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The 2nd Annual Conference Internet of Things Europe 2010

A Roadmap for Europe

Held on 1st and 2nd June 2010

The Crowne Plaza - Le Palace . Brussels

Conference Report

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This report of the conference has been kindly written by Rob van Kranenburg, Conference chair (Founder, Council)

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Report written by **Rob van Kranenburg**, Conference chair (Founder, Council).

Rob van Kranenburg is an innovation and media theorist involved with negociability strategies of new technologies and artistic practice, predominantly ubicomp and RFID, the relationship between the formal and informal in cultural and economic policy, and the requirements for a sustainable cultural economy. He has been teaching at various schools in the Netherlands (UvA, EMMA Interaction Design, Industrial Design) and has worked at several Dutch cultural institutions; de Balie, Doors of Perception and Virtual Platform. Until April 1 2009 he was Head of Public Domain at Waag Society. Currently he teaches at Frank Mohr and Fontys Ambient Intelligence. He lives in Ghent, Belgium. With friends he has set up Council, a consultancy/ thinktank on the Internet of Things for governments, cities and citizens.

For more information about this event, including access to all speaker presentations please contact:

Amanda Strevens
amanda.strevens@forum-europe.com
or telephone: +32 2 534 11 79.

Co-chairs:
Gary Finnegan, *Section Editor, EurActiv*
Patrick van Eecke, *Partner, DLA Piper*
Robert Schumann, *Lead Consultant, Analysys Mason*

Session 1: Keynote presentations

"A well-informed mind is the best security. And generations of well-informed minds are what are needed to give our country and Europe a bright future." - Neelie Kroes

"We have no road. We make the road by walking." - Neelie Kroes

Neelie Kroes, Vice President and EU Commissioner for Digital Agenda, European Commission kicked off the two-day conference in Brussels. Recently at wcit2010.org she stated that the Commission is very much an enabler: creating stability for long term investments means facilitating "effective cultures of cooperation". As 50% of the productivity growth in Europe is due to ICT, it becomes clear, she states, that the Internet of Things, the next wave of internet enabled connectivity, is not simply a technical innovation but a broad process in the heart of our society. The Internet of Things is about values and fundamental democratic choices. The Commission grasped this quite early on and has been facilitating dialogue on what some see as the key 'glue' to IoT, RFID. IoT is surrounded by a value system: as it comes so close to the heart of everyday life, social relations and daily services, it needs a broad

societal consensus to fulfill its potential. Can we integrate or hardcode our values into the protocols and technical possibilities? The Commission's long term strategy is aimed at building this broad support. If citizens experience it as a system that nags them, or sneaks up on them, then the time needed to show the actual societal benefit might not be enough. The sheer scale of IoT warns us of the possible consequences. We cannot undertake such a venture lightly. We need wise, informed and transparent debate. Public - Private Partnerships that have citizens at the centre of applications and an open service sphere need to be coupled with pragmatic ways to move forward in ethical issues, a productive policy environment, global cooperation, the to right debate with the right parameters at the right moment. This means focusing on smart cities, but in order to turn the digital divide into a digital dividend it also means a roll out in the local spectrum rural development. It means honest competition based on open standards: a soft approach at first, leaving room for stronger approaches later.

Neelie Kroes said: "I wish to announce my plan to set up an expert group, which will act as a multi-stakeholder forum to advise the Commission on how to address the really hard actions like governance mechanisms; data ownership, privacy; a 'right to the silence of the chips'; standards; and international scope." (source: http://www.euractiv.com/en/infosociety/kroes-chooses-wait-and-see-approach-on-future-internet-news-494847)

Full speech:
http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/279&format=HTML&aged=0&language=EN&guiLanguage=en

"Before all these new applications arrive, we should work out how to protect people's rights. The Commission is right that we need to find a balance. If we want this technology to be successful, citizens must be able to rely on it. We have to put it in the right hands. As we live in an open world, I think that we should raise this subject at a transatlantic level." - Maria Badia I Cutchet

Maria Badia I Cutchet is Vice Chair of the Group of the Progressive Alliance of Socialists and Democrats in the European Parliament. The European Parliament's Committee on Industry, Research and Energy (ITRE) discussed at its meeting on 17 March 2010 the draft report by rapporteur Maria Badia i Cutchet on the Internet of Things (IoT). The report welcomes the Communication from the Commission "Internet of Things -An action plan for Europe" and endorses the Commission's focus on safety, protection of personal data and privacy and governance of the Internet of Things. "

Maria Badia I Cutchet's keyword is trust. Over the past 40 years, she says, we have seen the growth of a critical ecology of machine to machine applications in food, transport, traceability, health… One of the main concerns is to establish a framework that covers future applications that are evolving as we speak, and those we can not even envisage at this

moment. A great emphasis should be placed on health, recycling, the right of the silence of the chips and the protection of personal data. IoT will only grow with the trust of citizens. However, a proactive approach is necessary in educating local authorities about the green aspects (energy efficiency, environmental protection) of smart cities. For this, cooperation at an international level is necessary.

For Maria, one of the most interesting things is that in this particular case both the Commission and Parliament are on time, just riding the wave of the first real iteration of IoT. Unlike previous technological revolutions, policy should not have to lag behind but can, in a thorough debate with all stakeholders, look out for the actualizations of the political: slow down the speed to make it more inclusive, mediate between various parties that have different interests and negotiate short, mid and long term effects into the lure of the momentary.

