IoT from an EU Perspective

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EC - Knowledge Sharing
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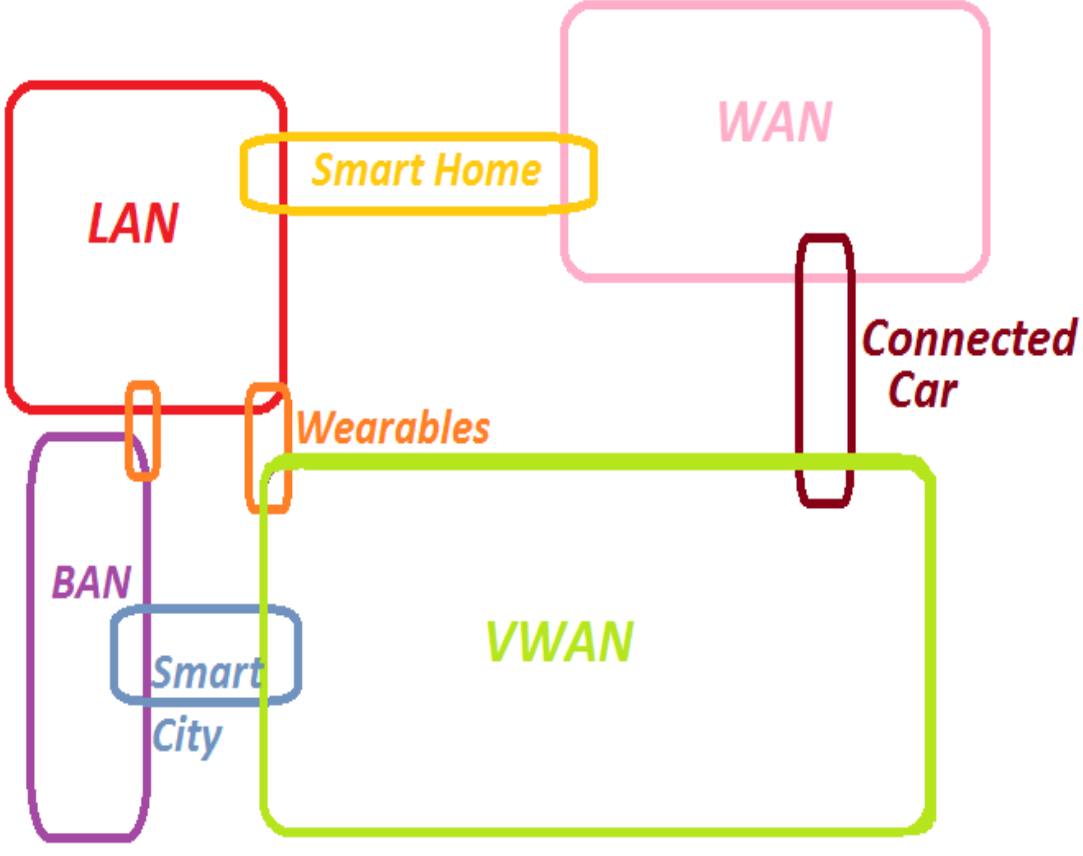
The Internet and the Internet of Things (IoT)

- *Internet, a network of connected networks that share the same protocol, has enabled messaging, email and file sharing*
- *The WWW made it possible to set up client-server systems that ran over the Internet*
- *The IoT allows to connect a wider variety of devices directly to each other in order to improve their effectiveness or an overall system: smart power grids, cities and homes…*

The IoT DNA

IoT is in essence the seamless flow between:

- *the **BAN** (body area network),*
- *the **LAN** (local area network),*
- *the **WAN** (wide area network), and*
- *the **VWAN** (very wide area network).*



Source: Rob van Kranenburg

How many connected objects in 2020?

An estimated 10 billion physical objects with embedded information technology already exist today and many more smart cars, homes, cities, factories, energy systems, and other networks of connected devices are being built. Many companies have already begun to integrate IoT technologies into their operations and projections for future penetration, while spanning a big range, all point towards significant growth. Gartner predicts that by 2020 around 25 billion connected “things” will be in use and their disruptive impact will be felt across all industries and all areas of society. DHL and Cisco suggest that the number of connected devices and objects in 2020 will reach 50 billion.

