ETSI World Class Standards

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4th November 2015 • Shangri-La's - Eros Hotel, New Delhi, INDIA

IN THE FRAMEWORK OF Project SESEI
http://eustandards.in/

IoT Standardization activities in / related with ETSI

**Presented by Francisco da Silva, Huawei,
ETSI Board member**

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ETSI IoT Activities

- Board IoT Strategy Group
- Smart Appliances Reference Ontology (SAREF) – *EC /ETSI Project*
- Through participation in 3GPP
- Through participation in oneM2M (*presentation by ETSI DG Luis Romero*)
- ETSI Participation in AIOTI (Assembly for IoT Initiative) – *EC Initiative*

Board IoT Strategy Group

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Board IoT Strategy Group
Achievements and status 2015

- Positioning of ETSI as a key player in IoT
- Supported the activities of the ETSI technical organization in the IoT area
- Consolidation of the topics of smart cities and smart appliances under IoT
- Contributions to SSCC-CG - the ESO Smart and Sustainable Cities and Communities Coordination Group - and to EC and Smart M2M /oneM2M related to SAREF project - the Smart Appliance REFerence Ontology.
- Support ETSI's leadership in EU initiatives around IoT, in particular AIOTI and the support of the LSPs
- ETSI leadership in AIOTI WG3 (IoT standardization)
- Creation of a catalog of SDO, Alliances and OSS in the IoT landscape
- Started work on developing strategic guidance for ETSI on IoT with medium/long term perspective.

Board IoT Strategy Group
2016 Objectives

Future work areas	• Do broad analysis of possible work areas not yet addressed by the ETSI standardisation activities • Develop strategic recommendations
Advanced Manufacturing / Industrie 4.0	• Priority area of both industry and governments in Europe • Analyse the needs and opportunities for ETSI in this field and develop strategic recommendations
Review EU and global policy priorities in IoT	• Identify possible opportunities for ETSI • Spearhead the activities in standardisation supporting EU and global policy priorities
Review liaisons	• Identify possible further needs for additional liaisons • Analyse in which areas existing liaisons are used and whether there may be further opportunities
Strategic positioning of ETSI	• Strategic positioning of ETSI will be further analysed • Recommendations will be made when appropriate for further improvements and advancements
Support from ETSI to EC LSP Large Scale Pilots projects	• Ensure that our technical organization is ready to respond to standardisation needs (gaps) identified by EC projects • Ensure the success of LSP projects

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Smart Appliances Reference Ontology (SAREF)

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EC Study on semantics / ontology for supporting interoperability of Smart Appliances

- A study on the available semantics assets for the **Interoperability of Smart Appliances** in order to map into a **Reference Ontology** as an "M2M Application Layer Semantics" has been tendered by the European Commission and was carried out by TNO.
- The EC study call for the tender was on 19/06/2013. The link for the result is available since 11/03/2015 as: https://sites.google.com/site/smartappliancesproject/deliverables
- Energy utilization of Smart Appliances can be reduced if they are managed and controlled on a system level.
- Many of the required standards already exist, but a common architecture does not, resulting in a market which is fragmented and powerless.
- Therefore, a reference ontology of consensus was designed to cover the needs of all appliances relevant for energy efficiency.

Arguments for a study on a Reference Ontology for Smart Appliances

Value for the PEOPLE

- **Better Living:** Home appliances are at the service of the people. Smart Appliances will provide an easier and conscious use of the appliances, profiting of the benefits of their integrated use / their connectivity.
- More efficient use / production of the energy in the home
- "Greener", more comfortable environment at home
- Better control of home when outside
- Reduction of the global footprint of our lifestyle on the environment

- **Better opportunities:** Smart appliances and IoT excellence means:
- More opportunities to develop high value know-how
- More opportunities to generate economical returns, on the EU market, but also in terms of export and footprint outside the EU border
- More jobs in the technology and service areas
- More efficient tools for managing our countries – in direction from smart cities towards smart countries

Arguments for a study on a Reference Ontology for Smart Appliances

Value for the HOME APPLIANCES Industry

- Home appliances is a strong sector of the European industry facing strong competition from other Regions.
- Anticipating innovation is a key factor. Integration with IoT opens a new dimension to the innovation on top of the intrinsic product.
- Integration with IoT will help to share the costs of the communication infrastructure and of data storage in the network, together with other industry segments. The intrinsic cost is still difficult to be faced by a single industry sector.
- It helps the relation with the clients, increasing the occasions of interaction and servicing.