Artemi Rallo is Director of the Spanish Data Protection Agency, and Vice-Chairman of the Art. 29 Data Protection Working Party Data Protection. The work of the article 29 working party in the field of privacy and disruptive technologies, for example in the move from privacy compliant applications to privacy compliant technology, has been impressive and important. The impact of The Internet of Things on democratic structures and organisational models is only just starting and it is imperative that there is a philosophical component in the policy thinking on this. Does the current legislation apply? According to him, new emerging technologies always blur borders and entail legal uncertainties. Especially in the case of IoT, with a vast deployment of sensors and actuators, the technical impact of data protection can be huge on emerging services and applications and the technical impact on the data protection of citizens will bring new relationships between industry, government and citizens. We are entering a new paradigm where things have their own identity and enter into dialogue with both other things and humans mediated through processes that are being formed today. There are high expectations of this process of integrating things in a communication network anywhere-anytime-anything-by anyone, in highway safety, health, telemedicine, home automation, domotics and smart energy grids, but there are

also challenges as to the scale and scope of the amount and quality of data harvested vs. the real use for actual citizens. The answer to the question "do data protection laws apply?" will depend on specific applications, effective and efficient ways of asking consent and a set of design principles that are at the moment quite abstract but that need to be made operational by (Industrial) Design:

- limitation
- purpose
- data quality (relevance)
- conservation principle
- information principle: transparency
- right to object
- personal information by default
- data miniaturization
  (only ask what you need)

Privacy by design and Privacy Impact Assessment (PIA) are two important policy tools that can help shape a balance between innovation and function creep scenarios where personal data that is gathered for one purpose will be used for another, pro active surveillance where behaviour of citizens can be predicted and the loss of context awareness in different spheres of one's personal life (work, family, recreation, hobbies…) Especially the way in which younger generations are using and shaping relations and data sets in social networks demands a real commitment on the part of industry. This might entail a larger obligation by service providers to design tools that will help users to manage their privacy.

Session 2: The consumer ecosystem

In the second session it became clear that one of the current key action points is to bridge the principles listed above to the actual emerging services and applications that are springing up in the field with a simple and clear privacy by design toolkit that allows these start-ups to quickly identify where they stand in relation to these principles. This could help streamline an EU vision on the IoT on a real, practical level. This session addressed the following questions: in terms of the consumer perspective, how will the IoT empower citizens experience and the capabilities of the individual? How will end user trust and personal experience drive the evolution of technological and application trends and architectures for the IoT? How could these new technologies affect our lives and well-being? How will 'green as a driver' affect IoT? What emerging innovations, technologies and market trends are being seen and are likely to emerge in the future?

Jim Morrish is Principal Analyst and leads Analysys Mason's Mobile Content and Applications research program. According to Jim "Operators and handset manufacturers are likely to be the driving force behind the development of more sophisticated applications that are suitable for a large cross-section of devices. The benefits that they reap from a rich mobile environment, in terms of churn reduction and customer acquisition (for operators), and device sales (for manufacturers), are more likely to outweigh the investments required to overcome device fragmentation." IoT is increasingly addressing consumer markets (farming, energy, pet utility, exercise equipment, CCTV, vehicle optimisation, internet-enabled household devices…) thus moving away from the silo approach of closed systems and device dependent services. IoT is still waiting for its iPhone moment though and faces the challenges of the data deluge and the thousands of updates a day that you/one, as a user, do/does not want. Who will own what data? Jim envisages kind of context aware IoT aggregator that acts as an effective layer managing web keys over multiple devices: a service layer that turns contractual arrangements (regulation, accountability, depersonalised data analysis, user generated, open source software, hot spots) into operational considerations.

Thorsten Staake is associate director of the Auto-ID Labs, a joint research initiative of ETH Zurich (Chair of Information Management, D-MTEC & Distributed Systems Group, Institute for Pervasive Computing) together with the University of St. Gallen (Institute of Technology Management). The Lab is dedicated to investigate the potential benefits of Ubiquitous Computing (UbiComp) technologies for a sustainable development. According to Thorsten the key issue at this stage in the development of IoT is people. Consumer behaviour is what will make take

up thrive or perish? Despite all regulatory movement and carbon emission swap schemes, in the end it is the end user who decides. We need to empower the end user in not only believing but being able to prove that IT and green means conserving energy and motivate users to make better choices, creating awareness with, for example, a smart water meter on real particular issues like energy used to heat water being 4 times the energy consumed for lighting in the home. Currently 10% would like to buy one of those smart meters, 20% would use it if they have it at hand but 70% are not really interested. Psychology and consumer behaviour research and sound marketing is greater required now than a focus on technology or objects.

Lorna Goulden is a Lead Creative Director at Philips Design responsible for innovation and strategic projects for external clients. She graduated from Sheffield University (BEd hons Design and Technology 1992) and the Royal College of Art in London (MA Interaction Design 1994) where she used RFID as part of her investigations to develop more natural relationships between hardware and software interfaces. Since joining Philips Design's Interaction Design team in Eindhoven in 1996 she has worked closely with Philips Research and Business groups in both Europe, Asia and the US on interaction concepts and new product development.

