problem.

All this big data, open data, and all these interactions are already there. Another important aspect is security. Security is not just to authenticate persons and systems in a strong



manner, but also usability, accessibility, availability and the integrity of the services. We can suppose that the design process has already taken into account all these different dimensions of modern digitised services.

What is the “virtual clinic”? Imagine, you wake up in the morning and you have some pain or just bad mood and you try to find some reason for that. Instead of calling a doctor immediately, you start some searching process. The virtual clinic offers services where you can upload your problems, but you also give the consent to retrieve the data from the existing data sources (medical records, personal health records, some environmental tracking, mobile devices...). As the owner of the data, you give the consent to the service and you make a kind of virtual health check of this data.

After this health check, you can use different analytics, such as Watson or a decision support system, and then enter two different systems: The first one is the existing healthcare system; as you have already narrowed the problem and narrowed the services you need. The second option is to get some coaching, for instance to get some (written) explanations about the reason of this symptom.

Regarding the different kinds of data and how the data is collected, medical professionals collect the data through the electronic medical record and individuals collect this data through their personal health record—and if people can access the data, they can use this new virtual services.

There is some evidences that using such kind of system before making your own decision, the need for real medical service is about 20 percent, i.e., 169 persons of the 800 cases. In today's system it was 329 persons. You can split this demand to the half and those who really need quick care can access faster and more précised services.

There are also other opportunities: One could build a marketplace for service providers, have different formats of risk analysis and lifestyle coaching, and of course people can use the data for other services, as they are the owners of their data.

According to a U.S. study, 54 percent of the people would use the possibility to measure their vital signs at home with a device attached to their mobile phone. About 47 percent would use the possibility to check an ear infection using a device attached to the phone.

There are a number of devices available but they are all separate and the “virtual clinic” could connect them.

We are just entering to the world where we are not just collecting health related data, but we also analyse it and can make some knowledge out of this and feed this back to the healthcare service providers. First pilots, testing some aspects of the “virtual clinic”, have been already carried out in Finland.



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Q&A

The chair and moderator, **Giampaolo Armellin**, GPI, opened the Q&A by addressing the question concerning a more ample meaning of bio-compatibility of technology. Is technology compatible with human beings?

Giuseppe Grassi, Venice Hospital ULSS 12, explained that one has to distinguish hospital technology and home technology. In the Department of Cardiology hospital technology helps optimising the resources in order to administrate the more appropriate medication. In the context of hospital technology, a machine recognises the person and supports the administration of a substance. The risks of dosage errors, drugs interaction or allergy are lower when the doctor is at the bedside knowing the medical history or recent X-ray CT scans. Hospital technology is, to some extent, approaching the work of doctors and nurses.

Home technology creates the umbilical cord between the hospital and the patients. The bi-directional data flow is very important because the patient maintains a direct contact with the doctor. In the context of home technology, technology is no longer a simple data detector, but a connector between a patient and the doctor. It is like bringing the doctor to the patient's home, who comforts the patient and intervenes, when necessary, with a therapeutic modification. Knowing that the vital parameters are transmitted and evaluated by his cardiologist provides security and the tranquillity to the patient at home. However, this technology has to be understood as a tool to be used when it suits the patient's need. It has not to be imposed as only solution to the problem, but as an alternative to bypass obstacles.

Maritta Perälä-Heape, CHT, added that the healthcare system is based on the acceptance that citizens are not very active in managing their health. It is a problem that we are not really developing personal health technologies. A lot of development efforts are going in such a way that organisations are trying to cut their costs—which means just digitising the processes that they are doing today on paper, often they are not even digitising processes. We have empower people in order to make them active, taking care of their healthcare. This really means that we have to have personal health technologies that are consumer friendly and plug-and-play—whenever you need it and anywhere.

The moderator then asked the panellists about the accelerated growth of innovation. Should that be a continuous growth? What limits do we have to consider?

Madis Tiik, SITRA, stressed that many things are already existing. The problem is that this healthcare system and this legacy organisation is hundreds of years old. It is not easy, and sometimes almost impossible, to fit these new technologies and new services and new thinking into the old system. This is why many of these new technologies are growing outside of healthcare. The existing new working clinic health kiosks are part of the healthcare market, however, at the moment they are not considered as being part of healthcare because healthcare is not able to change. The change is happening anyway and the sooner the healthcare system will change, the healthier the citizens will be. It is very difficult to fit these new things into the existing environment.

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Session 5

Day 1 – Afternoon – Parallel Session

Digital Life/World: Empowering Society

The session's moderator, **JULIA GLIDDEN, Managing Director 21c Consultancy**, United-Kingdom, welcomed the participants and briefly set the scene by introducing the focus of the following presentations.

As the topic of the panel was very broad “Digital Life/World: Empowering Society“, the idea was to add some focus to it and link the topic of “the digital life for the digital world” to one of the UN sustainable development goals—17 goals that Member States have been working on for the last two years and that just has been ratified by the General Assembly. IT has a really powerful and critical force in driving sustainable development. One of the areas the panellists will discuss and kick-start some ideas is the relationship between IT, the sharing economy and sustainable development. The notion of sharing that IT facilitates puts a whole new challenge to the consumptive, and to some extent capitalist, focus on acquisition of goods and constantly buying and selling and replacing. It leads us not just towards sharing and having a less material life, but also concepts of the circular economy and not concepts of constantly buying, throwing away, buying, throwing away... but borrowing and sharing in a manner that brings people together.

The chair of the session, **STEFFEN NERDAL, Chief Strategic Officer, Ascella AS**, Norway, [<https://www.smartdok.no/>] presented a real experience of how digitalisation works in a specific industry—a success story:

SmartDok: Smart Digitalization of B&C

SmartDok means smart digitalisation in the building and construction industry. SmartDok is the Nordic leader in this industry.

The company was founded in 2005. Ascella AS is a one-product company (SmartDok). It has a 2.5 million EUR turnover in 2015 with around 700 customers in Norway and Sweden. SmartDok has around 24,000 users. Ascella AS is located in Alta, Norway (14 employees), with a subsidiary opened in Stockholm, Sweden, two years ago (2 employees).

SmartDok was developed in 2005 and has been continuously developed since then. It helps entrepreneurs to build more efficiently in terms of process optimisation. SmartDok supports the entire documentation process from the beginning to the end of the building process through smart digital solutions. It is composed of 9 extensive modules (time hours, machine hours, goods produces, goods used etc).



In terms of strategy, the company is long-term oriented, very knowledge-intensive and fully integrated. Moreover, the company is very specialized and focuses only on one industry. Ascella AS is an expert in the building and construction industry.

The building and construction industry is a very conservative industry. Everything was done with pen and paper and there is very little ICT knowledge in this industry. The challenge of Ascella AS was to succeed in this environment. The solution the company proposed was digitalisation and the IT-solutions have been developed together with their customers.

SmartDok was developed using the right technology and with great market knowledge. SmartDok increases the quality of the work as well as cost efficiency. The use of SmartDok leads to more effective processes and less errors. It is also much more environmental friendly.

By 2019, the global construction industry will have a turnover of \$10,388.6 billion. The European construction industry has 15 million employees. The construction sector contributes about 16 percent to the GDP and the objective is to raise this to 20 percent of the GDP by 2020.

SmartDok's international vision is to empower the society by helping the development of Smart Buildings in Smart Cities in a Smart Industry.

The moderator followed-up with the question, "what are your thoughts in terms of the way a company like SmartDoks and shared and open data can contribute to the shared economy?"

Mr Nerdal stressed that Ascella is still a small company with a large market share in Norway. Once SmartDoc will play on an international stage, they have a lot to contribute. There are so many hidden things in the system in terms of cost estimation or using it for open source for BIM (Building Information Modelling) technology. There are so many unexploited things in the system—and there is so much interesting data in the system. It is captured, but Ascella has not the time to analyse it.

There is much they could contribute with in terms of how a building or construction company should work effectively. It is like a "candy store" for academia because there is so much one can learn from SmartDoc and Ascella AS doesn't have the time, nor the skills to analyse it. However, Ascella AS is very open do this due to the company's a global mindset.



TIM KELLY, Lead ICT Policy Specialist, World Bank Group, gave an inside into how the World Bank is handling the issue of the sharing economy in the upcoming “World Development Report”.

Digital Life and the Sharing Economy

The “World Development Report 2016”, which is the World Bank’s flagship report, is this year on the theme of “Internet for development”, to be published on January 14, 2016.

The World Bank tends to reduce everything down to economics and in this particular case, in trying to understand the way that digital life impacts the sharing economy, the World Bank thought of it in terms of transaction costs and how reduced transaction costs in the digital economy help to create inclusion, innovation and efficiency. Those are the three drivers of the Digital Economy, according to the World Development Report.

If you think of a sharing economy platform, like Airbnb or like Uber, it really includes these three mechanisms: on the inclusion side, house owners and car owners that previously were excluded from the sharing economy are included through the platforms that they have created. On the efficiency side, it is much easier to find a hotel, or to find a ride through platforms like Airbnb and Uber. And on the innovation side, we see innovation in platforms like M-Pesa in Kenya or e-commerce platforms. Those are also the three mechanisms driving the sharing economy.

But the digital economy very quickly comes into conflicts with the analogue economy. In the last week we have seen, for instance, the streets of São Paulo in Brazil come to a halt as conventional taxi drivers from the analogue economy protest against the perceived advantages given to Uber drivers from the digital economy.

Increasingly there will be areas of regulatory uncertainty where the digital economy and the analogue economy collide. And in all of these areas -- professional services, universities, bricks and mortar stores, in building and construction -- we will increasingly see the sharing economy bring the digital economy into conflicts with the analogue economy.

In the light of the recent survey that the EC has launched on the two-sided nature of the platforms and competition and the survey the UK House of Lords has launched to feed into European survey, Mr Kelly was then asked to give some quick thoughts on that:

Mr Kelly explained that countries are trying to find out what the two-sided economy really means. São Paulo was brought to a halt, and in June, Paris was brought to a halt by protests over the rise of Uber. As a general principle, there is nothing that special about the internet. People doing business on the internet are not that much different from people doing business in the real world. Ultimately, we can have an equilibrium where we have a level playing field between the analogue economy and the digital economy.



EIKAZU NIWANO, Producer and Director of Produce Group, R&D Planning Department, NTT Corporation, Japan, was presenting on behalf of Prof. Nagaaki Ohyama, who could not attend.

New e-ID card in Japan
~ cyberspace passport ~

What happens in the Information Society? Our daily social activities are expanded into the cyberspace in addition to the real space. Since both spaces have different characteristics, the selection of the spaces should be definitely up to the users. From a user-centric point of view, ultimate convenience could be provided by a cyberspace passport that identifies the card holder and any kind of personal information; e.g., certificates of license, membership and secure payment through on-line services.

Examples of social activities in the cyberspace are going shopping, going to a hospital to see a doctor, banking activities, or going to school or to a library.

When we are going to do certain social activities, we take with us cash or a credit card, both for shopping, medical insurance certificate or medical treatment. This means that everything indispensable for social activities should be electronic so that their functions can be digitally performed. We can roughly identify two categories: one is a concrete object, such as money or a signature; the other one is an intangible asset, e.g., a right (election, medical care, ...) or a duty (tax, education, ...). This is the reason why e-ID could be a key device for convenient and secure social activity in the cyberspace.

The new Japanese e-ID card is currently under preparation. This e-ID card (or My Number card) will be issued from January 2016. My Number card will support both digital signature (non-repudiation) and personal authentication services. The certificate of authentication service is anonymous and does not include any personal information.

My Number card will be issued on request without any charge. 15 million cards will be issued for a first deployment, up to 130 million cards will be issued once it is fully used for online validation of medical insurance. Field tests were carried out in February 2015, to show that My Number card can be used for multiple applications: the validation of medical insurance, credit card payment and CATV and a prototype of the cyberspace passport.

In order to enable a concept of multi-application using My Number card, all these applications are linked by making a table of the serial number with insurance certificate ID, customer number or credit card number. Therefore it is not necessary to download any additional application when adding a new a service to the card.

To conclude, the credit card and paper certificate could be recognized as attributes of the card holder. Therefore, the new e-ID card together with PKI service could be a cyberspace passport. The selection of the private sector's services is up to the card holder. Successful field tests of new e-ID card were carried out last February in healthcare, credit card and cable TV areas.

The moderator then wanted to know, how to add new applications to the card.

Mr Niwano clarified that, except of linking the membership number to a serial number, the procedure depends on the services. To take an example: The card holder chooses an application and requests to get a membership number. Then, the service provider may check



the status of the card holder and if the status is “yes”, it issues the membership number. Then, the card holder sends the certificate of the personal authentication and the service provider makes a linked table of the membership number and the certification number.

ALFREDO RONCHI, Secretary General EC MEDICI Framework, Italy, advocated a broader conception of security and safety.

Citizens in the Digital Age: ICTs safety & security

The idea is to extend the studies and try to create a common umbrella not only for cybersecurity but for any kind of technology solution that will range between security, safety and even disaster prevention or recovery and management.

If we consider safety, we have natural and human disasters but also infrastructure, transportation, safety at working places and our every day life, health, ...

If we speak about security—apart from cybersecurity, we have human security, security of goods, assets and items (including food, drugs, etc.), but also the security of ideas.

Some actions in this field: On the occasion of the 10th World Summit on the Information Society (WSIS) in May 2015 in Geneva, a group has been created in order to support the idea to enlarge the scope of action line C5. Building confidence and security in the use of ICTs. This group will have the possibility to discuss at the Preparatory Meeting of the WSIS in October at the United Nations Secretariat, New York. The hope is that this will lead to a new programme for the follow-up of the WSIS.

To conclude with an example, Grillo is a compact device, a cube, created by a group of young Mexicans, in order to provide citizens with an early warning system in case of an earthquake.

The moderator then followed-up with the question concerning the mentioned four aspects of cybersecurity (safety, security, disaster prevention, recovery and management) taking us away from a more technical aspect to a more human one in terms of the era we live in and how we deal with disasters in these areas. Why those four areas?

In order to be more explanatory, Mr Ronchi referred to an example of the technical university he is teaching at: There are a lot of skills related to security and safety in different departments. However, in each department, people used to work as stand-alone researcher and no one tried to mix up the knowledge, the different skills in order to improve the potential of the group. It took 10 years to put all of them together and to create a cluster of people consisting of chemical engineers, structural engineers, mechanical engineers, people from the information science etc. and to create a small unit of about 50 people that share the same concept of security. During the very first meeting almost every participant declared learning something from a colleague coming from another sector and the usefulness of transferring this to the own sector. Starting from this small nucleus a kind of international group, a joint research group, has been created aggregating additional forces in order to improve this holistic vision about risk assessment in general. This is very closed to what was mentioned in the presentation: the idea to put together things that are usually separated.



PAUL WORMELI, Executive Director Emeritus, IJIS – Integrated Justice Information Systems Institute; Innovation Strategist Wormeli Consulting LLP, USA, took a little different perspective and addressed the intersection of ICT and the sharing economy from the perspective of a CIO and the CSO, whether in a government agency or a private agency, and also from the perspective of law enforcement and criminal justice agencies who have to deal with the violations that occur in cyberspace, which is generally called cyber crime.

Information Safeguarding in the Sharing Environment

When thinking about the sharing economy, we know that the millennial generation stopped buying assets, they don't buy cars, they don't buy bicycles, they don't buy houses and this has enormous economic impacts.

One of the key things that we can understand better in thinking about the opportunities and challenges in applying ICT to this field is reflected in the fact that this is a different model of operation for the economy that requires a very different mindset, particularly if you are concerned about defending yourself against the possible intrusions into those systems that you called upon to protect.

Four truths about this sharing economy were brought up for discussion:

1) The sharing economy is dependent on information technology in a whole new way that we have never seen before. In the early days of the use of computers in our society relative to economy, we used computers to count things. And we are quite happy to automate those processes that we used computers for. But in the sharing economy, IT is the core of what enables the sharing economy to operate. How would Uber even be in business without a mobile App and a smartphone to run it on, not only to recruit passengers but make drivers operate?

2) All of the applications that we see in the sharing economy are so much more dependent on this technology than prior versions of our economy. It takes a little different thought process and it let us understand, and certainly companies like Uber and Airbnb and others, that information is an extremely valuable asset and requires safeguarding, perhaps more than it used to be with simply our financial accounting system.

3) We also know that the growth of the sharing economy is dependent on establishing and upholding trust between the users and the systems that make this economy operate. Without that trust, without people being willing to use the mobile App and putting their credit card through whatever system it is that they are using to rent assets. Without assurance that that data is being safeguarded these elements of the sharing economy would not likely succeed.

4) We also need to be aware of the fact that our ability to respond to the kinds of violations of trust that result in the perpetration of cyber crime is very poor. In fact, one of the key problems in the U.S., and probably in most of the world, is that we don't even know how much there is. We haven't even quantified the amount of cyber crime.

Corresponding to an estimate realised from a number of sources, the cost to society of cyber crime is now nearing U.S.\$ 1 trillion a year—that compared to estimates of narcotics abuse of around 600 million on a global scale. Cyber crime is so much of a mainstream activity and many police agencies throughout the world have no idea how much there really is. This is a problem that many police agencies, including the UN Office on Drugs and Crime, is trying to deal with.



But we are getting better with the technology. It is not a hopeless situation, we are improving considerably in our ability to do things like manage intrusion detections.

The real key that has been well-established by the people in the cybersecurity world is this concept of defence and depth. Any good CIO or CSO is going to make sure that there are a variety of measures that perhaps may fail on their own, but would not fail as a the whole problem that is presented to a potential hacker.

It is clear to all those working in this field, that insiders being careless or intentional are still the largest threat to our collective life. It is people who fail to update, to install the patches on their software, to those who are angry with their employer and decide to take some kind of action involving the computers that are the most difficult to deal with. The threats are migrating and from the law enforcement perspective, one of the biggest concerns people have is that organised crime and nation states are getting involved in this cyber crime business in a huge way—and it is not something that the average police agency, whether it is in the U.S. or any other country, is trained to deal with. This is an enormously difficult problem. And they are finding new targets.

One thing that is most troubling about all this, from a protection perspective and from our ability to deal with this as an national problem, is this enormous exponential growth of data. It is not just the Internet of everything, but the growth in data, just the normal everyday data. We are gaining data at a rate of 2.6 quintillion bytes per day. In the last 18 months we have digitised enough data that's more than the entire Library of Congress in the U.S. has in its entire collection. And this is not getting better, it is getting worse from the standpoint of what we have to protect.

We have to figure out a way to be faster, better and cheaper in dealing with these threats to our security in cyberspace.

The sharing economy is all about the theme of community. The moderator asked how can communities of interest, communities of people, communities where we live/ neighbourhoods work with law enforcement to tackle some of these problems?

Mr Wormeli stressed that there is an aspect of crowd sourcing which applies to dealing with these kinds of problems, just as we talked about in many other aspects of government and civilian working together. And letting the police know about these kinds of problems is important. People have to learn to understand that, without the data about what is happening, the law enforcement can't operate effectively and they can't get the intelligence they need about the methods and operations of the offenders who are attacking our systems. It takes a collaborative effort. It really is co-production, which means a way for us to attack and deal with the enormously fast moving of cyber crime.



NITYA KARMAKAR, Professor MQC – Macquarie University, Australia, presented an academic point of view on

Creating an Environment of Innovation:
challenges and opportunities in Australian context

Innovation is not possible without that advanced knowledge of science and technology. Knowledge is the asset. But, how to create this knowledge? Everybody knows data, everybody has the information, but very few know how to utilize that knowledge.

Other aspects to be addressed are: What are the catalysts for the new wave of innovation? Innovation and economic development; both are very much interdependent. And overcoming innovation challenges. Innovation is not easy.

There is this very interesting book of Peter Thiel “Zero to One”. Innovation leads to something new. Ultimately, it will give some sort of the importance to the economy and to the people. And will bring a lot of benefits.

As stated by Sir Ben Lockspeiser, First President of CERN Council, “scientific research lives and flourishes in an atmosphere of freedom-freedom to doubt, freedom to enquire and freedom to discover. These are the conditions under which this new laboratories has been established”.

Innovation is creativity plus commercialisation, but is also proximity plus convergence. Bill Gates once said, “Microsoft ‘s only factory asset is the human imagination”.

Albert Einstein said, “if I had an hour to solve a problem, I’d spend 55 minutes thinking about the problem and 5 minutes thinking about the solution”. “The greatest enemy of knowledge is not ignorance, it is the illusion of knowledge.” (Stephen Hawking). Innovation, creativity and entrepreneurship are about knowledge-creating new possibilities through combining different knowledge sets.

The new wave of innovation is Internet between business opportunities and citizen expectations: New ways of innovation, the development of Social Networks, the impact of the Internet of Things (25 billion connected devices by 2020 to build the Internet of Things—three for every person on the planet), and the creation of business value through trust.

Innovation has been defined by the Business Council of Australia as “the application of knowledge and technology to create additional value. Innovation can be incremental, or it can be transformational. At its core, demand for innovation is driven by the need to find solutions to problems. Innovation is essential to achieve the next wave of growth and investment in the context of significant global forces of change.”

The first electronic calculator for people with vision impairment has been developed in at the Macquarie University, Australia, as well as the wireless Internet technology and the Macquarie Dictionary.

Nobel laureate professor Brian Schmidt has been announced as ANU’s (Australian National University) next vice-chancellor. Schmidt, who most recently made headlines calling for the establishment of a national agency to address Australia’s poor track record in science, technology and innovation, has worked at the university for 20 years. He won the 2011 Nobel Prize for Physics and will be the university’s 12th vice-chancellor.



Australian key inventions that changed the world are: the black box flight recorder(1961), the electronic pacemaker(1926), Google Maps (2003-2004), the medical application of penicillin (1939), polymer bank notes (first circulated in Australia in 1988), cochlear implant (bionic ear, 1978), the electric drill (1889) and gardasil and cervarix cancer vaccines (2006 by Professor Ian Frazer).

Australia's most recent innovation is "Tribesta": lets you alert mates and loved ones when you're in trouble. (Click on the 'watch me' function to let flatmate or partner to know where you are and that you're OK. Click on the 'alert' function where you're feeling vulnerable). The Sydney-based founder of Tribesta Kathleen Kenny, has been working on the app for almost five years.

In his best-selling book "The World is Flat: The Globalised World in the 21st Century", Thomas Friedman argues that developments in technology and trade, in particular ICTs, are spreading the benefits of globalisation to the emerging economies, promoting their development and growth.

We have to built on knowledge and reputation (other wise there will be no trust). We have to built on disruptive technology and economy, built on commitment and trust, and, last but not the least, innovation is built around managing risks.

As Bill Gates said, "when you have money in hand, only you forget who are you. But when you do not have any money in your hand, the whole world forgets who you are!" Innovation and creativity are vital to economic growth. Wealth is the by-product of big ideas—for big ideas you need concentration, thus balance mind, body and soul. Technology and knowledge are needed as catalysts for innovation.

ALI KONE, Chief Operating Officer/Co-Founder, Coders4Africa Inc, USA, gave a perspective from Africa on the drivers of the sharing economy and the associated shift in mindset.

Technology is one of the biggest enablers of the sharing economy. We are more connected than ever, we have more data, but most importantly we have more knowledge about the behaviour of the people and the impact of what people are doing. This is a sort of catalyst where people can do things faster than easier.

Another significant driver is the community. Because there is a community actually using and willing to share the information that makes it possible. For instance, in Africa, you can find people in very low positions. Some of these people have Facebook accounts or Viber but they barely know to read or write. They will go to the studio lab and take a nice photoshoped picture and put it in Facebook. Today, People are engaged and are willing to share. If you give them the tool, they will participate.

Another important driver in the context of the sharing economy is the global recession. It placed a lot of burden on people and people have to be very cautious on their purchase and behaviour. They have to think before they buy because money is limited. They have to worry more about practicality instead of just consuming for fun. Most of the people that are low income are upon the sharing economy and share in the field they feel comfortable with.

Moreover, regardless of income, if people know that they will make money out of their goods



or their position, they will be upon to share some of it.

Another driver is people thinking about the future—whether it is the future of a society or the future of their environment. They relate all these things to sustainability. If you can do things that are environmentally friendly or better for the economy or for the society, you will feel good about it and a lot of people think that the sharing economy is the mean to do that.

From the perspective of Coders4Africa, there are number of principles that need to be adopted to the sharing economy in the context of the UN Sustainable Development Goals. They present an opportunity, but we cannot change our mindset if we didn't approach these problems.

Simplicity is one of these principles. We have to think about simplicity now—not only simplicity from the point of view of the user, but simplicity in terms of government policies being able to do things easier.

Transparency and traceability in the context of security are another principle.

