Internet of Things
Value Proposition for Europe

European Commission - DG CONNECT
Dr Florent Frederix, (Online) Trust and Cybersecurity unit

7th European Conference on ICT for Transport Logistics
5th – 7th November 2014
Dortmund (Germany)

"The views expressed in this presentation are those of the author and do not necessarily reflect the views of the European Commission"

Outline

- *Internet of Things:* ***enormous potential***
- *We build on a* ***series of achievements***
- ***ICT30****: EU commitment for 2014-15 in H2020*
- *Remaining* ***key challenges***

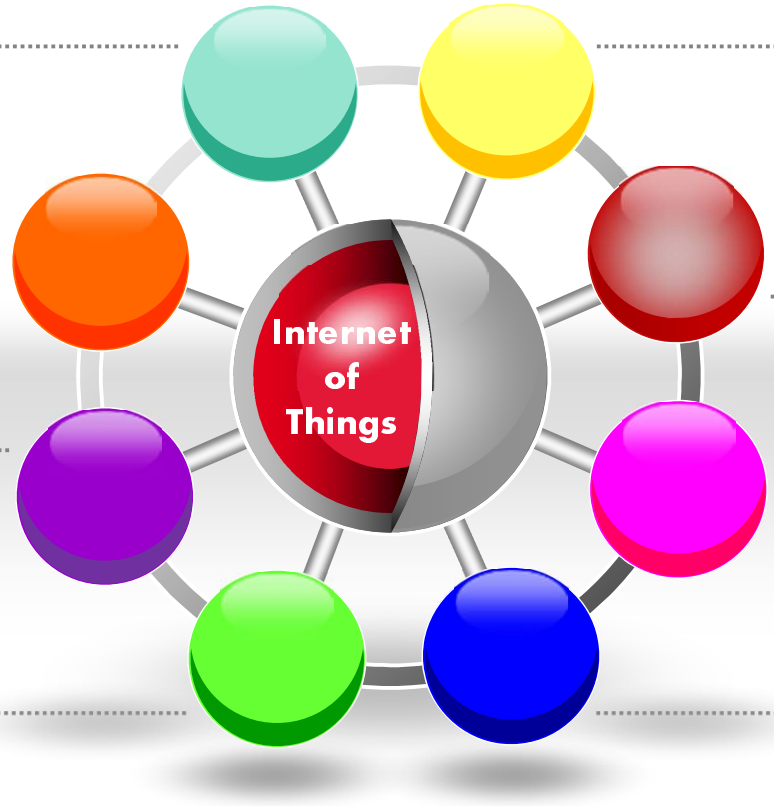
Definition of the Internet of Things

A *dynamic global network infrastructure*

with *self configuring capabilities*

based on *standard and interoperable communication protocols*

where *physical and virtual "things"*