Lorna calls for a broader understanding of the meaningful solutions and rather unpredictability of an Internet of Things world. The functionality that currently drives IoT is not really inspirational in its real life, everyday aspects. There seems to be a mismatch between research and reality and a difficulty of imagining, will we have any choice? Apart from the lack of an excitement, surprise, emotion, we also lack a design strategy that allows for levels of certainty that intended outcomes will emerge. We have a potential for open tools, new business models, open source IP, new licensing schemes, a more agile relationship between business, research and vision. Examples: iPhone, arduino, sugru, RFID guardian, shapeways (incubator from philips), makerbot. Keywords:

- let go
- predicting levels of unpredictability
- foundation - personalisation : critical mass/ start ups (bad ideas filtered out by the people)

Ajit Jaokar is an innovator and a pioneer in the Mobile Data industry and CEO, Futuretext (Web 2.0). In 1999, Ajit co-founded Futuretext, an innovative publishing / consulting company focused around mobility and digital convergence. According to him IoT is at the moment not open enough, it cannot scale. He asks where it will work first: most likely in health and the cloud. Ipv6 in the home domain will push intelligence into the network, and will be one of the main drivers. Unwalled, open gardens are essential for horizontal scaling.

Keywords:

- smart labs
- bloomboxes-- creating of energy—
- (see: http://www.engadget.com/2010/02/22/the-bloom-box-a-power-plant-for-the-home-video/)
- open gardens, open tolls

Alexandra Deschamps-Sonsino is CEO and co-founder of Tinker London. Initially trained as a product and interaction designer in Canada and Italy, she worked in the space of digital strategy and online communities with clients like Blast Radius, Jaiku, and Thinglink. According to Alexandra IoT may be coming from very small projects that will shape the conversation and the real situation on the ground. There is a DIY IoT ecology emerging. It started with Violet's Nabaztag (rumour had it that its target audience was divorced parents) which focused not on utilities but on family relationships in the home. At the moment we are hyper-connected as people yet still surrounded by 'dumb' devices. There is a tension between the policy talk, the privacy debate and the big infrastructures as long as we keep abstracting from what happens when people start to do IoT for themselves: no business plan, no big scheme, no permission. The arduino unit, for example, stems from 2005, has sold over 150.000 units of 20 euro each, is fully open source and tremendously popular with (industrial and interaction) design students. People have used it to track their cats, catalogue the humidity and water levels of plants and tweet that (available online), create a shared experience of a kicking baby and together with Pachube and Current Cost a home layer for smart metering. Every home has a story to tell, that is the key to Tinkers Homesense project, where they are looking for homes in the UK, France and Italy to use as test beds for designing smart homes from the bottom up.

Pilgrim Beart is Director and Co-founder of AlertMe (2006) a consumer service linking up devices in the home. He sees his service as a gateway between the home and the cloud: home security, energy management, telecare for the elderly. Currently he has deployed 35000 units, he expects millions in the coming years when large telecom and energy providers start zooming in on IoT. Awareness of our energy consuming habits is a key issue for him also. If you take all the energy that we use as citizens, we consume 50% directly

every day. With good feedback procedures on smart objects we can make this more visible and get it down. Pilgrim also stresses the resources cost of water heating (one third of energy consumption) and asks for more clear quick and dirty practical research on this for the building of smart cities. Amazingly his first 35000 users signed up trusting AlertMe with a lot of sensitive data, thus hinting at the fact that citizens are not only rational beings when it comes to privacy and security issues, but do trust clear and performative services. As such we can signal a mismatch between the set of abstract principles of the privacy commission, privacy theorists and regulations and what is really happening on the ground. Design toolkits as interfaces between the top down regulatory frameworks and the start up culture of launch and learn are extremely important at this moment where they can still meet within the soft approach of Neelie Kroes. Pilgrim foresees a battle over the gateway.

Session 3: The Business ecosystem

This session explored the opportunities and risks for businesses in the Internet of Things. What successful business models, varying in size from small companies and start-ups to multinationals, are emerging and how can these be adapted with future technological developments? What innovation and development is being seen? How can we encourage effective competition in the IoT? What new service architectures will be required for the new connectivity of such devices?

Gary Finnegan, Section Editor, EurActiv chaired this session.

Serge Willenegger, Vice President, Technology of Qualcomm states that, as IoT covers so much of the real world business and needs or wants to be as seamless as possible in user experience as we go from a paradigm of attached to a device (usb, bluetooth), or attached to a network (lan, wlan) to being attached anywhere horizontally, it is hard to see how we can leave the current verticals intact. He hopes to see innovation from the various verticals. They clearly need to take some steps in:

- device integration: work on environment, connectivity cellular, hardware interface, api
- device certification: move away from handset centric framework. Currently acceptance -baseline testing, network interoperability, operator acceptance, infrastructure acceptance - needs to go through handsets.
- device maintenance: expected device lifetime is higher
- service provisioning: sensored connectivity: see amazon kindle

- service integration: common api's; scale through commonality of open standards towards a new flexible model for billing and financial structures in IoT.

Jeroen Dijkxhoorn from SAS began by saying that SAS has been operating on the iterative process; starting from bottom up real world data and building a business platform on a business analytics framework as a foundation for future scenarios rather than a product. This is mainly B2B at the moment. SAS provides a platform where customers can choose then leveraging business peers, 'hosted solution' or consultancy. They see opportunities for improved decision making through their optimise-predict model, moving from a gut based to a fact based decision making structure precisely because the data tsunami that is lurking in IoT can be handled better by those who are accustomed to qualitative approaches to huge data sets. How to inform realm time decisions on the fly? With consumer expectations of younger generations changing so rapidly, we see an explosion of more granular information time stamped data. We therefore need to get analytics as close as possible to the data through distributed architecture, shared storage, pre filtering, message passing architecture, partitioned data architecture.