As regards the innovation front, this is really context based. Whether people are in Europe, in the U.S., in India or somewhere in Africa, they have a different context, therefore one can not think about the challenges in the same way. E.g., there was a Nigerian start-up that Coders4Africa consulted with, called 'Hello Tractor'. What they came up with was a better way to share the tractors that they have. They retrofit tractors with telematics and GPS and give it to farmers to have them increase their yields and give them additional income because this was not accessible to them and what the government provided was not working.

Community is an important aspect. Key here is collaboration. We all need to collaborate, whether it is people working together or sectors or industries sharing. This is what makes it happen. We have this new way of working towards a problem and this belief that this kind of working and change of mindset can help us attain most of the goals of the UN.

Coders4Africa is really community-based. The organization relies on the communities all across Africa and tries to make them ready for the new digital life.

The moderator then asked Mr Kone about his perspective on the difference between the drivers in the developing world and the developed world and the associated concerns with those drivers, e.g., in the context of taxis discussed earlier.

Mr Kone emphasized that the drivers are very similar but the motivation is different. Uber, for instance, is working very well in the developing world for practical reasons—it is cheaper. That is the main motivation. If you go to developing countries, you will negotiate with the taxi-driver to get the best price possible. So, money is not the reason. However, the reason to have an Uber-like system over there is to get more security or reliability. In Kenya, for example, the traffic is very bad and security is an issue. It could be good to have a reliable system informing about the profile of the driver, somebody who is sure, and having a device telling that this taxi is 10 minutes away or is going to be stuck in traffic... There is a slightly different nuance of perspective in how you approach the problem, but the basic drivers are really the same.

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Q&A

The first question from the audience was addressed to **Steffen Nerdal**, Ascella AS, in order to get some more information on SmartDok.

Mr Nerdal explained that SmartDok is a licensed based product, i.e., people buy a license for nine different modules (time, machines, tools, pictures, construction ID card, ...). People pay a start-up fee and then they pay a yearly license fee. The amount they pay is based on the number of users and the number of modules they purchase.

The following comment from **Jeremy Millard**, Danish Technological Institute, addressed the nature of the sharing economy: The sharing economy is largely based on IT but still brings people physically together who wouldn't otherwise get together. This is how trust is installed in the sharing economy.

The example of the Danish peer-to-peer car rental application GoMore was given. People can hire someone's car, who is currently not using it. It's not the same as car sharing, as you are hiring someone's car. You physically meet this person and this is where trust comes from. And looking at most of the applications in the sharing economy, this is what happens.

Is it really "analogue versus digital"? This is just the latest manifestation. Basically, it is people with the new business model fighting the people with the old business model. IT adds a new dimension of course—but it is basically the process of innovation which is creative destruction. People who are loosing don't like it, but people who have got the new idea and the new business model, whether or not the regulations are pulling them back or not, they are the ones that are going to come through—you see this with Uber, with Airbnb etc. It is an old phenomenon but in new clothes. And we shouldn't really think IT is completely different. It is dramatically different in many ways, it is a game changer. But people are basically the same.

Tim Kelly, World Bank, confirmed that there is nothing new in the sharing economy. He gave the example of Kenya, where ovens are rare. If you need to bake a birthday cake, you need to find out who has got an oven and when this oven is free. That system of sharing ovens has worked perfectly well for many years. It doesn't necessarily need the sharing economy to bring that about.

But obviously in the broadest scheme of things, the sharing economy is really facilitated by the information flow and low transaction cost you get with the digital economy. And it raises many important regulatory issues: Is Uber a software company? Is it a taxi company? How are the drivers regulated? What are the liabilities, who picks up the insurance bill?

Paul Wormeli, Wormeli Consulting, recalled those companies who are global in nature and who are building this sharing economy. What really amounts is disruptive technologies, compared to the old way. It might be the new guys fighting the old guys in many ways, but it is disruptive technology. The reason why it is significantly different from the perspective of security and control and maintaining trust, is that IT is at the heart of it. There has always been systems of borrowing in primitive societies in any rural area, but this is something that is enabled—at least the business making model—almost entirely by IT. And it becomes much riskier as a result. If you think about the risk that Uber has about its data being stolen, it is enormous. You can destroy this company in an instant if they lost access to their data;



unlike former economies that didn't have that high level of dependency on IT. It is a scarier proposition than the company that would built cars and sold cars and took in money. The life of the company is not dependant on technology in that older model, and now it is. And it becomes a different bargain for the people who care about the system behind it.

Ali Kone, Coders4Africa, added that, besides the technology itself, globalisation is an important aspect. We are living in a new world. With the globalisation, people worry about the different influences coming in. Everybody has to fight on a global, on a larger scale and therefore people have to come up with new business models more frequently. IT is the technical enabler but there is also the global aspect.

People value more in this connected world. People value the societal impact. What you are doing, is it better for the economy? Is it better for the society? Is it better for the environment? That is much more important now because people are so closed to it.

Alan Shark, PTI, commented on the discussion between the good of technology and the bad of technology. The fact is that we have to deal with both of them.

Regarding the mentioned points about the dangers, the example of the online dating service The Ashley Madison Agency (35 million people) was given. These businesses do not necessarily have a social mission involved.

What really has not been discussed is the role of government in all this. In some case you have people doing things that are very much in the consumer interest to certain segments, but the role of government has to be somewhere to be the equalizer. They are the last resort that the public has for both protection, as well as, is it in the public interest and who are being left out? In the U.S. there are 19 percent of the population that are not on the Net for a lot of reasons, part of it is ignorance, part of it is poverty. This is a huge problem and there could be a whole conference on this subject between the ying and the yang of sharing in a knowledge economy.

If you do not have trust, everything falls apart. Today, every country is worrying about their physical borders and no one is really paying attention to our digital borders. We need a digital kind of force that can help restore trust. If we don't protect our digital borders, we won't get this community of trust but a community of distrust.

Regarding the issue of the police mentioned earlier: So many crimes are miniscule to the point the local police can not afford to investigate in a 500 dollar crime. Therefore there needs to be national response and an international response. It can not be solved by local police. They have to cooperate but it requires a much stronger national force. Unfortunately, there is no movement in this direction right now...



The following question was about “cyberspace against the real space”. There are a number of countries with eID cards (Estonia, Japan, ...). How do the citizens live this duality of citizenship (digital and physical)?

Jeremy Millard, Danish Technological Institute, answered that in many ways they are complementary. For instance, a study has shown that more than 90 percent of Facebook friends are friends in real life, too. And 80 percent of the people who play war games are friends in real life. It tends to complement rather than substitute, but it certainly affects the way we think about our relationships. We should not think about digital versus physical, but the complementarities of it—although there are also huge problems coming along with this.

Paul Wormeli, Wormeli Consulting, highlighted Singapore as an example of a country that has a digital ID card for a long time. The citizens in Singapore assume that it is just the normal way of living to have a digital ID card. There is a lot of memory, all their medical records, school test scores, credit card information etc., and they price very much having this card as ticket to anything in Singapore. The people just have learned to adopt and deal with this cards like people in other parts of the world would deal with their driver license. It is just part of their being and they take it everywhere. So, there are nations where it works out very well.

There are other nations that are struggling with this. The U.S., for instance, is struggling with this for decades and the political will is not there to allow the government to create a national ID card.

Jeremy Millard, Danish Technological Institute, then mentioned Denmark as one of the leaders concerning digital public services. Digital by default—600 or 700 services are only available digitally. The question they ask is, what is about IT which is better than humans can do. It is managing data, it is applying strict roles to data, it is doing a lot of quick analysis, speed and connectivity. Those services that are subject to that are put online only.

Other services, like teaching or health, where your need people to people, are supported by IT. Denmark is not going to replace nursing or home help services by robots, services where your need “warm hands” or empathy or sympathy and listening to people. But, they will get the robot in the home help to do the cleaning while the visitor, the human being, is taking to the old person. Denmark has a new sort of understanding about what IT does and what people do. And this is changing all the time, it is in flux.

A participant from the audience added that in Japan, elderly people in homes are now developing emotional connections with robots that are taking these people in their arms. Moreover, robots become more and more human-looking.

The moderator, **Julia Glidden**, 21c Consultancy, thanked the panellists and closed the session with some final thoughts on what has been said.

There have been a lot of discussions about the technical facilitators, the drivers of innovation, the broad meaning of sharing—but the theme that keeps coming through, whether we are talking about the built environment or security, is community and that linkage between people that IT facilitates and can break down. This real interaction that digital technology creates is something important and needs to be more nurtured.

There is a lot of challenges, there is a lot of threats, there is a lot of scary things, but there is



also a very positive humanising element. The sharing economy is showing off the way in which technology can actually bring us back to that village-sense of community that urbanization and mass sprawl that was necessitated by a lack of technology created. In a funny way, technology is binging us back to this village community of sharing assets, and sharing time and connecting each other whether we live in proximity or not.

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Keynote Opening

Day 2 – Morning – Plenary Session

TIMO KATAJISTO, Executive Vice President, Elisa Corporate Customers; Member of the Executive Board of Elisa, Finland, [<http://elisa.com/>], chairing and moderating the session, opened this second day of the Global Forum by setting the scene for the presentations to follow.

While the first day of the Global Forum dealt, amongst others, with the digital strategy vision of different regions and digital disruption, this second day looks at drivers for innovative infrastructures, mobility and the promise of 5G, regulation, self-regulation, and co-regulation from different perspectives, the Arctic region perspective as well as smart cities and digital communities. These topics describe very well the complexity of the digitalization we are facing. Hopefully this will bring us one step closer to understand how digitalization creates sustainability.

Digitalisation is Shaping our Future

Digitalization is not a one-theme—we talk about issues like technology, IoT, 5G, big data, etc. It is neither a one-theme, nor it is a full menu of these issues.

Digitalization is driven by two different areas: technology and Internet. The impact of both is accelerating. As the technology is getting smarter, cheaper, faster, and slimmer it will be finally everywhere, and everything will be connected as there are a lot of motives for this to happen.

In earlier days, a global company faced many obstacles when entering a new market: language barriers, legislation, cultural barriers, etc. It was very difficult and time consuming. Today, this looks totally different: With the help of technologies and the Internet it is fast and it is even getting faster. Actually, it is so fast that a companies and regulators do not have time to adjust that well.

Due to this faster pace, every company plays in a main league, they need to be competitive globally, not only locally. This will take them from hardware business closer to the software business. But even that is not enough in tomorrow's world. Your customers will finally gain the best value out of the system where one product is only part of the bigger based system. This evolution shifts to value as well.

You should never think of technology as the main driver. It has a big part but the business management is behind the success. But how should we do it? How to succeed? First of all, it is about the ownership—that needs to be retained and remain on top. It is also about the customer—we really have to keep the customer in the centre of what we do and



how we develop our digital activities. It is about “thinking digital first”—not that kind of having your own old manual operation and then starting to think how to digitalize that a little bit. Think natively—digital first and what this means. And it is about pilots and experiments. Learning—it is a learning journey. You need to exercise this every day.

Ask yourself, how did we learn to walk? Was it a kind of 3-year waterfall plan that made us change all and that made us start walking? No, it was an exercise that we repeated again and again. Experimenting. The same goes with digitalization. That is the key for success.

SUVI LINDÉN, Chairperson for the Board of NxtVn Finland and Vice Chair for NxtVn Group, Finland delivered a thoughtful and inspiring keynote address on

Digitalization from Disruption to Sustainability

The UN General Assembly has just adopted the Sustainable Development Goals (SDGs) for the next 15 years.

In 2000, the Heads of State and Government agreed upon the eight Millennium Development Goals. Eight very important goals and ICT was actually mentioned in one of the goals. Now, with these new 17 goals we already understand better that ICT can make the difference in development.

The new agreement is called “Transforming our world: the 2030 Agenda for Sustainable Development”. It acknowledges the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies. It also sets out ambitious ICT development targets in the goals agreed for education, gender and infrastructure, with ICT recognized as a means of implementing the SDGs.

Regrettably, ICT is not mentioned in all 17 goals. It’s a pity that people still don’t consider ICT as being part of every single goal, whether it is reducing poverty or clean water or education. However, we are progressing and ICT is now mentioned in 4 goals—let’s see what will happen in 2030.

The original Maslow’s hierarchy of needs is about physiological needs (breathing etc), it is about safety and when safety is secured, you go to the next level which is love/belonging, followed by esteem and self-actualisation. Nowadays, some people have translated the Maslow’s hierarchy into a pyramid of different applications which are important for us today, such as Fitbit for fitness, Monster to find a job, or Twitter, Facebook, Flickr and many more. This just indicates how strongly we are involved with different kinds of applications and how they are important for our daily life. This has been made possible by broadband. Broadband connectivity has become a fundamental need in digital living. It even should be a human right to have access to broadband.

Finland is still the only country in the world who has made it a legal right to have access to the Internet. In Finland this is an equality issue—every Finn has a right to have access. And especially if the public sector wants to develop e-services, everyone should have access to them.



However, even in the UN language, human right is a very delicate issue and its better to call it a basic right. Everyone should have the possibility to get access to the Internet and it is the responsibility of governments and politicians to figure out how to succeed in providing access, whether it is a legal right, or a basic right or a universal right.

It is about basic human needs, it is about employment, it is about friends and family, it is about respect and about creativity and sense-making.

The public sector is spending a lot of public money on funding infrastructure—infrastructure that empowers the society and creates new businesses and jobs. Nowadays, broadband is the new highway and data is the new currency. They are structures of digital economies.

Spectrum is another important element of the structures of the digital economies. Without spectrum there is no mobile broadband and without mobile broadband there is no accessibility in many countries. Spectrum has become the new oxygen.

It is amazing that everybody today accepts the idea that digital infrastructure is as important as traditional infrastructure. However, for many governments it is still hard to have this kind of vision, and unfortunately digital infrastructure is very often heavily taxed or subject to various regulation obstacles, so that at the end the customer, the poorest of the poor, doesn't have the possibility to access that infrastructure.

Public-private cooperation works very well in this sector. In the Broadband Commission for Sustainable Development, the private sector always stated that, if governments regulate right and create the enabling environment, the private sector will build the infrastructure. The public sector doesn't have to put money in it. Except, sometimes in very sparsely populated areas the public sector has to put money in, but most of the networks are built by the private sector.

And spectrum is such a great asset—and here it is not a question of "some have it others don't". Finland is among the countries that have wisely used this asset. The best way of empowering a country, is to do things right when it comes to spectrum, i.e., the right kind of allocation and the right kind of regulation.

Where are we now? Globally, there are about 7 billion mobile subscriptions. Given a world population of about 7 billion, this means that almost everyone has a mobile subscription—but only 40 percent have broadband access. Most of the people are still using 2G mobile connection. There are still a lot of things to do. However, things are improving compared to 2005 when there were only 2 billion mobile subscriptions. It is a great and very rapid progress.

The Broadband Commission for Sustainable Development was set up in 2010 when the UN organisations and governments realised that ICT is a game changer and that something should be done. The Commission was tasked with promoting the adoption of effective and inclusive broadband policies and practices in countries around the world, with a view to achieving development goals and empowering every woman and man, and every society, through the benefits of broadband.

The Broadband Commission has set a number of goals, and one target was that by 2015, all countries should have a national broadband plan. 2005, there were 17 countries and in 2015, there are 148 countries. This is a great achievement because studies have shown that when there is a plan, there is also some kind of action. But the big question is where are the 46



countries that are missing? Do they realise how important it is to have a plan for broadband and digitalization?

The second target was that by 2015, broadband should be made affordable. The challenge was not to provide accessibility as private companies are bringing the networks there. Affordability is a much bigger and challenging issue. Today, there are 111 countries where broadband access is less than 5 percent of the monthly income and this is reasonable. But there are still a lot of countries where it is more than 5 percent. It can be even more than 1000 percent of the monthly income and then, of course, there is no affordability.

In the context of affordability the right kind of regulation and taxation is key. If the Indian telcos had to pay 53 billion dollars for 3G licenses, one can imagine how much Indians have to pay for a subscription. It might help the Indian government to increase its budget, but it doesn't help the development of the country.

A third target was getting households online; by 2015, 40 percent of the households should be online. This target was not reached as in 2015, only 34 percent of the households are online.

The fourth target was to get people online. In 2015, over 80 percent of the people in developing countries are online, but for example in least developed countries it is less than 10 percent. There is a big gap and there are still a lot of things to do to reduce this gap.

There are still a lot of things to do in the context of Sustainable Development Goals and hopefully, these targets that were set by the Broadband Commission will be reached. There are a number of proposals of the Broadband Commission on how to reach these targets: It is about the broadband plan, an enabling environment, ICT regulations (spectrum allocation), the promotion of education for all (digital inclusion), investments in broadband, the use of universal funds for broadband, and monitoring.

The Broadband Commission often brings up the issue of the language and local content. There are thousands of languages in the world and only 5 percent of them are present in the Internet. Only 10 languages provide about 80 percent of the content of the Internet. How to get the local content for local players because the demand for access comes when there is interesting content.

For instance, during the Tubecon 2015 in Helsinki, 15,000 young people under 18, all vloggers, came together. When you provide the inclusion, the skills, the tools, the device, and when there is a demand, things will happen. In Finland, with a population of 5 million, 300 hours of video are downloaded to YouTube every day.



WLADIMIR BOCQUET, Head of Policy Planning GSMA Association, [www.gsma.com], highlighted some critical aspects relating to incentives for investment in this digital world.

The telecommunications market changed dramatically, but is still regulated by the same set of rules that have been developed at the end of the 90s. However, in terms of service solutions, applications and innovations we are changing radically. New applications, broadband connectivity, competition has changed the way we are consuming digital content.

Recently the EU institutions launched an initiative to modernise, and hopefully to reduce, regulation on the market. The idea is provide the right incentives to address this new wave of investments and the new development of mobile broadband communications.

However, to succeed it is time to think differently. We need to address a clear long-term thinking to accelerate the development of mobile broadband. This could be done through an appropriate regulatory framework. We need a forward-looking policy and regulatory framework to make sure that investment and innovation will be the key drivers of this new century.

We also have to think about the citizens. Citizens should receive the same level of protection and also have to understand what these protections are when they are using similar or same services.

We have a unique opportunity to create a new business environment, change the rules and make sure that we have the right incentives for this investment in mobile and broadband sectors.

But, how to do this? Having a flexible light-touch regulation is crucial. Heavy taxation is a clear barrier for investment. Having the right level of regulation and taxation will help to manage this type of development and investment.

A key resource for the deployment and development of mobile broadband is spectrum. Spectrum is the lifeblood, the oxygen, the fuel of an industry. With the development of new applications, the multiplication of connections and connectivity, data traffic is growing exponentially.

In terms of data traffic we are expecting a 10-fold increase in the next 4-5 years. This means that we need to respond to this demand. New technologies and new solutions developed in different standards and harmonised standards will help to cope with this data traffic increase. Changing the topology of networks, densifying the network, and small cells are also very important.

But the fundamental element that will help us cope with this data traffic is spectrum. This year is a unique opportunity to respond to this demand: The World Radiocommunication Conference 2015 (WRC-15), taking place in Geneva in November, represents a crucial milestone for the industry to elaborate and prepare the future.

Of course the spectrum that will be identified for mobile broadband at this conference will not be used the day after, but we need to prepare mobile broadband of the next 10 years. A lot of discussions will take place in Geneva in—hopefully with a good understanding of the situation in order to make sure that spectrum will not be a bottleneck but an enabler for the future of mobile broadband.



With regards to applications and new innovations in the context of how we use connectivity, IoT has become a key word. GSMA strongly believes that a positive socio-economic benefit will be associated to the IoT. It is about how to apply the connectivity to different industries and verticals. m-Health is absolutely key, but also smart cities, m-automotive or something like the (German) initiative “Industrie 4.0” are rather important.

However, IoT is a nascent business—a business that is growing and we need to understand how to deliberate the right policy and regulatory framework to facilitate investment and facilitate the incentives for these innovations.

A light-touch and flexible model should be applied to the IoT. There is not one model, and there is a number of elements of the development of the IoT which could be seen through different perspectives. However, it is just a nascent business and we have to make sure that operators can associate their environment and their understanding of the market in order to develop and implement and innovate in the world of IoT.

Traffic management is absolutely key in the context of the IoT. Managing the transmission of bits of information for one specific application versus a more critical application needs to be well understood. Moreover, in the context of single traffic types operators should not discriminate in favour of any content provider. Flexibility could support this development of the IoT.

GSMA recently launched a new initiative called “Mobile IoT Initiative”. It is supported by 26 leaders, including mobile operators, but also OEMs, chipset suppliers and infrastructure companies. The idea is to address the use of Low Power Wide Area (LPWA), which is one aspect of the IoT in the license spectrum. Bringing together all these industries will demonstrate showcases and facilitate and foster the implementation of this type of solutions.

5G is another key topic. However, it is important to understand what 5G really is and what kind of applications can be supported by 5G. In terms of world mobile connections, 63 percent of the world population still relies on 2G connections, 32 percent on 3G, and only 5 percent on 4G. We are just at the beginning of the journey towards 4G. In the period of 2014-2020, 1.7 trillion USD will be invested in the implementation of 4G. With 4G we can bring good value, innovations and appropriate infrastructure for broadband development. 5G will come after.

With regards to 5G, there are two main directions: One is the service-level view, where we try to provide some extreme and reliable communication. The other one is the traditional generational view where we try to improve the performance (improvement of the data rate, latency reduction).

A 5G workshop has been organized by 3GPP last week in Phoenix. Three high level use cases have been addressed: Enhanced Mobile Broadband (i.e., improving the performance, data rate and latency); massive Machine Type Communications (the cellular component in the IoT or in the mMTC supports new innovations in this field); and Ultra-reliable and Low Latency Communications.

We are just at the beginning. But 5G, like the other technologies, will definitely need spectrum. WRC-15 will shape the spectrum for the next 5 to 10 years. The conference will also discuss the future of 5G as there is a new agenda item on additional spectrum for 5G. It will be absolutely crucial to find the appropriate way to structure the spectrum need for today, tomorrow and also for the 5G.



MIKA LAUTANALA, Executive Director, Smart Living, Tekes – Finnish Funding Agency for Innovations, Finland, introduced an innovative mobile initiative that could change the transport sector.

Digitalization Driving Revolution in Mobility

Digitalization has deeply impacted our personal lives, but when looking at the economy or businesses there are only few areas where the change has really been radical: the music business has changed a lot, in the media sector totally new business areas came up, and retail is going through a major change.

The mission of Tekes is to fund companies and research in order to create these changes in the businesses. Typically, such changes happen through start-ups which are more likely to disrupt industries, rather than existing companies who are well-established and whose main goal is to maintain their businesses. This is why Tekes is focussing on start-ups. However, the organisation also provides funding for medium-sized companies, large companies and even research.

Tekes is a public organisation getting all funds from the state budget. The objective is to improve the competitiveness of Finnish industries.

Innovation is important for every country. There is some correlation between innovation and GDP. Innovation activity is a key driver of economic growth and enables the funding of welfare services in the long term. In the past, it were probably resources and other assets that were generating welfare, but today innovation is the main driver of well-being.

How digitalization will change this picture? In the past 20-40 years, the picture was totally different. Digitalization will change the way innovations are made and also the kind of activities to be done to be successful in that area. For example, it is more about experimenting and trying to quickly create new systems within the shortest time span than putting efforts in long-term issues. Platforms are getting more and more important when you are developing new digital systems which require some kind of infrastructure on top of which they will be built on.

Another important aspect is regulation which maybe enabling in some areas, or disabling in the case that they do not support the change that is going to happen.

What does digital technology mean for transportation? The manufacturing industries, for instance, are trying to increase the capacity usage as much as possible to be efficient in terms of investments. Digitalization could also improve capacity usage in transportation (bus, taxi, train, car, ...). Digitalization makes it possible to share the resources in transportation and this have a higher usage of the capacity.

Also think about public transportations, bus lines and timetables. In the past, such a concept of bus lines and timetables was the only way to match the person and the vehicle. It was to agree in advance that this is the route the bus will take and this is moment in time when it will be there. But today, it doesn't make sense anymore to have a concept using fixed lines and timetables—it should be rather on-demand based.

Such a system is currently tested in Helsinki. It is a great project, but too small to be economically feasible at the moment. Tekes is working on a concept called "Mobility as a Service", together with mobile operators who could provide the mobility as a service for the user. The idea is to offer a door-to-door service combining different modes of transportation



(regional public transport, taxi, car and ride sharing, bike sharing etc.) and to have a single payment system for that. The system has to be transparent in order to allow the users to select what kind of a service level they want to have, how much they are willing to pay for that, and whether it is a direct non-stop route or whether they want to change the vehicles during the trip. Moreover, a standard open interface is required so that the system could be open for many operators.

At the moment Tekes is working on this project, which needs to involve a large number of different players. There is a kind of inherent paradox: If you want to remove the customer from the driver seat, you need to put them on the driver seat of this process. It has to be thought and developed in a way that the customer receives value.

What is preventing the change? In many cases it is the vast amount of different regulations which are preventing innovation to happen. They are typically local and vary from country to country.