Arguments for a study on a Reference Ontology for Smart Appliances

Value for the generality of European industries

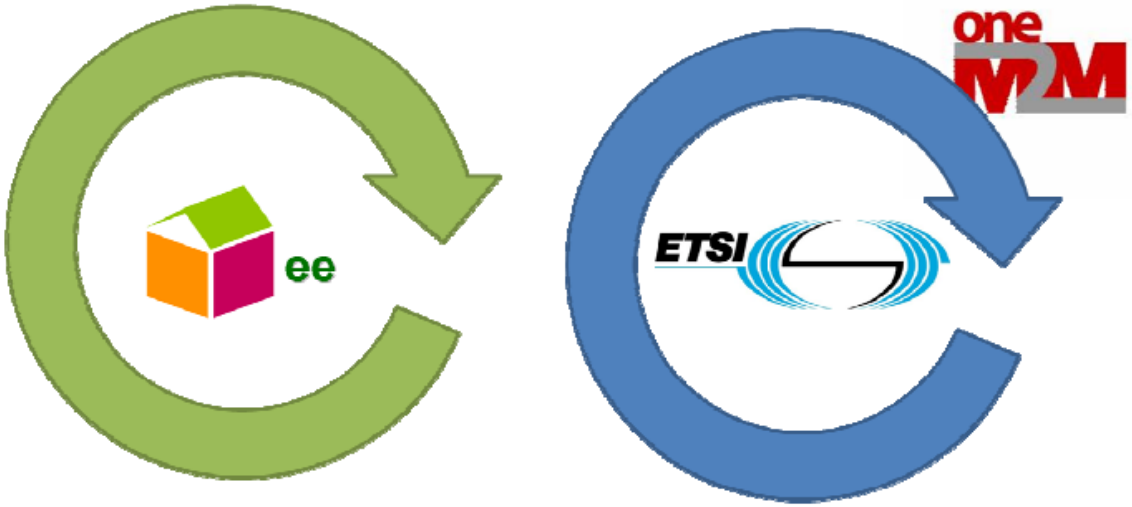
- True that IoT is already part of today's experience, but still is far of a full exploitation - and is growing relatively slower than the more optimist views.
- The know how for IoT is of high level, and EU excelling as a first class deploying Region represents an opportunity for its industry and economy, as leverage for the "technology" industry and for the "application services" sectors.
- A quick development of Smart Appliances in Europe would be a key factor for the IoT development - would be a catalyzer for other sectors.
- Smart appliances Industry could be one of the European "champions" sector, that would lead European industry in general towards new industrial, know-how and service opportunities.

The 2-wheel mechanism

This study is intended to provide the required material needed to define the semantic tools and data models as required for Smart Connected Appliances seen as cooperative objects in the Energy Efficiency ecosystem, as required by an M2M approach.

Study

Standardisation



To make sure that the requirements of the Energy Efficiency "vertical market" are collected in a structured way, in a near M2M "Service Capability Layer" (SCL) format

To make sure it is made fully M2M conformant and integrated as an asset of the M2M community

Where the Smart Appliances project is

- **SAREF** is the **S**mart **A**ppliance **REF**erence Ontology. It has been mapped to the oneM2M base ontology (oneM2M TS-0012: "Base Ontology") to be used with oneM2M systems.
- TC SmartM2M work on-going is based on TS 103 264 SAP Ontology and oneM2M mapping to be published in November 2015 in V1 and TS 103 264 V2 in Summer 2016 with a oneM2M mapping.
- SAREF was built via a wide consultation of IoT and Energy related consortia and alliances, with 4 EC+ETSI SAREF workshops, and publishing the EC study which was regularly presented to oneM2M (WG5) community.
- Therefore this work has two major objectives: 1) To provide a standardized framework for the Common Ontology derived from the EC Study Group on Smart Appliances; 2) To map the common ontology onto the elementary oneM2M.
- SAREF evolution should be maintained to avoid fragmentation of its definition in different places.

