IoT Council: Three Questions on IoT: Gérald Santucci

When did you hear first of IoT? In what context was that?

I couldn't say if actually *I met IoT* or if *IoT met me*. Probably the two movements happened concurrently. I first learned about IoT at the end of 2004 while considering to draft a communication on Radio Frequency Identification (RFID) at European Commission's DG INFSO (now DG CNECT). The phrase 'Internet of Things' caught my mind during conversations with experts from academia (ETH Zürich, Auto-ID Center) and industry (SAP, i.e. "sense and respond", GS1/EPCglobal). It was the moment when I discovered that British computer scientist Kevin Ashton, MIT's Executive Director of Auto-ID Labs, coined the phrase "Internet of Things" in 1999, while making a presentation for Procter & Gamble – he believed RFID was a prerequisite for the Internet of Things as an inventory tracking solution.

Few of my colleagues at DG INFSO believed that "IoT" was a real phenomenon – they felt that the phrase was just an unrealistic and useless metaphor, and they preferred to use the phrase "Ambient Intelligence" (AmI), coined by my colleague Ken Ducatel, on the basis of work done at Philips, and heralded by the IST Advisory Board of the Fifth Framework Programme (1998-2002) and the Sixth Framework Programme (2002-2006) as a way to promote a vision of consumer electronics, telecommunications and computing. Ducatel's report was titled "Scenarios for Ambient Intelligence in 2010".

My work on RFID played an essential role in the popularization of IoT in DG INFSO. A bit against the wish of the Directorate General's hierarchy, Mrs. Viviane Reding, then Commissioner for Information Society and Media, followed my advice to launch a series of workshops and public consultations on RFID. The announcement took place officially on 9 March 2006 and led to an EC Communication on 15 March 2007, in which the final paragraph was the following:

"The Commission will continue to closely monitor the move towards the "Internet of Things", of which RFID is expected to be an important element. At the end of 2008, the Commission will publish a Communication analyzing the nature and the effects of these developments, with particular attention to the issues of privacy, trust and governance. It will assess policy options, including whether it is necessary to propose further legislative steps to both safeguard data protection and privacy and address other public policy objectives."

After the adoption of the RFID Communication, I took a series of ambitious initiatives, including three EU Presidency conferences on the Internet of Things (Berlin, June 2007, Lisbon, November 2007, and Nice, October 2008), a public consultation on a Commission Staff Working Document on the Internet of Things (from 29 September to 28 November 2008), and finally a Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on "Internet of Things: an action plan for Europe" on 18 June 2009 (COM(2009) 278 final).

In the meanwhile, I had read the UN/ITU report on IoT, released in 2005 by a dynamic international team led by Mrs. Lara Srivastava, which had a strong impact on my commitment to pursuing discussions and designing EU actions on IoT.

Did you think it was big then or just another technology?

My intuition in 2004/2005 was that RFID, which kept me busy as Head of Unit at DG INFSO during 5 years (2005-2009), was just the doorstep and threshold to something "big" named the "Internet of Things". I always thought it would be not just another Internet technology but actually a deep revolution in tech, applications, and human-object relationships. I was impressed by the work of thought-leaders like Bruce Sterling and Julian Bleecker who presented complementary clear and thrilling visions of the IoT.

To make a shortcut, my conviction then was that the "Internet of Things" would not only develop and thrive as a complement to the initial "Internet of People", but that it would lead to a metamorphosis of objects, and hence a new understanding by humans of the meaning of their existence. For me, the Internet of Things reflected, as I wrote at that time, the commitment of policy-makers from industry and governments in the EU to accept and promote a new spirit – a new sense of community, a new willingness and commitment to develop digital systems and applications for more sustainable growth and better quality of life, a new understanding that citizens and groups are all in this together, also a new recognition of the helpful role of the European Commission in guiding and driving the necessary R&I efforts, and finally a new readiness on the part of our democratic societies to seize the full advantages of the ongoing technological revolution.

What were your dreams, hopes for it once you realized how big it was going to be?

I considered first of all the risks of IoT for humans and society. Though covering a broad scope of topics, my initial work on RFID was focused on data protection, privacy and security. This concern led to the introduction of "IoT ethics" as part of the discussions within the RFID Expert Group that worked on an IoT Recommendation in 2010/2012 – by the way, it was the first time "ethics" was given such an important place in EC's reflections on digital tech.

I also encouraged the group to discuss the relevance and feasibility of a new right, actually the "right to the silence of the chip", but the idea was dismissed by its majority. Then – poetic return of time? – thanks to my close collaboration with what was at that time DG MARKT and DG ENTR, the concept came back, slightly nuanced, in the 2016 General Data Protection Regulation (GDPR) under the concept of the "right to be forgotten". So, to some extent, work on a doomed IoT Recommendation influenced the way the GDPR was designed, drafted and negotiated.

Rapidly, I became convinced that IoT was a formidable opportunity for the EU economy, the EU society, and later for the planet as a whole (impact on climate, nature, environment, medicine…). The internet's penetration of the real/physical world would mean that relations among individuals, entities and societies would increasingly be embedded in the IoT.

I remember the essential role Chinese Premier Wen Jiabao played for the development of the IoT when on 7 August 2009 he made a speech in the city of Wuxi calling for the rapid

development of Internet of Things technologies. It included an “equation”, which reflected nicely the vision of IoT I had at that time: *Internet + Internet of Things = Wisdom of the Earth*. Wen Jiabo followed up with a speech on 3 November of the same year at the Great Hall of the People in Beijing, in which he encouraged breakthroughs in key technologies for sensor networks and the Internet of Things.

I think it’s important to recall this short history in order to realize that Europe was first in promoting the IoT, followed by China, while at that time the United States were more focused on *smart dust* or *sensor networks*. The way you name your initiatives and endeavors tells much about the vision you have of the future.

Unfortunately, in less that 5 years Europe lost its momentum and the pole position it held during a short moment in the IoT global race. The same happened more recently with other technologies, which today are considered essential for global competition, sustainable growth, mitigation of global risks, and technological sovereignty – 5G, Metaverse and Artificial Intelligence. Incidentally, I have the feeling that the hype and hope over the last few years of 5G, Metaverse and AI are now dying down in favor of the IoT – back to the future!

Like most new technologies IoT has an ambivalent dimension - in fact the *good* or *bad* coming from it depends on what humans actually do! After 2012/2013, while busy with other roles at DG CNECT, I decided to continue to get involved in IoT thinking and developments and I strived to balance my own reflections in a way to consider both the opportunities (incl. for industry and the European economy) and the potential threats/risks (for individuals, communities, nature, the planet).

The IoT Council banner – “IoT for Good” – is indeed the very engine of my efforts on this.

Finally, I would like to add one thought. If the phrase “Internet of Things” was coined in 1999, its roots lie in various original research works, and for me the first ripples of what became IoT were embodied in the concepts of “Real-time Operating system Nucleus” or TRON (Dr Ken Sakamura, 1984), “Ubiquitous – or Pervasive – Computing” (Mark Weiser, 1988), “Ambient Intelligence” (Philips and DG INFSO, 1999), and some others (Cyber Physical Systems etc.). No doubt everyone has his/her own ideas about the origins of the Internet of Things, but what is interesting is, for me, to remember and understand the history of how new concepts are named – for example, AmI had little success beyond the academic community, whereas IoT, first ill-considered by academics and engineers, quickly became a political and media catchword that ensured its long-term success.

I bet the IoT saga is just beginning.