IoT vs. WoT, M2M, CPS: A war of terms

- IoT vs. M2M
  - M2M is part of IoT – IoT comprises a broader range of interactions and is not necessarily focused on the use of telco networks
- IoT vs. CPS
  - The highest degree of overlap with IoT

    CPS to be used in the case of systems that involve large scale real-time control (e.g. time-critical problems)

    IoT to be used in reference to systems involving networks of embedded systems + tight human-machine interactions
- IoT vs. WoT
  - IoT is about creating a network of objects/ people / systems and applications while WoT tries to integrate them to the Web

European Commission

EC research and policy support to IoT

Research funding over seven years (FP7, CIP, joint calls)

- Creation of research portfolio - 3 FP7 calls with a direct budget of 100 MEUR
- 5 IPs for conception R&D and piloting; > 15 STREPs for specific challenges (e.g. security)
- 5 CSAs for innovation support and international co-operation
- Application areas: Smart City, e-Health, Industry, Logistics, …
- Support by European Technology platforms – EPoSS, ARTEMIS
- Creation of IERC – Internet of Things European Research Cluster

Policy support towards innovation and take-up

- Driving IoT Standardisation initiatives (from RFID experience in mandate M/436)
- Convocation of a dedicated IoT Expert Group on IoT Governance (2010-2012)
- Exchange and cooperation with MS government initiatives on IoT
- International co-operation on IoT with China, Japan, Korea, Taiwan, US and Brazil
- CAF – Connect Advisory Forum IoT workgroup (innovation stakeholder)
- Link to new General Data Protection Regulation

From FP7 to H2020: IoT in the making…

FP7- Ignition phase

FP7 research results (platforms, architectures, demonstrators)

2014-15 Building the eco-system

ICT30: *Building the eco-system, breaking silos CPS-IoT, Using platforms integrating devices, embedded systems and network technologies for a multiplicity of novel applications*

+ ODI, FI-ware accelerators, IERC, standardisation etc.

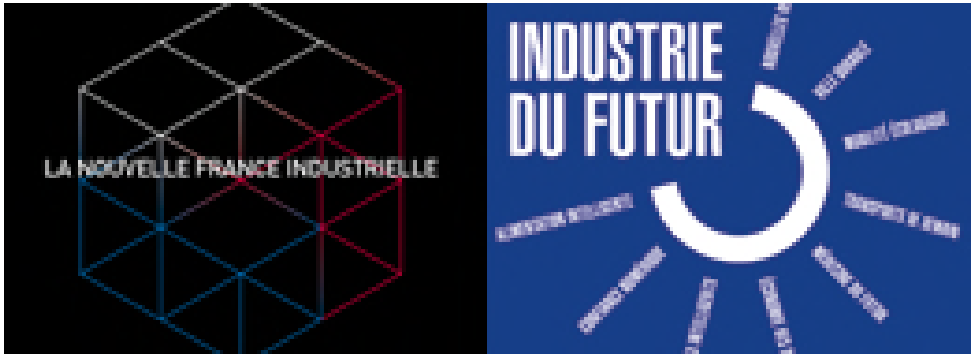
2016-17 Going to market

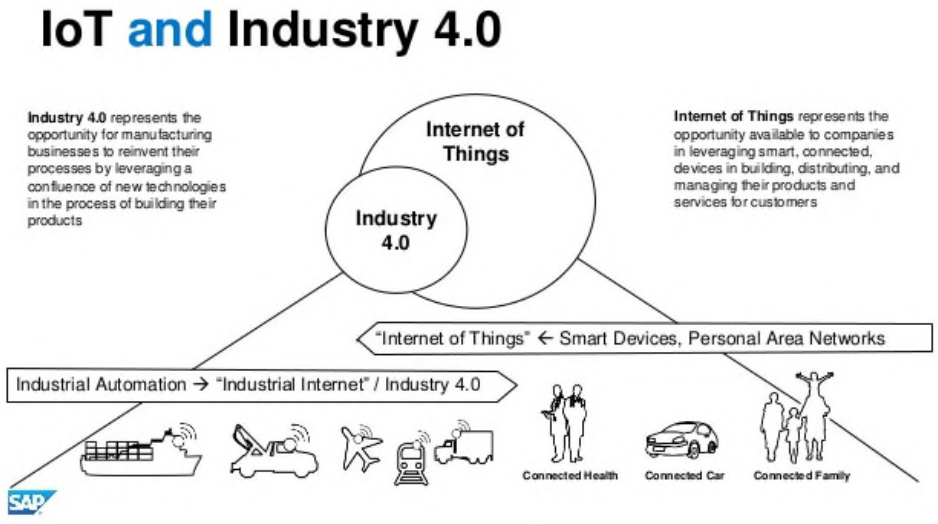
WP16-17: "Focus Area" on Internet of Things will focus on experimentation with real-life solutions being tested at large scale with users

Deployment

European Commission

EU Member States' initiatives in IoT





IoT and Privacy

http://ec.europa.eu/justice/newsroom/data-protection/news/151221_en.htm

EU Data Protection Regulation

- *Definitions (Art. 4)*
- *Principles relating to personal data processing (Art. 5)*
  - Lawfulness, fairness and transparency
  - Purpose limitation
  - Data minimisation
  - Accuracy
  - Storage limitation
  - Integrity and confidentiality