Fernando Fournon from Telefonica thinks IoT can work for all verticals if we see it as an open system and wall up that needs to be walled up by the particular players at particular times. The worldwide business revenue of IoT is valued currently at 200 billion, leaving enough room for opportunities.

Keywords:

- pervasive broadband
- intelligent devices
- smart computing & social media process

Telco's can leverage through open service platforms and the long tail.

Usman Haque, CEO of Connected Environments explains Pachube (the name is based on the patchbay switchboard telephony operating system, as a convenient, secure & scalable platform that helps you store, share & discover realtime sensor, energy and environment data from objects, devices & buildings around the world. The platform is open to use and scalable, talks to everyone (even to Second Life) and as a restful web service or web API it uses HTTP and the principles of REST. Being an open ecosystem, web 3.0 - this bridging of the 'real' and the 'virtual' and linking of sensors and actuators anywhere, anytime, with anyone claims to become the worlds leading open platform for the bottom up building and educating citizens in the connectivity of IoT. Pachube is user friendly and a free service where you can develop prototypes quickly. In London, communities are using it to hook up their smart meters to Pachube and get real time feedback on how they are doing compared to their friends. The free aspect is important

as you are open to opt in, and when you do so you share your data. If you don't want to share your data you upgrade to Pachube Professional; if you want privacy that is what you pay for. The granularity of participation - different ways with different entry points in the system; coupled with a server infrastructure for free, ad hoc discoverability, has led to Usman Haque announcing that Current Cost's new 'Bridge device will use Pachube Enterprise for its backend data management.'

Session 4: The International experience

This session explored what lessons can be learned from Europe, Japan, China and the US and how such knowledge sharing can encourage and exchange best practice and explore new business models to emerge for the future.

Gary Finnegan, Section Editor, EurActiv chaired this session.

Ken Sakamura, Professor of Information Science at the University of Tokyo announced that he would very much like to see a uID Center in the EU Region, uID architecture being one of the possible cornerstones of IoT, alongside barcodes, RFID, Zigbee and Ipv6. In ubiquitous ID architecture, various real-world objects are embedded with ubiquitous ID tags (ucode tags) made up of RFID elements, sensors, or other components. The fundamental approach is that ucode tags will store information about the objects, but current limitations in memory capacity make it unfeasible to store comprehensive information. Communication using ubiquitous ID technology requires a certification authority for secure transactions that takes privacy into consideration. Even after objects with ucode tags have become popular with the general public, the special protection afforded by the contactless communication interface of ucode tags will prevent unauthorized users from attempting to read the information. Uid is working and featured in Casagras-2, CAS, CHEARI, and T-Engine Forum, China (www.t-engine.org)

Liu Dong, President of BII Group could not be present, which led to several questions on the position of China in the global IoT debate. Ken Sakamura stated that especially because of Premier Wen Jiabao's remarks on the IoT as sensing objects has caused a strong acceleration of interest. Xi Sizhe mentioned in this respect an upcoming Conference on the Internet of Things, GIOTC & CIOTE, 23-25 Nov 2010 at National Convention Centre, Beijing, China. (http://www.giotc.com/) Peter Friess (EC Coordinator, DG Information Society and Media) stated that IoT in China is also a driver for broader adoption and uptake of IPV6.

Dan Caprio, Managing Director McKenna Long & Aldridge LLP noted that in the US there is not so much talk of the 'Internet of Things', there is more talk about 'the cloud'. For ITU it is "always on". Cloud computing is seen as an enabler for IoT, or as a continuum of connectivity. IoT is seen as a network of networks. With a 100 billion devices getting connected it is clear that IPV6 is a key enabler. However at the moment we lack global agreement on adoption procedures and protocol. Major issues in the US are privacy and security, transparency, international data flow, copyright, liability, antitrust or lock in and standards. the main issue for the White House is privacy and cyber security legislation. In the EU these issues are viewed somewhat holistically, in relationship with innovation. Policy and governance in such a changing environment needs to be flexible, forward looking and contextual. Premature policy making might result in hindering innovation and launch and learn start-ups, especially as IoT will go through many transformations and predictions as to what it will enable are extremely difficult. Getting people's attention

by focusing on real life issues that local communities and mayors care about, such as smart garbage or smart trash, might raise it above the hype cycle or 'what's in it for me' attention.

Patrick Guillemin of Strategy & New Initiatives, ETSI sees IoT as a system of systems, a network of networks and although the challenges are huge as the terrain is so big: FP7 research, RFID Mandate, IoT/RFID, ISGF AFI M2M through initiatives like Casagras 1 and 2 there are timely standardisation debates going on as we speak. We tend to look from the rear view mirror so the challenge with all policy makers in this dynamic and exciting time is to be careful before we legislate and lock in. It is important to realise that in Europe IoT did not simply 'pop up'. The work of EU research, from i3 (Intelligent Information Interfaces), Future and Emergent Technologies through more specific programs such as Casagras has been very deliberate. The past decade has also shown that there will not be one technical standard for IoT but several generic numbering schemes, which makes the role of middleware, interfaces and open standards of paramount importance. The key factor of openness was very present in the discussion that followed. The successful case of iUD in Japan was very much a result of the openness of the infrastructure and platform together with the very string links between academic research and industry R&D successful cases, favouring, as Ken Sakamura stated, not a de jus, but a de facto, more informal environment. In this respect it was also voiced that this openness has to go both ways. It is possible to create very negative control and surveillance scenarios but, just because every can of coca cola can have a unique IP address, does not mean that there is a current business case for such a scheme, or indeed that such a scheme will be likely within ten years. Notions of privacy and security must be invested with objective assessments of the likely scenarios and not be informed by Black Swans as a default.

