IoT Research and Innovation in Horizon 2020

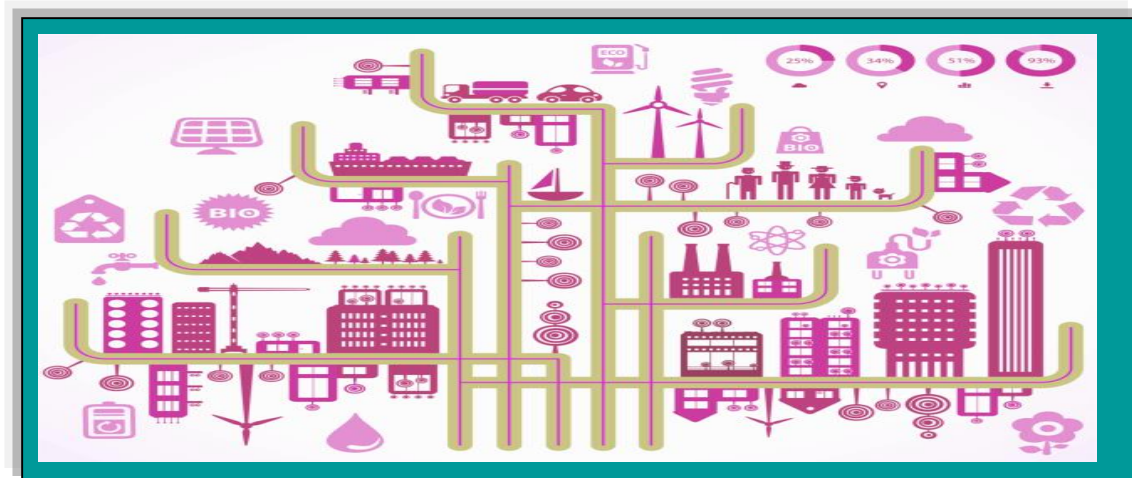## A Focus Area under WP2016/17

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Rolf Riemenschneider CNECT /E1

DG Communication Networks, Content & Technology
European Commission

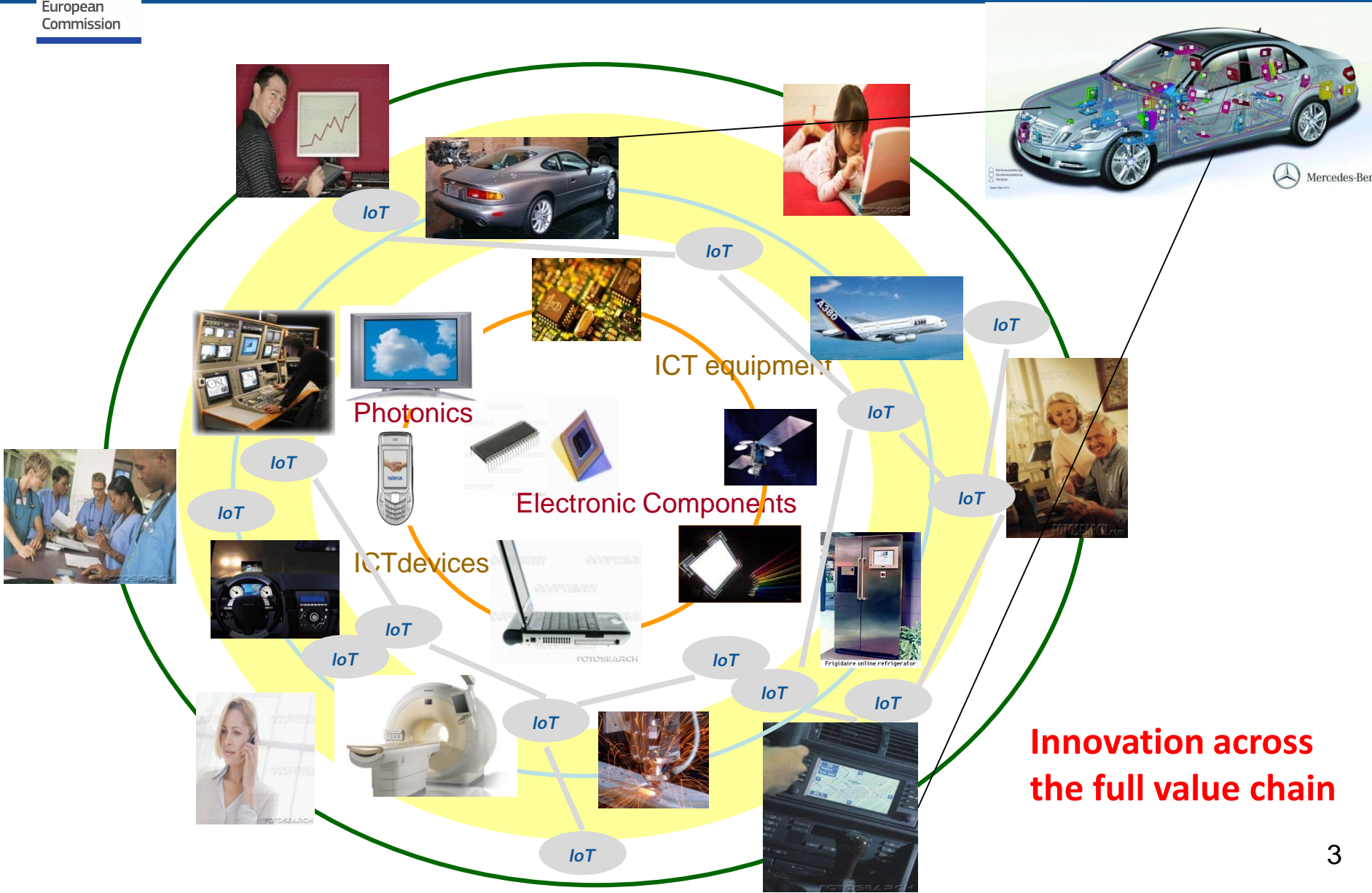# Internet of Things

What is in it?

- An enabler of a **future hyper-connected society**,

- A set of sensors, actuators, smart objects, data communications and interface technologies

- that allow information to be collected, tracked and processed across local and global network infrastructures.

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IoT · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT** · **IoT**

ICT equipment

Photonics

Electronic Components

ICTdevices

**Innovation across
the full value chain**

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The Internet of Things is the next digital revolution

- **IoT, Industrial IoT, Internet of Everything**
- **Everything Connected = Convergence - Physical + Digital + Cyber**
- **IoT + Cloud Computing + Big Data + Real Time Smart Analytics**
- **Cyber-physical Systems - Robotics - Augmented Reality**
- **Smart products and services – Smart Environments**