have *identities, physical attributes, and virtual personalities*

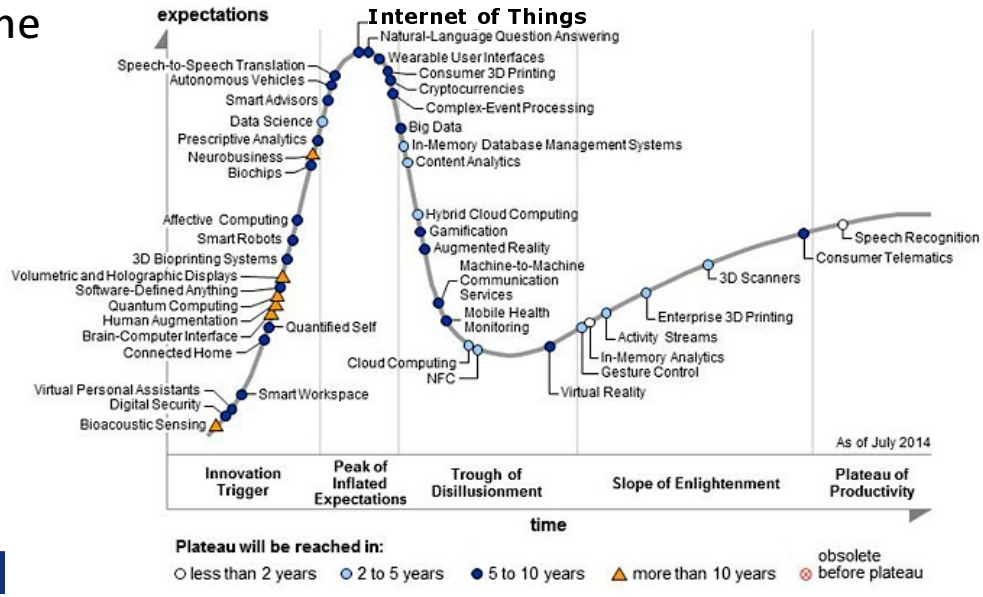
use *intelligent interfaces*

can *sense* and *actuate*

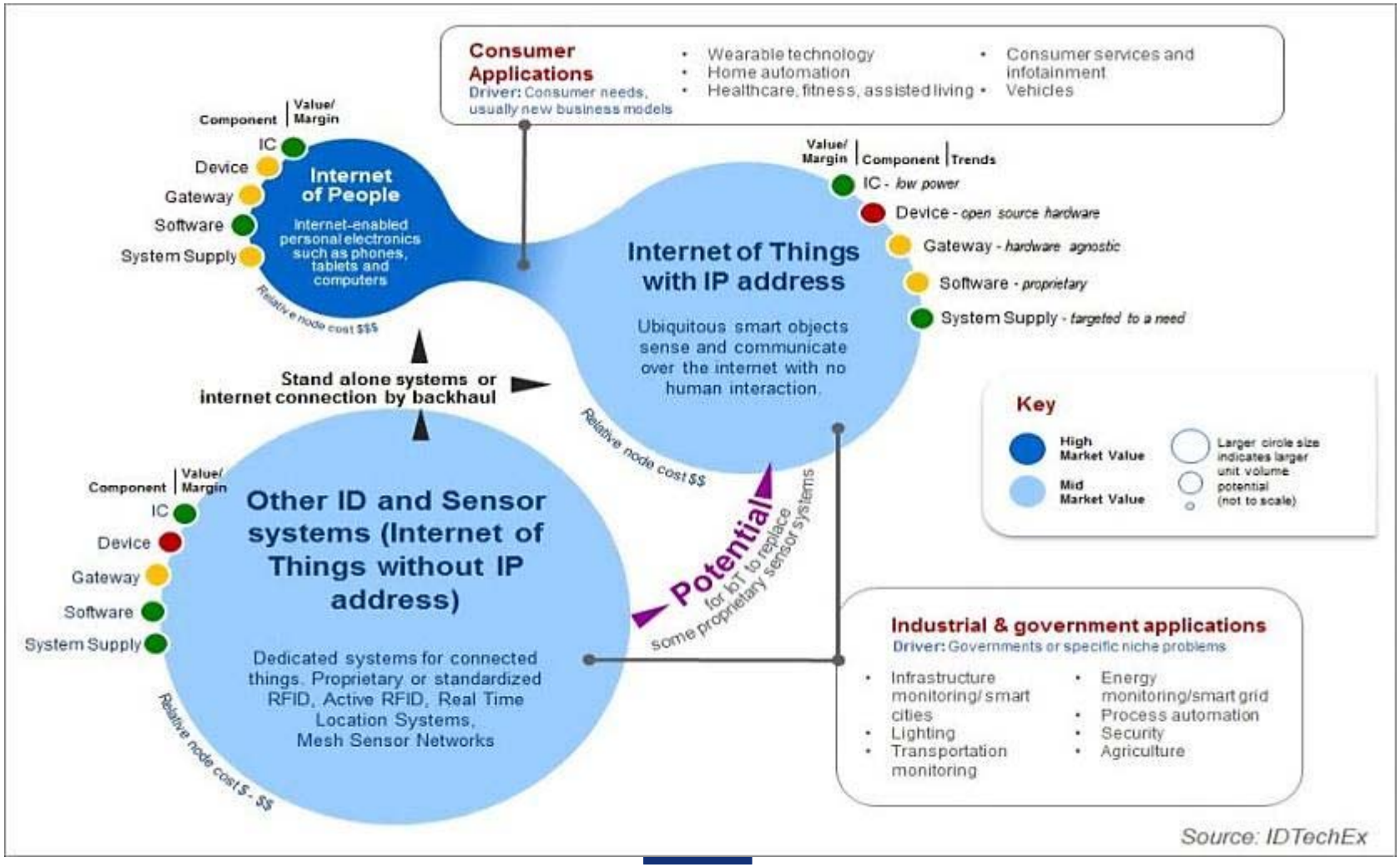
into *the information network.*

The Internet of Things is on its way forward

- 9 billion 'things' connected to the Internet today – Gartner says 26 billion online by 2020; ABI Research puts that number at 30 billion; Cisco estimates about 50 billion...
- McKinsey estimates 2-6BEUR annual turnover in the coming years
- Large players and SMEs (infrastructure equipment suppliers, telcos, component / system manufacturers, application designers,…) take up IoT
- Stakeholders on all levels to exploit the potential of connectivity and embedded intelligence mix
- Powerful combination of IoT with Cloud, Future Internet, Big Data, Cyber-Physical Systems, Robotics…