In Finland, for instance, there are different permits for different vehicles: If you want to have a taxi, you need taxi permit. Moreover, busses are only allowed to stop on bus stops—they are not allowed to pick-up or drop out customers anywhere else—so, it is not possible to provide a door-to-door service in this system. You are not allowed to mix person and goods transportation, although, when you think at retail and online shopping, it would make sense that once a taxi picks up a customer, it could also transport a parcel that needs to be delivered to a customer who ordered online.

Also the public procurement is in silos and typically only procuring Parts of the system rather than providing the users a door-to-door service.

Big data is another issue. There is a huge amount of data on people's movement that could be very helpful in this context, but regulation is hindering the use of it. Basically this data could be a key to simulate this kind of a totally different transportation system. It would help to analyse people's movement and determine how the system could be developed.

The Finnish Ministry of Transport and Communications is involved in this project. The project is currently piloting activities throughout Finland to test this system where different modes of transportation could be combined.

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Q&A

There was a lot of discussion about taxation and the missing level playing field from the digitalization point of view, both for the infrastructure and the services. The question "what should be done?" was addressed to Suvi Lindén, NxtVn Finland.

Suvi Lindén, NxtVn Group, stressed that countries should follow the example of Finland, as in Finland there are no extra taxes for telecommunications. However, in many emerging countries the telecommunication field is often one of the few fields where the governments can get taxes out. For instance, in Bangladesh the taxation was about 56 percent extra on the mobile phone. They were taxing SMS, SIM cards, voice, device,... They put so many special extra taxes on the mobile phone that at the end it was just impossible in terms of affordability. Although it is hard when the government is lacking money, and this is often the



normal case, governments have to ask themselves whether they are making investments for the country for the long-term, e.g., 10-20 years, or is it just a short-sighted strategy because the budget deficit is smaller when taxing a lot. This is really a pity, because there are so many positive elements, e.g., the correlation between broadband penetration and GDP-growth. Pakistan, for instance, lowered the taxation of the mobile phone and this boosted the sales of those phones. There are evidences that there is a clear way how things should be done, but unfortunately it is still very hard to put this puzzle together and get this kind of good long-term investment.

Wladimir Bocquet, GSMA, added that sector-specific taxation is really a barrier and the bottleneck for the development of the mobile broadband. Spectrum and the access to spectrum in some markets is most important to reap the benefits on a long-term basis. This requires putting in place an appropriate approach to release this spectrum, and not just looking at short-term benefits. Especially when you release spectrum one has to look at the long-term benefits of putting this spectrum on the market: Having a better network and broadband availability and all the associated socio-economic benefits associated to this development.

The moderator than asked Mr Bocquet whether it would be possible to have a kind of a flat rate on the mobile side. Is there enough spectrum? For instance, the 4G take-up is extremely high (about 40 percent in the business sector) in Finland due to a flat rate.

Wladimir Bocquet, GSMA, stressed that spectrum is not necessarily an issue but a challenge. The future of this growth will be prepared during the WRC-15 in Geneva. Having abundance of this spectrum will help to better manage consumer needs and demand and also to better response to the market. We are in a fast growing movement in terms of traffic, innovation, new applications, and the objective with spectrum is to secure affordable access to this broadband resource and make sure that we will be able today, tomorrow, and the day after tomorrow to respond to the consumers demand.

Referring to the “Mobile as a service” experience, the Mr Lautanala was asked, how to get this project moving now?

Mika Lautanala, Tekes, explained that the project is currently having the first pilots running in Finland. The experience could be scalable on a global market later on, but before, experiences are needed on how the project could work within different environments—both in denser city areas as well as areas with a low population density—and what kind of services could be made available in that kind of areas.

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Session 6

Day 2 – Morning – Plenary Session

Towards Greater Intelligent Infrastructures

ALAN SHARK, Executive Director & CEO, PTI – Public Technology Institute; Associate Professor of Practice, Rutgers University School of Public Affairs & Administration, USA, moderating, opened the session by welcoming a great panel.

The Global Forum over the time is like a quilt. A quilt is something that repeats itself, pattern by pattern, and by the time we leave, we have a very clear sense of what are the priorities, what are the issues and what we might anticipate in the coming years. If looking back 10 years ago, it is very interesting to see how the topics have evolved.

This session will address one of the most fundamental parts of this entire issue of digitalization, which is the issue of infrastructure. Are we ready? Ready for what and when?

ANTTI LARSIO, Senior Advisor, SITRA - Finnish Innovation Fund, Finland, [<http://www.sitra.fi/en>], chairing, welcomed the panellists and summarised the main questions to be addressed during the session.

The four pillars of our road to the digital future are, first, e-infrastructure, which is rather close to intelligent infrastructure. The second is e-applications—applications that allow us to use that infrastructure and build new services. The third one is e-security and e-privacy. The fourth one is e-skills.

What is the role and responsibility of our public sector and our governments in these areas? Should they lead the development or add trust as enablers to this development? Probably, it should be the latter one. Governments should enable the development and work in close cooperation with the private sector.

Governments should promote the environment and, by regulatory means, ensure that there is an environment where this development can happen. There has to be a descent network communication available for everyone and mobile network coverage also in the rural areas. Broadband access and mobile network coverage are two key elements.

Moreover, regulators should ensure that the development doesn't compromise citizens rights and that citizens feel that their security and privacy concerns are taken seriously. And even further, governments should ensure that the education system will generate citizens who can take the full benefits of this development and the associated digital services.



But, is this enough? What is a decent communication network? At which point we can say that mobile coverage is good enough?

Technologies are evolving incredibly fast. We are moving towards a world where we are connected everywhere, seamlessly through any device. What is ahead of us? What are the drivers of this development? Who will, and how, benefit of this development? What is the government's role in this development? Should they invest—and if so, what, when and why?

ALAN SHARK, Executive Director & CEO, PTI – Public Technology Institute; Associate Professor of Practice, Rutgers University School of Public Affairs & Administration, USA, moderating, set the stage by presenting the “big picture”.

When we look at the Internet of everything, so often in the conversations we keep talking about broadband as if we were talking about mobile devices only. However, the term digitalisation includes everything and so broadband may be just one of the pipes—one of the avenues in which information flows from one point to the other, whether it is through fiber, through satellite—but this whole idea of 50 billion smart objects is really a staggering figure. And already, it is starting to happen in our homes where we can be anywhere and be able to look at any room in the house with a very inexpensive camera and see exactly what is going on.

All these objects, whether it be a camera, a sensor etc. , all these things are sending data. At this moment in time, there are more machines talking to each other than people. This is a whole issue of tying together people, things, data and processes. We are designing a quilt together as leaders, and looking at these various issues, starting to comprehend the dollar amount that is associated with this, the policies that have to support it, and the manufacturers who are developing products with unbelievable speed.

The next convergence, why now? It is all coming together. This wouldn't have happened 3 or 4 years ago, but clearly we are seeing all this connectivity, the cloud is been more accepted, sensors and devices are becoming more sophisticated, smaller and with better battery life. We have ubiquitous connectivity, and now we have the analytics to support many of these things to be able to really measure and hopefully make better decisions.

What public sector leaders should know: First, the Internet of Things, or the Internet of everything, is here today. Second, concerns over security in systems and data are real, and all this will fail, unless we are able to better protect. In the U.S. 3 trillion dollars are lost every year to fraud and theft. We have to be very careful as we move towards this connection of everything. As we become smarter with our equipment, we also become more vulnerable. Third, data governance on ownership, control and sharing is critical. We don't have all the answers yet, but we start to pose the right questions. And then, fourth, governments need to be involved. They must establish policies to create a level playing field and to support certain industries and ensuring the safety and treating violations with far greater seriousness than they had today.

Young people don't care about the overall subject of the Internet of everything, they don't care about advertised speed with their devices, they don't care about infrastructure. But, they care about always being connected, they care about how quickly they can search, find and view, they assume that there will be abundance of spectrum, they care about affordability and accessibility, and they care about security and they are hoping that somebody is looking out for them collectively.



TIMO ALI-VEHMAS, Head of Ecosystems Research, Nokia Technologies, Finland, [www.nokia.com], outlined the challenges of a programmable world, where intelligent connections bring millions of everyday objects online.

Programmable World

“Programmable world” means the transition to this huge digitalization that we are experiencing today.

What is this future intelligent infrastructure? From a telecom perspective, the infrastructure is very easy to understand. It has served the generations of 2G, 3G and 4G and is heading towards the 5G. In many ways this infrastructure has served us very well. The step from 4G to 5G is the key technology issues today, and this transition is going to be significant. People are using the term “1000 times”, meaning that it is 10x more throughput, 10x better latency, 10x more spectrum required...

The step is significant—but this technology step is only one facet. We also need to look at the ecosystems: how the 5G is able to serve all kinds of ecosystems? One key element of the 4G was the flat architecture that materialised also as a flat rate. The primary ecosystem that 4G supports today is just the flat rate ecosystem—which of course matches marvellously to our today’s key applications, including media, entertainment and all kinds OTT-applications. The 5G has to be much more than just the best effort. The 5G has to support plurality of the services and different types of service classes.

This doesn’t mean that 4G either has to stay with flat rates forever. 4G also has capabilities to evolve towards new type of service quality classes and better traffic management. Thus, when talking about 4G and 5G here, I mean telecom infrastructure and its evolution in general.

Until now, telecom and IT development have been some kind of geeks’ paradise for the geeks themselves. The systems and services have been developed for the sector specific needs. This is a reflection of the regulation which is typically sector specific also. We need to develop the mentality onwards from that in 5G. The future telecommunication infrastructure aims to support all the sectors of the society, and this means much more than just a few services which are all using the same type of flat rate scheme.

The 4G is cost effective, but it is not high-performance enough for the future. There are applications, e.g., self-driving cars or some industrial applications that require a much higher quality of service. At the same time, 4G is low-cost — but it is not cheap. There are services that require much cheaper infrastructure, like a segment of machine to machine (Internet of Things) applications where very narrow band bit pipe is the primary need. The 5G has to serve all of this and thus has to be very flexible. It has to provide the service for the very low-cost uses and very high performance at the same time; not necessarily for the same customer, but the network itself has to be capable of doing that.

The 5G telecommunication system will be one of the greatest endeavours that mankind has ever done.

However, just looking at the telecom network is not enough. The 5G-era is going to change everything. That’s why we have to look at the infrastructure of all the segments and all the clusters that we have: There is the telecom cluster, but there is also the content cluster where all the information is collected to. There is the cluster which is consisting of all the equipment that the end-users have, and there is the cluster of the end-users themselves.

Due to all the sensors, the consumers become one cluster of the infrastructure



by themselves. This is why we also need to look at the structure of this overall future infrastructure and see where the functionalities are and what kind of borderlines for business and for the regulation we need.

In practice, the data is the driver. The data which is generated through these different types of IoT-devices or some other ways and which is then collected somewhere in the content layer. Value created through the data is the driver and we need to look at how this will change the dynamics of ecosystems, or even the whole business. The data is much more tightly coupled than it has ever been. It is bi-directional, it is real-time and in that way, it creates network effects we have never seen before. This is something that makes the infrastructure development different, because many incentives to invest are indirectly depending on the network effects.

There are many ecosystems to be supported on this infrastructure. We cannot afford to develop the infrastructure for each of the ecosystems separately, but we need to make the ecosystems to live and operate on one generic infrastructure. Therefore, we need to think segmentation, we need to have the configuration, and we need to have the capabilities to configure the infrastructure in different ways instead of fragmenting it to pieces for different purposes. Hence, it is very important to look at the structure and the interfaces for the data for portability and mobility, including also instance privacy as security.

Data is the key in many ways. Today the Data seems to be a kind of a hot potato, although it should become the new honey pot. There is the value that people are looking for and want to get access to. And we have a good reference how to deal with such things. If you look at how such a honey pot was managed earlier just look at the radio spectrum. There are many things we can learn from how spectrum has been managed over the last 100 years. We can manage the data using the same models we have used to manage radio spectrum.

And as before the network effects are important when trying to understand the dynamics in this new era. To balance the dynamics we need to use the openness of the interfaces, the openness of the access and all kinds of modularity elements.

There are many things that we can learn from the development of the telecom service. The networks do provide a lot of consumer choice, they are global and interoperable. Moreover, there is already a continuous competition between the operators, between the infrastructure vendors, between the device vendors—and this is basically due to the open interfaces as well as the standards. We have to look at the standards same way from the perspective of the overall infrastructure, not just for telecom.

We know that history never repeats itself exactly, but the things we have seen in the past, whether it is the renaissance or the Internet or spectrum management and data, are the things we can use when we are now trying to manage the infrastructure and the infrastructure development.

These are part of the mechanisms to create the Great Intelligent infrastructure, which now consists of the content elements, the cloud and data analytics, the network but also the consumer devices and through the data the consumers themselves. We need to think about what kind of interfaces we need in order to keep that overall system at the same time open and under control. This infrastructure will support our aims in anything we are used to do so far in our business, social or private life. And additionally it will then provide the quantum leap in the productivity in our society and in our well-being in the areas where the society is politically ready to jump.



WLADIMIR BOCQUET, Head of Policy Planning GSMA Association, [www.gsma.com], talked about the spectrum policy and regulation requirements from the perspective of an association representing the mobile industry.

4G Evolution and 5G Spectrum Policy

When talking about architecture and its evolution, we also need have the appropriate spectrum policy associated to the current and the evolution of the 4G, but also the 5G. We have to make sure that we are creating a sustainable future for the development of mobile broadband. Spectrum is the oxygen of the development and investment in this infrastructure for mobile broadband.

We are exceeding the expectations in terms of data traffic on mobile networks and we are just at the beginning of the journey in terms of evolutions and traffic and network. We are connecting more and more devices, this could be through smartphones, but also through IoT and M2M communication tools. How to cope with this massive capacity growth?

First, we need harmonized spectrum. Harmonisation is key and it is not limited to the standards, but also the way that we are accessing to this scarce resource. Spectrum is a national, but scarce, resource and we absolutely need to make sure that we are optimising the use of spectrum and frequencies. We also have to make sure that we have the appropriate drivers to ensure that the spectrum will be efficiently used, i.e., make sure that regulations will not slow down innovation.

The principle of refarming is to implement a new technology on a band that has already been allocated to a previous technology in terms of mobile development, for instance the use of GSM band for 4G. This example shows that what we are researching is not necessarily what is happening on the market. Policy makers and regulators have to make sure that they give enough flexibility to the mobile operators to satisfy consumer and market demands.

Regulators must work together internationally to agree on new mobile allocations. This will happen at the ITU WRC-15. It is an absolute key milestone to make sure that policy makers and governments understand what is harmonisation, what is important for spectrum and how we should shape the future with this scarce resource.

WRC-15 will not be the end of the story but will achieve a very significant milestone in terms of developing and managing the future. But this is only the first step. The second step is how to get access to this scarce resource on the market and how to maximise the socio-economic benefit by releasing this spectrum.

First, a light-touch regulation is required to make sure to encourage and incentivise investments and to ensure that operators will have the ability and the flexibility to manage this scarce resource appropriately to respond to the consumer demand. Second, make sure that you have a clear licensing framework. Operators need a stable, transparent regulatory environment to invest in networks. Uncertainty discourages investment. And finally, it is important to have a long-term plan and roadmap. Guarantees and clarity surrounding long-term regulatory plans are essential to promote long-term investments.

With regards to 5G, we are still at the beginning of the journey, but we need to understand what it means in terms of spectrum. Spectrum will be a key driver for 5G, not only in terms of technology innovations but also where we will implement this 5G systems. Today, there is no clear agreement on 5G and it is impossible to accurately predict spectrum needs. It is



assumed that by 2019-2020, we will have a clear picture of the spectrum that will be associated to this evolution in terms of mobile broadband networks.

5G likely to require significant additional capacity spectrum and a number of initiatives and research have been made concerning the high frequency. High frequency shows a number of benefits for the specifics that are under the development under the umbrella of 5G.

The experience with 4G shows that existing spectrum of 2G could be efficiently reused for new generations and this will be the same for 5G. We have to think about how we can reuse, optimise and maximise the benefit of using the existing spectrum and also open up to new areas in high frequency to cover this additional and significant capacity needed for the development of 5G.

The moderator then wanted to know whether it is possible to give an estimation of the horizon of time?

Mr Bocquet highlighted that a key milestone will be 2019 as the spectrum parties will look at this in terms of standardisation. In terms of development we see that for the period 2014-2015, most of the investment will be on the 4G, but 5G will come smoothly after. 2020-2022, mobile operators will start thinking about the 5G implementation and it will be done smoothly on the top of the existing. 5G will not disturb everything—it will be an additional component that will make value on the top of the existing one.

CLAUDIA SELLI, Director European Government Affairs, AT&T, Belgium, [www.att.com], discussed the pace of innovation and our ability to adapt.

AT&T is one of the largest communication companies worldwide. The company connects 3.5 billion industry consumers around the world, helping them to be connected in more than 200 countries.

In the past 70 years, the pace of innovation has been slow and incremental. We were used to wireline and wireless telephone, we had broadcasted and cable TVs and satellite, but in the last 10 years, the pace of innovation has been revolutionary. Especially the introduction of the smartphone has revolutionised our life.

Everything is connected and consequently, our networks have experienced an incredible increase in data flow. In the last 8 years, we have been witnessing an increase of about 100,000 percent in terms of data flow. In order to be able to provide a great customer experience, investments in the upgrade of the network are needed. In the past 6 years, AT&T has been spending about 126 billion US dollars to upgrade its network..

It has never been more clear that we need more and more investment. We are entering an era of ubiquity where everything is connected. It is not just connecting the objects to the network, but also allowing them to talk to each other and provide the customer with a seamless experience, i.e., offering a global network where people are really able to use the application they need. But in order to do that, government should be involved—but also industry and governments need to work together in order to shape the right policy framework.

In order to allow the Internet of Things to develop, we firstly need a flexible policy framework that allows innovation to grow and that doesn't stifle innovation. It doesn't have to catch up



with technology but it has to pave the way for technology. Imagine the concrete example of driving from one country to another: You really need an interoperable framework; the customer doesn't think that maybe something is wrong in the regulatory framework and that maybe in Belgium you have a different policy than in France. They just want to experience the same service wherever they travel.

Secondly, you need spectrum. There is a need for more and more harmonised spectrum across Europe and ideally even on a global scale. The mobile industry is providing a lot of growth and jobs and a lot of opportunities and we need develop it.

BASUKI YUSUF ISKANDAR, Head of Agency for ICT R&D and Human Resources Development, Ministry of Communication and Information Technology, Republic of Indonesia, explained how Indonesia copes with the rapid development of ICT.

National Strategy Development for 5G

Why 5G technology, even if earlier technologies are not fully utilized, particularly in Indonesia and many developing countries? 10 years from now, ICT technologies are expected to be integrated in common high performing platforms and provide a malleable service defined 5G infrastructure, with seamless integration of heterogeneous wired and wireless capabilities, and powering business solutions, while offering multi-tenant technical and commercial control.

5G technology is more than providing an evolution in network technologies, it is envisioned as a revolution: not just about increased data rates with a new radio access technology, but also new services, such as machine-type communication supporting massive numbers of devices, millisecond latency communications, cloud and caching, high reliability, and energy efficiency, aside from traditional services (voice, user data). The standardization process is still ongoing, including issues for considering the combination of software designed networking and network coding. Anyway, Indonesia has to face the unavoidable challenges.

In 2014, Indonesia had about 340 million mobile network subscribers. There are 41 percent 3G and 59 percent 2G base transceiver stations. Indonesia has still to upgrade its present 3G network capacity in the rural areas as well as the city cellular network.

Since the end of 2014, 4G services have been introduced, mostly in the big Indonesian cities, despite the network's inadequacy for meeting 4G quality requirements. 4G terminals have already been manufactured in Indonesia. The national backbone network, the Palapa Ring, will be completed with the last implementation in the submarine cable in the most eastern part of Indonesia, the Papua Province. The national network capacity and speed would increase with its achievement. A network failure or disconnection in the Ring would be compensated by rerouting traffic through the other side.

Indonesia is the largest archipelagic state in the world with thousands of relatively small islands. This specific situation makes the deployment of telecommunications infrastructure more difficult.

The challenges of adopting 5G are the following: First of all, the technology is not mature yet. There are also limited human resources and budget for R&D. Moreover, there is a high risk to fall into a technology dependency trap, because it represents a radical change of technology. Despite such evolution represents the opportunity to take part in the production



of 5G technology, this requires huge efforts and the need focus on special components. The adoption of 5G also entails additional cost of social learning in adopting new 5G technology.

In terms of infrastructure challenges, there are high switching and a limited fiber optic backbone. Moreover, there is a need to adapt existing regulation. In terms of social challenges, the use of ICT is rather consumptive than productive. Indonesia is an archipelago that consists almost 17,000 islands which need to be connected.

Indonesia will take the following actions: Discussion of a frequency allocation plan for 5G; the reuse of 2G allocated frequency bands; the utilization of the digital dividend band after analogue switch-off; utilization of higher frequency bands (e.g. beyond 10 GHz) with wider bandwidth; strengthening local industrial players; foster the coordination and collaboration among research among stakeholders (academic, industries, government); gradual implementation of 5G; public education to foster the productive use of the backbone; promotion of innovative business models and promotion of creative industries in application and content; as well as the adjustment of the regulatory and policy framework.

5G adoption will be initiated if the switching cost can be covered by the future benefits based on rational economic adjustment. Social and industrial readiness should be prepared.

LATIF LADID, Founder & President, IPv6 Forum; Chair, 5G World Alliance, Luxembourg, talked about Internet Protocol version 6 in the 5G era

IP v6–Based 5G: The Two-Way Internet

Successful technologies get generations happening and with these evolutionary upgrades of technologies things are improving and we move onwards. We have seen this with the Internet where the first generation was based on a research project of the U.S. government. IPv6 is actually under way since the mid-1990s.

The success story of Europe is 2G, thanks to ETSI and the various stakeholders from around the world. This didn't really happen for 3G or 4G. There has to be some catch-up to be done in Europe, while the U.S. has deployed 4G rather well.

3G had picked-up IPv4, but not the right protocol. It picked up NAT (Network Address Translation), which is private IP-addressing. This will be fixed in 5G, which will be IPv6 exclusive in order to get this original end-to-end concept. This allows people to be their own operators from their own device—but also many other things that are not yet really addressed, such as privacy. As soon as privacy is taken over by companies or the government, you have no right to privacy. This is not democratic and has to be fixed.

5G should not be seen as 4G+1. It is a new opportunity, also to redefine the current Internet. These things have been done for the Ethernet. We already had gigabit access on the Ethernet back in the 1990s and on the fibre side, we have terabit access. With wireless we are just moving to some kind of gigabit access and in the future we have to move further because the elasticity of this service is quite fundamental.

Moreover, 5G should not just seen as an access technology, as it is defined today. It has to embrace everything. Fibre is the backbone and on top of this you have 5G which will allow multi-gig access and most probably beyond.



We are able to do many things that we are not able to do properly on the wireless side. However, you cannot just deploy the many things that are coming, such as IoT, smart grids, smart cities etc., you need to look at the security side, the privacy side, etc. Thus, redefining the various protocols is fundamental.

LTE or 4G is also another issue that we have. The technology is called LTE, on the market it is called 4G and this is confusing the branding of the service. However, from a standardization point of view this is not such easy. The curve of LTE is going to span until 2040. But it is only an access technology and we should not make 5G to be 4G again, unless we want to extend 4G beyond. We have to give 5G its own business case where it makes sense. It would be in the verticals or any application we can not do it with 4G.

With respect to the upcoming ITU WTC-15 meeting, the different agents are currently very strong in promoting 5G and hopefully there is not a cacophony coming out and confusing the meeting or even delaying the discussion about spectrum. We need to be careful in getting a harmonised message to the ITU.

In terms of the entire Internet, there are many people defining the protocols. Most of the time they have a kind of “harmonised liaisons” in place—which creates silos in defining the protocols. We have to bridge this and use 5G as an opportunity to get all of these people together to define something that makes sense—but also to take the responsibility in creating something beyond the current Internet and also 4G/5G. These people have to create inter-working groups and to intersect the various issues that are not addressed by the various individual groups.

In summary, the IP-infrastructure will be there for a long time. Radio access is absolutely critical, it is basically the infrastructure of the future. But then, we have to look at the many things that are not yet standardised, like cloud computing. Cloud computing today is not in favour of the sovereignty of the countries. The data has to be in the country. You can not use protocols that are defined by somebody else. The organisation that is currently monopolizing this, should open their services to enable the use of open stacks so that each country can define its data to be in its country and nobody else has access to it. This is not the case today. Cloud computing is hackable, especially by governments.

The management orchestration today is too simplistic. There are new ways of doing things on top of the routing platforms which are defined by the Open Networking Foundation, but still they are working on their own and they should be integrating organisations like ETSI and others. This would open up a new way of doing the Internet. Currently we have an hourglass; in the future it should be a champagne glass, where access is below and in the middle we have a very simple protocol on how to get the services done end-to-end.