The Internet of Things is not just hype

- **Research cycle is maturing**
- **Demand is consolidating**
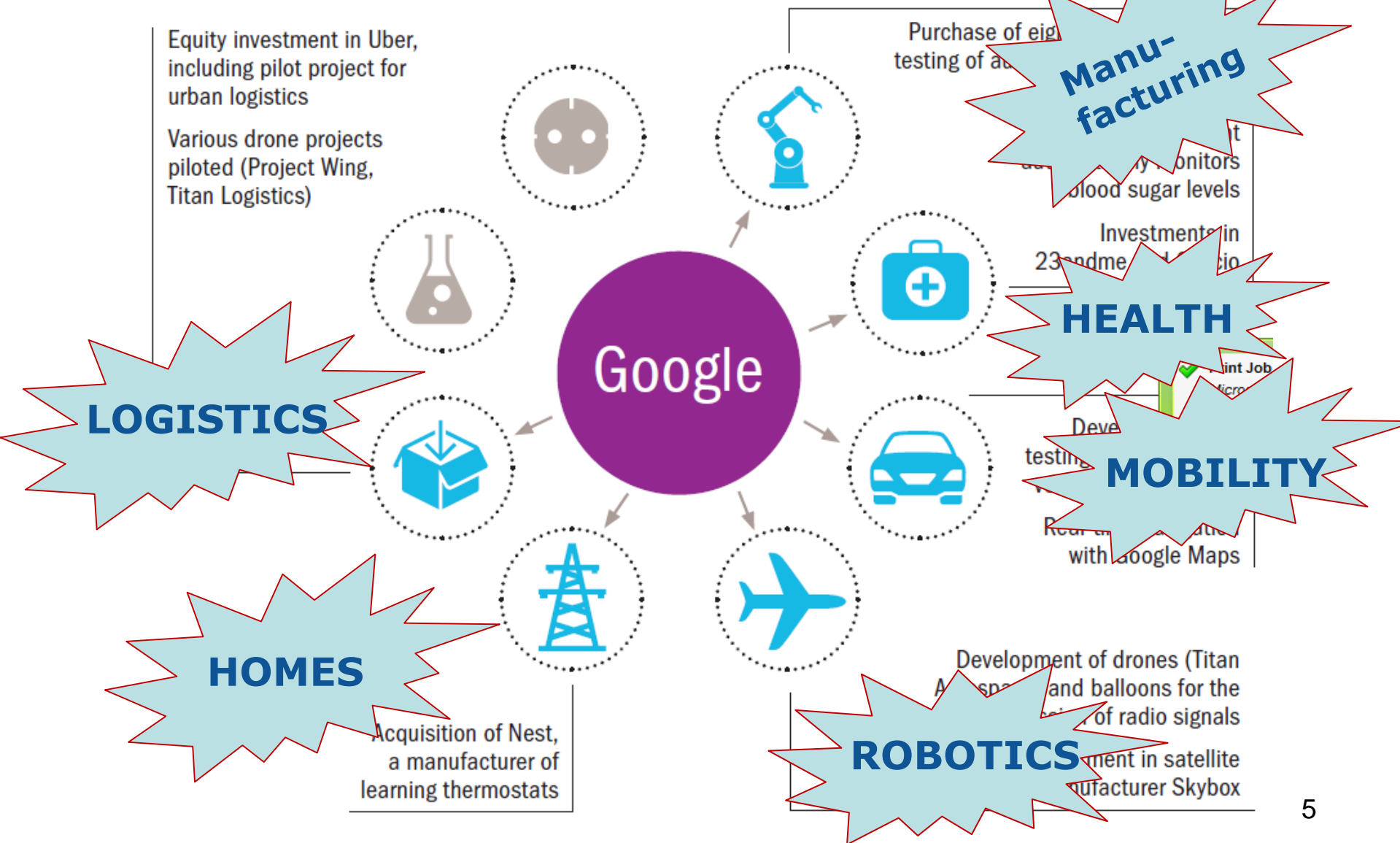- **Leading to innovation and tremendous economic opportunities**

Europe has the capacity to lead

- **We have all the ingredients (research, players, eco-systems…)**
- **But there is a big risk of fragmentation and delay in front of international competition**

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Source Roland Berger

European

Equity investment in Uber, including pilot project for urban logistics

Various drone projects piloted (Project Wing, Titan Logistics)

Purchase of eig... testing of a...

Manu-facturing

...onitors blood sugar levels

Investments in 23andme...

HEALTH

Google

LOGISTICS

...int Job ...cro

Deve... testi...

MOBILITY

...with Google Maps

HOMES

Acquisition of Nest, a manufacturer of learning thermostats

Development of drones (Titan A... spac... and balloons for the ... of radio signals ...ment in satellite ...ufacturer Skybox
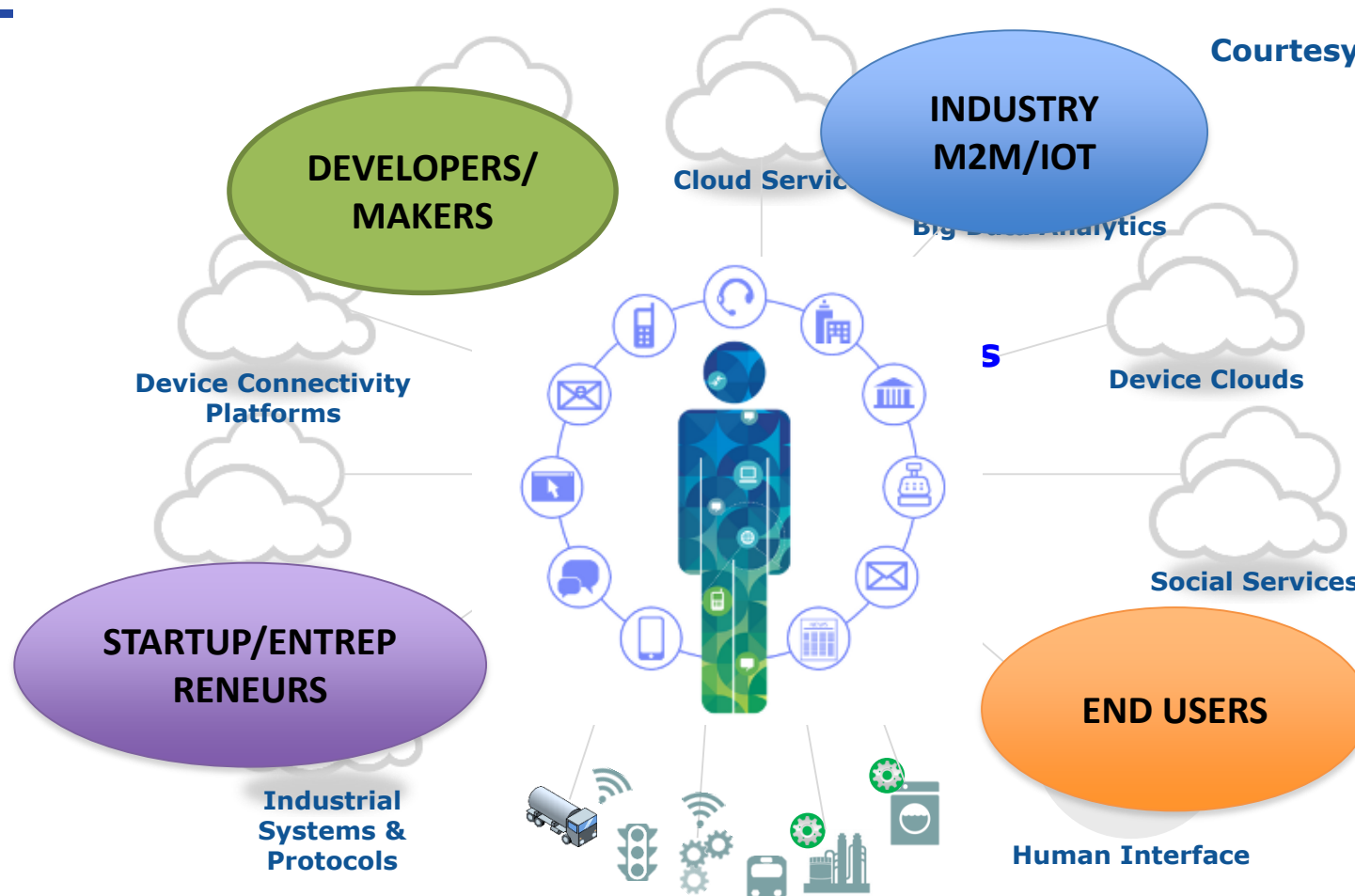
ROBOTICS

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- **In FP7 -** 3 FP7 calls with a direct budget of **100 M€** for conceptional R&D and piloting

- **50 M€** EC direct support in 2015 for the creation of IoT Innovation **Ecosystems**

- **Over 100 M€** EC direct funding in 2016 for IoT Large Scale Pilots and the future **IoT Focus Area**

- IoT is the hot topic for industry, investors and start-ups in Europe

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Internet of Things Focus Area

- Fostering the take-up of IoT in Europe and enabling the emergence of **IoT ecosystems** supported by open technologies and platforms.

- Supported **IoT Pilots** will use the rich portfolio of technologies and tools so far developed and demonstrated in reduced environments and extend them to real-life use case scenarios.

- **Support actions** provide consistency and linkages between the pilots and complement them by addressing horizontal challenges critically important for the take-up of IoT at the anticipated scale.