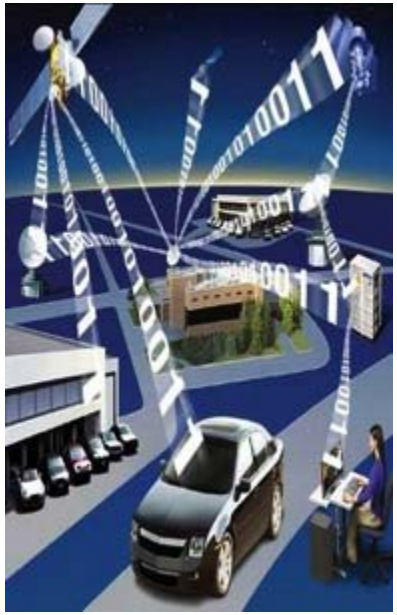


Internet of Things Market Potential



Internet of Things has been continuously supported on research and policy level during FP7

- **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
  - Link to Future Internet PPP (Generic Enabler)



- **Policy support towards innovation and take-up**
  - Driving IoT Standardisation initiatives
  - Convocation of a dedicated IoT Expert Group on IoT Governance
  - 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 EC Data Protection Regulation

Results and achievements in wider context

IOT ARCHITECTURES

- IoT Reference Architecture and Open IoT platform
- Clouds of internet-connected objects, Open source middleware framework
- City infrastructure as a cloud service (CIaaS)
- Future Internet PPP Generic Enablers and platform approaches (FI-WARE, FI-CORE)
- Adaptive middleware for small solutions and virtual objects
- Open platforms ReAAL and Universaal for home environment (smart home)
- Cyber-physical systems (I4MS) for manufacturing

IOT SOLUTIONS

- IP-based smart objects connectivity with low power consumption
- Naming and identification systems
- Ubiquitous, secure location-based IoT
- Semantic interoperability approaches
- Reliable communication and self-configuration mechanisms in industry
- Embedded smart objects / Cyber-physical systems
- real-time measuring and decision making solutions

Results and achievements (cont'd)

IOT DEMONSTRATORS

- Use-cases in e-Health, Smart Mobility, Smart Office, Smart Shopping, Smart Home, Tourism, Smart Toys, Smart Agriculture
- Use Cases in European Smart Cities (energy, environment, open data, transport, security, water mgt., social communities, urban regeneration)

<u>Examples</u>

- City-scale smart city experimental research facility (Santander)
- Smart Agrifood for planting and machining (Netherlands, Hungary and Spain)
- Smart Manufacturing for textiles (Pamplona, Naples, Torre de Moncorvo (PT)
- Eco-hotel (Espoo)
- "Citizen as a Sensor" (Malaga)
- Smart Campus platform for future smart spaces (Surrey, Trento)
- Social Connected TV combined with device management (Berlin, Cologne, Lancaster)
- City environment parameter measuring (Las Palmas de Gran Canaria)
- Creative Industry support (CREATI-FI)
- Smart Care / advancing active and healthy ageing

ICT 30 - Internet of Things in WP 2014-15

Internet of Things and Platforms for Connected Smart Objects

- Cutting across several LEIT-ICT areas (smart systems integration, cyber-physical systems, smart networks, big data)
- Bringing together different generic ICT technologies and their stakeholder constituencies
- 51 M€, 2nd call of WP 2014-15 (publication: 15 October 2014)
- Research and Innovation Actions (100% funding) + Coordination and Support Action
- Large Projects
- Mechanism of open competitive calls up to 30% of total budget

ICT 30 – Scope of Research & Innovation Actions

- Architectural concepts and concepts for semantic interoperability for "Platforms for Connected Smart Objects"
  - Dynamically configured infrastructure and integration platforms for covering multiple technologies, multiple devices including robots, and heterogeneous integration levels
  - Integration of smart devices into self-adaptive, robust, safe, intuitive, affordable and interconnected smart network and service platforms

- Reference implementations, including proof-of-concept, large-scale demonstrations and validation driven by innovative use scenarios, e.g. in
  - Smart homes, public spaces and context aware commercial environments
  - Potential use scenarios include health, energy, mobility and commercial services

ICT 30 – Scope of Coordination / Support Action

- Measures for development of ecosystems around the platforms e.g.
  - Communities of open API developers for low cost applications, networking of stakeholders
  - Contribution to pre-normative activities / standardisation, development of business models, innovation activities which aim at stimulating platform adoption
  - Activities to increase societal acceptance and foster specific education

- Funding of one Co-ordination and Support Action to stimulate the collaboration between selected projects and between the potential platforms (including research clusters)
- Preparing for follow-up Work Program, in particular innovation actions

ICT 30 – Expected impact

- European offer for integrated IoT systems and platforms
- Availability of architectures and methodologies to provide IoT turn key solutions
- Dissemination and availability of results for technology adoption and pre-normative activities e.g. in standardisation fora and bodies like the EIT
- Facilitation of platforms for co-creation of products and services in open innovation ecosystems including all relevant stakeholders.