Session 5: Privacy and Security

This session explored possible new stances with regards to IoT privacy and data protection policy – regarding issues such as intellectual property rights, personal data, profiling, exchange of data between applications or objects and consent, what security challenges, particularly surrounding unauthorised access to and unintended disclosure of data may be presented by the Internet of Things? What rights pertain? 'Privacy by Design' is seen as a visionary principle for legislation, including the right to forget and delete data. What are the solutions that policy and regulation can provide? Is the current framework appropriate to deal with such issues? Are the principles in focus still valid with today's legislation? How can the rights of citizens or businesses be safeguarded on globally connected networks

and how can civil liberties, free speech and the internet be combined securely?
Patrick van Eecke, Partner, DLA Piper chaired this session.

Peter Hustinx, Supervisor, European Data Protection Supervisor (EDPS) says his mission is to make sure that the fundamental right to protection of personal data is respected by the EU institutions and bodies. According to him, the risks that go hand in hand with greater access for users and the call for transparency either way calls for coherent privacy frameworks. Accountability goes for industry, citizens and governments alike. Moving into the direction of a surveillance society is one possible scenario for IoT. Such a scenario will not bring the trust that is needed to build new services, it is all about values. The more we can build this from the start into the technical protocols and frameworks, the more effective ethical principles can be in practice and innovation need not slow down. He suggests that working with incentives and focusing on responsibility of providers works as best as the strongest incentives are there where successes can be delivered.

Chiara Giovannini, Research & Innovation Manager, ANEC, a consumer organisation active in the field of standardisation, is focusing very much on the way citizens are going to have to get used to and have to be educated into the 'total' connectivity of IoT. For her, privacy by design, privacy impact assessments and the right to the silence of the chips are very important tools to make sure that the balance stays on the side of the protection of citizens' privacy. Stating her support for a "privacy by default" policy, Chiara said "Users tend not to change their privacy settings."
(http://www.euractiv.com/en/infosociety/kroes-chooses-wait-and-see-approach-on-future-internet-news-494847)

Joseph Alhadeff, Vice President of Global Public Policy and Chief Privacy Officer of Oracle, believes that the stories and cultural atmosphere of IoT as a larger ecosystem hold five keywords: continuum, context, creativity, collaborative, credible. He too believes we should have sound business cases before venturing on describing what IoT could be or do. Joseph quoted the 'Spandex rule', "just because you can does not mean you should", which he said should also apply here. Out of the box thinking must also be implemented in privacy protection. Privacy by design should not focus on technology, but start with the model and concept itself. Research, business, abstract principles, design and real applications and services should be in one iterative model; or - the IoT has to credible. Confidence builds user trust and adoption. Language providing transparency helps to develop that confidence.

Jaap Henk Hoepman, Senior Scientist TNO ICT claims that in order to go to a transparent and trustable IoT giving people agency and educating them into managing their control through privacy settings is paramount. For this purpose the Dutch consortium DIFR has made (with the financial backing of nl.net, a funder of open source solutions) an NFC application, the Privacy Coach. A consumer

sets his privacy preferences in a profile stored on his mobile phone. If he holds the phone close to a product in a shop containing an RFID tag, the phone will read the tag number from the tag. It will then query (over the Internet, either through GPRS, UMTS or WiFi) the back office to retrieve the privacy policy corresponding to the tag number. It will then match the tag policy with the consumer policy, and present the result of the match to the consumer on the display of the mobile phone in an intuitive and appealing manner. (http://www.difr.nl/?page_id=10) We should not, he says, kill the Internet of Things with silence of the chips scenarios. This will lead to a defensive mindset of citizens and not to scenarios that lead to more trust.

In the ensuing discussion Chiara Giovannini thought this was an interesting idea, but she said: "Users tend not to change their privacy settings. Too much choice is overwhelming". Hoepman stated that if you believe in the social benefits of RFID and would want to offer citizens granularity in choices with more intermediaries and coaches. We can envisage that globally we will end up with a hybrid situation. If we have one rule only, we might lose context. Joseph Alhadeff claimed in this respect: how do you handle privacy by design when you don't know what the service will be, or because of unforeseen collaboration, the use of applications morph? There was a question on the possible use of creative commons for privacy.

Jaap-Henk Hoepman, TNO ICT: introduced a fake IoT Google screen "Where are my keys?" with the Google answer "on the fridge where you left them". Hoepman said "don't kill the Internet of Things by doing stupid things". He suggested a real debate around opt-in only RFID use and explained the importance of the default settings. Privacy by design is not a technology issue but a system one. If privacy by design is a system issue, then who's responsible? asked Peter Hustinx, EDPS. A comment from GS1 NL, "There are no good tags and bad tags but a good or bad use of them" (http://sanscontact.wordpress.com/)

Session 6: Creating a climate to encourage investment

This session explored how the future development of IoT will be affected, and looked at questions such as: How can IoT stimulate economic growth? Where will investment come from? Are Public Private Partnerships the way forward? How can we encourage effective competition in the Internet of Things? Standardisation will play an important role in the uptake of IoT by lowering entry barriers to newcomers and allowing industry to compete at international level. The European Commission has the objective of encouraging global standards and interoperability of the Future Internet. Are additional standards mandates necessary?