- **A coordination body** will ensure an efficient interplay of the various elements of the IoT-FA and liaise with relevant initiatives at EU, Member States and international levels

- Research and innovation effort in specific IoT topics will ensure the longer-term evolution of the Internet of Things

European Commission

Courtesy: IERC 2015

INDUSTRY M2M/IOT

DEVELOPERS/ MAKERS

Cloud Services

Big Data Analytics

Device Connectivity Platforms

Device Clouds

STARTUP/ENTREPRENEURS

Social Services

END USERS

Industrial Systems & Protocols

Human Interface

Sensors, Devices, Gateways, Equipment, Mobile Assets

Home • Energy Healthcare Industry Signage Tourism Security Automotive Transportation Environment

European Commission

Development of Context-Aware Applications using FIWARE	Connection to the Internet of Things
Real-time processing of Context Events	Handling Authorization and access Control to APIs
Publication of Context Information as Open Data	Big Data Analysis of Historic Context Information
Creating Application Dashboards	Real-time processing of Media Streams
Providing an Advanced User Experience (UX)	Hosting your Application on a FIWARE Cloud

FIWARE is a set of **37 software components** essential for developing any kind of innovative Internet services.

They are package in **10 groups** for easy use by developers.

Prime sectors are smart cities, creative industry, health manufacturing or agrifood.

All of FIWARE is **open-source and royalty free** available today to anyone on www.fiware.org.

The **FIWARE ecosystem and community** provides all what is needed for users, developers and public sectors actors to start using FIWARE

Financial support to third parties
(a.k.a. "open calls" or "cascading funding")

From General Annexes – K

Proposals […] shall **clearly detail the objectives** and the results to be obtained and include at least the following elements:

- a **closed list** of the different types of activities that qualify for financial support,
- the persons or **categories of persons which may receive** financial support,
- the **criteria** for awarding financial support,
- the criteria for **calculating the exact amount** of the financial support,
- the **maximum amount to be granted** to each third party

Innovation Actions
up to 20%

Specific rules for this call

- maximum amount to be granted can be in the order of **EUR 50.000 to 150.000** per party (general rule in H2020: max. 60.000)

- total amount to be granted via open calls can be **maximum 50%** of the project funding

"The action <u>may</u> involve financial support to third parties"

(this is not mandatory!)

European
Commission

Internet of Things Focus Area

- the emergence of **IoT ecosystems** supported by open technologies and platforms.

- Supported **IoT Pilots**.

- **Support actions** provide consistency and linkages between the pilots and complement them by addressing horizontal challenges.

- **A coordination body** will ensure an efficient interplay of the various elements of the IoT-FA and liaise with relevant initiatives at EU, Member States and international levels

- Research and innovation effort in specific IoT topics

European Commission

IoT-01-and IoT-02: Inter-twinning of IoT1-LSP & IoT2-CSA in 2016

IoT1

IoT2

Smart living environments for ageing well

Smart Farming and Food Security

Wearables for smart ecosystems

Reference zones in EU cities

Autonomous vehicles in a connected environment

1) Coordination of pilot areas through mapping of pilot architectures; interoperability, standardisation
2) Horizontal support for IoT governance, innovation and creativity
3) Accompanying support for societal, ethical and ecological issues related to the pilots

- *IoT-02-2016:*
- *IoT Horizontal activities*

Scope a) or b):

a) Co-ordination of and support to the IoT Focus Area: through mapping of pilot architecture approaches; interoperability and standards approaches at technical / semantic levels; requirements for legal accompanying measures; common methodologies for design, testing and validation; federation of pilot activities and transfer

a) Horizontal support: exploitation of security and privacy mechanisms towards best practices and a potential label ("Trusted IoT"); legal support to relevant subjects; contribution to pre-normative activities and to standardization. International cooperation with similar activities. Europe. Exploitation of ICT & Art combination

b) RRI-SSH support to IoT: Pilots shall be citizen-driven with existing / local communities at an early stage. Two entities other than ICT technologies required (e.g. social sciences, psychology, gerontology, economy, art, etc.)

Total budget:

*a) up to 3 MEUR (funding rate: 100%), b) up to 1 MEUR (funding rate: 100%)*

Dates:

Call opening: *20th October 2015*
Call deadline: *12th April 2016, 17.00*
Expected starting date: *January 2017*

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European Commission

Internet of Things Focus Area

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- Research and innovation effort in specific IoT topics will ensure the longer-term evolution of the Internet of Things

European Commission

o *Building an IoT innovation ecosystems across the value chain /across silos*

o *Put IoT on the map and link to PPPs, JTI, and national initiatives*

o *Prepare Large Scale Pilots for 2016 → landscape analysis*

o *Advancing IoT convergence across verticals for* *standardisation/interoperability*

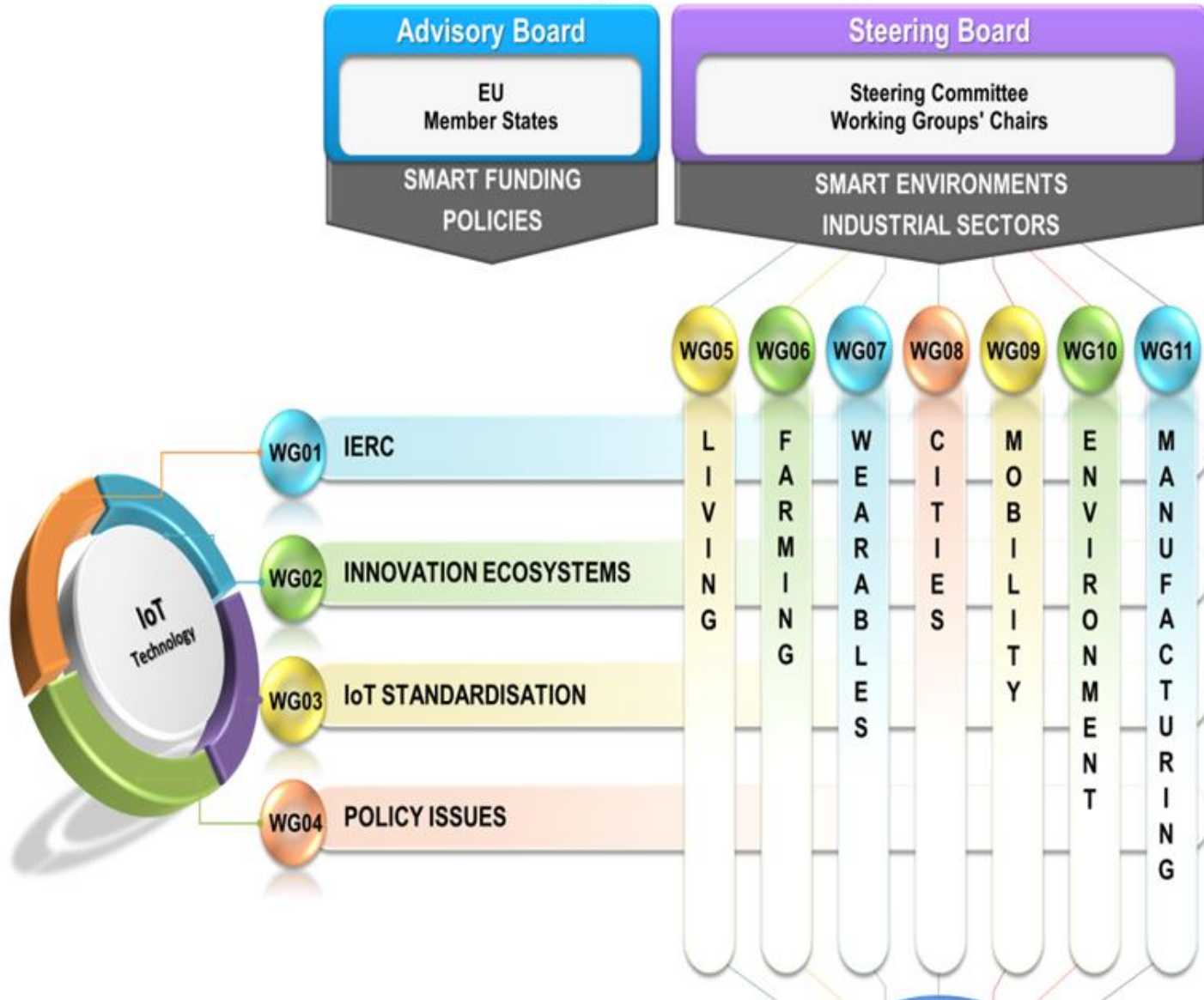o *Discuss with industry to provide guidance for IoT in the DSM*