Next steps

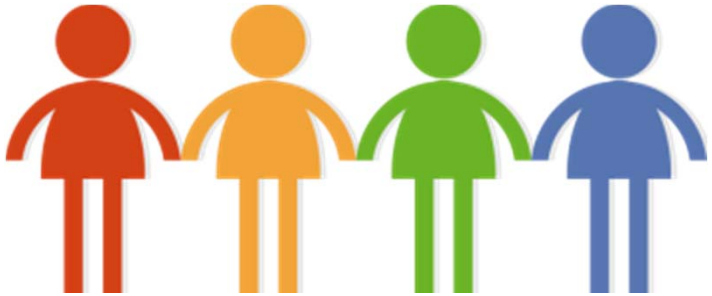
- Publication of Call in 2nd half of 2014
  - Publication date: 15th October 2014
  - Deadline: 14th April 2015, 17.00

- 2014 Community building
  - Networking day at IoT Week, London: 20th June 2014
  - Networking event in Brussels: 07th November 2014
    Registration: https://ec.europa.eu/digital-agenda/en/news/community-building-event-internet-things-and-platforms-connected-smart-objects
  - Networking day at CPS info event, Brussels: 17th Dec 2014

ICT 30 – Clarifications

Community and value chain

- **A strong community building towards the creation of ecosystems** is required for the actors coming from various disciplines, including the industrial background and application areas, for supporting smart environments, businesses, services and end-users
- Need to have different actors of the value chain(s) (not only technology providers). Be creative in consortium building, keeping in mind that the consortium is the starting point of the future ecosystem
- The cooperation with technology partners such as FI-PPP, ARTEMIS-ECSEL JTI and FIRE, and with relevant international partners outside Europe is important



ICT 30 – Clarifications

Integration, examples, technology

- Demonstration of a sound integration of the LEIT (Leadership in Enabling & Industrial Technologies) is required towards future generations of devices, embedded systems and network technologies, software technologies and other evolving ICT advances.
- HW and technology development is in scope, but should not be the only focus. Overall the project should go beyond integration only (excellence in science)
- **Examples should in particular address potential cross-sectorial applications but can also include vertical representations of sectors.** Consideration of open platforms and technology approaches should include hardware/devices which allow application developers to produce new added value across multiple systems

Funding

- **Requested funding is expected to be in the range of 5-8 Mio € for Research & Innovation Actions and 1 Mio € for one Coordination/Support Action**; an appropriate integration between R&I Actions and the Support Action is pivotal

Related work program objectives

- ICT 1 – 2014: Smart Cyber-Physical Systems
- ICT 2 – 2014: Smart System Integration
- ICT 5 – 2014: Smart Networks and novel Internet Architectures
- ICT 6 – 2014: Smart optical and wireless network technologies
- ICT 7 – 2014: Advanced Cloud Infrastructures and Services
- **ICT 10 – 2015**: Collective Awareness Platforms for Sustainability and Social Innovation
- ICT 11 – 2014: FIRE+ (Future Internet Research & Experimentation)
- ICT 14 – 2014: Advanced 5G Network Infrastructure for the Future Internet
- ICT 15 – 2014: Big data and Open Data Innovation and take-up
- **ICT 19 – 2015**: Technologies for creative industries, social media and convergence
- ICT 32 – 2014: Cybersecurity, Trustworthy ICT
- EUJ 1 – 2014: Technologies combining big data, internet of things in the cloud
- **H2020-SCC-2014-2015** : Smart Cities and Communities solutions integrating energy, transport, ICT sectors through lighthouse (large scale demonstration - first of the kind) projects

Key challenges

Remaining technological challenges

Security and privacy, connectivity and reliability of data transmission at large scale, semantic interoperability

Risk of fragmentation

Between siloes, between standards, between MS

User acceptability

Privacy, user-friendliness

Moving mainstream without interoperability

Google, Apple, Samsung, General Electric, …

Discussion and feed-back

Comments? Questions?

Opportunities for IOT in logistics?