The moderator wondered whether IPv6 alive and well now. Is it usable today?

Mr Ladid explained that there are 75 million American users using IPv6 without even knowing it. The number 1 country in Europe is Belgium where 45 percent of the people are using IPv6 without knowing it.

This is primarily due to the OTT-applications, like Facebook. Facebook has decided to implement its entire network in IPv6 only, because they have seen efficiency beyond 15 percent compared to IPv4. The main player is Google, because they have the knowledge and the capacity of doing that around the world.



IPv6 is happening, but it is happening like IPv4 before. In the future, when you know that you have an IPv6-address, you can do multiple things with it. You don't just get only one single IP-address, with IPv6 there are 3.4 billion IPv6 addresses for each person. Down the road you have multiple functions, you can do every single transaction with an IP-address and this is where the ground is laid for immense innovation in the future.

MATTI LATVA-AHO, Chair Professor Department of Digital Transmission Techniques, University of Oulu, Finland, approached 5G from an academic point of view.

5G – Enabler for Future Economical Growth

5G is not just another radio technology. In fact, it is everything else but radio technology. The technology boost is a key enabler for new services, new ways for spectrum sharing policies and using higher frequencies, the creation of a totally new business potential through major changes in 5G networks operation. Although radio technologies are evolving fast, probably the biggest changes are business models related.

5G is predicted to peak around 2035. Now we are supposed to start developing standards—a process that has already been started 2 weeks ago by 3GPP. The standards should be ready by early 2019. This gives us only few years to innovate and develop new things. Moreover, the spectrum regulation meeting will take place this year and in 2019. Many decisions will be frozen until 2019.

What does this mean in terms of innovation cycles in innovativeness, when we talk about all this magic 5G which is supposed to solve all kinds of problems, i.e., ultra-low latency, huge capacity, tons of different devices connected to the Internet wirelessly. The challenge is mind-blowing and bigger than ever before. And the clock is ticking.

Maybe the technology itself is not the key driver of 5G. Maybe the key driver is what we can do with the technology. Should we do something differently compared to what we have been doing in the past 40 years of the history of mobile communications, which so far has been entirely operator-driven and operator-centric? Should we open the door for some other types of business models and some other types of players, assisting the current players in making this digitised world and the IoT reality—at the speed that is needed?

We need faster cycles and we need to do things differently than in the past. In terms of fast ways towards 5G, we first of all need more spectrum, we need to use existing scarce spectrum more efficiently, and we probably have to apply all sorts of spectrum sharing schemes between various systems, operators etc. We also need new radios to do things more efficiently, to allow better connections of low power sensor types of radios to mobile networks. One way to increase capacity very fast is to break down the base station structure to hundreds of small densely spaced cells. In the future we will see base stations in a form factor of WiFi access points deployed everywhere indoors.

What does this mean? 5G is not just radio technology. We have to see it more as an enabler for doing something fantastically novel in totally new ways—without violating the position of current key players, which are operators, ISPs, hardware manufacturers etc. There is big business also behind 5G, provided that we take this opportunity in spectrum regulation already into account. We should find ways for new players to deploy and operate indoor densely spaced small cell networks. The operators' role may change drastically, maybe not



yet during 5G, but in the years to come. There is a need for new models.

Building this new densely spaced indoor networks is very expensive and requires a lot of efforts. To make the IoT reality we have to get a clear understanding of how this process that we are trying to automate really functions, what are the key aspects to improve, etc. And we need new players to do that.

JUHA PALVE, VP Customer Solutions, Knowledge Intensive Products and Services, VTT Technical Research Centre of Finland Ltd, Finland, addressed the topic of intelligent infrastructure and 5G in particular.

5G and Intelligent Infrastructure

The topic of intelligent infrastructure from the technology perspective ranges “from silicon to cloud”—from sensing and measurements, e.g., MEMS, optical disposable sensors, to the wireless telecommunication layer and on top of this the data science, such as big data analytics, cloud services etc.

VTT is dealing with all of these technologies in various application areas. The company has identified the following 5G network challenges: We need to handle the capacity need of the radio systems without major increase in energy consumption. We need to ensure the required hardware performance and verify and improve software performance. We have to design antenna and other radio frequency components for complex radio systems. And, we need to ensure information security

This type of challenges are also key 5G system requirements set out in the European Union’s Horizon2020 5G Infrastructure Public Private Partnership: We need 1000 times higher wireless area capacity and more varied service capabilities (compared to 2010). We need to save up to 90 percent of energy in mobile communication, especially the radio access network. There has to be very dense deployments of wireless communication links (over 7 trillion wireless devices serving over 7 billion people) and advanced user controlled privacy.

In terms of 5G research, VTT has developed millimetre wave radio links for 5G. These links are already operating. From the software perspective, VTT has demonstrated Licensed Shared Access (LSA) for faster access to new spectrum. Moreover, VTT has designed the network management and virtualisation environment, including IoT gateways etc., for the Port of Singapore. In terms of research, VTT has accelerated the 5G test network, a national flagship project. VTT drives a number of 5G research programs within the EU 5G Infrastructure Public Private Partnership.

As research organisation, VTT is already thinking 6G and beyond.



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Q&A

The first question was addressed to **Claudia Selli**, AT&T. Things are changing from the traditional phone and tablet market to a more expanded view. How is that changing the thinking of AT&T and what are the implications?

Mrs Selli confirmed that the business it is going global, and consequently the thinking of the company is changing. Some examples:

One of the services AT&T is offering is AT&T Cargo. AT&T Cargo enables the customer to monitor merchandise while it is shipped around the world. This allows to take fast decisions, e.g., to decide not to deliver the merchandise if it is rotten or if something goes wrong. Moreover, decisions can be taken in real-time. This helps saving a lot of money from a companies standpoint.

Another example is the connected car: AT&T has agreements with 8 car manufacturers to connect their cars worldwide, for instance BMW. Customers are travelling from Germany to France or even worldwide. This influences the approach of AT&T, as AT&T has to connect these cars globally—and thus needs to address the different regulatory challenges. For instance, in Europe alone there are 28 different types of regimes. You really need to have a harmonized framework and you need to talk to different regulatory bodies to explain them the hurdles that can be encountered. One of them could be cross-border data flow, or spectrum or enabling the extraterritorial use of numbering, because this car or the ship has a SIM card which is linked to it and you need to connect them wherever they are. This requires to work in different Member States—something which is very different from the handset we used to have before, that is managed locally or that has a local approach and you just interface with one single regulator.

The next couple of questions came up from the audience: How do we ensure the funding and earning models that will be required to change rather drastically when 5G comes? Regulators have learned to make money out of selling spectrum. This is probably not being the case in the future. Operators have accustomed end-users to flat rates. How to change this? Moreover, the densification of networks will cost a lot of money. There are many technical challenges, so 5G will not come free of charge. How and where do we start the dialogue between different parties, industry, regulators and business, right now to make sure to pave the way for 5G?

Latif Ladid, IPv6 Forum, stressed that it is not possible to compete with 4G, we have to use 5G with a different business model in order to make money out of something else. If we just continue with the 4G-model of flat rates, 5G won't happen at all. It would be just impossible for anyone to invest in it.

Since the governments are pushing for this and the EC is also funding massively 5G, they have to be very careful not to show that it is going to bring trillions of dollars. Otherwise regulators will claim a share immediately. This was what happened with 3G and we should not repeat that mistakes of 3G.

Wladimir Bocquet, GSMA Association, added that the value of the spectrum needs to reflect the market price. We have seen a number of biased results affecting the industry.



However, there are more and more policymakers understanding this element.

GSMA has recently carried out a study on the densification of the small cells in Europe. The study showed that it takes on average 12 months to get all the approval in Europe to install a base station—even 18 months in certain countries. This is one of the key challenges to be resolved, having a harmonized view to facilitate and better respond to the consumers demand. A fast response to the consumer demand will drive down the price and will enable the operators to cope with what is happening in terms of indoor and the evolution of the traffic through the mobile network and mobile broadband

Timo Ali-Vehmas, Nokia Technologies, commented that if you look at the overall 5G, or the future infrastructure as a whole, so that it includes all the sectors of the society and the role of the operator, it is now very important to separate the role of the network operator from the service operator. There are already virtual operators in telecoms, but these virtual operators are actually operating the data of the telecom service.

Mobility as a service, for instance, is a service and requires an operator. When talking about data and digitalization, we need to think about the operator in that sense—not the network operator alone, this is a separate entity for the network, but for the data. Mobility as a service, healthcare as a service, community as a service, anything as a service—each one of those services will require an operator and this operator is basically responsible for the data that he or she manages. The overall paradigm of this future intelligent infrastructure is relying on data. The spectrum was and is still important for the connectivity, but if you think about the overall infrastructure, the new value will be in the data. And when we think about the data, we need to think about the data operator. This is the way we can start seeing how the new value is created on the top of the platforms that we need to build below that.

The session's chair, **Antti Larsio**, SITRA, thanked the panellists for their extremely interesting presentations and concluded the session with some closing observations:

Intelligent infrastructure is a mandatory requirement for our digital future. There is a strong relationship between our digital environment and nations' competitiveness, wellness and standard of living. Future technology, especially 5G, defines and allows new business models and fosters the economical environment. 5G is the future, but the route is unknown. There are still lots of open questions. Technical development will continue. And, we need an extremely high-speed communication channel between the brains of policy makers, regulators and industrial players.

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Session 7

Day 2 – Morning – Parallel Session

Smarter Regulation in the Internet Age: “A New Policy Toolbox“

DESIREE MILOSHEVIC, Senior Public Policy and International Affairs Adviser, Afilias, Ireland, [<http://www.afilias.info/>], chairing the session, opened the session and welcomed the participants.

The Internet should be for everyone, everywhere . However, unless we have good regulation and good government policies, good technical standards and corporate decisions –all these aspects to be addressed during this session—we won't be able to have Internet for everyone and make it as accessible to all.

GERARD POGOREL, Professor Emeritus of Economics and Management, Telecom ParisTech, France, moderating the session, started by putting the topic into perspective.

We are talking about smarter regulation. Does this mean the regulation used to be smart and should be smarter? Does it mean it was down and we have to make it smart? Everyone has his or her own notion of what smart is.

We have lived in an age of exploration in terms of regulation, e-communication and digital services. We had a legacy situation of pre-existing copper communications networks, we had emerging information services and the key issue was to shift from a legacy situation of monopoly, at least in most countries, to a new situation of competition. Regulation was actually centred on one issue: how to competitively access pre-existing networks?

The situation today is completely different. It was not anticipated that, 10-15 years after the regulation has been put in place, completely new networks would have to be built and the issue would no longer be to grant competitive access to pre-existing networks, but to incentivise—from public policy perspective—the building of this completely new network, including both mobile and fixed technologies. The central issues today are how to incentivise investments, how to foster innovations, and how to do it in a competitive manner. Although competition is not the central tool in this respect.

The English language has only one single word for competition, while, for instance, Italian and French have two words ‘concorrenza’ and ‘competizione’ respectively, ‘concurrency’ and ‘competition’. Concorrenza means that we have a relevant market and we will look at how it works within this relevant market. Competizione means that we look at the whole industry, not only on one market, but we look at what is at stake, what works in the industry and what is the impact on the whole economy?



There has to be an important shift when we look at public policy: It is how to shift from pure competition in the narrow sense, sometimes even short-sighted, to a broader concept of competitive market dynamics. If we don't have a competitive market dynamics approach to investment and to networks, 4G will have difficulties reaching 100 percent coverage and maybe 5G won't even happen. We have to talk in business terms and in industry terms.

The following presentations will discuss how to achieve this shift in regulation from a narrow perspective of competition to a much broader perspective of competitive market dynamics.

KLAUS NIEMINEN, Communications Network Specialist, FICORA – Finnish Communications Regulatory Authority, Finland, addressed the issue of the EC's review of the Telecommunications Regulatory Framework from the perspective of a regulatory professional.

The EU Telecommunications Regulatory Framework and national regulations were built in a time of circuit-switched telephony networks. In Finland there has been a green book telling the operators how to build and manage the networks in great detail. This is not really the way we should do it anymore.

The government is actually pretty good in inventing new rights and obligations. But it is many times harder to remove anything. We need less, better and more focussed regulation in the telecommunications!

First, we have to think about the question of sector specific regulation. Where do we actually need that? We have a good general regulation, e.g., in the areas of consumer protection and competition legislation. Is this enough or do we need something that is specific for the telecommunications sector? This is one of the big questions we need to discuss and rethink in the upcoming review of the regulatory framework.

Of course, we still need some regulations. For instance, the Finnish Regulatory Authority wants to make sure that the end-users have access to an infrastructure that is secure and reliable. I would say that this kind of network level regulation is needed also in future.

We already have been seeing the introduction of the OTT services, new players in the Internet. We should not try to duplicate the current regulatory framework that works for network services. More likely, we should try to have a really light touch regarding OTT services and probably leave many of those things out of the regulation. On the other hand, we need to make the playing field equal. We have to rethink the current regulations we have for the service side, namely broadcasting services. Do we really need to have a complicated regulation on the television services? Maybe we want to regulate the emergency calls, but what other regulation do we need for the telephony services? We should focus on the enablers for the economy and let the market decide the services and application side. Of course, some security and privacy rules are probably needed also there. In the larger scale, another aspect is the EU's Digital Single Market. It is important and may change the market.

There are some ideas of what should be done. First of all, we need to make sure to have a healthy commercial media. For example in Finland, the commercial media is not doing that well, due to the Internet, Google and the competition. We really need to think about how much regulation we need for the broadcasting side for example. Do we need to regulate advertisements anymore? We have plenty of different rules on how you can do advertisement in television.



The other issue is the silos that are made nationally. It may be that the providers are creating those silos in order to prevent the free movement of services or it may be the copyright. For instance, the national broadcasting company YLE can't sell its programmes abroad. If Finns are travelling to Sweden or anywhere else in Europe, they can't watch their national channels from abroad. It is important to tackle this kind of issues that prevent the free movement of services and their usage by the users.

Another important issue is network neutrality. Reliable and good networks are essential for the future growth and innovation, but also the open Internet. This hasn't been a problem in Finland so there wasn't really a need for this kind of strict network neutrality regulation. However, on a pan-European level, this might be useful. Now there is an agreement about the rather strict network neutrality regulation in Europe—which it is still very unclear. There are plenty of questions that need to be tackled. This is done in the BEREC, the Body of European Regulators for Electronic Communications, who tries to solve these open questions. But there are only eight months to do it...

In terms of the way of doing regulation, cooperation and self-regulation can work very well. For example, the question in Finland was whether it should be made mandatory for operators to implement the IPv6. Finland decided not to mandate it and, instead of regulating, a 2-years work with the stakeholders was done. Recommendations on how to take IPv6 into use have been made before the national launch of IPv6 in June. Currently, there are more than 5 million IPv6 enabled subscriptions in Finland. This is a real success and it was entirely on a voluntary basis. This is a good example of how the regulators you can actually achieve their goals also with soft regulation and cooperation

Given the experiences made with self-regulation in the financial sector, the moderator wondered how far can self-regulation go.

Mr Nieminen explained that it is important to evaluate where self-regulation can be a tool to be used. It is not something that can be used for every purpose. For example, regarding items that are really costly for the operators but which are still critical for the society, in these cases it may actually be useful to have hard regulation in place.

Finland uses self-regulation and this kind of cooperation schemes for defining the bit stream product for the broadband wholesale services. It uses also a self-regulatory scheme to arrange number portability. In general, if there is a kind of common interest, these kinds of self-regulatory tools and cooperation can be easily used, but it is not the answer to everything.

As some of the standards bodies are moving towards consumer protection by trying to rebuild trust in the network and communication media using encryption, the session's chair followed up with questioning the opinion of the Finnish Regulatory Authority about default encryption.

Mr Nieminen stressed that encryption as a default is definitely something that belongs to the self-regulatory regime. FICORA tries to provide ISPs and users with the tools making them more secure; however FICORA don't want to push and force somebody to encrypt their traffic as this might be a problem for some of the service providers. FICORA wants to avoid that a service can not be used in Finland because it is unencrypted. It is definitely more likely in IETF where the way of thinking is to have more and more traffic encrypted. This will come with the normal development of the services and the protocols.





Standardisation is part of the regulation picture. The boost of 5G will be determined by both technological advancements and some regulatory adjustments. The questions addressed to **MARGOT DOR, Strategy Development ETSI - European Telecommunications Standards Institute**, [<http://www.etsi.org/>], concerned the relationship of standardisation and regulation and ETSI's view on differences among the regions regarding this relationship of regulation and standardisation.

Margot Dor underlined that it is important to differentiate between policy making, legislation and regulation. People tend to always use the term of regulation. We need to be precise regarding the words we use—policy is not the same as legislation, which is not the same as regulation. Standards are very often used in support of policy making or in support of legislation and sometimes in support of regulation.

Finland was part of this big push of GSM. There has been this very specific alignment where everybody pushed in the same direction, industry, regulators, spectrum authorities, governments etc. to make this incredible success story and all this value creation happening that followed the 2G mobile communication turning to 3G, 4G and hopefully 5G.

Historically, there has been in a number of domains this standards at the service of a policy vision or legislation or in support of regulation. As the world moves towards digitalization this will be increasingly true as all the services of our life, e.g., health, tax, transport etc., become digitally enabled. The question of standards and interoperability will be increasingly crucial to make sure that we have the right level of interoperability, the right level of level of protection, access for the consumers etc.

There is a sort of a triangle which is policy and legal aspects, then there are the standards, technology and businesses, and with the digitalization, there is increasingly a third pillar, which is the users. Standardization, which in the beginning was very much a business-to-business exercise, is increasingly getting business-to-business plus business-to-consumers due to the digitalization of every aspect of life and economic interactions.

With respect to the question of differences among the regions, digitalization is something global and all the regions are dealing with that differently. Standards are often used to support either a policy vision or a legislative framework or some regulation, which, for instance, in France would be rather ex-post than ex-ante. It goes usually with a vision on not only issues related to interoperability, user access, and user protection, but also in support of competitiveness.

Those who complain about the EU being a fortress are simply wrong. ETSI has 800 members, starting from Apple to ZTE, with everybody in the middle that we can think of. ETSI is working with the U.S., with Asia, with Chinese players etc. Because of the roles standards play, ETSI has a lot of interaction, not only with industries but also with governments, policy makers etc. Nowhere else but in Europe we see a system which is as open to the rest of the world in terms of standards in support of regulation, but also legislation and in support of policy.

What happens with the Digital Single Market or with the Reform of the European Standardisation System 3 years ago means a sort of open up Europe to players from all regions of the world, including to get standards in support of regulation but also in support of policy. The question to be answered by the EC is “what is the vision behind and how does this support the competitiveness of Europe?”. There is this tension between user interoperability etc. and regional competitiveness.



Both in the U.S. and in China, when there is a vision about an industrial policy, there are the tools, including the standards that support that vision. Neither in Washington, nor in Beijing there are the equivalent tools where players from Europe, for example, can come and decide on what will be the policy of the region in terms of standard making etc. In Europe, this exists and it is a big question to ask.

The session's chair then wanted to know whether that interoperability is hard-wired in all the other regions. Is this interoperability of the global network that leading foundation and vision or are there some regions not having the same aim?

Mr Dor explained that interoperability is hard-wired in every standardisation exercise. Standards are produced in order to reach the right level of interoperability so that business can develop.

The title of the panel is “smarter regulation”. Being a regulator is rather difficult these days. On the one hand, people are asking for deregulation. On the other hand, people claim for a better regulatory framework with smarter and stronger regulation.

Yesterday, someone said that for every dollar invested in Internet infrastructure or services, there is a 17 dollar payback. The question is: Who do these 16 dollars go to? This is where the role of the regulator is—to make sure that there is some kind of market rules of “where does this money go to” and at what social cost.

The role of the regulator is to make sure that these 16 dollars are shared between the different market players and the society; and that the cost of producing these 16 dollars is not at the cost of each citizen being transformed in a huge data ATM machine without them even knowing where their data goes to. This would be smarter regulation.

Given that both regulation and standardization do not only have technical and market dimensions but also business and political dimensions, the moderator followed up with a question about the general vision on this.

Mrs Dor referred to three or four pillars that structure the market in the end. You need to have the business environment, and maybe the standards and the interoperability, and the policy environment. They go hand in hand. This is why ETSI always looks for a sort of strategic dialogue with the EC, in particular in the context of GSM, about how standards can support this.

For instance, it is not the business of the Commission to do business models for the IoT. It is a construction between standards, regulation, business, business strategies etc. The example of Finland shows very well that one will be successful if everyone cooperates; everyone is in its role, no more and no less. Everyone is in its role and cooperating in order to make the best out of it, including for competitiveness.

Regarding encryption, there is a lot going ahead in ETSI, and this is probably the same in IETF and ITU, about security and encryption and the programmes are going on very well attended both by governments and industry players.



When talking about competitive market dynamics, it is critical to look at the world economics as a whole. What are the new developments in China regarding the telecom industry? And what will be the impact on innovation on world markets and what are the challenges for Chinese law makers? These were the questions addressed to **SARAH - XIAOHUA ZHAO**, Partner Perkins Coie LLP, China.

Sarah - Xiaohua Zhao stressed that the Chinese regulatory market is very different from the one of Finland. In China, everything is highly regulated. Since November last year, about 40 regulations, rules, policies and measurements have been issued governing telecom broadcasting and the Internet industries. Some of them dealing with standards, but the most important one is the rule to promote the conversion of telecom, broadcasting and Internet—three network conversions. The government has tried to promote this for a while, but due to the specific market nature it was not an easy task.

The telecom players have their own territory and didn't want to give up their rights, and the broadcasting players didn't want to give up their rights neither. As a result, convergence could not happen for a long time. This is part of the reason why the Chinese government couldn't issue the telecom law in China. China doesn't have comprehensive rules in terms of telecommunications law. Conversion was the major problem.

Then, about 5 years ago, the Chinese government issued a 5-years plan and tried to fix the problem. They came up with trial projects in different provinces all over China. 54 cities and regions have been involved in the trials to make telecom and broadcasting converge and work together.

5 years later, the government had identified the problems and developed the approach to move on. Last month, the State Council issued the Circular No 65, which informed about the specific goals, the specific authority, the specific agencies and also the new agency who is going to be in charge of issuing lessons in the area.

There will be a new body consisting of representatives from different ministries and agencies, such as the Ministry of Industry and Information Technology, the broadcasting industry, the security bureau, or the planning commission. With this new body, representing a new platform, the government has expanded the involvement of government agencies. In the past, there was just the ministry of telecommunication or the broadcasting agencies, now they also involved the transportation industry (because of the relation of technology and infrastructure) as well as also some local bodies. The Chinese government is moving forward with a very well planned kick off.

One of the benefits is to make full use of the infrastructures. In the past, it was divided into telecom and broadcasting, now they are combined. This also can enhance technology, as the technology that can be used for three applications, not just telecom or broadcasting, has to be created. Future competition on the market will be much more diversified and vital. Currently, there are only 3 basic telecom providers. In the future, the broadcasting network can be the basic telecom provider, if they want to. This is one reason why telecom players in the past were scared for the broadcasting to get in. Moreover, the telecom players can actually create broadcasting programmes. It is a completely new age. The market will be very active and create a lot of competition and new opportunities

For the Chinese government it is a new system to manage—and it is much easier to manage or to control a unified platform. Maybe in the future, there won't no longer be a need for so many ministries. The consequences can be significant.



This new body is already established. It is not a new agency, it is a kind of working group. There haven't been any lessons issued yet, they will be issued on a case-by-case basis. Whenever a player or product is mature, the government will issue it. It is still new, but it is a step in the right direction.

Moreover, this action has a significant impact on the future regulatory regime. In the past, the telecom law or broadcasting law couldn't be issued due to the two sectors fighting all the time. Once a rule was issued it had to be changed soon. As a result, there are only regulation policies, but no law issued in this area. This new circular abolished the barriers of the two sectors separation. Very soon, the Chinese telecom law will be available to be implemented and a broadcasting law will be promulgated.

China is a number 1 market for many companies. The next question of the moderator referred to the potential implications of these evolution in China on the world markets, both as a supplier and as a market.

Mrs Zhao emphasised that this new action creates many new opportunities for both domestic and foreign companies. Today, if a foreign company wants to do business in China they could establish a joined venture to provide services in both telecom and broadcasting. Moreover, China needs new technologies that can be applied to this converging system. There will be a huge market. And if you get a customer like the China Telecom wanting to get into broadcasting this is significant.

CLAUDIA SELLI, EU Affairs Director, AT&T, Belgium, [www.att.com], was asked "what AT&T's business customers focus on today in terms of technology, what is their take on public policies, and how does AT&T see the major trends in the evolution of the demand to the telecom and digital industries"?