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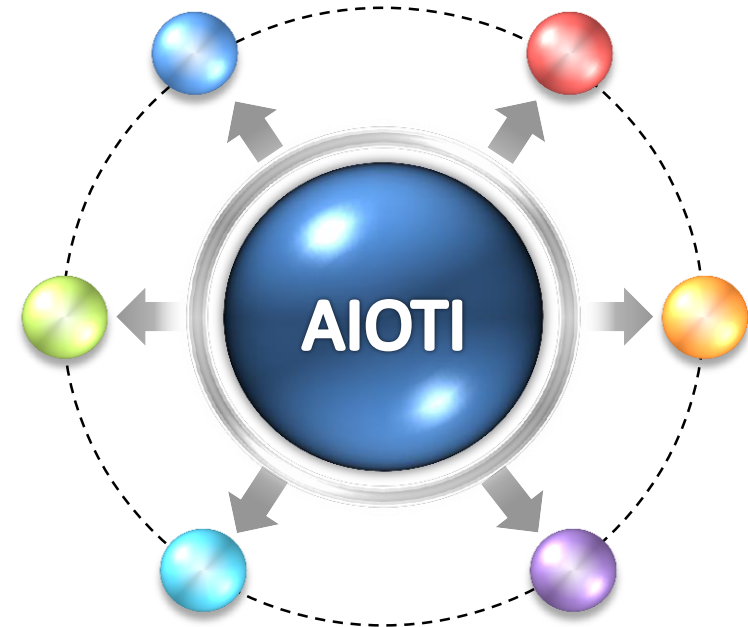
IoT SDOs and alliances landscape
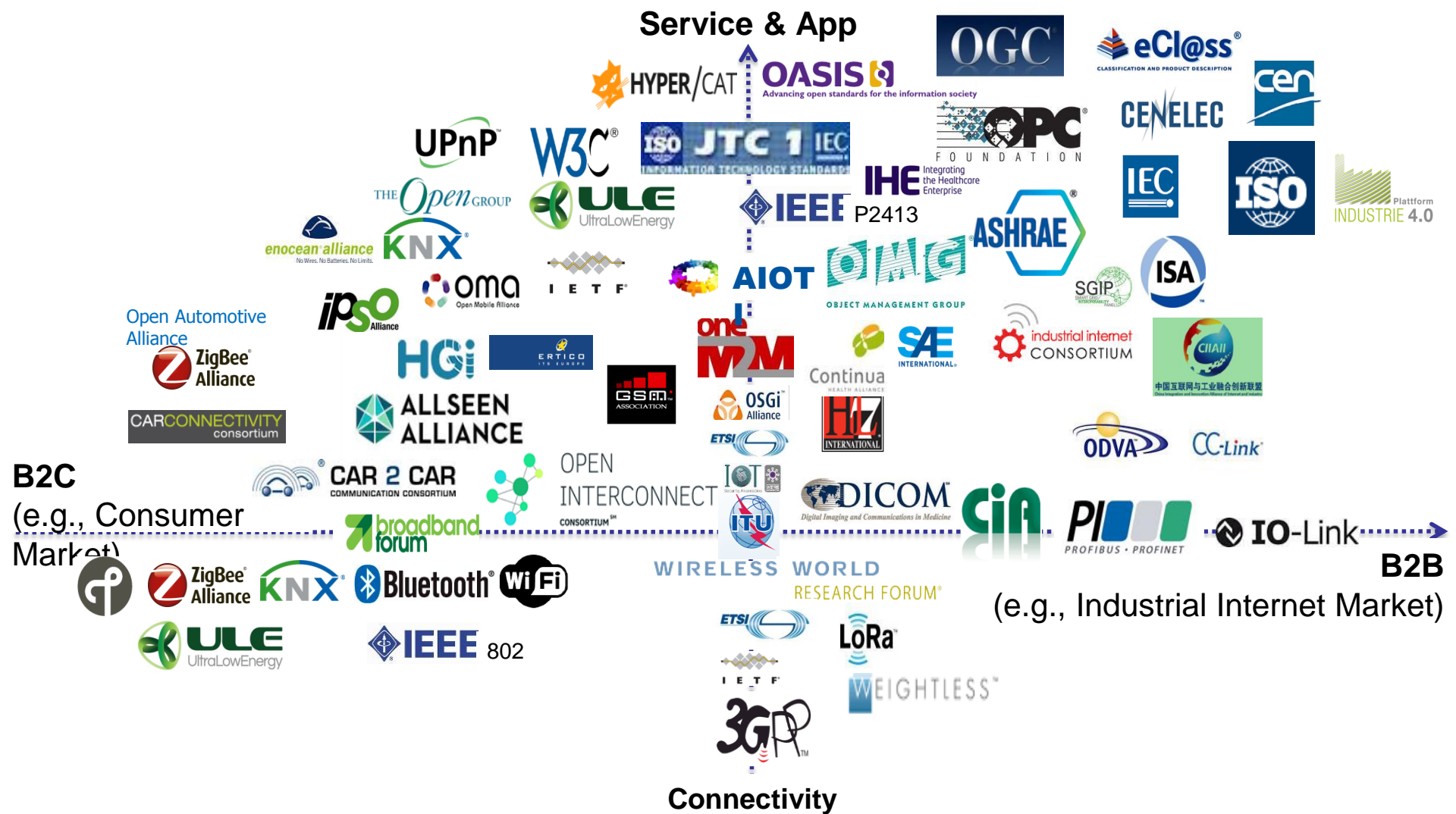
Source: AIOTI WG3 (IoT Standardisation) – Release 1

THANK YOU

Useful links:

- Internet of Things in DAE:
  http://ec.europa.eu/digital-agenda/en/internet-things

- Horizon 2020 – The EU Framework Frogramme for research and Innovation:
  http://ec.europa.eu/research/horizon2020/index_en.cfm

- The Alliance of Internet of Things Innovation AIOTI
  http://www.AIOTI.eu

- IERC – Internet of Things European Research Cluster
  http://www.internet-of-things-research.eu/

Internet of things Focus Area WP2016/17

IoT Direct Focus Area Calls

IoT-01-2016: Large Scale Pilots (IA)

IoT-02-2016: IoT Horizontal activities (CSA)

IoT-03-2017: R&I on IoT integration and platforms (RIA)

IoT International Cooperation

ICT-37-2016: CHINA: Collaboration on Future Internet (CSA)

EUJ-02-2016: Japan: IoT/Cloud/Big Data platforms in social application contexts (RIA)

EUK-02-2016: South Korea: IoT joint research (RIA)

EUB-02-2017: Brazil: IoT Pilots (RIA)

IoT – Large Scale Pilots in 2016

IoT LSP: Specific features

- Involve all value-chain actors
- Address business model validation & standardisation
- Address user validation and acceptability
- Up-scaling of open platforms across verticals

Key Performance Indicators:

- Ensure the longer-term evolution of IoT
- Critical Mass, leadership, mobilisation
- Rich portfolio of technologies and tools
- To guarantee the sustainability of the approach beyond the project

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FA IOT Pilot areas:

- Pilot 1: **Smart living environments for ageing well** (EU contr. up to 20 MEUR)

- Pilot 2: Smart Farming and Food Security (EU contr. up to 30 MEUR)

- Pilot 3: Wearables for smart ecosystems (EU contr. up to 15MEUR)

- Pilot 4: Reference zones in EU cities (EU contr. up to 15MEUR)

- Pilot 5: Autonomous vehicles in a connected environment (EU contr. up to 20 MEUR)

Total budget:

- 100 MEUR (funding rate: 70%)
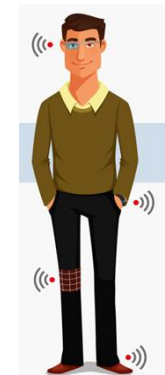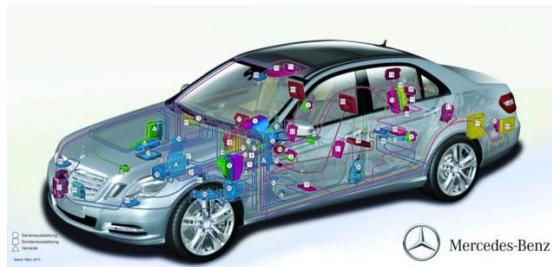
Multiple stakeholder support