- *Right to erasure ("right to be forgotten") (Art. 17)*
- *Data protection by Design and by default (Art. 23)*
- *Data Protection Impact Assessment (Art. 33)*
- *Codes of conduct (Art. 38)*
  - e.g. RFID notification and PIA process

IoT and Privacy

U.S. Federal Trade Commission

- *Staff Report: https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-staff-report-november-2013-workshop-entitled-internet-things-privacy/150127iotrpt.pdf*
- *Non-legislative policy options: voluntary transparency; FTC best practices; liability lawsuits; market competition*
- *Legislative policy options: mandatory certification; mandatory data minimization; opt-in consent; federal standards; give customers the right to sue*

IoT and Privacy

Art. 29 Data Protection WP (16/09/2014):

- Opinion 8/2014: http://ec.europa.eu/justice/data-protection/article-29/documentation/opinion-recommendation/files/2014/wp223_en.pdf
- Wearable Computing
- Quantified Self
- Home Automation

IoT and Privacy

Mauritius Declaration (14/10/2014):

- International Data Protection and Privacy Commissioners
- http://www.privacyconference2014.org/media/16596/Mauritius-Declaration.pdf
- Self-determination is an inalienable right for all human beings
- IoT sensor data "should be regarded as personal data"
- Data protection is "a joint responsibility of all actors in society"
- Privacy by design: "a key selling point of innovative technologies"
- End-to-end encryption

European Commission

A new European vision to unleash the IoT?

Cost of non-Europe in IoT

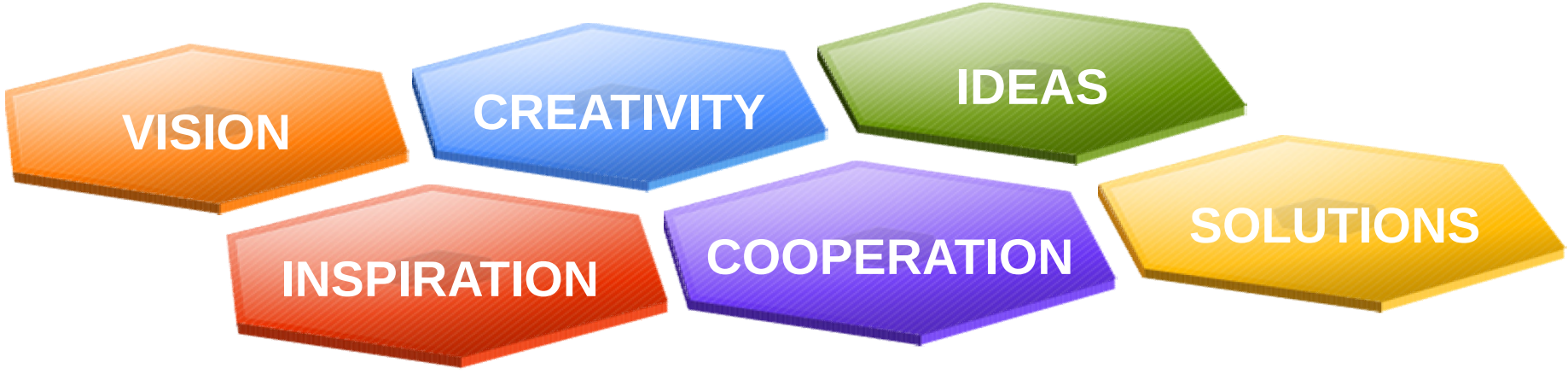
- **Fragmentation between national markets**
  - ≠ Digital Single Market
- **Fragmentation and ossification of industrial silos/applications**
  - ≠ innovation ecosystem
- **Uncertainty and lack of trust about the IoT**
  - ≠ take-up by consumers
- **Lack of priorities and focus in key markets**
  - ≠ research and capital investment
  - ≠ adoption of IoT solutions

Four Pillars of Wisdom…

- **Single market for IoT**
  - IoT devices and services should connect seamlessly and on a plug-and-play basis anywhere in the EU
- **Thriving IoT ecosystem**
  - Open platforms are used across vertical silos
  - Developers' communities are supported to innovate
- **Human-centred IoT**
  - Empowering of citizens rather than machines and corporations – a "trusted IoT label"?
- **Spearheading some markets for experimentation and fast take-up**
  - Connected cars; smart home; smart agri-food; wearables; smart cities; smart manufacturing

AIOTI – the next steps

- *Promotion of H2020 IoT LSP calls and AIOTI recommendations by EC*
  - Dissemination and promotion of AIOTI results in conferences and workshops
    Organization of open information days IoT reference architecture workshop of EC and AIOTI WG3
- *Future directions and setup of AIOTI after this first phase (IoT LSP calls) discussed by the AIOTI steering group*




Thank you

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