AT&T Global Network connects more than 3.5 billion industrial customers in about 200 countries around the world. AT&T helps its customers mobilise their people, to scale up their operations to go mobile and to use the cloud. What they expect from AT&T is a global connection and a seamless experience.

The environment has tremendously changed because we are now connecting all the objects to the Internet. Cisco predicted that by 2020, there will be 50 billion objects connected to the Internet. There is more and more data flow on the networks, which requires networks with a certain capacity—and this requires a lot of investments.

From a policy standpoint, AT&T's customers need a service that works seamlessly—but for AT&T, in order to provide that type of service, they need a policy framework that is interoperable and flexible, that addresses consumer demands and consumer protection, that is applied in a competitive way, and that reflects the market reality, because the market has changed a lot, and that is also trying to foster competition and innovation. When you have a lot of participants on the market that are also investing, you can trust the market dynamics to create a good environment.

As the EC is promoting an integrated internal market for the digital economy, the moderator followed-up with the question about AT&T's feeling about how to cope with this market, which is at the same time borderless, at least in some areas, and very fragmented.



Mrs Selli stated that AT&T is a licensed operator in 27 of the 28 EU Member States. AT&T has employees in all the different countries and is serving its customers at a pan-European level. AT&T faces many challenges due to the fact that there is no real digital single market in Europe. There are 28 different types of regulation. There is a lot of red tape AT&T has to face, and there are a lot of cost and resources associated to this. AT&T, as a big multinational, has the means to face all that, but this is not the case for a start-up that wants to scale up to a European level. Cutting a lot of red tape would allow these start-ups to grow; this would be a growth for AT&T as well, because some of them are probably customers of AT&T.

The digital single market is a unique opportunity for Europe. It represents the chance of harmonising the framework for the creation of a unique market with more than 500 million people that can have access to these services. As President Juncker and Vice-president Ansip have stated, this can bring more than 250 billion euros of growth in Europe.

Cross-border data flow is one of the issues challenging companies like AT&T, because there are customers having some fears and asking for local storage of data. However, this is going against the spirit of the type of service AT&T is providing—building local servers in different member states is fragmenting a market and fragmenting the cloud computing type of services. This is just one example. Allowing for example the extra-territorial use of numbering would help scaling up the Internet of Things and the connected car business. These are only few examples, but there are a lot of opportunities there that we need to seize.

When reading the public consultation on the evaluation and the review of the regulatory framework for electronic communications networks and services, it becomes obvious that the EC has changed the focus from telecommunications to Internet access. **NIGEL HICKSON, VP, Global Stakeholder Engagement, Europe, ICANN – Internet Corporation for Assigned Names and Numbers**, addressed the question about the future of Internet governance and how it relates to broader regulatory issues. What are the difficulties, what is at stake and what will happen?

The European Commission has recognized the progress that has been made from telecommunications to e-communications services to the Internet. There is this acknowledgement that the future is the Internet.

Two or three things come out of this: First of all, smarter regulation. The issue that we face in smarter regulation is that we are confronted to the paradigm that not all regulation is the same. We still have a situation where we have to have “horses for courses”. There is no single global paradigm to regulation of the Internet or the regulation of telecommunication markets. You can sit here in Finland, Scandinavia or Northern Europe, in this sophisticated environment, where the government has legislated for Internet access for all people and you get a sense of where Internet access is going—how people are using the Internet both for their personal lives and their social lives, in work, for public services. The Internet has become something which has transformed society.

But only a couple of weeks ago in Nairobi, there were discussions with the Commonwealth and African governments and leaders about access to telecommunication services and access to the Internet there. And that is a very different paradigm.

On the one hand, FICORA is legitimately noting that the EC in their review of the



telecommunications framework has to be smart, has to be targeted, doesn't want to interfere where businesses doing already a good job and where competitive markets are delivering services for customers and businesses. But on the other hand, we have the situation where in some markets in Africa and in Latin America and in other parts of the world, there is no telecommunications framework. There is no independent regulator, there is no economic regulation. And there, the very fundamentals of having economic access to the Internet, of competitive markets, of consumers being able to use the services that we take for granted in Europe is needed. One can't dismiss regulation. Regulation depends on the market you are looking at.

ICANN has a role in the governance of the Internet. ICANN is a kind of custodian of the domain name system, ensuring that the top level of the Internet, the root of the Internet, the top level domains, the country-codes (.fi, .uk etc.), and the generic codes (.com, .net., .org, ...), that all the domain name system remains a single entity, that the Internet remains interoperable.

The lesson of the governance of the Internet is twofold. One, it involves all the players. It seems to be evident that regulation has to involve all the players—it involves all the players in Europe, it involves all the players at ICANN, all the different constituencies come together so ensure that the governance of the Internet is taken forward in a sensible way. But this is not a paradigm that is shared globally. There are still countries calling for a UN system of governance of the Internet, for a UN system of governing cyberspace, of governing privacy, of governing various intellectual property issues. We are still faced with this debate, is the future of governance in the hands of all the stakeholders, i.e., the users, the businesses, the civil society and the governments, or is it in the hands of just the governments? This is still a debate that is played out.

What ICANN has shown in the way the DNS is managed by this community of different actors is that you bring the different wisdom, the different benefits, the different perspectives to the table, and as a result you get better regulation. If there is any example to use from the governance of the Internet space to the telecommunications to smarter regulation and elsewhere, it is this sense to bring all the players to the table.

The moderator then wanted to know whether this works because the stakes are well defined. What are the unknowns and how will it work 5 or 10 years from now?

Mr Hickson underlined that is very difficult to predict the future. However, the whole aspects of Internet governance is a longstanding and ongoing debate. There will be a high-level conference in the UN General Assembly in December, called the WSIS+10 Review Conference. In 2003 and 2005, the UN hosted the so-called World Summit on the Information Society, partially to look at the way the Internet was governed and this is being reviewed 10 years hence. Ministers and ambassadors from 192 UN countries will meet and discuss the future of governance.

There are still some serious aspects to be looked at and to be considered. Some governments legitimately say the Internet is throwing up so many difficulties, such as cyber crime, child abuse issues, fraud, intellectual property theft. How should it be governed and who should govern it? There will be serious discussions.

To come back to this paradigm: On all these various conferences, is it just governments that are speaking? Is it just businesses that are speaking? Is it just users? No, in most cases, the



most successful ways forward are when all the actors come together.

The governance of the domain name system, the governance of the technical side of the Internet is something that has only been in existence since 1998. Before 1998, the whole governance of the Internet, the giving out of the top level domain names, was in the hands of the U.S. government, namely in the hands of the University of Southern California. The U.S. administration, in 1998, created ICANN as a non-for-profit body to govern this domain name system. The U.S. maintains one link as U.S. authorities maintain this backstop ability to monitor what goes into the root of the Internet. If a new TLD or a new country-code comes along, the U.S. has an overview of that. However, the U.S. is giving up this. There is a project going on on this transition of this responsibility of the U.S. to the global community. When that is complete, hopefully in early next year, it will mean that all governments have equal say in the governance of the Internet along with other stakeholders. That will help the future governance of the Internet.

The session's chair followed up with the question whether this transition is likely to happen.

Mr Hickson emphasised that this transition must succeed. The U.S. role was historical and was there for good reason, but for many governments this U.S. backstop role is an affront to sovereignty. Because technically it means that if the UK government, for instance, decides that they want to manage their .uk domain, or if the Finnish government decides to give the administration of their domain in the hands of the Russian government, or the hands of some other government, then that change in the administration of the domain has to go through the ICANN system and ultimately has to be blessed by the U.S. The U.S. could intervene theoretically to stop it. Now the U.S. have never abused this power, but the power is there. And that power is obviously an affront to many governments.

This transition—the U.S. is giving up this responsibility and giving it to the global Internet community—is a very important step in the democratisation of the governance of the Internet. And it is something, that can't go backwards. However, this transition is confronted to many difficulties. It is complex, there are a lot of arguments, and it is tied up in the accountability of ICANN as well. How you make a non-for-profit organisation with a nominated board accountable to the global community? These are decisions that our children and our grand-children will be affected by. This is the openness of the Internet. This is the ability of people to use the Internet of the future.

Young generations assume that the Internet will be there in the same way water or air will be there in the future. The Internet is a global right. Finland has made access to the Internet a human right. In the UN, people are calling for the Internet a right. But the Internet is only there because of the overall governance of the Internet, because of all the players that come together to make this Internet available. And therefore we have this real reasonability which we must fulfil.



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Q&A

The first question from the audience was “what does regulating really means and what should be its goal?”

Klaus Nieminen, FICORA, explained that doing regulation is first of all having a very clear view of what you are doing, a clear goal of what you want to achieve and an analyse of the tools that can be used. Publishing a new regulation is just one of the tools and one should not abuse it. It is a tool that should not be used where it is not necessary. Regulating issues is really telling somebody to do something in a way you like it to be done. It is a really powerful tool to mandate everybody to behave in a similar fashion. Thinking about the Internet, the evolution of the networks, the usage, the digital society—where actually do we want to make people and the companies to behave in a similar fashion, or is that something that rather prevents growth and innovation? It is really an important topic and you have to carefully analyse the implications before doing anything.

The following question was addressed to **Sarah (Xiaohua) Zhao**, Coie LLP: Will this convergence lead to more competition or will the major players remain the same?

Sarah (Xiaohua) Zhao, stated that currently the major players are still the same, but the private sector can, and probably will, come in now.

Changes are already happening on the market. For instance, Beijing Television Network, the second largest TV broadcasting network in China, has already built a cloud platform using the broadcasting platform to provide Internet TV and Internet telephony. It is also possible to order plane tickets online-on the broadcasting network.

The next question addressed the issue of collaboration between governmental regulators. There are plenty of different players in different countries setting their own policies, regulations, etc. In telecommunications, there are two major players, ETSI and FCC, that are setting regulations and policies for that. However, there will be an increasing number of technologies, technology usages and an increasing number of players. Although, there are always different players having different interests in terms of setting policies etc. Are these governmental players going to start looking more from a global perspective rather than a local perspective? Is that happening right now?

Klaus Nieminen, FICORA, underlined that harmonisation is always difficult. Looking, for instance, at the current EU level discussions aiming to building new guidelines for network neutrality. There are all the different views from the Member States. The aim will be to reach a common position, but it is most likely that there will be some issues were people won't really agree on the common view, and some issues, where a common position can be published and thus harmonisation can be done.

However, even in this regulatory framework review it is always rather easy to have some minimum harmonisation, or some minimum rules, e.g., on the level of protection, the Member States want to have all over Europe. However, trying to do total harmonisation is much harder and then the Member States are most likely to resist the idea.



In the context of global level regulation, the EU Member States are not really happy to have for example the ITU to take the position to have the global rules for most of the issues. It is not easy because the conditions are so different in China, Africa or Europe. There is no common view about many things. For example, if we are talking about the open Internet, the rights for users, freedom of speech etc.—trying to reach a global harmonization for that kind of issues is simply impossible.

The question addressed to **Claudia Selli**, AT&T, was whether regulation helps or hinders innovation. Is the situation in Europe that bad or is it acceptable? What should change?

Claudia Selli, AT&T, pointed out that the aim would be to have a flexible and high-level regulation.

The regulatory framework should not be too prescriptive and should not go too deep into details, because the ecosystem is changing continuously, new applications and services are continuously being developed. For instance, Google that was born in 1998, or Facebook or WhatsApp—the thriving Internet that we have today is also due to the fact that it has been governed under the multi-stakeholder approach.

In the context of net neutrality, the approach is to have a policy frameworks that don't create supplemental barriers. In Europe there is still a fragmented market. Europe has the amazing opportunity today to change this and to look at all the new market dynamics. For example the U.S. has taken distance to net neutrality and regulates much more than before. It could be damaging for an industry investing a lot of money in the upgrade of the network. You need a stable framework that allows also return on investment.

Desiree Miloshevic, Afiliias, chairing, wrapped up the session by conceptualising the presentations in three boxes.

The session talked about networks and communication regulation and what would be a good opportunity to create equal opportunities for all. Network neutrality regulation plays a big role with that in the EU, trying to enhance and uptake of smaller players as well.

We also heard about difficulties in having a same goal and agreeing to common goals and values. This is one of the challenges. But in terms of institutions, the session looked at a different model, i.e., how ICANN is dealing with policy development. ICANN is trying to be a global player and make global polices for the rest of the world—understanding that there are all these different players in the ecosystem, that each has a different value and sometimes different goals. It requires hard negotiation and work as a community towards the same goal of an interoperable global Internet.

In this session we have also heard about the changes in the market, e.g., in China where the same players trying to rearrange and making the convergence of the telecommunications and broadcasting system happen. This is what happened, for example, in the UK when OFCOM has been created, that now deals with both broadcasting and the network system. And hopefully it will open up some room for new players in China.

Continuing on the institutional level, it was interesting to hear from ETSI about their perspective of what is needed in the smarter box. They emphasised that the regulation is not the same as legislation and policy. And whilst they have a membership model, they accept



global membership where they all make decisions together and they would like to see more openness in other regions of the world.

The session also addressed consumer protection. This is essential and some of the other standard bodies are trying to make more use of encryption, as we have seen that many governments have been weakening and banning the encryption, although it is one of the tools for making the trusted use of the Internet working.

We have learned a lot about the fact that, even in the vocabulary of the EU that is changing from e-communications to the Internet, everything is now evolving around the smarter Internet age and how to use it to the benefits of all people.

Lastly, what we haven't really talked about is this new smart leaders and individuals that we also have in our ecosystems. There are the issues of moralisation, we are in the era of "cheating software" as the NY Times put it. We have different views on how Google should manage the links in terms of rights to be forgotten and how that is going to harmonise across Europe. We have just opened a huge plethora of issues and complex questions. But we can take a lot from this panel in terms of recommendations, that we do need flexible and as much harmonised rules in the EU for the players to exercise and invest in the network. There is a huge potential of self-regulation and government policies should not interfere unless it is absolutely necessary.

The future success of the Internet really relies on having this common vision of the open Internet as an innovation platform. However, it is a collaborative effort of all the stakeholders and technical standards bodies and government coordinators and corporate decision makers to work on this as much as possible decentralised platform. Hopefully this approach of multi-stakeholder will be adopted when addressing these complex issues.

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Session 8

Day 2 – Morning – Parallel Session

Smart Cities & Communities

HUGO KERSCHOT, Managing Director IS-Practice, Belgium, moderating, welcomed the participants and briefly introduced the speakers.

The session will explore how smart cities meet the challenge “from disruption to sustainability”, but also, after 10 years of discussions around the buzz-word “smart cities”, what we can really offer to the citizens of our communities today.

ALEXEY ERSHOV, Vice President, Smarter Cities Europe, IBM, Spain, chairing the session, shared valuable insights about where we currently are and where we are going in terms of smarter cities applications.

Smart Cities:
from disruption to sustainability

What is a smarter city? It is a more liveable city. Let us think about smarter cities rather than smart cities, because smart implies a destination and smarter is a real journey. Every smart city can become even smarter. There are many examples of that.

“From disruption to sustainability”—this title is not really clear. If we think that we have seen all the disruption coming from digitalization ending now, and we will enter the era of sustainability, this just won’t happen. Disruption will continue. It is not a choice between disruption and sustainability. In fact, the most innovative disruptive business models are also promoting sustainability. Uber, Airbnb and Tesla are very good examples—all three are promoting sustainability in their industries, and all three of them are hugely disruptive.

Uber is evaluated over 50 billion dollars. It is hugely disruptive for taxi drivers, but promotes sustainability and promotes a more efficient use of resources, fixed assets, cars and improves transportation in the cities.

Airbnb, valued at over 25 billion dollars now, disrupted the hotel industry but promotes sustainability as it makes better use of fixed assets, the real estate.

Tesla definitely promotes sustainability by producing electric cars for the mass market. It is now valued at 33 billion dollars (Renault is evaluated 18 billion dollars, VW and BMW are 50 billion).

All of these 3 companies demonstrate that disruption and innovation and sustainability go together. You don’t have to make a choice between them.



In terms of smarter cities, citizens increasingly expect more from the cities they live in, and cities around the world are innovating in different areas, be it water, energy, transportation, social programmes, public safety etc.

We also see that the leading cities are integrating across functions, capitalize on new insights and create system wide efficiencies. Not only they innovate within silos, but they also interconnect different functions.

The IBM City Heartbeat app gives mayors and city leaders full visibility and insights of the city through a set of indicators, but also through an embedded GIS showing where are the major events. The city leaders can look at their cities on different areas to see what is happening in their city, in terms of emergency, transportation, water management, and many more. He or she can click on maps to see the status of the car park loads, bus arrival time delays, crime, citizen collaboration etc. The app includes social media analytics, analysing twitter and blogs, and the city leader can catch up on what people are worried about and complain about in the different parts of the city. Running on an iPad, the city leader can directly communicate with the right agency or responsible to request more information or to push an action.

Another example of what is already possible today, is the project MiNT (Madrid iNTEligente). Mayors in general agree that they are paying too much for city services (garbage collection, street cleaning, maintenance of the parks, playgrounds etc.) and that they don't have enough control over the quality. Madrid is changing that with this city operations platform. It is a platform which combines citizen collaboration, interaction with suppliers and managing of the city services contracts and managing of the inspectors.

Service providers are now paid for the quality of the services, rather than just activities. The city projects savings of 6 percent on their physical city services and 10-20 percent on IT costs due to the common data platform. Suppliers have now longer term contracts and they have incentives to innovate and optimise resource deployment. MiNT also promotes enhanced transparency towards the citizens.

In the same platform, all the city contracts are managed. City inspectors go around the city with secure tablets and the apps; they take pictures of problems encountered (garbage overflowing etc.)—everything is auditable and enforceable—and at the end of the month the service supplier payment might be reduced due to the incidents encountered.

In 1997, IBM Deep Blue made history by defeating Garry Kasparov in chess. In 2011, IBM Watson made history by defeating two all-time best players in the American television game show Jeopardy! And technically, it is a much bigger deal to create a system to play in this game than in chess. However, since 2011, Watson has been put into serious use, most notably in healthcare. There is also a cookbook “Cognitive Cooking with Chef Watson”.

To quote Kevin Kelly, the founding executive editor of Wired magazine, “In fact, the business plans of the next 10,000 start-ups are easy to forecast: Take X and add Artificial Intelligence. This is a big deal, and now it's here.”



MIKA RANTAKOKKO, Chief Operating Officer, Six City Strategy; Vice Director, Center for Internet Excellence, University of Oulu, Finland, presented a strategy for sustainable urban development carried out by the six largest cities in Finland.

The Six City Strategy Working Together Towards Open and Smart Services

Sustainability is a challenge and it has been identified by the European Commission. “Sustainable urban development” is part of the European Structural Funds Programmes. Related to this is a tool, called Integrated Territorial Investment, which has been used to tackle this challenge. The Finnish way of using this instrument is “The Six City Strategy” collaboration.

The aim is to strengthening Finland's competitiveness by using the six largest cities as innovation development and experimentation environments. The project is funded by the EU and the six cities Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu.

These 6 biggest Finnish cities collaborate to generate a critical mass. Finnish cities are rather small and to generate a critical mass, they have to create networks and find ways to collaborate in the best possible way. For instance, this six city collaboration covers approximately 1.8 million people, which corresponds to 1/3 of the Finnish population. This is significant when developing new solutions for smart city activities.

The core areas of The Six City Strategy are open innovation platforms, open data and interfaces and open participations and customership. These activities are implemented via spearhead and pilot projects in the three focus areas.

As part of the open innovation platform work, The Six City Strategy is exploiting the existing infrastructures of cities to be used as innovation platforms. Then, intensifying the development of new services and supporting the development of new businesses, but at the same time, also supporting the development of new and better public services.

Open data and interfaces means opening the city-owned data for public and business use. That means creating an interface for companies, so that they can use this data for the development of new services. If they succeed, within this six city collaboration network, to use the data of all of the six cities, then a pilot test will be realised, which later on will be transported to a real product and onwards also to the global market.

Citizens do participate and they are the customers of the public services. This is also one of the three focus areas. The Six City Strategy provides possibilities for developing new ways of open participation and customership for the development of new services. And as a result, new know-how, new business and new jobs are created—these are the goals of The Six City Strategy.

Collaboration is the key to sustainability, but also key for developing new activities, especially in such a sparkly populated country like Finland. The entire city community participates in the development work. Corresponding to a Quadruple Helix model or a PPPP, all stakeholders are put together: citizens, companies, research and development operators and the authorities. The Six City Strategy uses open operating models. With the Quadruple Helix approach, the cities change the way they operate and become more sustainable. The solutions implemented in the six cities are made available to all Finnish cities.



One example of the work done within The Six City Strategy is “traffic and mobility as a service”. Traffic and transport are very central enablers in improving employment, the accessibility of services, business life and urban development. The opening and harmonisation of traffic and environmental data supports the development of renewable energy and energy-efficient solutions. The solutions created, e.g., by opening real time interfaces in transport and traffic, can be used immediately in other cities

Another example is city district development. New city districts present an experimental innovation platform for co-creating smart urban infrastructure and services, e.g., Kalasatama (Helsinki); already existing city districts with a focus on renewing the area and its services, e.g., Tesoma (Tampere); ending up with individual streets, e.g., Iso Robertinkatu (Helsinki), as a test bed for climate friendly solutions. Thus, the whole scale of districts will be involved in this piloting and support of the development of services and businesses.

ERIC LEGALE, Managing Director, Issy-Media, City of Issy-les-Moulineaux, France, provided a concrete example of a smarter city.

What makes Cities Smart?

Issy-les-Moulineaux is a medium-sized town situated in the suburbs of Paris. It is one of the major hubs of the French IT-revolution. Issy-les-Moulineaux is currently the only French city providing FTTH for every household.

Over the last years, Issy-les-Moulineaux has developed a proactive strategy of innovation to build a local Information Society, open to all.

Issy-les-Moulineaux is experimenting in many of the new smart city domains, such as smart energy consumption, with the IssyGrid project. IssyGrid is the first operational district level smart grid in France. Operational since 3 years, this information system covers the consumption of the entire district. It enables the analysis of energy production and consumption in order to advice and encourage consumers, in partnership with the electricity distribution network, to consume at "the right time" in order to reduce peak demands.

IssyGrid is co-production across sector collaboration, it is a good example of the emergence of the new cooperation system between public and private sectors. Issy Grid was created by the city and a French real estate leader with the help of 10 stakeholders mastering all strategic and technical skills required for the implementation of a smart grid, like Alstom, EDF, Microsoft, Schneider Electric, Steria and Total.

Another project concerns the challenge of building smart mobility systems to improve local transport plans. Today, people depend on smartphones to navigate the complexities of city transport systems. While huge numbers of apps exist to help with this task, most deal with only one mode of transport. Moreover, the availability of data from our transport systems, combined with ubiquitous smartphone use, creates unprecedented opportunities to make moving around cities faster, simpler, and more convenient.

Issy-les-Moulineaux is partner of two European projects on smart mobility: Open TransportNet and ECIM, the European Cloud Marketplace for Intelligent Mobility.



OpenTransportNet is an exciting new project designed to revolutionise the way transport related services are created across Europe. By bringing together open geo-spatial data within City Data Hubs and enabling it to be viewed in new easy to understand ways, OpenTransportNet will create collaborative virtual hubs that aggregate, harmonise and visualise transport-related data to foster the creation of innovative applications and services.

Once created, applications could run on the ECIM platform. It is a new solution set to change the way we access and use transport apps for the better.

Several experimentations are currently being conducted in Issy-les-Moulineaux: The smartphone application “Zenbus”, for instance, allows to see in real time where your bus is. The smartphone application “Path to Park” will help you to easily find an on-street or off-street parking slot, or you can use the application “BePark” as a key to open private parking. Another initiative will be launched next week, involving private partners like Cisco, Colas, the Caisse des Dépôts, and several start-ups.

It is not possible to build a smart city without open and big data, but how to make citizens understand what is open data? Issy-les-Moulineaux started a collaboration with the French National Centre for Scientific Research in the framework of another European project called “Route to P(ublic) A(dministration)” with the ambitious goal of creating a social network linking citizens and administration on open data.

Cities need to talk to their citizens about open data for various reasons, e.g., to optimise the use of its big offer of datasets, to use open data to support the employment market, to boost transparency on local democracy or to solve big issues, such as mobility.

Issy-les-Moulineaux is working on several European projects and is sharing experiences and ideas with many cities in various countries. This is one of the most important elements of the strategy of Issy-les-Moulineaux, because sharing experiences with other cities facilitates new ideas and solutions to come up. Issy-les-Moulineaux adopted very early the Living Lab methodology to involve its population at the very beginning in the development of new services. Issy-les-Moulineaux is also member of the European Network Of Living Labs.

ICT is the economical driving force of the city. Almost 60 percent of the companies based in Issy-les-Moulineaux are in the ICT sector, e.g., Cisco Systems Europe, Orange Labs, Huawei or Microsoft Europe.