- Platform and sustainability

Ecosystem

Data sharing

Connectivity

Micro-Nano/Embedded Systems

European
Commission

Wearables – Consumer -- Industrial

Enterprise wearables

Hands-free engagement

Innovative customer and employee experiences

Decisions in the moment

3% of companies are currently investing. Top five industries are:

- 10% Healthcare
- 7% Technology
- 6% Automotive
- 5% Industrial Products
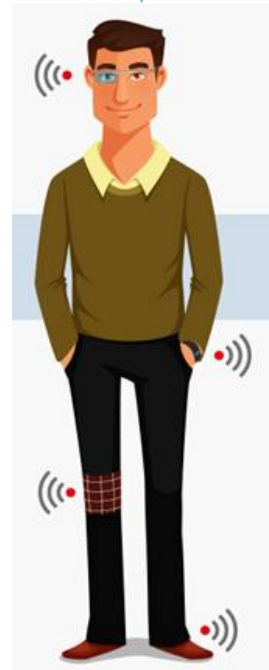- 4% Business and Professional Services

Business sensors

Ubiquitous, low-cost data collection

Better visibility into operations

Improved context-specific decisions and interactions

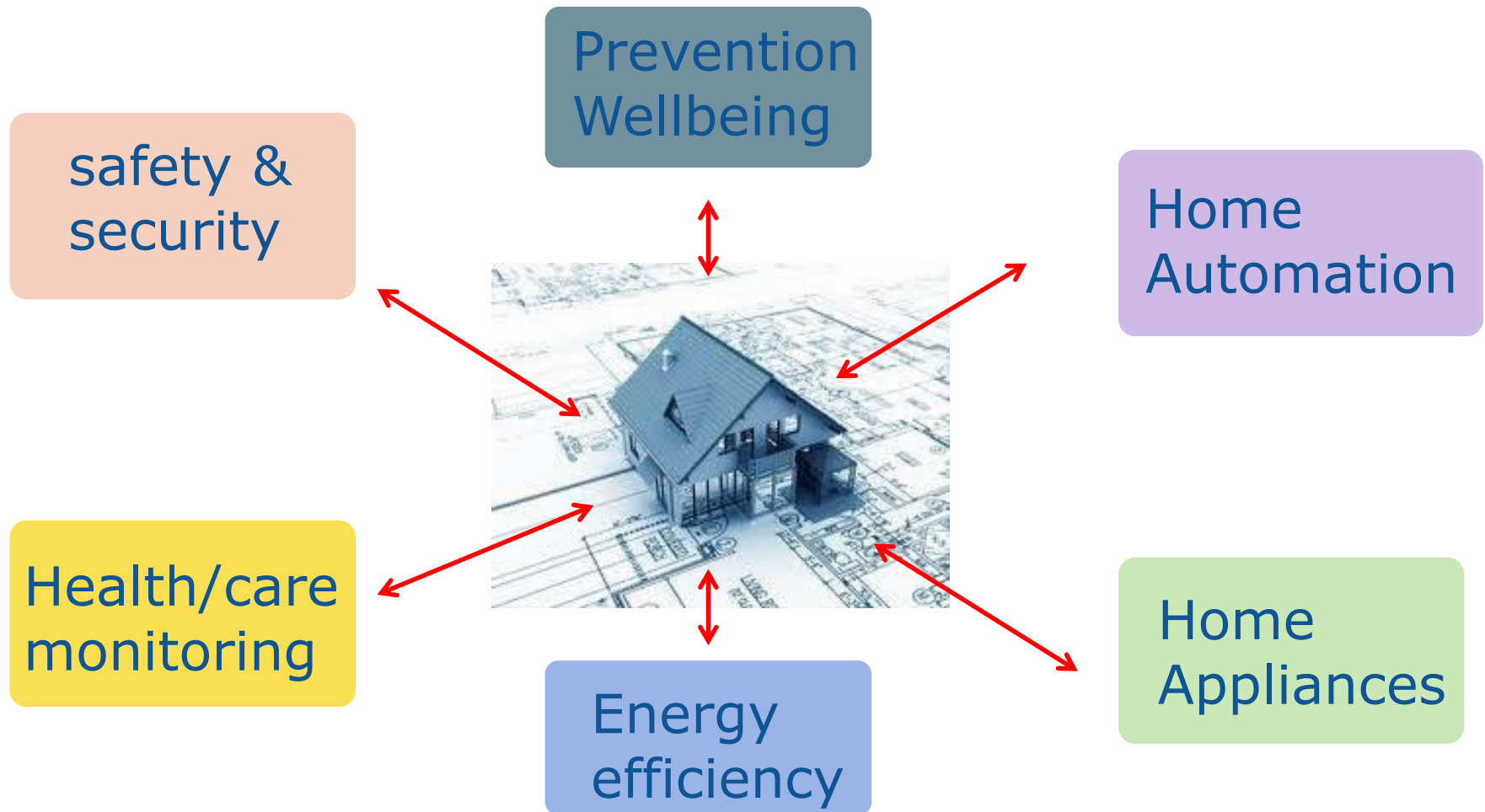**23%** of companies are currently investing. Top five industries are:

- 52% Retail and Consumer
- 33% Industrial Products
- 30% Hospitality and Leisure
- 27% Energy, Utilities and Mining
- 25% Automotive

Courtesy: www.PWC.com

Fabrics
Cloths
Patches
Body-mounted devices

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European Commission

Internet of Things- SMART Home

Prevention Wellbeing

safety & security

Home Automation

Health/care monitoring

Energy efficiency

Home Appliances

EXPECTED – IMPACT

➢ Validation, sustainability and replicability, of architectures, standards, interoperability properties, of key characteristics such as security and privacy

➢ New industry and business processes and innovative business models

➢ Significant and measurable **contribution to standards or pre-normative activities**

➢ Improvement of citizens' quality of life, in the public and private spheres, in terms of autonomy, convenience and comfort, participatory approaches, health and lifestyle, and access to services

➢ Creation of **opportunities for entrepreneurs**, expanding local businesses to European scale, etc.

➢ Development of secure and sustainable European IoT ecosystems and contribution to IoT infrastructures viable beyond the duration of the Pilot

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IoT-01-2016: Large Scale Pilots

Pilot areas:

Pilot 1: Smart living environments for ageing well (EU contr. up to 20 MEUR)

Pilot 2: Smart Farming and Food Security (EU contr. up to 30 MEUR)

Pilot 3: Wearables for smart ecosystems (EU contr. up to 15MEUR)

Pilot 4: Reference zones in EU cities (EU contr. up to 15MEUR)

Pilot 5: Autonomous vehicles in a connected environment (EU contr. up to 20 MEUR)

Other relevant pilots in the WP: _Smart manufacturing;_ _Water management_

Total budget:

100 MEUR (funding rate: 70%)

Dates:

Call opening: **20th October 2015**

Call deadline: **12th April 2016, 17.00**

Expected starting date:**January 2017**

IOT Focus Area – Topic Coordinator(s):

→ *Rolf.Riemenschneider@ec.Europa.eu*

Backup: Peter.Friess@ec.Europa.eu, Werner.Steinhoegl@ec.Europa.eu

Pilot-specific:

Pilot 1: CNECT-ICT4ageing@ec.europa.eu

Pilot 2: Ana.Cuadrado-Galvan@ec.Europa.eu, Peter.Friess@ec.Europa.eu

Pilot 3: Andreas.Lymberis@ec.Europa.eu

Pilot 4: Olavi.Luotonen@ec.Europa.eu, Ari.Sorsaniemi@ec.Europa.eu

Pilot 5: Cecile.Huet@ec.Europa.eu, Eric.Gaudillat@ec.Europa.eu

Events:

http://ec.europa.eu/digital-agenda/en/internet-things

→ **IOT Info Day on 25 January 2015 in Brussels**

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Wearables for smart ecosystems

(Pilot 3)