Patrick van Eecke, Partner, DLA Piper chaired this session.

Luis Rodríguez-Roselló joined the European Commission in 1989 as Head of Division in Directorate-General "Information Society and Media" responsible for the R&D Programme DELTA (Developing European Learning through Technological Advance). End 2004 he was appointed Head of the Unit "Networked Media Systems", where he leads European R&D on this topic within the current EC Framework Programme. In November 2009 he was appointed Director a.i. of "Converged Networks & Services". The key opportunity is - he states - making key societal infrastructures and business processes more intelligent and sustainable through tighter integration with the Internet. This will most like be build by a multistakeholder architecture and PPP, Public Private Partnerships, are a poweful instrument in attaining this goal. The overall goals of Future Internet PPP are to leverage the internet infrastructure as an open secure, open, and trusted platform, improve the inter-linkages between technologies and applications, make business processes and operation of infrastructures and applications more efficient, foster cross-sector industrial partnerships, address regulatory and policy issues, and maximise the societal benefit through involvement of end users, civil society/ consumer organisations at local, regional and national levels. Interoperability and standards are as important as ever and should go hand in hand with user driven open innovation and large scale test-beds.

Florent Frederix, Head of RFID Sector, European Commission made a passionate plea for large scale innovation. After all these decades of investing in the most cautious way forward by keeping human values and technological possibilities in balance, now the time has come for the EU to put forward the most coherent vision. He sees PPP: Private Public Partnerships as large scale projects that are able to enhance all sectors with the future internet. The grid, the cloud and SME are key drivers.

Bernard Benhamou, Delegate to Internet Usages, French Ministry of Research. Bernard Benhamou was pleased to see a number of European startups and he expressed his hope that there will be support from the EU for these platforms. At the moment Apple and Google are the main drivers most visible to citizens and very much able to push their visions forward through their devices and (free) services. There is a duopoly and although the EU holds the key to the research and vision on IoT this in itself will not ensure leadership. Europe has not been able to become a service key operator. In the online services field there are no EU companies. The speed of mobile is staggering, all prognoses in the past years have had to be pushed back. Currently the thinking is that 2012-13 already will show more mobile access to the net than laptops and fixed computers.

"More mobile devices to connect to the Internet than PC in 2012, opportunities for Europe. The European mobile market is a major asset: Europe is a large market, a hi-tech market, with lots of content, 3 key advantages to build IoT services. We need to help small EU companies (aka Small Business Act). We need online services, mobiles services and soon to come IoT services. Make it simple to small companies to build the new services, 2012 more mobile device to connect to the Internet than PC, Europe (and France) have also to help medium size companies. Bernard Benhamou mentions a mobile portal for French citizens" http://www.proximamobile.fr/" (http://sanscontact.wordpress.com)

Marylin Arndt, Chairman, Technical Committee M2M - ETSI stated that business models are changing. She is seeing that a number of verticals are not clashing but converging with horizontal layers. An M2M service layer is emerging. This service layer is being formed quite intuitively at the moment and it needs to be debated by all stakeholders as to the relative weight of policy, regulation, industry, consumer organizations and standard schemes. Marylin stated "The Technical Committee provides an excellent environment that will allow ETSI to develop standards to support M2M services and promote innovation across the industry. As chairman of this committee, I am looking forward to developing the future standards for the "Internet of Things", thereby allowing objects to communicate between themselves and to be connected on the Web." (http://lpra.org/news/etsi-develops-standards-for-machine-to-machine-communications)

Marisa Jimenez, Public Policy Director Europe, GS1 Global Office asked quite poignantly if current initiatives and current policy mechanisms were not sufficient to tackle the main challenges and main questions now. Instead of moving ahead on the ground she stated that she hoped that the two year debate that will now ensue through the expert group on IoT that will be installed by Neelie Kroes will stay within the already addressed policy domains, principles and vision as outlined for example in the Europe 2020 policy document. As IoT exists of global user driven open standards, any debate that

is not global must be very critical of its scope. Apart from Europe 2020 there is an ICT Standardisation Plan that is not restricted to a specific technology and is addressing issues of converging of electronic ID. In what respect can ISO standardization be instrumental?

In the ensuing discussion Alexandra Deschamps-Sonsino asked how can the investment climate in the EU landscape change as there is a huge brain drain going on, luring EU coders, programmers and designers to the USA? An answer somehow seemed to be that yes we have the scientists, the designers and the business men but we lack the concept of a middle-size company with an international footprint. We also lack a unified market. Small companies need to be able to grow on their own (Benhamou). Obama's open data era is coming soon (http://bit.ly/cFqFQl) the claim in the US seems to be, it is hoped that the EU follows this initiative and allows sme's to make new and innovative services with these data sets. There is a gap after PhD research at the University labs. Once you come out of the research Department without a product you are in trouble. It was hoped that the EU could create a kind of salon where business angels and venture capital could meet promising start-ups and EU SME.

Session 7: Governance and public policy

Questions addressed in this session were: Who is responsible for naming and identifying the IoT within Europe? What are the defining set of principles and regulation underlying the governance of IoT? How can an open, independent, transparent and accountable governance of the internet be created? The European Commission suggests that private companies should continue to take the lead in the day-to-day management of the operation of the internet, as long as they are accountable and independent. What is the role for public authorities and how can an architecture be set up with a sufficient level of decentralised management so that European public authorities can exercise their responsibilities as regards transparency, competition and accountability? What policy tools should be exercised to ensure stakeholders are accountable?