For Issy-les-Moulineaux, the best results achieved are more jobs, more inhabitants and less local taxes since the launch of the city’s innovation strategy. This is sustainability.



HUGO KERSCHOT, Managing Director IS-Practice, Belgium, provided some more information about the ECIM project:

European Cloud marketplace of Intelligent Mobility

ECIM, an innovation project of the EC, involving the city of Issy-les-Moulineaux as well as very congested cities like Brussels and London.

ECIM is putting together different existing mobility applications on one platform, e.g., applications for paying an on-street parking place, for finding a parking place on-street or off-street, for city bikes, for taxi places. The whole scheme of the public transport is put together on one platform. There will be one single sign-on for all applications.

An example: 4411 is an online app to pay your on-street parking in Brussels. All you need is a mobile phone number and a password to log in. You will be asked for your visa card number when it comes to payment. That is the build-up. Once you are in the city, the system will inform you, that it is not possible to reach the place you want to go by car, but that you can drive until the BePark parking place.

BePark is an off-street parking place provider, a small start up company, using non-used parking places, typically parking places of shopping malls, as these parking places are usually empty during the night and during the week-ends. Using the BePark app as a key to that parking is one of the solutions offered not only in Brussels, but also in Issy-les-Moulineaux.

You can start a parking session, you can even use the route planner to find your car, when you forgot where you are parking.

The main objective of the ECIM project is not to build another app for smartphones. The objective is to create even more than a platform, but a mobility service marketplace, where ECIM invites all these big or small mobility service providers to deliver their APIs. These APIs become the ECIM's building blocks to build end-to-end solutions.

The ECIM marketplace brings together mobility services (parking, public transport schemes, city bikes etc.), data providers, and developers. The ECIM platform is open to all kind of developers who are invited to creatively use these APIs and to put them together to a specific solution for the specific city or for a company who would like to provide a mobility solution to the employees.

ECIM also tries to push standards in mobility APIs.

The open API web page is accessible under www.smartmobility.io



NEZAR MAROOF, Director of Strategy, Business Process Reengineering & Enterprise Partnership, Bahrain eGovernment Authority, Kingdom of Bahrain, presented Bahrain's journey towards a successful e-government model.

National eGovernment Strategy

Bahrain is a small island, 765 km² and about 1.2 million inhabitants, located in the Middle East.

Before the launch of its national e-Government Programme Bahrain faced a number of challenges: lots of paper to be exchanged, data redundancy etc. Before 2007, the Kingdom of Bahrain was ranked 53rd in terms of the UN e-government index. The e-government programme has been launched in 2007. Since then things have improved significantly, and in 2014, the Kingdom of Bahrain was positioned 18th in UN e-government index ranking.

Due to these exceptional achievements, the UN organized 2 study tours in Bahrain. About 30 different countries came to Bahrain to learn about the main factors leading to this improvement in terms the providing public services.

What are the success factors that made the country one of the top twenty leading countries in terms of e-government services? To address a few:

One key success factor is the support from the leadership. In 2007, the Cabinet issued a resolution to create the SCICT (Supreme Committee of ICT) chaired by the Deputy Prime Minister. This Committee acts like a board for Bahrain's e-Government Programme and involves many of the key ministers, such as the Minister of Finance, the Minister for Education, the Minister of Commerce, the Minister of Health and others.

Such a programme board allowed to implement actions and initiatives, executed by the e-Government Authority, very fast. As soon as actions are reported to that kind of small cabinet, they are be spread over all the other entities of the government.

Another key factor was the creation of working groups in each ministry. In order to engage the other ministries to be part of the e-Government Programme, small groups have been created in each ministry, headed by the their respective undersecretaries. Such small teams are extremely helpful in terms of smoothening the implementation of decisions and engagements with other ministries .

Another key enabling factor was the engagement of the private sector. As a rather small authority, the e-Government Authority did not have the resources to manage such a big programme and the private sector, as a solution provider, was of great help in this respect.

Bahrain also involved the NGOs in its e-Government Programme to support awareness and capacity building among the society. The NGOs in Bahrain have been involved in road shows, in the organisation of events and were organising awareness campaigns. This helped a lot in maximising awareness of the programme.

There was a clearly defined strategy for the e-Government Programme. This strategy was composed of a number of strategic objectives with very clearly defined key performance indicators.

Moreover, the e-Government Programme is completely in line with the Bahrain's National



Economic Vision called “Bahrain 2030”.

Another tool utilised to ensure the maximum benefit of the e-Government Programme are Focus Groups. These Focus Groups are groups of volunteers from different sectors (students, civil society, private sector, etc.), their role is to challenge and to examine the electronic services before putting them online for the public. These Focus Groups are testing each service and provide their feedback to enhance the service or to detect problems before putting it online.

The e-Government Programme itself is not just simply automating public services. One important element is business process reengineering. Any new service that will be provided through Bahrain’s e-Government portal needs to go through an extensive reengineering cycle, to ensure that the government will provide their services in a better way.

Another aspect was the creation of a Change Management Team. Any project run by the government, and this is part of the mandatory requirements, has to address change management. This is a sort of a joint effort between the government and the solution provider, i.e., the organisation providing the services for the public.

One lesson learned was that the level of utilisation of many e-services provided by the government was very low, not due to technical problems, but because the change management was not properly addressed either in the ministry who provided the services or with the public. Therefore, this Change Management Team was created to apply different change management techniques to ensure the maximum benefit of the services.

To provide two examples of current projects: The Business Licensing Integrated System is a one-stop shop for any new business to be established in Bahrain. All the investor, or the person who wants to start the new business, has to do is going to this portal, which is linked to all ministries concerned. He then can collect the license at this one-stop shop online, rather than going to the different entities.

Another big project is the multi-channel e-services platform. All electronic services are provided through the portal bahrain.bh for mobile apps. This includes all kinds of mobile apps, e.g., in the fields of traffic, education, municipality etc. Moreover, there are kiosks or terminals located in different crowded places all over Bahrain, such as post offices.

There is also a national contact centre, which is a unified telephone number for all the services provided by the government. People just have to remember one unique telephone number (8000 8001) and a help desk agent will help them to get an answer to their question.



VAINO OLEV, IT Director, City of Tallinn, demonstrated how Estonia deals with smart device security.

From Disruptive technologies to Sustainable use of Smart devices

Estonia has about 1.3 million inhabitants. The city of Tallinn has 430,000 inhabitants. On the one hand, this is good news, as bigger cities have higher resources. On the other hand, it may cause problems to a regions, when a large part of the population is concentrated in one area.

It was Franklin D. Roosevelt who said, “the only limit to our realization of tomorrow will be our doubts of today.” In the today’s context, this quote is quite true when looking at technology, environment, but also when looking at the future.

Technology nowadays is always disruptive. Companies are keen to push their products to the market and those products are never final versions. An example are our laptops, computers or tablets: We regularly receive updates, and once the last update is installed, we learn that there is a new version.

Sustaining technologies correspond to well known technologies that undergo successive improvements. Disruptive technologies mean new technologies that still lack refinement, often have performance problems, are just known to a limited public, and might not yet have a proven practical application.

Technology is driving very fast and we have to follow this trend.

We are using more and more smart devices. In Estonia, in 2014, the number of all purchased smart devices exceeded the number of purchased notebooks and standalone computers. That means that the majority of the population has a smart device.

Mobile Internet is gaining more and more popularity; it is very easy to use. In Estonia, the so-called triple package, which is sold by telco companies, is 5 to 6 euros less expensive per months. The triple package allows to make phone calls, to receive and send SMS and to use the Internet. That means that its popularity compared to, for example, stand-alone WiFi connections will raise.

The Mobile Internet Research Report 2014 shows that Finland (5GB/month), Sweden (more than 3 GB/month) and Estonia (2.7 GB/month) are ranked first in terms of the use of mobile Internet in Scandinavian and Baltic States. Moreover, there was a significant increase in terms of mobile Internet usage from 2012. Finland: more than 3 times, Estonia: 3 times, and Sweden: 1.5 times.

Despite the fact that the city of Tallinn has been quite successful in developing e-services, and is using very efficiently safe infrastructure, which has been developed by the Estonian State, the city also keeps an eye on its citizens. The number of smart devices is raising and this is a trend. But at the same time we know that a smart city is not only technology, it is not only organisations and e-services.—it is also smart citizens. And people are talking about their fears, computer viruses, Spam and others.

80 percent of all data flows contain Spam, viruses and other things that is not really needed for our daily work.



Estonia has launched a project called Nutikaitse 2017 (SmartDefence 2017). The project was initiated mainly by private companies, telcos, banks, also involving the Estonian Information Systems Authority.

The overall aim of the Nutikaitse 2017 project is to raise security awareness among mobile smart device users, developers and retailers. The project will promote the safe use of mobile smart devices and also aims to ensure that secure software solutions are easily accessible and user friendly. The agreement was signed on 5 November 2013 by the Certification Centre, the Estonian Information Systems Authority, Swedbank, SEB, TeliaSonera, EMT, Elisa and Tele2. The project is co-ordinated by the Look@World Foundation

The goal of the project is to ensure that 70 percent of mobile smart device owners in Estonia use their devices in a secure way by the end of 2017. With the help of Nutikaitse 2017, at least 300,000 people in Estonia will use the secure Mobile-ID for electronic authentication and digital signatures. The vision is also that 80 percent of Estonian e-service providers, developers and Estonian Association of Information and Technology members will join the initiative.

EIKAZU NIWANO, Producer and Director of Produce Group, R&D Planning Department, NTT Corporation, Japan, talked about how to deliver trust in the IoE.

From Secure to Trusted Smart Cities

There are two major Japanese projects related to smart cities. The first one is “2020“, the Olympic Game, Tokyo. Here, the scope is not only focused on Tokyo, but also on many other regions and sectors for tourists etc. The second one is the “Regional Vitalisation” project. As many regions or districts in Japan run the risk to disappear due to a declining population, the Japanese government strongly promotes the project “vitalizing citizen, town and work”; officially called “Overcoming Population Decline and Vitalizing the Local Economy in Japan”.

This shows that sustainability is an important issue for regions, also in terms of continuity even after the above mentioned projects.

e-Self-government capability with cross-sectorial federated life support services with social trust might be important for sustainable smart cities, from a point of view of autonomy and spontaneity through citizen-oriented approaches. In order to realise such federation, security issues are important for reducing safety risks, but in addition social trust will become important.

The CSA (Community Supported Agriculture) model and crowd funding with some compensation will be an appropriate solution for sustainability. What is the issue to expand the model to others and to accelerate the usage?

Why social trust and what is it? In the environment of the Internet of Everything, we need to provide more transparency about who is who, or what by whom etc., especially in the case we connect to unknown or well-known but uncertain humans or objects. In this environment, security is basically just a computing issue.

Social trust and reliability (not as a performance issue) will be some kind of guarantee and the basis of relief in the IoE environment. Until now, trust is discussed in such fields as TPM (Trusted Platform Module), or the trust circle in a SSO (Single Sign On) environment, but



above layered human social aspects may have to be discussed more. In an IoE environment, services and data that humans and objects own, administrate or utilize may have to be shared based on social trust, such as self trust, mutual trust, cooperative trust and public trust. This is significant because those values change dynamically based on social trust, and social trust itself also changes dynamically according to many occasions and human view.

Sharing models, like CSA and crowd funding, based on social trust will be an important concept for sustainability, because it might give city-community dynamic resilience by every citizen and any other stakeholders by increasing the chance and reducing the risk of sharing,

A CSA (Community Supported Agriculture) model extended to other sectors and crowd funding based on social trust will become important.

In smart cities, trust exists between various kinds of entities, between humans and objects, humans and services, or objects and services, and services and data. In the case of a sensor network, there is trust between owners and administrators and each IoT device or object, but also between IoT objects or devices and IoT objects or devices and data etc. The same situation exists in the context of social media or social services and open data.

To conclude, social trust sharing has to be well-managed by using City Operating Systems. But how to evaluate and guarantee many types of social trusts in city?

HERVÉ RANNOU, CEO Items International, CEO Citizen Data, France, addressed some of the unsolved questions related to open data and big data.

Open Data & Big Data in Smart Cities

Citizen Data is a start-up focussed on data coming from sensors and the Internet of Things which requires specific technology. There is a lot of confusion about what big data really is— in some cases it is just an improvement of data mining. The IoT and sensors require very specific technologies, that is what Citizen Data develops.

Smart Cities is one of the main focus areas of Citizen Data. There is a kind of ambiguity related to open data and big data. Cities generally have a rather clear view of what open data is, but often this is not the case when it comes to big data.

Actually everybody understands that open data is the data the city, or organisations running public services, could open partially. The question about big data is more complex. However, this is the future and it is a big issue for cities.

Today, legacy data represents between 95-99 percent of the data of a city. What is supposed to be open data represents about 1-5 percent. Generally, this data is static data describing what happens in the city (documents, time tables for transport etc.). In the future, the main issue will be big data, i.e., all the data of a city.

This won't mean that the cities will manage all this data by themselves. But we can notice that there is more and more concern about this kind of data in the city. If a city does not have the intention to manage the data by itself, the question remains whether they are going to be able to access parts of the data.

Let us take the example of water infrastructure. Cities can manage the water infrastructure



either by themselves, or they decide to ask a third party, an operator, to manage the water infrastructure. In the latter case, the operator will not disclose the data due to privacy issues or because it is business data, and thus the city will not get access to it.

But the situation is going to change. Today, local authorities ask to have access to the data. In some countries, local authorities invest in the electric infrastructure and this electrical network is operated by a third party, therefore the city cannot access the data.

But cities today ask for data related to their investment. They pay for the infrastructure and need to understand details concerning the infrastructure they are investing in, or they want to have more information about the quality of service. The information exists and cities ask for the data.

Another example is transport. Here, the situation is the same and more and more cities want access transport related data.

In the U.S., some cities have decided to issue a decree to get access to the data, or to let researchers accessing the data. Obviously, there are privacy issues and we have to take notice of this potential problem. But, at the end of the day, all this data will concern the city.

There are significant differences between open and big data. Open data is static data, while big data is dynamic. The objective of open data is information, while the focus of big data is quality of service, monitoring etc.

Another interesting issue is the cost. There is no sustainable economic model in open data—except the city decides to pay for the open data. But there is no sustainable economic model in terms of allowing local companies using the open data and doing business with it.

However, there is a business model for big data, because big data you are going to be provided, processed, analysed and used for correlations between sectors etc.

The trend of usage is a transfer between what is big data and what is open data. However, the aim is not to open big data. Big data is the whole data existing in the city. Again, a big concern for the city.

Another question is the governance of data, i.e., to take the decision to open this data or not. And sometimes there is a confusion in terms of the data the city would like to access and the data the city would like to open. This is not the same and cities have to consider this point.

Some of these questions will be discussed within the new European project bloTope (Building an IoT OPen innovation Ecosystem for connected smart objects), coordinated by the University of Aalto, Finland.



Godfried Smit, International Policy Director, ESC – European Shippers' Council, Belgium, broke the ice between transport and smart cities.

Trends in urban logistics (tips and trucks)

For the members of the European Shippers' Council transport is never a goal, it is the necessary link between production and consumption. And cities take a special position because they are a concentration of people who like to consume in shops, restaurants, theatres etc. But also they like to move in their city as undisturbed as possible, and therefore a truck is rarely perceived as a positive phenomenon in cities. Although, 75 percent of our economy depends on transport. Without transport an economy or a city comes to a full standstill within a few days.

However, there are a number of challenges in urban areas, such as noise, pollution and congestion. And the uncoordinated delivery of goods by different suppliers certainly adds up to the problem. Most shops in city centres do not have any warehouse and m²-prices are very high. For retail companies it is therefore impossible to require big quantities at a same time.

There are also new tendencies, like e-commerce. Internet sales are normally delivered at the consumers' homes. And as in an average street people are, in a majority of cases, not at home during daytime, this delivery should be repeated several times. For the delivery of goods to end-consumers often Vans (light commercial vehicles) are used, and these failed attempts to deliver goods to the addresses adds up to cost and time of logistic operators. Of course, they also have a negative environmental impact.

Another issue is the empty running. Empty running is still a problem: the empty running of trucks is around 40 percent. For shippers and consumers it is an important issue, because this figure should go down as far as possible. Inefficient transport will increase the total cost for consumers and decrease the competitiveness of a product on the market. On the other side, we should realise that empty running will never be reduced to zero percent, as there is an unbalance of goods entering and leaving urban areas. And we don't like to have our meat brought into the city in the same car that takes our waste from the city.

If you look at the last mile, compared to the global delivery of goods, it is a very costly last mile. This is even more the case, if goods must be transported and conditioned, such as food, flowers or pharmaceutical products. These temperature controlled deliveries are normally also transported in Vans and there, the pollution and the noise can be a problem.

Local air quality of course is a problem. Medical investigations have proven that polluted air can influence expected age and life quality. Sometimes also extensions of ports and airports is conditional to the reduction of road transport to the favour of other modalities.

The lack in coordination of policy is a major problem. For solutions we should look to the EU, but also to the national governments and to the communities. Because it is the municipalities normally setting the rules for congestion and for emissions. This means that sometimes time and windows have to be identified concerning the most congested hours. This means that an optimal spread of the day is not possible. The same applies, for instance, for night distribution.

Although, there are some enablers. In many countries, best practises are developed and it is important to build on them and not to reinvent the wheel. The site <http://www.bestfact.net/>



gathers a lot of best practices.

It is also important to agree on smart indicators in measuring successes. For instance, we are still lacking standardised methods of emissions. The EU supported factor system does not fill that gap, and also the Green Freight Europe system or the lean and mean system don't fully address this need.

It is important to link the drivers to elements that are economically important. Next to reliability, money is often an important driver. If efficiency, sustainability and reduction of congestion can go hand in hand, lower cost can seduce traders to change their traditional behaviour. For consumers, it is also important that they understand the consequence of their decisions. If all-in prices are used like in some web shops, consumers have no influence at all on the way goods are delivered.

In fact, small scaled initiatives, often run by subsidies from the EU, certainly have some success. Many work with consolidated models where goods are delivered at one micro warehouse and from there brought to certain addresses in the city. This is done, for instance, by electronic vans and or even by cargo-bikes. In Utrecht, for instance, there is a good example with the bio-boat.

To sum up, to really be successful in meeting the goals in urban logistics, we need a coherent approach in politics. The next important issue is standardisation. Standardisation is really key. Then, we need to focus more on a complete supply chain solution, and not only on the last mile which can lead to sub-optimisation. Make more use of the possibilities of IT. And, the legal framework should be more proactive than just reacting to the development.

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Q&A

Citizens don't mind paying for hard services, like snow shovelling or parks, but they hate to pay for the soft services, such as open data and data management which is very expensive for cities. How do we convince our citizens that data management and open data policies are actually the hard services for the future?

Hervé Rannou, Citizen Data, gave the example of a smart building. Smart buildings have different silos: one to manage the electricity, one to manage the heating, one to manage the security etc. Today, there is a kind of subsystem to try to understand the building as a whole and to manage the quality of service. At the end, this is a waste of money because you could develop new technologies and make a direct correlation between different data coming from components of the electricity system or the heating system and adapt the consumption.

For cities this is rather the same: It is possible to correlate data of different sectors, e.g., between traffic and energy etc. It is difficult to measure the concrete financial benefits, but at the end the city is going to save a lot of money. The problem of cities are silos and big data technology helps crossing data from different silos and optimising the quality of service of a city.

Alexey Ershov, IBM, added that there is no contradiction with open data. It is best done when you aggregate data. There are often real financial benefits, such as in the Madrid



project presented above. If you save 6 percent on city services, it is a base for a lot of IT implementation and at the same time it gives you the platform to open the data for the citizens. They go together: you first build the platform and aggregate the data. It brings the financial benefits for the city and then you open the data for the citizens. You don't have to pay for open data with tax payers money.

Hugo Kerschot, IS-Practice, stressed that open data is a product since many years, for example for weather forecasts. People need that data before leaving the house in the morning. And nowadays, cities can tell to their citizens, not to take the car because there are traffic jams. That is very valuable.

The second question concerned the evolution of smart cities during the last 20 years. Did we make progress in the last 20 years? How to manage change to make sure that in the years to come we can speak about achievements and not only about issues?

Vaino Olev, City of Tallinn, commented that "happiness is not a destination, it is a journey". All those issues we are talking about are continuous. Technology is changing. Maybe we are sometimes repeating mistakes—but maybe repeating some of the steps and informing others about our problem will create new knowledge on that we can build upon. We are humans. We have to share our information and knowledge, and some things will repeat anyway. Even history is like a circular flow—it repeats the same things but on another level.

Sharing information and at the same time getting information from others and using it for our benefit, this is the value. The value is also in organisations like the EU, where we are getting together and trying to reshape solutions. Estonians and Tallinn's experience is just a small country and small city experience, but will show some sort of way to solve issues and provide answers for the future. In any case, we will talk later, in some years, maybe not about the same issues, because today we can solve these issues, but we will talk about relatively the same issues, which will be at the same time brand-new.

It is like our journey from 3G to 4G and 5G, we will probably face relatively the same problems, but on a new level.

Mika Rantakokko, Six City Strategy, confirmed that being a smart city means being a city with a continuous improvement. If you want to be smart in 20 years, that means that you have to improve the performance all the time. If you stop developing, this is the alarming signal that you no longer are a smart city.

Hervé Rannou, Citizen Data, stressed that 20 years ago, the main challenge regarding ICT was broadband connection and mobility. Today, around 90 percent of the European population accesses the Internet by broadband or mobile Internet and 80 percent of the population use e-services with the cities. This didn't exist 20 years ago.

The following question addressed the fact that most national education systems are still based on the old industrial model education. We are not teaching our children change, critical thinking all the new literacy that they will need to fully fulfil their potential. And, societies run the risk that older people are left behind.

Alexey Ershov, IBM, agreed that programmes need to catch up with where kids already are.



In terms of older people, there are great examples where technology makes their life better and easier. IBM has a big partnership with Apple and the Japan Post in order to deploy iPads to 5 million senior citizens in Japan. The aim is to build apps specifically to make their life better, and to make it easier for them to connect with their families, so that they can live at home longer. There is no contradiction between new technology and senior citizens.

Vaino Olev, City of Tallinn, commented that Estonians often say that you have to learn all your lifetime but unfortunately you will die as a fool. Learning is continuous. You have to start from the very beginning as a kid and you have to continue learning all your life.

There is a digital divide between social groups. Tallinn is trying to provide additional education for retired people, but also for the socially deprived families. Computer courses for seniors and adults are offered in 8 districts, but also in Tallinn's library.

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Session 9

Day 2 – Afternoon – Parallel Session

ICT: The Arctic Region Perspective in a Global Context of Collaboration and Creativity

JAY GILLETTE, Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, University of Oulu, Finland; Senior Research Fellow and Institute Secretary, Digital Policy Institute, USA, moderating, welcomed the panellists and opened this panel on Arctic issues.

JOHANNA IKÄVALKO, Ministerial Adviser, Ministry of Transport and Communications, Finland, presented a Nordic showcase of Arctic expertise.

Arctic Marine Testing, Training and Research Center (ArcMaTe)

The Arctic Marine Testing, Training and Research Center (ArcMaTe) is a Finnish Norwegian initiative that has been developed during the last 1,5 years.

It all started from the idea that both countries, Finland and Norway, have Arctic strategies and both strategies have a lot in common—not to mention the common items with the Arctic strategy of Sweden for example. The Nordic countries have very similar goals when it comes to the Arctic, but they have different fields of expertise. By putting all this together, they ensure to provide something unique to the community that wants to do business or wants to have some other activities in the Arctic but don't have the experience in that.

As a result of the development of the past 1,5 years, the suggestion came up to establish the ArcMaTe Center in Finland. However, it would be certainly a Nordic showcase of cold climate expertise. ArcMaTe Center will offer services in this following fields of activities:

Navigation in sea ice. Most of the icebreakers that are operating in the world are designed and constructed in Finland. ArcMaTe could provide services in design, construction and operating of ice navigating vessels.

The ArcMaTe Center could also offer services in developing Arctic marine search and rescue (SAR) operations. Most of the navigable Arctic marine sea area belongs to Norway, and they have a very big responsibility to rescue people if there is an accident in the Arctic sea area. There is great need to develop those activities.

ArcMaTe Center will also offer services related to situation awareness, i.e., weather forecasts and ice management, which are vital to safe navigation in any safe operation in the



Arctic.

Finland, Norway and Sweden have expertise in port design under Arctic conditions, i.e., strong winds, strong waves, tide and a lot of ice which can be highly destructive.

The ArcMaTe Center will also address communication demands and challenges in the Arctic, where the traditional and the common ways of communicating don't work. Communication is vital for any operation in the Arctic—if it does not work, nothing else really works. The Nordic countries have a lot to offer for the global demand for communications solutions in remote areas. Not just in the Arctic, but remote areas in general.