DG CONNECT
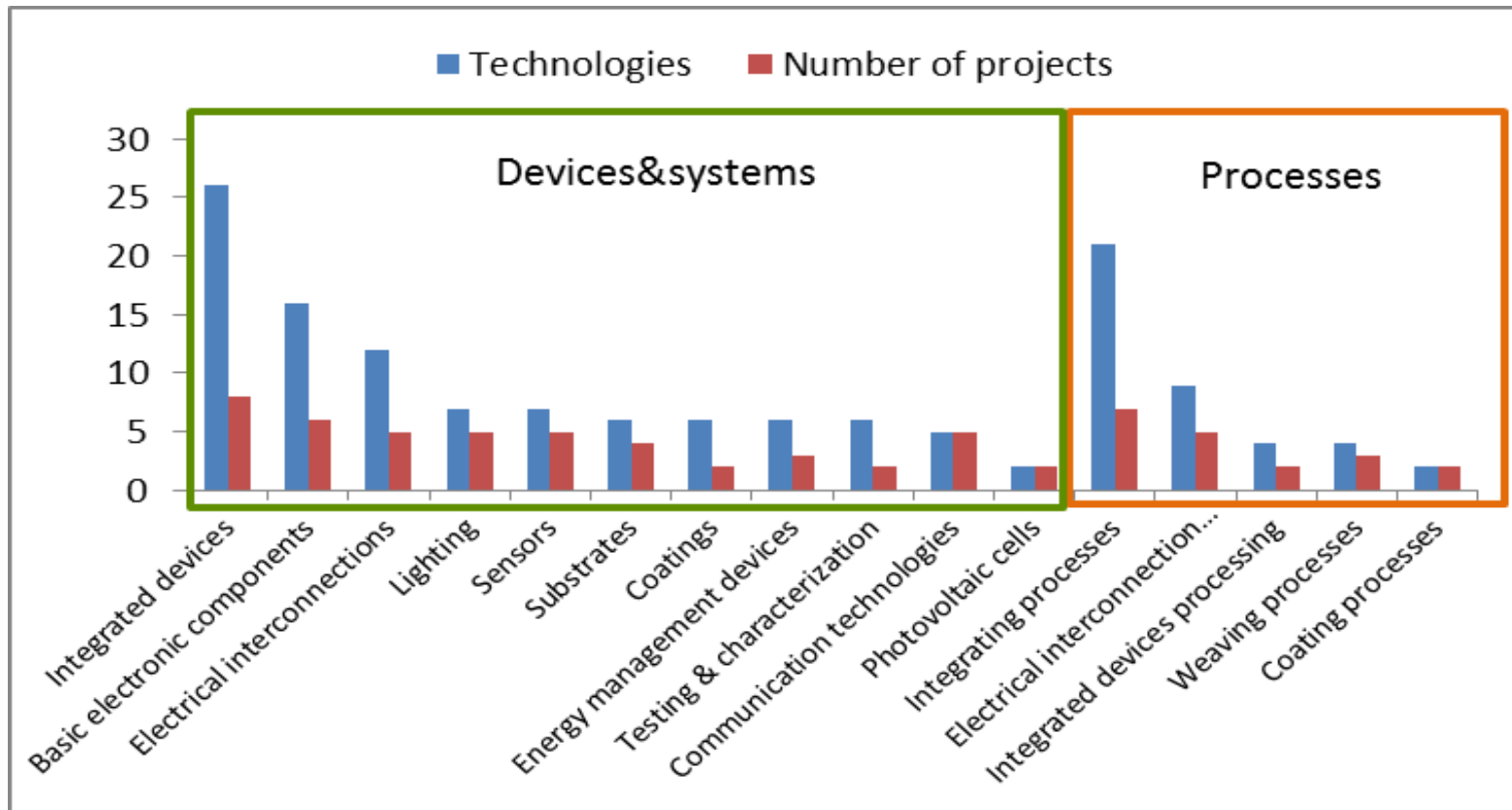Andreas.lymberis@ec.europa.eu

Courtesy CSEM, CH
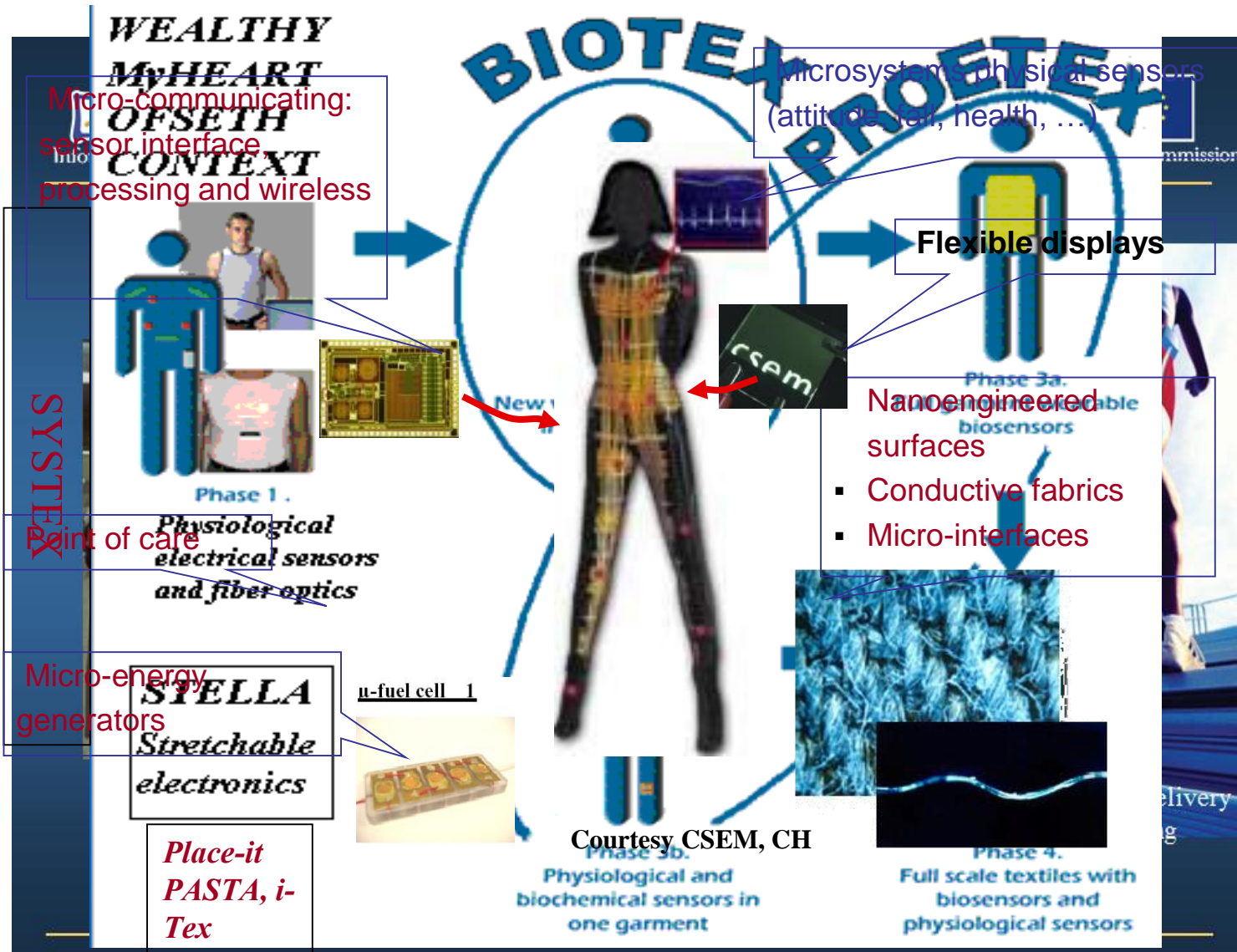
- 10 projects:
  - **8 CP projects,**
  - **1 CSA**
  - **1 CP-CSA**
- Total Costs: **63.7 M€**
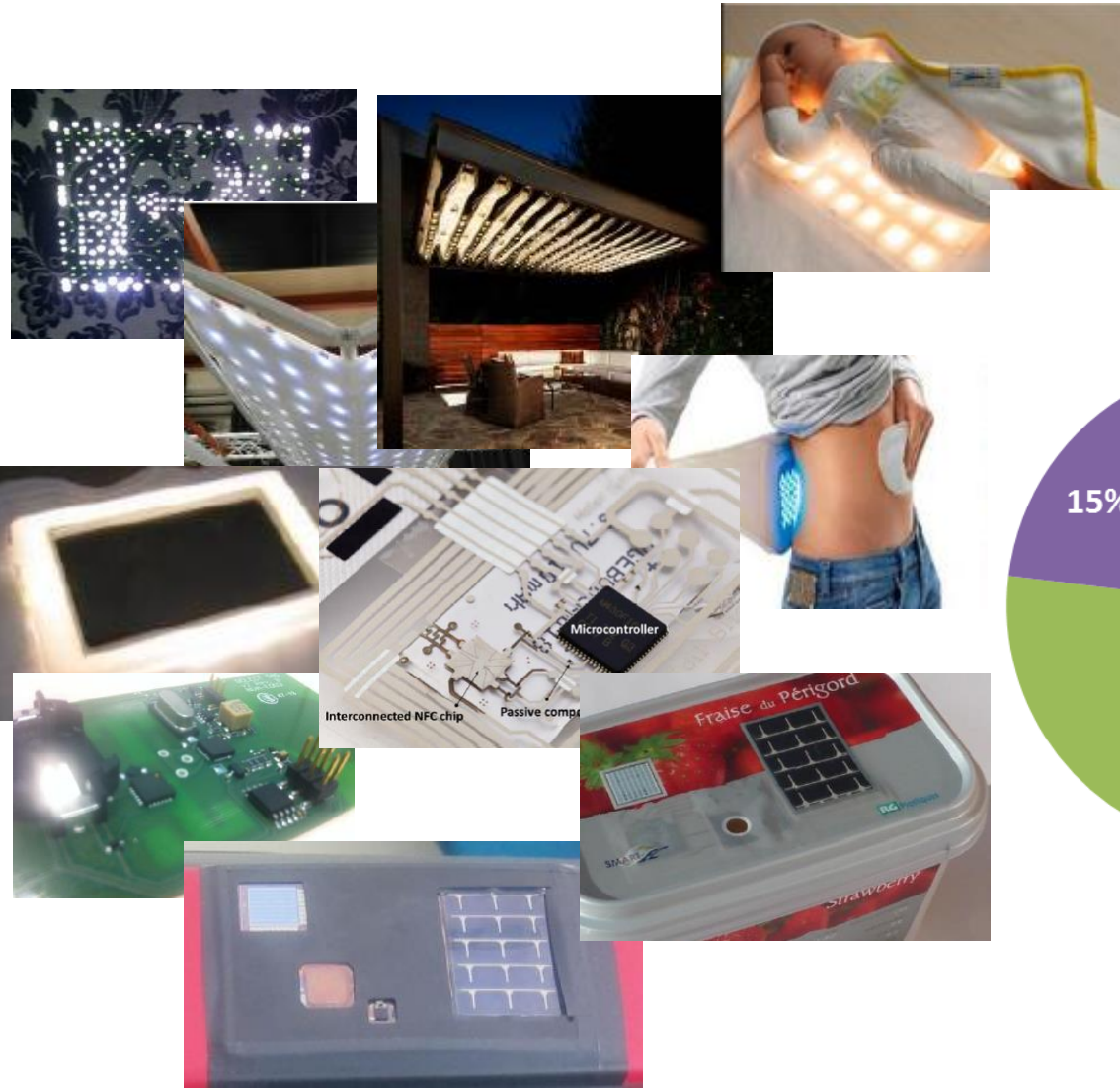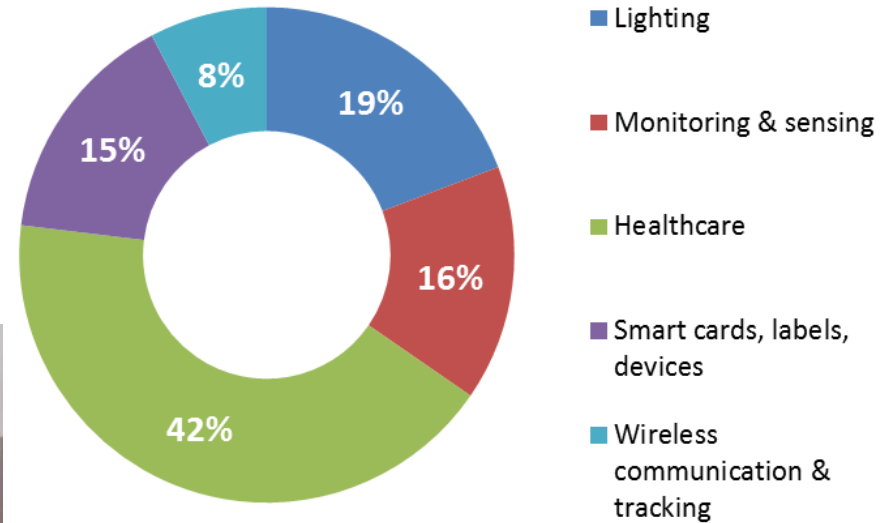- EC contribution: **43.5 M€**
- 94 different participants
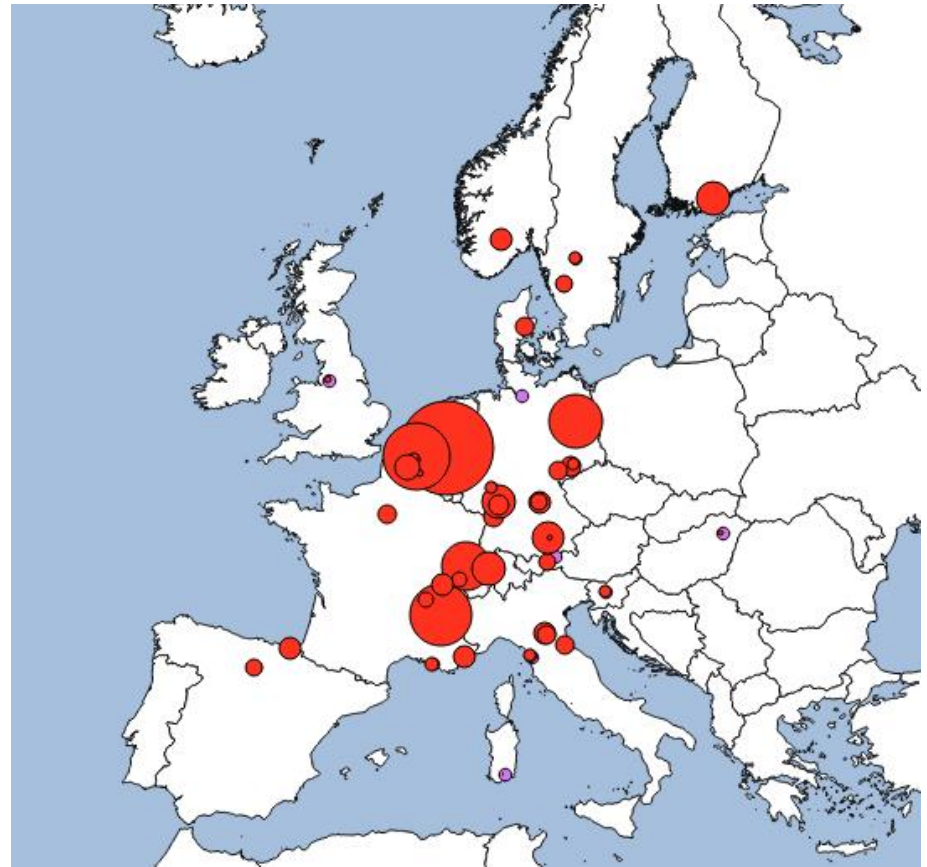
- *Wide variety of devices and systems developed*
- *Great effort related to fabrication processes*

Prototype Demonstrators

Applications

- Lighting — 19%
- Monitoring & sensing — 16%
- Healthcare — 42%
- Smart cards, labels, devices — 15%
- Wireless communication & tracking — 8%

Scope

- *What do we want to achieve with this pilot?*

  Innovative wearable* solutions and services:

  - *Integrated in interoperable IoT ecosystems*
  - *Driven by user needs*
  - *Transferable to other application domains*
  - *Scalability demonstration*

  Deployment, demonstration and impact assessment
  (across the value chain)

  Fabrics
  Cloths
  Patches
  Body-mounted devices

- *Possible Application scenarios ?*

  - *Healthcare, well-being*
  - *Safety, Security*
  - *Infotainment*

- *Within the IoT context*

  - *Operation across multiple sites,*
  - *Scalability to large # of heterogeneous devices & systems,*
  - *Interoperability, security & privacy, liability, etc.*

Scope

- Demonstration of **wearable solutions** and services integrated in interoperable IoT ecosystems.