Through participation in 3GPP

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On 3GPP work for IoT

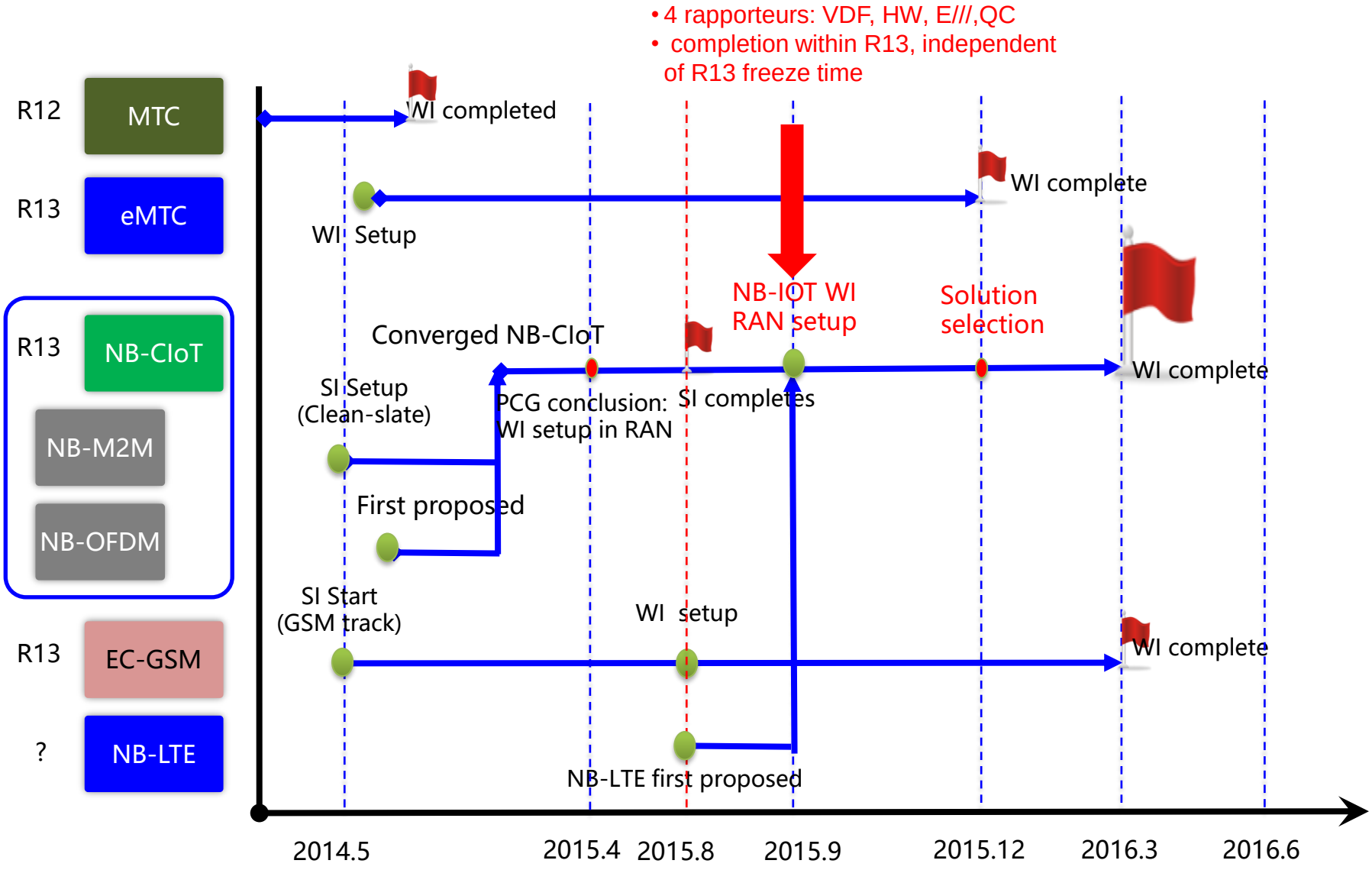
- 3GPP is developing for some time now a comprehensive program work enabling IoT support
- Work had already began from 3GPP Release 10, MTC (Machine Type Communication), having requirements: Rel 10 feature - MTC device overload control; Rel11 feature - MTC device triggering; Rel12 feature - recall/replace device triggering, power saving mode.
- In Rel. 13, 3GPP defines features such as Service exposure with 3rd party service providers features and Charged party selection.
- These additional Rel. features are exposed by the 3GPP architecture through its Service Capability Exposure framework.
- Also for the present Release 13 (and related continuations to Release 14 when appropriate) we can mention work e.g.:
- *on Lower latency,*
- *on Peak rate capacity: LAA, Carrier CA, etc*
- *and on Massive Connections: Narrowband IoT (NB-IoT), LTE-D*

- In the following slides, it is covered the hot topic LPWA / NB-IoT.

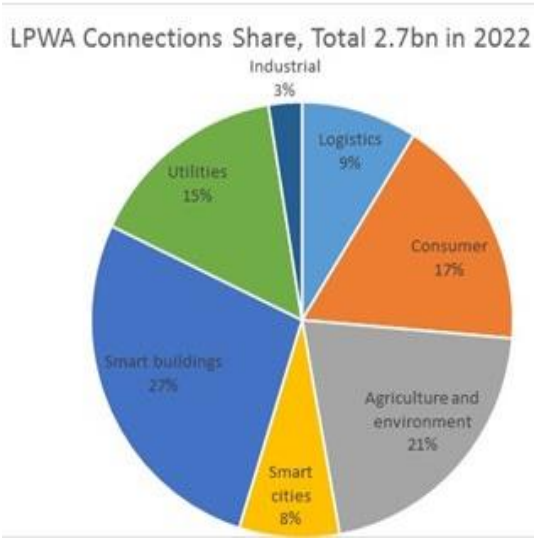
LPWA Candidate Solutions: Non-standard IoT v.s. Cellular IoT