And then, human surviving in the cold. This includes physiology, psychology, and technology. Finland and Norway have vital research in that field and have many solutions to offer to the community;

And then, last but not least, oil combatting training at sea. Oil combatting in sea is relatively easy, but when you have ice involved it is a whole different story. The ArcMaTe Center can provide a lot of answers and solutions to that.

KARI LAINE, Director, Thule Institute; Vice President of Research, University of the Arctic, Finland, explained what are the trends in the Arctic and how to put them together with ICT.

Megatrends in the Arctic

Nine megatrends can be identified and each megatrend is connected to ICT.

First, increased urbanisation—a global trend also including the Arctic. Throughout the eight Arctic countries people are migrating from rural areas to the cities. This challenges both rural areas and cities. It is a phenomena that can be observed in Russia, in Alaska, in Canada and in the Nordic countries.

Second, demographic challenges—the old people stay while the young leave. How to solve issues, e.g., related to health and well-being, in rural areas? The same problem exist in Canada, Alaska, in Russia and in the Nordic countries.

Third, the continued dependency on transfers and the exploitation of natural resources will continue to dominate the arctic economies.

Fourth, continued pollution and ongoing climate change will have a significant impact on the nature and the environment of the Arctic area. This is a real problem, which has also been recently addressed by President Obama in Anchorage, Alaska. Pollution is a big problem and there is a need for environmental monitoring systems and monitoring programmes.

Fifth, the Arctic needs to generate more human capital by investing more in its people. There is a real lack of human capital in the Arctic circle area. e-Learning could provide solutions.

Sixth, changes in the nature of interaction between the public and private spheres will impact development. This is mainly a political problem, but we do have to keep in mind indigenous people and local people.

Seventh, renewable energy will contribute to a "greening" of the economy.



Eighth, increased accessibility provide opportunities as well as new risks. Everyone is talking about the North East Passage, shipping from Far East to Europe. But we have to keep in mind that this also entails problems and risks.

Ninth, the Arctic as a new player in the global game. The Arctic Council is very active in this field. Everyone is talking about the Arctic and there are many reasons why China, Japan or India would like to become at least observer member in the Arctic Council.

Together with the Oulu University of Applied Sciences, VTT and the Oulu University, a project has been carried out putting together ICT and Arctic. The aim of this SMARCTIC project was to build a roadmap to a smart Arctic specialization.

SMARCTIC concentrated on the following four focus areas: 1) Environmental informatics and mobile technology; 2) Smart logistics, infra and living environment; 3) Natural resources management and economics; and 4) People in the North.

A roadmap to an Arctic expertise has been elaborated, followed by discussions about the business possibilities and potential. The final report can be downloaded at: <http://issuu.com/hanneleh/docs/smarctic/0>

The dialogue between researchers, scientists, business and political representatives is crucial. There are at least 5 important meeting each year:

The next Arctic Circle Assembly will be held in October in Iceland. The president of Iceland is hosting the event and about 2 000 people will attend the meeting.

Other upcoming important meetings are Arctic Frontiers 2016 in Tromsø, and the International Arctic Forum in Russia. And then, there is also the Arctic Science Summit Week. The next ASSW will be held in March 2016 at Fairbanks, Alaska.

Moreover, the Fulbright Arctic Symposium will be organised in February 2016 in Oulu, promoting discussions between scientists, stakeholders and investors.

SMARCTIC is the way from disruption to sustainability in the Arctic.



MARTTI HAHL, President, Barents Center Finland, Finland, provided key facts of the European High North and the European Arctic from the business point of view.

The economic outlook in the European High North and Arctic, challenges and opportunities to ICT

Barents Center Finland is a strategic market intelligence operation, which is funded by the Northern Finnish cities and counties. Barents Center Finland is a non-profit organisation, which supports Finnish enterprises and public sector in the Barents region. It covers the entire Northern European area.

The Nordic countries have a combined population of 26 million, of which 400,000 in the Arctic. This constitutes the 10th biggest economy in the world, with a GDP of 1,400 billion euros. The biggest drivers for the economy are the Norwegian, Swedish, Finnish and Russian Arctic, where the combined investment plans amount to roughly 200 billion euros until 2025.

In Norway, the investments are led by Statoil, a Norwegian state controlled oil and gas industry giant. In Northern Norway, there is one field in operation, one more will come on stream this fall. By 2020, there will be five fields in operation; by 2030, nine fields. Each field represents an investment of at least 7 billion euros.

In Sweden, the investments are led by LKAB, a Swedish state controlled global iron mining actor. Two complete cities will be moved to new locations starting now, completed by 2023. LKAB pays the bill.

Sweden has decided to invest 60.2 billion euros until 2025, in logistics infrastructure, roads, railroads, harbours, tunnels, airports etc. Norway is following close with 56 billion euros.

Sweden, Norway and Finland are planning to invest between 13 to 16 billion euros each in wind power development in the High North. In order to succeed, the planned wind power investments need sufficient regulating power in low/volatile production conditions. To even out this hydro power is exemplary. The potential is needed and available in Northern Sweden and Northern Finland, but this renewable, no-emission energy resource is facing opposition due to nature conservation concerns.

North-West Russia is heavily relying on mining in the Kola peninsula. Oil and gas investments are amounting close to 30 billion euros due to the three LNG (Liquefied Natural Gas) plants and required logistics infrastructure in Yamal.

The Northern Sea Route and the Belkomur railroad (1,161 km), projected and financed by China, from South Urals to Archangelsk are the other major drivers on the Russian side. The Russian Federation is heavily involved in the mentioned projects.

In all of these countries there is an abundance of energy resources, oil and gas, hydro and wind power, topped by nuclear energy. To utilise these resources the logistics and electricity transmission lines need to be developed.

Why is it of interest for Europe and globally? 17 percent of world's mineral deposits are in the European High North (Northern Sweden, Northern Finland, Northern Norway and the North-West of Russia). The EU uses 20 percent of the world's ore and minerals, but produces only 3-4 percent of them. By investing in mining and logistics in the High North, the EU could



bridge the gap and become self-sufficient.

Over 25 percent of the global oil and gas reserves are in the European High North. The forest area of the Barents region equals to 70 percent of the EU forest area.

Fish production in the Norwegian High North is growing rapidly to satisfy Asian and EU markets, making up to 50 percent of the fish consumed within the EU. Growing food, extracting oil and gas and mining on the seabed in the Arctic is the trend.

Functioning logistics to customers in Europe and Asia are still missing. To utilize the above mentioned potential we need functioning logistics and ICT.

What is the role of ICT in the High North and Arctic? The common nominators for the European High North and Arctic are coldness, darkness in the winter and light in the summer, harsh climate, long distances, rough terrain, long travel times, hazardous conditions for humans on ground, under ground, on sea bed and on sea.

In order to combat the challenges of the Arctic we need functioning ICT. The needs are, to name a few:

- Secure communication and data with no zero signal zones on sea, on seabed, underground and in faraway locations.
- Weather prediction, vessel/rig adapted sea and ice condition monitoring, ice management need ICT and big data.
- SAR (safety and rescue) real time communication and monitoring of humans and machines in cold and faraway places.
- Intelligent clothing with personal monitoring and communication capability.
- Accident prevention, real time analysis and monitoring.
- Damage limitation and fighting applications.
- Rescue management.
- Remote operation/management of vessels and rigs.
- Remote operation of open pits and underground mines.
- Remote operation of sub-sea installations.
- Real time analysis and monitoring of bio environment on sea, i.e., fish farms.
- Communication networks along Northern Sea Route.
- Wireless monitoring and management of electricity transmission lines and intelligent grids.
- Communication with satellites.
- Secure GPS in all conditions.
- Individual GPS mapping with 3D capability on ground enabling autonomous vehicle operations.



STIG NERDAL, CEO, Transportutvikling, Norway, addressed the importance of cooperation.

Arctic Logistical Cooperation

The Barents region, i.e., the northern parts of Norway, Russia, Sweden and Finland, is characterised by a small population and rough climate. It is far away from major markets, it lacks integrated infrastructure and modern ICT solutions (northern parts of the Barents sea).

But there are also tremendous opportunities and there is a need for both, good physical and digital logistics to survive in the future. The Barents are a global supplier of maritime resources, not only oil and gas, but also to mention one of the biggest fisheries in the world.

The Barents region is also a global supplier of minerals and connected to shipping services. The port is handling several million tons of minerals from Sweden.

Moreover, there is a potential of global transit through this region, not only the mentioned passage, but also by integrating the land transport system in Asia through this region. It is shorter, better and you are avoiding the congested areas in Europe.

Some challenges can be solved, and some opportunities can be materialised, through cooperation.

The Arctic Maritime Cluster represents 42 Norwegian companies and organizations focusing on Arctic maritime business in the High North: 9 shipping related companies, 14 suppliers of equipment and services, 5 shipyards, 7 universities, R&D institutions and knowledge providers, and 7 others. Most of these organisations are commercial companies and they are fighting for profit.

Together with the Ministry of Transport and Communications, the Arctic Maritime Cluster is going to introduce some kind of cooperation within the context of the Arctic Marine Testing, Training and Research Center (ArcMaTe).

Research is important, but the objectives are also commercially driven. First meetings have already taken place. The next meeting will take place in October in Tromsø.



HENRIK VUORINEN, CEO, Port Luleå, Sweden, presented a concrete example of how good infrastructure can be a key to sustainable growth for an entire region.

Good Infrastructure – a Key to Sustainable Growth

The Port of Luleå is one of five European TEN-T core harbours in Sweden, one of 80 in Europe. It is the most northern public port in Europe, the next ones are on the south coast of Finland and in Sweden Stockholm, roughly 800 km away. Main customers are the mine industry and the steel industry

Good infrastructure is key to sustainable growth. This is in fact a truth, no matter the subject. If you transport people between countries, between cities, for business or for leisure, you need to have a good infrastructure. If you are planning a city, than you need good infrastructure to move people to and from work, to the Kindergarten, to the shops.

For the industry, it is crucial to have a good infrastructure. For example, Facebook's first mega data centre was established in Luleå and one reason was the stable supply of power. And of course, the rough and cold climate helps as well.

The Port of Luleå's part in the infrastructure is to get the iron ore from the producer to the customer. The port is an enabler and has its role to play in the good infrastructure.

90 percent of the EU's iron ore production is located in the Arctic region connected to the Port of Luleå. Today, roughly 27 million tons are produced annually. And more is to come: The state owed mining company LKI is planning to increase its production of about 40 percent in the coming 5 years. LKI is opening three new mines that will of course increase the production. They have spent about 3.5 billion euros the last years in the mines, and more than 6 billion during the last 10 years.

This also puts a lot of demands on the port, as there are increased iron ore shipments. Roughly 70 percent of the production goes via the port in Narvik and 30 percent goes via the Port of Luleå—with another 10 million tons produced, 3 to 4 million tons will go through Luleå.

Recently, there has been a new EU Sulphur Directive for the Baltic Sea. This increases the costs for the customer of about 20 percent. The current oil price is rather low, but it is still 20 percent more costly to use that very low sulphur oil than normal oil.

Due to its geographical position, the Port of Luleå faces a land rise (post-glacial rebound) of about one centimetre per year. Moreover, there is the very clear trend that transportation ships are getting bigger and bigger. As to the ship size, today's ships are 7x bigger than they were in the 1970s. And, over these 40 years, you have a 40 centimetres shallower fairway. Something has to be done.

The solution is a huge dredging project. The plan is to dredge the fairways with about 20 million cubic metres. If you take these 20 million cubic meters and you make a half meter high pile, then you can make a 4-lane highway from Oulu to Munich. It is a huge amount of material. This will give the Port of Luleå the possibility to increase its capacities and to handle about 20 million tons of goods every year. In addition to that, it will reduce the cost of transportation of about 40 percent. The total investment required is 330 million euros.

This project is more than the Port of Luleå. This Malmporten project opens the entire Gulf of



Bothnia for larger vessels, so-called Baltic Sea max. size with a draft of 50 meters. Today, the Port of Luleå can take in ships that carry around 45,000 tons. In the future the port will be able to take in ships that take 200,000 tons. This is almost 4x higher capacity than today.

Another positive aspect is that the project can be run in some kind of green environmental spirit. It will enable ships to fuel with more environmentally friendly fuels and the port will use the most modern technology for waste treatment. At least in Sweden there has been a big discussion about cruise ships that dump their waste water into the sea. These new facilities will allow to take care of every single litre of waste water. And of course, it will support the logistic companies to move transportations from land to sea, for environmental reasons, but also because it is really crowded, at least in Sweden on both the railroad and on the highways.

This will reduce, not only the cost by 40 percent, but it will also reduce emissions by 40 percent. It is great to have a project where you save 40 percent of money and you get 40 percent less emissions.

This is one example of how good infrastructure can be a key to sustainable growth, for the region and not only for the port.

HEIKKI AUTTO, Chairman, Rovaniemi City Council, Finland, described a region out of the ordinary.

Why does the Arctic matter? There are soon more than 9,000,000,000 good reasons—as by 2045, there will be more than 9 billion people on earth.

While there is shortage elsewhere, the Arctic has not only clean air, fresh water and free space, but also all the natural resources mentioned in the earlier presentations.

The Arctic is easy to draw as the 60th parallel and all the areas above that—everything that is above ordinary in the world. This actually includes Finland as a whole. This vast landmass has only 17 million inhabitants and 5.5 of them are living in Finland. Every third Arctic citizen in the world is living in Finland; 60,0000 of them in Rovaniemi.

In Finnish, the word “arctic” is spelled “arktinen”. And in Finnish, the word “everyday” is “arkinen”. In Finland arctic is truly everyday business. It is the Finnish Arctic know-how and the Arctic knowledge that is in great demand in all these investments in Northern Sweden and Northern Norway, but not only in Scandinavia, all over the world. It is the Finnish way of living, it is how Finns can live with the spirit of sustainable development in these harsh Northern conditions. This is the everyday business in Finland.

The Arctic region is interesting for countries all over the world.

The Gold Rush in California in the 19th century made of California what it is today—one of the most prominent areas in the world. The first millionaire was not a gold prospector, but a guy who first came up with the idea of selling shovels, wheelbarrow and panning gear!

Now we are that the edge of the Arctic Rush in the 21st century. And again, the winner will be the one with the best ideas!



ESKO AHO, Former Prime Minister of Finland; Executive Chairman of the Board, East Office of Finnish Industries, delivered a great talk on the Arctic challenge.

The challenge we are facing with the Arctic could be compared to the Apollo programme. When launching the moon landing programme in the early 1960s, President Kennedy said, “we are going to the moon. We are not going to the moon because it is easy, but because it is difficult”. It is roughly the same with this Arctic challenge: It is not going to be an easy challenge, but it is very important for the future of mankind. It is also going to create a lot of new opportunities.

In 2012, almost all the people on the planet had in their hands or pockets the same computing capacity as the Apollo 11 Lunar Module "Eagle" had when it landed on the moon in 1969. And the price of that computing capacity was just a few dollars, while the price of that capacity in 1996 was tens of millions of dollars.

Thanks to the Apollo programme we were able to get a lot of benefits—and a lot of more benefits to come, when people really learn to use these capacities.

When we speak about Arctic, we are not speaking about traditional projects. It is not a linear effort; going Arctic is a breakthrough.

We urgently need good collaboration between businesses and governments. It must be based on shared value thinking. This effort cannot be fulfilled without having governments creating a certain infrastructure, giving certain guidance, regulatory environments, standards for this efforts. At the same time, governments cannot do this without having access to the best skilled talents and resources of the private sector. In some ways, this collaboration has to be created as well.

What is the difference between business and government? That is rather easy to say. We have a lot of good examples why business operates with different types of rules than governments do. But there are also some similarities. One very essential similarity is that, both in business and government, everything is about the balance between context and concept.

To take an example from Nokia: Today, there are a lot of discussions about why Nokia has failed in the mobile device business. Recently a study came out explaining that leadership was doing wrong choices and that the leadership style was outdated. This sounds good and media like this kind of stories. However, you can easily explain, both ups and downs, of Nokia by looking at this balance between concept and context. Imagine Nokia in 1991/1992, when the company was in the midst of a crisis. Its market capital was about 100 U.S. dollars. And 8 years later, in summer 2000, it reached the level of 300 billion U.S. dollars.

It has been the same people than the ones who were there when the decline started. It is not about people, it is about context. And Nokia's concept, which was chosen in the middle of the crisis, was very risky. Nokia decided to risk everything to achieve a high market share in mobile technology, relying on the fact that this business is going to grow fast. Nokia estimated that the number of mobile connections will increase from 10 million in 1990 to 15 million by the year 2000. And the real figure was 700 million! Easy to understand why the company was doing remarkably well. But in the same time, Europe was able to provide the best ecosystem for mobile technology to be developed. Mobile technology which was driven by hardware business; hardware technological capacities were critical for that business.



But what happened in 2000? Software, and especially digital content, became dominant, and the context changed in a dramatic way. But Nokia's concept was still the same and it was partly impossible for Nokia to change its concept rapidly enough. So it started to decline.

We have to think about the Arctic in that way. We have to understand that Arctic opportunities are changing the context in a dramatic way—not today, not tomorrow, but within the next 20-30 years. It is going to be a dramatic change opening new frontiers—just as the moon programme was opening new frontiers.

And the question is, who is able to change its concept in a way that this new balance between concept and context can be reached? This is a great opportunity for countries like Finland, the Nordic countries or all countries that have an interest in the Arctic area.

Digital technologies are going to be everywhere. When we are looking at infrastructure, sustainability investments, environmental investments, environmental protection, when we are looking at logistics and transportation systems. Digital is everywhere. But what to do in order to get those benefits from digital as fast as possible?

We know that the technologies are more or less already there. 7 billion people have mobile devices with the same capacities than the lunar module Eagle—but we don't use them. We can take benefits only in the field of entertainment. And that is the challenge: How to create such an environment where technologies can be fully utilised? This is a challenge in the Arctic area as well: How to break silos in a way that those capacities of digital technologies can be rapidly integrated into environmental protection, into logistical systems, in everything that we are doing in the Arctic area? And digital means also smart. Smart and Arctic should be integrated and probably the word Smarctic is a very good illustration of that.

In a nutshell, we have been struggling the last 25 years with who is able to produce cheapest. The next 25 years we will be struggling with who is going to be able to do the smartest things. That is the challenge.

However, predicting the future is difficult. Wayne Gretzky, one of the best ice hockey players in the world, was once asked about the difference between a good player and a star. He answered, that a good player is skating where the puck is, and a star is skating where the puck is going to be. It is easy to say, but it is so difficult to be done.

A report published in 1998 was entitled "The period of opportunities: Finland in a new Northern Europe". How many times the word "Arctic" was mentioned? Not once. And the report was published 17 years ago.

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Q&A

The first question was about the 5 million indigenous people who are occupying the Arctic area. They heavily rely on their land and they heavily rely on reindeer herding and farming. How do we take their needs in consideration?

Heikki Autto, Rovaniemi City Council, answering as an indigenous Sami, emphasized the importance of preserving the Sami languages (there are 3 in Finland alone) for the future generations. In order to save the traditional way of herding reindeers and all the other very important and unique characteristics of the culture, the young people have to stay in their ancestors lands in the North. And the only way to keep the young generation in the North is



to provide employment. This is why there is also a need for modern infrastructure investment and all other kinds of investments. The northern part of Finland is more than half of the country, the Lapland district is 1/3 of the whole country; there is space for the traditional way of living, and the modern tourism, mining, and all other kinds of business activities—on condition to keep the sustainable development in mind.

The following question addressed that fact that it seems to be difficult to convince those who are not coming from the Arctic area of the great opportunities existing in this region.

Kari Laine, Thule Institute, stressed that Finland was coming into the Arctic business and Arctic ideas very late. Finland was the last of the 8 Arctic countries coming up with a strategic plan. However, there are many other countries, such as Japan, China, or India, which are very interested in the Arctic region.

Esko Aho, Former Prime Minister of Finland, underlined that the problem is very typical for today's way of meeting challenges. We are living from day to day, from week to week, maximum from month to month, and then the agenda will be changed. However, the Arctic is not a short-term issue, it is a very long-term issue. And this is why it is very difficult to get visibility, especially in the media, for Arctic issues. They are on the agenda only if something goes wrong. If something is going to be a failure, then people are actively discussing. But if everything goes fine, opportunities are there but very few are interested in.

A second reason is that, when we are speaking about opportunities, we are speaking about the future—and this will not bring us an immediate return of investment. This is another problem.

Finns have been extremely slow, and, for example, when looking at all the construction opportunities up in the North, only companies in Northern Finland have been active. In Southern Finland they are sleeping—and blaming that the construction sector is not doing well, that there are no business opportunities. Although, these business opportunities are so close and easy to reach. But in some way we have not been able to utilize that.

As far as the Arctic agenda is concerned, it is going like just everything else. It is like a hockey stick phenomenon: in the early phase, slow progress and limited achievements. When it goes up, it goes up much faster than one had expected. This is why it is important to create this awareness and to invest in this. Especially governments should be active in that.

Martti Hahl, Barents Center Finland, added that it might be some kind of a psychological issue. It is a big difference between thinking that we are far away from the market or if the market is far away from us. It is important to be much more offensive when presenting the opportunities, at least in the Northern part of Sweden.

Johanna Ikävalko, Ministry of Transport and Communications, explained that the question raised is very much Finland centred. One of the core preoccupations when developing ArcMaTe, was to find ways to ensure sustainability in the Arctic. There will be increasing activities in the Arctic—how to ensure sustainability? In fact, there is even a bit too much interest in Arctic resources and in the Arctic in general.

The economic crisis had slowed down this interest in the Arctic, which was getting almost out of control. The current economic situation gives more time to construct sustainability and sustainable actions and pathways to get to the Arctic.



Martti Hahl, Barents Center Finland, confirmed that the global awareness concerning the Arctic is actually very low. But there is one clear trend which is China investing heavily in the Arctic. We should not forget this when talking about transport routes.

Three years ago, the Ukraine-built Chinese ice breaker Snow Dragon made a sailing from China through the North Pole and surprised the Russians on its way back from Iceland. When it passed through the Northern Sea Route the first time, the Russians wanted to escort the Chinese with a pilot icebreaker. Thus, the Chinese went to Reykjavik, Iceland, and then headed straight to the North Pole. China is investing very heavily in the infrastructure in the Northwest of Russia, while it seems that the EU is missing the opportunity to go into the Arctic. The awareness in the EU is very low, but the future of the EU is actually in the High North.

Stig Nerdal, Transportutvikling, pointed out that the picture is not just black and white. Of course one could do more to make the Arctic region more visible, but at the same time it is far from being invisible. There are very huge international investments along the coast of Norway; when it comes to oil and gas there are international companies, and even in the fisheries and the tourist business capital from different countries has been attracted.

The next question concerned the opportunities in the Northern Arctic and on what level actions have to be taken: the EU level, the national or regional level or even the city level? Who should be the most active?

Esko Aho, Former Prime Minister of Finland, answered that, as far as Finland is concerned, there is a need for a real strategy. The report that is currently called a strategy is more an action plan than a strategy. And once Finland has a good strategy, it should start collaborating with other EU member countries, so that the EU will have a joint strategy. And then, there has to be work with other countries globally in order to get a certain kind of rules and regulations—like in telecommunications where standards were needed and then things started to happen. This is also the answer to the environmental challenge. We need common rules, regulations and standards on what is possible and what is not. This is what governments have to do.

Locally, Oulu can play a really big role Finland. Oulu has potential to be a leading region in Finland and to take initiatives. Other parts of Finland do not have similar capacity to do that.

Moreover, it is important to get more media attention. Billions and billions are invested in the northern part of Europe and no one even knows what is going on in Northern Sweden and Northern Norway.

The panellists then were invited to rapidly express a short take-away message:

Heikki Autto, Rovaniemi City Council: Well done is so much more important than well said. We now have to grab the opportunities and do it.

Martti Hahl, Barents Center Finland: Up in the North we have space, we have grace and if you want to follow the money, it is where you have to come.

Johanna Ikävalko, Ministry of Transport and Communications: Please think about the



ArcMaTe concept and send your feedback.

Stig Nerdal, Transportutvikling: When talking about the High North, we are always talking about raw materials and export of raw materials. We have to bring some kind of balance flow in this concept. We have to build businesses in the North which have stability to buy and sell, not just sell.

Henrik Vuorinen, Port Luleå: The development of the Arctic is about communication, respect and sustainability, and of course making money.

Kari Laine, Thule Institute: Dialogue, cooperation, keep in mind environmental issues, Smarctic and action.

Esko Aho, Former Prime Minister of Finland: The Arctic agenda is one of those few areas where collaboration in these present circumstances is possible. Let us use that in a maximum way.

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Session 10

Day 2 – Afternoon – Parallel Session

Digital Communities

DOYNA ZHARAVINA, Project Manager for eHealth, Millennia2025 Foundation, France, moderating, welcomed the participants and introduced the topic of the session.