- **Bring new functionalities into clothes, fabrics, patches, watches or other body-mounted devices**.

- **Assist humans** in monitoring, situational awareness and decision making.

- Particular attention to actuating functions providing, whenever feasible, closed-loop solutions.

- **Prototype development and demonstration expected for healthcare, well-being, safety, security and infotainment applications**.

- **Driven by concrete business cases**, open design approaches and **user requirements**, taking into account **data protection and liability concerns**.

- Involve **actors of the entire innovation value chain**, potentially including creative & artistic actors

Project (up to 15 M€ for pilot 3) 70% funding

- Majority of effort should be on piloting; **Building blocks should be proven**;

  May include **limited research** and development activities

- Effort devoted to supply (technologies) and demand (users) should be balanced

- Important elements of supply side:
  - Management and adaptation of involved **sensing**, actuating, processing, **energy supply**, storage technologies at node level
  - Integration of devices, objects and systems in an IoT environment
  - Approaches to **interoperability** and openness
  - **Security and privacy** approaches

- Important elements of demand side:
  - Design, implementation and **testing of multiple use-case scenarios**
  - Interoperability needs and testing
  - Security and privacy needs
  - Feedback to IoT supplier for **technology optimisation**
  - **User**s/citizen awareness, involvement and **acceptance**
  - Impact, added value and affordability assessment

Pilots are expected to have a high impact on citizens, both in public and private spheres, industry, businesses and public services.

Key performance indicators should be defined to measure progress on citizen benefits, economic growth, jobs creation, environment protection, productivity gains, etc.

- Validation of technological choices, sustainability and replicability, of architectures, standards, interoperability properties, of key characteristics such as security and privacy;
- New industry and business processes and innovative business models
- User acceptance validation addressing privacy, security, vulnerability, liability
- Significant and measureable contribution to standards
- Improvement of citizens' quality of life, in the public and private spheres, in terms of autonomy, convenience and comfort, participatory approaches, health and lifestyle, and access to services.
- Creation of opportunities for entrepreneurs, expanding local businesses to European scale, etc.
- Development of secure and sustainable European IoT ecosystems and contribution to IoT infrastructures viable beyond the duration of the Pilot.

Micro-Nano electronics
Sensing/actuating
Energy scavenging & management
Wireless communication
Low-power computing
TOLAE, e-textile, smart fabrics

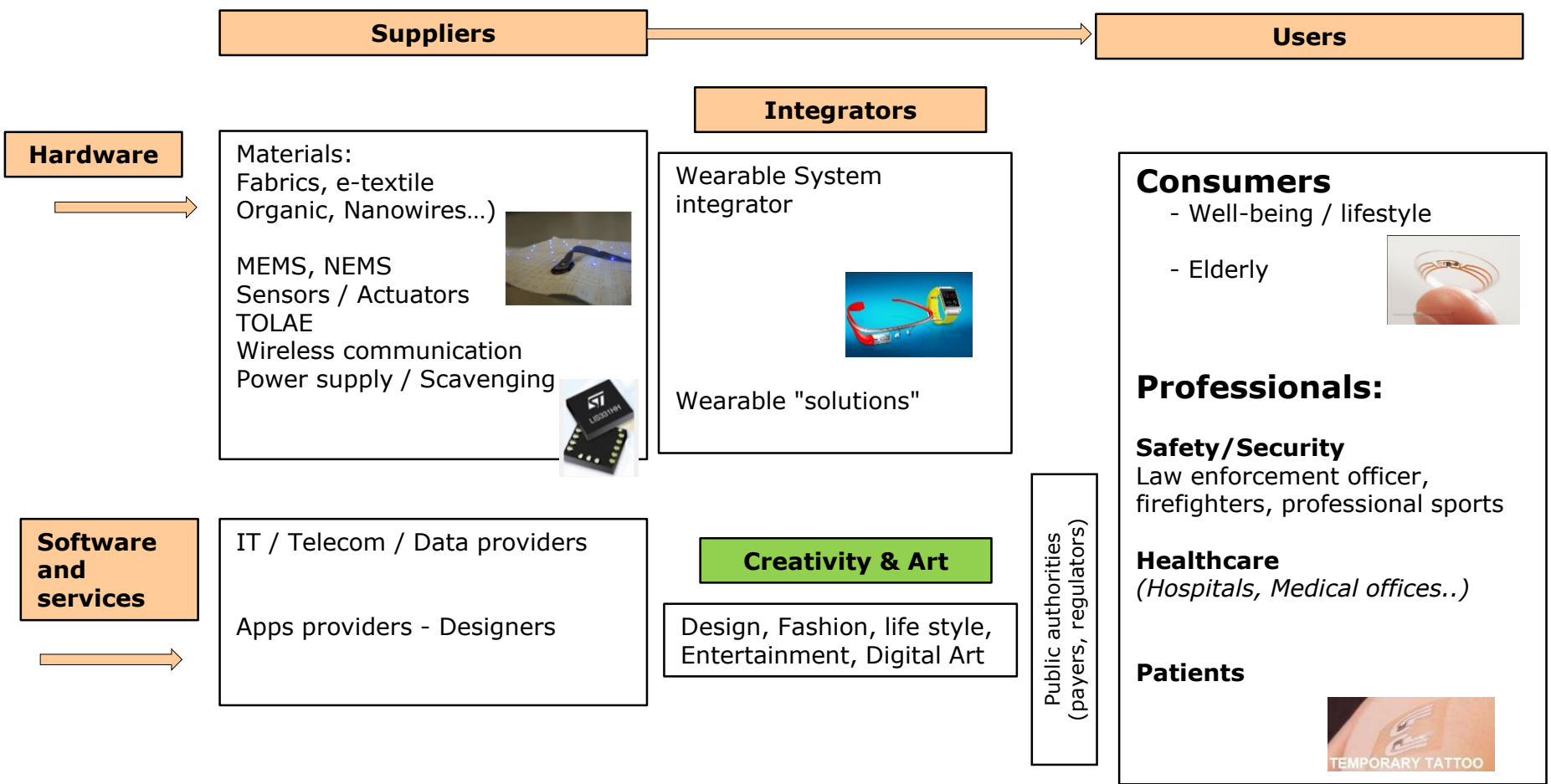Embedded distributed Intelligence
Data management for privacy & security

Manufacturing:

System integration (SSI)

Integration in Wearable Solutions

Solutions And Services

Stakeholders – Who ?

Suppliers → **Users**

Integrators

Hardware

Materials:
Fabrics, e-textile
Organic, Nanowires…)

MEMS, NEMS
Sensors / Actuators
TOLAE
Wireless communication
Power supply / Scavenging

Wearable System integrator

Wearable "solutions"

Consumers
- Well-being / lifestyle
- Elderly

Professionals:

Safety/Security
Law enforcement officer, firefighters, professional sports

Healthcare
(Hospitals, Medical offices..)

Patients

Software and services

IT / Telecom / Data providers

Apps providers - Designers

Creativity & Art

Design, Fashion, life style, Entertainment, Digital Art

Public authorities (payers, regulators)

Thank you

Digital Agenda for Europe – Components and Systems:
https://ec.europa.eu/digital-agenda/en/science-and-technology/components-systems

Research in Key Enabling Technologies:
http://ec.europa.eu/research/industrial_technologies/

Horizon 2020 on the web:
http://ec.europa.eu/research/horizon2020/index_en.cfm

Horizon 2020: To find out more:

- http://ec.europa.eu/research/horizon2020/index_en.cfm
- **LEIT ICT Work Programme 2016-2017:**
  http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-leit-ict_en.pdf
- **National Contact Points:**
  http://ec.europa.eu/research/participants/portal/desktop/en/support/national_contact_points.html
- **The Participant Portal:**
  https://ec.europa.eu/research/participants/portal