Robert Schumann, Lead Consultant, Analysys Mason chaired this session.

Gérald Santucci, Head of Unit, RFID, European Commission started his presentation with a joke that aimed to show that the very definition of IoT governance is hard work let alone the real life exercise of it. One day a man on Le Havre port attempted to drink a good bottle and found a Genie instead. "For all your hard work you can ask me one favour, and the Genie said." "Hmm? I would like to go to Canada but I hate to fly, can you build me a bridge from Le Havre to Canada?" "Well, a bridge that long? Ahum, No, I don't think so, too much concrete, think of the lights!

Is there something else that you can ask me?" "Actually there is something yes. We're planning to have a global Internet of Things that is dynamic, green, complex, consisting of a hundred billion things and six billion people living in harmony." "Ok, how many lanes do you want for that bridge?" This story goes to show the enormous responsibility that we have to make everyday objects come alive in a virtual world. From the ITU report in 2005 to the recent Digital Agenda for Europe, we have been looking at how to shape a governance architecture that is driven by innovation and competition but also by open standards and interoperability, privacy protection, human rights, diversity, etc. At this particular moment in time, the greatest difficulty is to get the right people together at the right time. In the IoT all global partners should be on equal footing and we should avoid dominance of single company or country. Gérald Santucci noted that the governance architecture of the future IoT could be private sector led or government led or, perhaps preferably, based on a multi-stakeholder strategy.

Ali Rezafard, Senior Software Architect, Afilias Ltd and on the Technical Standards Committee at GS1 explained the difference between Object Naming Service (ONS) as pointers to services designated by the creator of an EPC class and Discovery Services (DS) as pointers services designated by any organization that claims to hold information on a specific serialized identifier. ONS & DS are just enabling and neutral technologies.
DS design address security and privacy concerns. Laws and best practices augment the technologies to protect Citizens. EPCglobal DS technical SAG work group has formed and will deliver specs in 2011. DS requirements include many principles that are important to the European Commission and our shared values of:

- openness
- competition
- choice of provider
- confidentiality of information

Patrik Fältström, Senior Consulting Engineer and Cisco Systems Member started his presentation by saying that in building things using internet technology sharing in building the network is paramount and governance one of the most important factors. As appointed advisor to Swedish Government since 2003 he has been involved directly in large scale disasters and Incidents like the Tsunami in Pacific Ocean the Tornado in Sweden and the IT Attack against Estonia. For him, open standards, innovation, power scavenging and generic policy frameworks are building blocks towards:

- Shared Responsibility: Everyone must take care of their piece of The Internet
- Robustness
- Dependencies: Coordination needed between electricity -, telco - and petrol distribution companies

- Governance in Coordinating Role
- Public Sector Be as a Good User

IoT is a market place first and foremost according to Peter Gabriel, Project Leader, Institute for Innovation + Technology at VDI/VDE-IT GmbH, Germany, and as such the market needs 'room to play'. Governance by design should be kept to a minimum as the global debate on consensual architecture towards ever more decentralization will inevitably call for technical solutions to interoperability if ONS is no longer unique and multiple ONS routes can be envisaged. Can we envisage gradually changing the internet architecture itself?

IoT as a market place should be open to applications and participants.

IoT is a market place for innovation and SMEs. IoT is an infrastructure, any regulation should not impact technology. Q – Since internet was built by small groups of academics, instead of corporations, why can't we do that again with IoT? One DNS Internet (monopoly or standard) / 2 ONS (IoT equivalent) is competition better? Patrik Fälström, Gérald Santucci, Bernard Benhamou. (http://sanscontact.wordpress.com/)

Session 8: Enabling IoT - the short and long term view

This last session discussed the future of IoT with existing and potential IoT application scenarios and the dimension of new services. It looked at IoT in action and how smart connected cities may evolve in the future and how application providers can provide opportunities from "real-life".

Robert Schumann, Lead Consultant, Analysys Mason chaired this session.

Jean Philippe (JP) Vasseur is Distinguished Engineer at Cisco. He opened with a motto "we reject kings, presidents and voting; we believe in rough consensus and running code" (U.S. computer scientist David D. Clark, 1992). JP is also the chair of the Technology Advisory Board of the IPSO (IP for Smart Object Alliance). IPSO aims to create awareness of available and developing technology with IP for Smart Objects, generate tutorials, white papers and highlight use cases, complement the IETF which defines standards, but does no marketing, link companies that support IP based sensing and control system, coordinate and combine member marketing efforts, support and organize interoperability events. JP Vasseur states that IP end to end for "The Internet of Things" is a MUST.

Jean Prevost, Director of Innovation of Groupe Casino is working on the store of tomorrow for and by shaping the customer of tomorrow, "shopping in a smart city begins at

home" and "the architecture of the city begins at home". Prevost believes the key group to focus on in this respect is women as 80% of the consumers are women. Prevost launched a term: screenagers, that is a generation that navigates as easily on a screen as in real life and is beginning to shape real life architecture based on screen interface and interaction.

"Can the semantic web definition help in understanding IoT?" asked Professor David De Roure, Professor of Web Science Trust, explaining how e-science studies where the digital world meets the physical world whereas web science means studying the web like an organism. As we see ever more born digital data (facebook, RFID, smart metres) B2B masterdata management is rapidly becoming something that should be part of personal skills and educational courses like media wisdom.