Don't put all your trust in things like intelligent infrastructure and ICT development, especially the one that comes from governments.

The session will talk about communities and examine how communities are impacting the digital development, how they are impacting the digital future, how they are defining themselves there own needs—with a particular focus on women.

Digital development is often considered as a process that will bring an open, secure and accessible cyberspace and women are the group that has to gain a lot from this development. The digital divide is higher than 30 percent in many countries.

The three speakers are going to address respectively healthcare, business and innovation and education.

The Women Observatory for eHealth

The Millennia2025 Foundation is a digital community of 10,800 women in 145 countries. It was initially created as a platform to help women share their ideas and their vision of their future through a digital community. After having had enough members, working groups were set up that focus specifically on certain questions. Out of these working groups, accompanied by questionnaires and some research, came certain very specific action plans.

Each of these action plan projects is to highlight the crucial role of women and their capacity as builders of the future through the digital community. Particularly the WeObservatory, one of the Millennia2025 action plans, is each year selecting 5-10 projects made by nurses and midwives that have an ICT component and intertwine the topics of ICT, women and health.

The Millennia2025 Foundation also selects specific online courses in different languages (English, French and Spanish) giving women access to education and healthcare. However, the Foundation don't create online courses, it picks them out and puts them on the website.

ePrevention LAC is one of the projects carried out by the Millennia2025 Foundation. It is a project realised in Peru, in an area with a lot of secluded places, up in the mountains. A nurse takes her backpack and, together with 2 or 3 other people, goes out to the communities, brings basic information on hygiene and healthcare, talks to girls about sexual education, about the dangers of early pregnancy etc. This nurse is also trying to set up a sort



of digital community making sure that there is at least one computer per community and that the people are able to re-contact and come back to this nurse and have her expertise and her consult on very basic questions.

Furthermore, Millennia2025 is sponsoring a research project on telehealth and elderly, realized in cooperation with the University of Valenzuela, Philippines. It is basically a lab set out and a nurse is studying how the elderly use and receive information. Are they likely to keep using it? The nurse showed that, after some basic training, it is very easy to convince the elderly to use that technology. And after they go home, they keep using it and form their own community based on this research group and they are willing to consult the nurse online even when they are at home.

Another project is “Zero Mothers Die” empowering pregnant women with mobile health. The project is carried out in partnership with a number of private companies.

ANNE PETITGIRARD, Co-Founder Zero Mothers Die, France, shared her long and rich experience in developing and implementing healthcare projects for vulnerable populations all over the world.

Women’s health access to health services

When working on access to healthcare, or access to the right to health, the community based approach as a key element of success, as well as the participation of people in the design and implementation and a bottom-up approach.

Zero Mothers Die is a global partnership initiative fighting maternal mortality, focussing on pregnant women in vulnerable situations (HIV, remote areas, ...). The project intends to provide these women with mobile technologies and tools to enable them to access health information and messaging services and to contact their local health worker by phone.

The women get a small pink mobile phone, which is free of charge and with monthly free minutes (women get the phone for 6 months pregnancy plus 6 months after delivery) to enable calls to their midwife or health worker. The women also receive information messages about the evolution of the pregnancy, reminding them to look for warning signs and what to do when a warning sign occurs. The messages are sent as voice messages in the women’s local language.

This partnership has been developed by Millennia2025 in cooperation with two other partners. One is ADA, Advanced Development for Africa, a pan-African non-for-profit organization working to scale up the development and achievement of the Millennium Development Goals. ADA combines technology, capacity building, cross-sector partnership and tries to work with women to improve the health education empowering of women and youth.

The second partner is UniversalDoctor, a digital health company providing an e-health tool facilitating communication between patient and nurse or medical doctor. The application overcomes language barriers by offering thousands of medical phrases and audios in over 20 languages covering various medical disciplines. The application also contributes to translate the messages that are sent to the pregnant women.



Zero Mothers Die is implemented in four African countries, and documented to see if it can be replicated. Being close to the people at the community level, speaking their languages and responding to their specific needs of information, monitoring and help is a central part of the project.

The project responds to the vulnerability of women around the world. Among the various vulnerabilities women are exposed to, the Zero Mothers Die project responds to the one of pregnancy. Every day, 800 women die during their pregnancy or during/ after delivery. Nearly 300,000 women died due to problems encountered during pregnancy last year. Major causes are bleedings etc., but it is also the distance from healthcare, not accessing the healthcare services. It is also a problem of being comfortable to go to the health centre, being welcomed at the health centre and being understood by the health centre.

The project also takes into account the different social-cultural elements, which prevent women in many countries to go to the healthcare centre .

Zero Mothers Die is really about accessing healthcare services. It is not talking about health, because then one also has to include clean water etc. Its just dealing with access to health services, which is already one major component. 68 million women delivered a child in 2013 without a skilled birth attendant. Zero Mothers Die can make the difference by reaching women in remote areas, share information regularly, monitor a woman's pregnancy and help them to take decisions about their own pregnancy and well-being.

Talking about women in this context, also means talking about adolescents because Zero Mothers Die is implemented in African countries where the average age of first pregnancy can be around 13 or 14 years.

The project also wants to provide access to education and information concerning pregnancy through the mobile phone, but also access to counselling. It is not enough just to provide information; one also has to listen to the people and to counsel—ideally face to face, but also through mobile phones in remote areas.

e-health and m-health can be a plus in many projects. Two examples were given:

ESTER (Ensemble pour une Solidarité Thérapeutique en Réseau/ A network for inter-hospital solidarity) is a French (then European) initiative created in 2002 to improve access to quality care and treatment for adults and children living HIV/AIDS, by strengthening local capacity through hospitals twinning and fostering partnerships. The first objective was the creation of reference hospitals and centres. The second objective was to work on the continuity of care and to build a consensual approach between hospitals, associations and civil society groups. The tools used at the time were a global health and participatory approach, monitoring missions, data collection, and visio conferences for the update and planning .

What if ICT would have been accessible when ESTHER has been put in place in 17 countries with 70 hospitals twinned and teams in Africa and South-East Asia? It would have supported the expansion of access to health and health practices in and from remote areas. It would have helped to improve treatment adherence, i.e., to help people getting a better understanding of their problem and support the continuity of their treatment. The use of ICT would have facilitated the cooperation with the health workers.

It would probably have facilitated the participation of people, in particular women, in the



follow-up and in the potential re-orientation of activities according to the needs. It would also have helped to increase participation in the design and implementation of the project, which is key of the success of such project.

Moreover, ICT would have supported the promotion of health and would have increased the knowledge of people by accessing information on health and on the quality of services. And it would have facilitated monitoring, especially in the context of data collection and patients and project monitoring.

Another example is a project on neonatal and maternal health in the Sahel led by the French Red Cross. The objective of the project was to reinforce the system and make sure that women have access to good quality neonatal and maternal health in the four countries Niger (Zinder), Mali (Bamako), Mauritania (Gorgol), and Chad (Batha).

What if an ITC element would have been added to the project? The idea was to strengthen the health centres to offer quality care, quality delivery and postnatal, prenatal and newborn care. They worked with volunteers who went to the villages speaking with the women and their husbands and informing about family planning, delivery, etc. They did a great job, but it would have helped to have a good referral strategy, especially for the health centres. It would also have helped to break the isolation of women and allow them to have an informed decision about their health and their attitude. Definitely, technology would have been helpful, but the big challenge is not just to have ICT tools, but to have patient friendly tools. It would also have helped the Red Cross to provide improved ongoing training for the health workers in remote areas.

There is a lot of added value ICT can bring. But more important is to work together. ICT will add value and will help going further or more in depth, but we have to collaborate, both health professionals and ICT experts. If you want to develop, make sure that there is a task shifting policy in the country. Medical doctors have a certain power in countries that nurses don't have; we really have the government to make a task shifting policy in the health system.

e-health and m-health have to support health and not just be an available tool. Ethics is crucial. The implementation of new technologies for health requires an ethical framework to ensure respectful care for the persons and their communities.

There is still a long way to go to improve well-being and health with ICT.



EFFAT EL SHOOKY, Technical Director, WBDC – Women Business Development Center, Egypt, presented the work of a non-profit business organization whose mission is to support innovation at the community level.

Innovation for Community Development:
The Egyptian Experience

[A short introductory video was shown]

Egypt is a nation of 90 million inhabitants. 50 percent of the population are young people, and 50 percent of the 90 million are women. Egypt is facing a number of challenges, among those unemployment and poverty.

WBDC is trying to work with people at grassroots level, i.e., the organisation is trying to reach the disadvantaged areas with a very special focus on women. In the context of rural development or rural communities, special attention should be paid to women because they are the base for building the families and building their own communities.

There are many already existing opportunities in these rural areas, in the villages and in these communities, but the people are not aware of that. They are not aware that they have assets that they are just not utilising. Thus, WBDC is focussing, not only on business development or entrepreneurship, but especially on social entrepreneurship. When talking about development, one has to look for the impact on the communities. Money and profit is not all—it is more about the impact on development and how far the communities can really grow.

WBDC is trying to initiate projects that are owned by the youth and by the communities themselves. The organisation has successfully initiated a number of innovation for development projects; among those NGOs, start-ups, and networks which are building their own communities and which are implementing projects in the villages, not just in cities. They are dealing with agricultural areas, health, or education and there are a lot of activities that have proven having a real impact.

The “Knowledge Innovation & Social Entrepreneurship Initiative” has been launched by WBDC last year. The project is not about technology innovation but rather knowledge innovation. Women in rural areas are not in need of technology, they are in need of knowledge. The question is how to improve their knowledge about their own problems and challenges that they are living?

The Egypt ICT Trust Fund was established in 2002 by the Egyptian Ministry of Communication and Information Technology and the United Nations Development Programme (UNDP) to support community and rural development in using ICT. It has implemented a number of projects.

WBDC considers learning from other countries’ experiences as very important. There are many experiences made in developing countries that face the same environment and challenges as Egypt. Therefore, WBDC is encouraging the so-called South–South Cooperation among the developing countries in relation to specific applications.

The South–South Cooperation is a broad framework for the collaboration between developing countries to exchange resources, technology, and knowledge, also known as countries of the Global South.



The UNDP is now establishing the South-South Development Academy Egypt (SSDA). Based on national development priorities, SSDA is entitled to identify thematic focus areas on a yearly basis with which it conducts research to nominate the best development solutions for documentation and dissemination. The main focus of SSDA Egypt is to scale up or replicate development projects.

The Finnish Embassy has recently launched a call for proposals for community development in Egypt. WBDC is currently preparing a proposal to be submitted. This project proposal focuses on waste recycling as one of the major challenges communities are facing. There are already a number of Egyptian NGOs partnering with WBDC to put the waste recycling management and ICT together in order to build Living Labs on Community Waste Recycling. WBDC is inviting any of the Finnish industries interested in collaborating within the framework of this project.

INDRAJIT BANERJEE, Chief of Information and Communication Technology in the Education, Science and Culture Section of the Communication and Information Sector, UNESCO, delivered a thought-provoking speech, reminding the audience to keep a realistic view on digitalization.

The former UN Secretary-General Dag Hammarskjöld once said “The United Nations was not created to take mankind to heaven, but to save humanity from hell.” ICT can be seen that way too. How do you leverage ICT to enhance livelihoods, to enhance democracy, empowerment of people and avoid the negative consequences, which unfortunately are getting more and more predominant.

Recently, UNESCO organised a conference on Internet use and radicalisation and it was shocking to see how the Internet is being used by fundamentalist groups to radicalise young people. The negative consequences are equally there, so let us not just jump to conclusion and think that the Internet will change your lives automatically.

In terms of epistemology we have to consider three stages of our understanding of ICT. The first one is what has been considered to be a utopian phase: Internet will create democracy, mobile phones will empower everybody etc. This very utopian approach was followed immediately afterwards in the 1980s, early 90s, with a dystopian approach saying we have given excessive importance to ICT, we should pay more attention to the integration and use of technology and society by what specific groups, for what specific purposes, in which specific areas, and then we should not jump the gun. The last perspective, which is woefully lacking, is the realistic perspective. Where and how ICT can have an impact? Because they do in specific areas, but it is not as wide as we seem to believe.

UNESCO’s approach to this whole problem of ICT has been completely the opposite of what we generally tend to see. It should not be technologically driven; technology should not be a driver, technology is a tool, technology should be leveraged where possible with the maximum possible benefits. In 2003, there was the World Summit on Information Society in Geneva. At the WSIS in Tunis in 2005, UNESCO came up with the concept of knowledge societies, stating that it is not the information society that we are looking for; we want knowledge societies where information becomes a tool and the end goal is knowledge.



UNESCO's concept of knowledge societies is based on four core principles: First, universal access to information and knowledge which is absolutely fundamental in order to integrate people, in order to create greater participation etc. Second, quality education for all. Without education we are not going to be able to get rid of all the problems and challenges we are faced with today. Third is freedom of expression. It is absolutely critical in terms of participation, emancipation and empowerment. Fourth, the promotion of linguistic and cultural diversity.

UNESCO believes that the ultimate goal is to be able to build equitable and pluralistic knowledge societies, for which ICT will be a crucial enabler.

There is a lot of euphoria, everybody is talking about innovation, smart cities, smart everything... We were not stupid before. We are not getting smart overnight just by declaring that we are smart. We have to be a bit more balanced in our perspective.

There are 3.5 billion Internet users and almost 7 billion mobile phone subscriptions. What are they doing on the Internet? Which sites do they visit? What do they do with the Internet? To what extent is this access being leveraged for improving livelihoods? Is it be used for the empowerment of women or poor people? There is no concrete evidence as to that. Let us be very cautious what do they do with this access, how do they leverage this access to enhance livelihoods. If the number of poor people is not decreasing in the world, if there is one billion people with disabilities in the world, we are not really heading towards a much greater and more prosperous and more happy society anyway.

There are 750 million illiterate people in the world, one billion people with disabilities, and one could go further on with statistics. The world has not become a dramatically better place thanks to 3.5 billion people having access to the Internet. We must pause and look at all the connectivity divides, language divides, generation divides in terms of access, and then come to conclusion in terms of how these technologies can be leveraged by us, not driven by them, to empower ourselves and create a better society.

There are 6,000 official languages in the world, out of which 300 are online, out of which only 10 languages have 80 percent of the content on the Internet. What is the incentive of a poor farmer in India or China or elsewhere in the world whose content in local language is not available online to connect to the Internet? That immediately reduces the number of people who are using or leveraging the Internet for enhancing livelihoods and empowering themselves.

The UN has just approved and unanimously endorsed the Sustainable Development Goals Agenda, which has 17 goals and about 160 indicators. We should focus our entire approach to ICT not to the Internet of Things or the Internet of Everything, but how concretely, in every sphere of our life, can the Internet be leveraged to empower ourselves, to empower marginalized people, to empower women, children, and disabled people to live a better life. Let us be realistic, let us focus our work much more on real things and not waste our time on a lot of other things.



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Q&A

The first comment of the audience referred to the presentation of Indrajit Banerjee, UNESCO: The commentator agreed that digitalization should not be the driver, but many ideas come up by “playing” with digitalization. People suddenly may discover new opportunities. It is important not to look at buzzwords, but on the other hand we should not do things in sequence, i.e., first defining what we want and then looking at what digitalisation can contribute. There is a mutual incentive.

Indrajit Banerjee, UNESCO, underlined that here are very poor countries without any basic infrastructure. Promoting the argument that digitalization works equally for everybody is mistaken. We have to begin with where digitalization can add value, where digitalization can fulfil critical gaps. Unilaterally imposing digitalization as a solution to all challenges of mankind will not work.

There are stages of development where different technologies can come and enhance and leverage and we have to look at this in a case by case basis. We should not jump the gun and say digitalisation should not be seen separate from the development agenda. Of course, if we can do both it is fine, but there are undeveloped countries, developing countries, and developed countries and you can't have the same digital solutions for all the three different groups.

The following question to the panellists was to name the three most important challenges relevant to digitalisation for communities.

Sylviane Toporkoff, Items, stressed that this depends on the goal to be achieved, i.e., on a local or national level. Irrespective of the community you focus on, whether it is a health community, a community of women or disabled people, you have to bring the community together. You have to get community acceptance and realise the project together. And then use digitalisation as a tool—however, it can only work if you have the right regulation in place and if you have the right network.

Effat El Shooky, WBDC, addressed the question of the three main challenges for communities. Egypt has a very high rate of illiterate women in villages. To answer to this problem, a digital solution, tailored for women illiteracy, has been developed. It is a digital curriculum for illiterate women to learn how to read and to write, and at the same time they learn reading and writing, they also learn basic issues, such as what is an ID, what is registration, what is a birth certificate etc. The impact is significant: It usually takes 1,5 years for an illiterate women to be able to read and to write and to get the certification that she can go to school if she wants. This is the classical mode. When using the digital CDs, it takes 6 months to learn reading and writing. It is an project that was proven in Egypt and that is currently used.

The second challenge is knowledge. Women and young people in villages lack knowledge about many things. WBDC has developed healthcare learning objects, e.g., what is osteoporosis, what is breast cancer, how to prevent breast cancer, etc. WBDC has developed very simple learning objects. They are put on the Internet or on CDs and women can improve their knowledge.



A third example addresses the challenge of unemployment. WBDC, together with Microsoft, set up e-shops for women and e-employment for women. Women can go to already existing Internet cafes and they will get help by the staff to find new ideas of work in small projects.

These are three concrete cases where digitalisation has supported the development of disadvantaged communities.

Anne Petitgirard, Zero Mothers Die, confirmed that knowledge leads to ownership and to own decisions, for instance about your own health.

We need mutual incentives between digitalisation and health. In the project Zero Mothers Die, you give a mobile phone to the women and you encourage them to be very careful with the different warning signs etc. But at the same time, you need to work with the governments and the national authorities. Thus, the health centre gets more qualified and reinforced. The two have to be thought through and built together.

Doyna Zharavina, Millennia2025 Foundation, added that the discussions basically address the question when a community starts being an expert and when it stops being an expert. There are things where a community knows where their needs are, and there are things that need to come from the other side. The discussions also come back to the core concept of education.

The question about “what do people do online” was raised. If we don’t educate them to what they have access to online, they are not going to know where to go. Basic awareness of what is the cyberspace is crucial. Information illiteracy—there are old concepts that take different forms. In this case infrastructure is quite important. If we have the opportunity in more developed countries to continue building infrastructure we should do this. If we don’t have the same opportunities in developing countries, we are going to do other things. And here small e-health projects, such as Zero Mothers Die, come in. The women have to walk for two or three days to reach a hospital. Hospitals still need to be built there, but if we can temporarily fill in this gap, for instance with the help of a small pink mobile phone, this already improves something.

Ali Kone, Coders4Africa, emphasised that we live in a globalised world and we are in the digital era. We have to compete on that level, otherwise we will be left behind.

Many African countries lack infrastructure and are faced to politicians that are not moving fast enough. However, people can not always wait. In certain countries Coders4Africa is working, the infrastructure is lacking but that doesn’t stop them from training people to do something. It is no longer the usual top-down but a bottom-up approach. There is a small group of people, they are growing and having some impact. We can not expect the leaders to always do the right thing, therefore you have to take action on your own.

Indrajit Banerjee, UNESCO, summed up that it is important to use *all* available tools and instruments to solve a specific problem. But we should stay realistic. We have to look at the problem and look what possible solutions exist. We should not try to enforce solutions to problems which can’t be solved by technologies.

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CONTACT

CONFERENCE DOCUMENTATION

All conference documentation, including programme, presentations and slides, speakers' profiles, participant's testimonials, photos and related information on the Global Forum 2015 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.

ITEMS International
– Global Forum/ Shaping the Future –
6, rue Jean-Baptiste Potin
92270 Vanves
France

Tel: +33 (0) 1 46 42 48 76

Dr Sylviane Toporkoff, President of the Global Forum/Shaping the Future

stoporkoff@items-int.eu

Sébastien Lévy, Vice President of the Global Forum/ Shaping the Future

slevy@items-int.eu

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 2016 edition of the Global Forum.

Please make sure to check our website regularly for updates.



ACRONYMS & ABBREVIATIONS

AIOTI	Alliance for Internet of Things Innovation
API	Application Programming Interfaces
APT	Advanced Persistent Thread
ATM	Automated Teller Machine
BAN	Body Area Network
BEREC	Body of European Regulators for Electronic Communications
BIM	Building Information Modelling
BYOD	Bring your own device
CAD	Computer-Aided Design
CATV	Cable Television
CEO	Chief Executive Officer
CIO	Chief Information Officer
CISO	Chief Information Security Officer
CNIL	La Commission Nationale de l'Informatique et des Libertés/ Commission on Information Technology and Liberties
CoR	Committee of the Regions
COTS	Commercial-off-the-shelf
CO2	Carbon dioxide
CRM	Customer Relationship Management.
CSA	Community Supported Agriculture
CVSS	Common Vulnerability Scoring System
DdoS	Distributed Denial-of-Service
DG	Directorate General
DSM	Digital Single Market
DTCE	Digital Trust and Compliance Europe
EC	European Commission
EHR	Electronic Health Record
eID	electronic ID
eIDAS	electronic IDentification And Signature
EKG	Electrocardiogram
EMR	Electronic Medical Record
ETSI	European Telecommunications Standards Institute
EUR	Euro
FCC	Federal Communications Commission (USA)
FTC	US Federal Trade Commission
FTTH	Fiber to the Home
Gbps	for Gigabytes Per Second
GDP	Gross Domestic Product
GHz	Gigahertz
GIS	Geographical Information System
GP	General Practitioner
GPS	Global Positioning System
GSM	Global System for Mobile Communications
gTLD	generic Top Level Domain



Hadopi	High Authority for the dissemination of works and protection of rights on the Internet in France
HIPAA	Health Insurance Portability and Accountability Act
HIV	Human Immunodeficiency Virus
HVAC	Heating, Ventilation, and Air Conditioning
HW	Hardware
H2020	Horizon 2020
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	Information and Communication Technology
ID	Identity
IDC	International Data Corporation
IETF	Internet Engineering Task Force
IoE	Internet of Everything
IoT	Internet of Things
IP	Internet Protocol
IP	Intellectual Property
Ipssec	Internet Protocol Security
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IPR	Intellectual Property Rights
ISO	International Organization of Standardization
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunication Union
LAN	Local Area Network
LNG	Liquefied Natural Gas
LPWA	Low Power Wide Area
LSA	Licensed Shared Access
LTE	Long-Term Evolution,
Mbit/s	Megabit per second
MEMS	Micro Electro Mechanical Sensor
MEP	Member of the European Parliament
MICE	Meetings, Incentives, Conferences, and Events
mMTC	massive Machine Type Communications
MOOCs	Massive Open Online Courses
MS	Multiple Sclerosis
M2M	machine-to-machine
NAT	Network Address Translation
NGO	Non-Governmental Organization
NIST	National Institute of Standards and Technology
NSA	National Security Agency
OECD	Organisation for Economic Co-operation and Development
OEM	Original Equipment Manufacturer
OFCOM	Office of Communications
OPIC	Overseas Private Investment Corporation
OTT	Over The Top



PC	Personal Computer
PHR	Personal Health Record
PII	Personally Identifiable Information
PIR	Private Information Retrieval
PKI	Public-key Infrastructure
PPP	Public-Private Partnership
PPPP	Public Private People Partnership
RCS	Remote Control Systems
QoS	Quality of Service
Q&A	Questions and Answers
R&D	Research and Development
SAR	Search And Rescue
SCADA	Supervisory Control and Data Acquisition
SDGs	Sustainable Development Goals
SIGINT	Signals Intelligence
SIM	Subscriber Identity Module
SLA	Service-Level Agreement
SLS	Selective Laser Sintering
SME	Small and Medium-sized Enterprise
SMS	Short Message System
SNMP	Simple Network Management Protocol
SPID	Public Digital Identity System
SpO2	Saturation of Peripheral Oxygen
SSO	Single Sign On
SSDA	South-South Development Academy Egypt
STEAM	Science, Technology, Engineering, Arts and Mathematics
STEM	Science, Technology, Engineering, and Mathematics
SW	Software
TEN-T	Trans-European Transport Networks
TLD	Top Level Domain
TLS	Transport Layer Security
TOR	The Onion Router
TPM	Trusted Platform Module
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USA	United States of America
US	United States
USAID	United States Agency for International Development.
USD	US Dollar
VIP	Very Important Person
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VW	Volkswagen
VWAN	Very Wide Area Network



WAN	Wide Area Network
WiFi	Wireless local area network
WRC	World Radiocommunication Conference
WSIS	World Summit on the Information Society
X-ray CT	X-ray computed tomography
3D	3-dimensional
2G	Second Generation
3G	Third Generation
4G	Fourth Generation
5G	Fifth Generation
3GPP	The Third Generation Partnership Project

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