According to Hartwig Tauber, Director General, FTTH Council Europe, paradoxically as it may seem, wireless will be a driver for fibre (LTE base stations) as smart cities will need bandwidth anywhere, anytime, anyhow and, with ever more connected citizens getting used to seamless connectivity, symmetric upload and download is an essential feature. Fibre to the home is rolling out in quite some unexpected places and Europe is lagging behind.

Provisional conclusions

On a technological level we see a tendency towards many platforms, a high number of solutions and open standards and we foresee a deluge of data. Much like the end of the 90's when RFID got under the penny cost and database storage became cheaper and cheaper, storage as such might not be the real issue, but turning data into meaningful information for end users remains the key challenge. Especially when we are confronted with a tendency to making data public by governments and by public making data through all kinds of emerging services like Pachube, Arrayent and AlertMe. Is it possible to build a generic service layer between end users and the applications, appliances and devices in the home, work and fun sphere? Confronted with younger generations that want to stage their lives and are accustomed to sharing so they might want to 'stage' their homes by tweeting every change, new notions of privacy and privacies become crucial if we want to balance a productive and innovative relationship between individuals and groups

This 2nd Annual Internet of Thing Europe Conference made clear that we are moving in the direction of the 4th iteration of IoT as a mental construct. The first phase dealt with RFID as the technical driver. The second wave combined the big hype stories with the first what can we really do with it RFID trials on the ground. We now see that people are doing all kinds of things using an entire ecology of wireless, zigbee, rfid, RESTful

api's, iUD codes, 2D barcodes, barcodes, EPC Global, IPV6, 6Lowplan, breaking the big stories into small, complex, real life services and applications that have to show value for money for hardnosed customers. Energy and sustainability coupled with a broader Green agenda is driving this first wave of the real IoT on the ground. During the Conference we had some stories moving into the direction of the 4th iteration which is the Internet of Things for people. How can we get there?

- integration of policy recommendations, applications and cloud to store
- standards to go hand in hand with applications
- more effective application of governance
- multi stakeholder consultation process
- migrate terms: seamless might shift towards usability: seamless experience, hard-coding might shift toward social values, in the sense of standard making will also mean not only technical but also interaction and value

What we need:

- an (EU) device:
  We see that the uptake goes through 'things', so we should not only focus platforms and services but acknowledge that the i-phone is something people want. The basis of such a device could be the RFID Guardian, a lifestyle manager. Such a device could also have in its protocols the key issues – rules mentioned by the Article 29 Working Party. Hardware and software could be fully open source and both could be made operational on very low level through rapid prototyping (fab and brico) labs in a vision of IoT as 'networked neighbourhoods'.
- Education:
  We need to develop EU programs on 'sensor wisdom' very early on in schools. This is important to acquire the granularity of experience and the debate we see on the right of the silence of the chips. Can people really learn without making mistakes? Throughout the EU the term 'media-wisdom' is taking root. Learning to live in a smart city is just as difficult as learning the rules of traffic which should go hand in hand.
- Climate change as a transnational driver:
  We see that at this stage energy is a big driver and in a broader sense we see a Green Agenda looming. It could be logical if we follow this that we see transnational global standards coming alive as nations begin to realize the concrete threats of Climate Change. The Chinese vision of sensing objects - a Sensing Planet - can go very well with this idea. Yet apart from this focus on being wise and sparse with resources, this is not the whole story to

what it means to be human. We also need generous services, notions of abundance to inform a positive view. The real profit may lie in getting to know ourselves better and being able to live up fully to our potential if everything becomes a bit more transparent.

- IoT is changing the relationship between the individual and the group, society.
  We see IoT favours the making of warm tribes, but how good is it in fostering cold solidarity with people that you do not know? The debate about balance and democracy will be scaled up according to Peter Hustinx to decision-making and democracy itself. Here we can envisage projects on garbage 3.0, sewage 3.0, roads and public transport 3.0.

Testimonials

"Thanks to Forum Europe and their partners, Europe has been able to host the first truly international event ever on the Internet of Things! The diversity of views and opinions, but also the widely shared IoT-community spirit, can be interpreted as promising seeds on the way to a challenging and interesting global debate in which Europe will affirm a clear stance and will show a high commitment to openness, collaboration, achievements and world-class excellence. The Internet of Things began several years ago as a broad vision for the future of pervasive computing related industries; during the conference we celebrated the translation of this vision into a clear roadmap for researchers, industries, governments and civil society actors around the world. We now know that it is up to all of us to use the power of technology responsibly and to ensure that citizens share fairly in the benefits. The conference actually invited all of us on an exciting journey."
Gérald Santucci, European Commission

"Thanks to Forum Europe for organizing a great event with lots of interesting presentations, discussions and networking opportunities… keep up the good work!"
Jeroen Dijkxhoorn, SAS

"Thanks for your kind words and having inviting us. We really enjoyed the conference, great organization and content ! Hope to see you next year!"
JP Vasseur, Cisco

If you are interested in participating at the 3rd Annual Internet of Things Europe 2011, please contact:
Amanda Strevens for more information on amanda.strevens@forum-europe.com or telephone: +32 2 534 11 79.

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Tel: +44 (0) 2920 783 028
Email: james.wilmott@forum-europe.com / dan.craft@forum-europe.com

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www.forum-europe.com