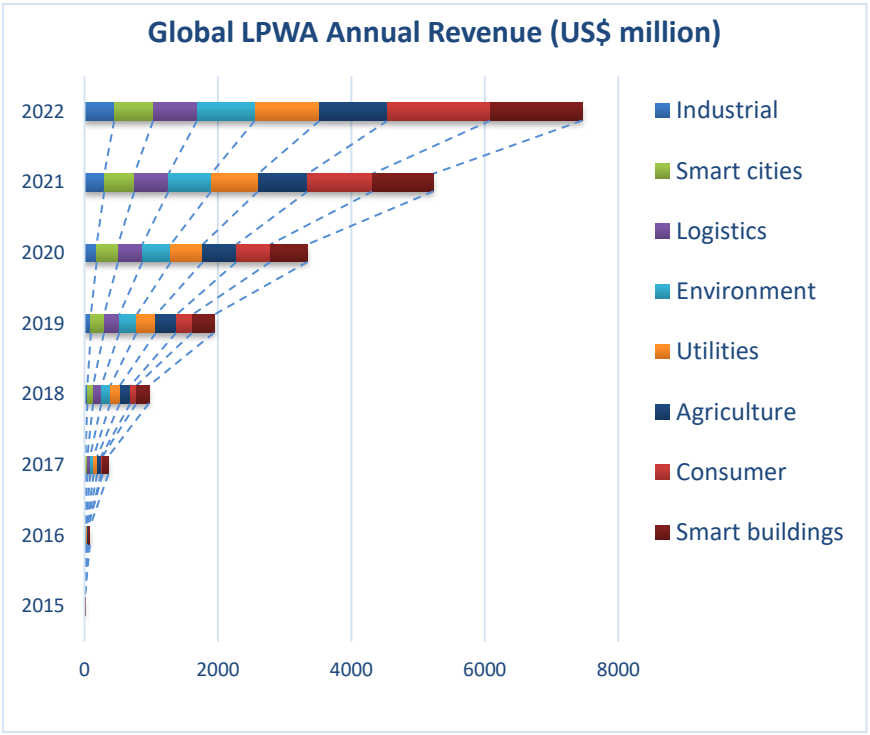
	Standard /Global ecosystem	Band	System Bandwidth	Coverage	Module cost	Battery life	Capacity	Time to market (years)
SigFox	✗	**Unlicensed**	250kHz~ ?MHz UL 100Hz	GSM 14dB+	X		Lower than NB-IoT	✓
LoRa	✗	**Unlicensed**	7.8k~500kHz	GSM 18dB+	X			✓
EC-GSM (R13)	✓	**GSM band**	2.4MHz	GSM ~20dB+	2X		About 1/10 of NB-IoT per unit BW	1~2
eMTC (R13)	✓	**LTE band**	1.4MHz	LTE 15dB+	**3~10X**		Similar as NB-IoT	1~2
NB-IOT (standalone)	✓	**G/U/L MSR /dedicated**	200kHz	GSM 25dB+	X		>50k/cell/200kHz	1~2
NB-IOT (guard-band)	✓	**LTE band**	200kHz	GSM 20dB+	X			1~2
NB-IOT (in-band)	✓	**LTE band**	200kHz	GSM 17dB+	X			1~2

3GPP Narrow Band Cellular IOT History



LPWA IoT Market Analysis





✓2.7 billion connections and annual connectivity revenue will reach US$7.5 billion by 2022

✓LPWA Market is large enough for an individual UE category but avoiding fragmentation is essential to the success of CIoT.

IoT Applications and Technical Requirements

Application family	Applications	Battery Life	Coverage	Latency	Mobility	Technology Fitness	Can meet cost req. of <5$?
Type 1	Consumer – wearable's, VIP tracking (humans or animals), smart bikes, medical/assisted living	2~5	Outdoors / indoors	Estimated at about 30 seconds, 2-5 seconds might be required in case of VIP tracking.	Low mobility, mostly nomadic	NB-IoT > eMTC > EC-GSM > Cat0	**NB-IoT = Yes** eMTC= No EC-GSM= ? Cat0=No
Type 2	Industrial asset tracking, microgeneration; agricultural & /environmental – near real-time monitoring	5~10	Outdoors	Under 10 seconds in most cases.	Nomadic (assets or live stock) and stationary	NB-IoT > eMTC > EC-GSM	**NB-IoT = Yes** eMTC= No EC-GSM= ?
Type 3 – a	Water/gas metering, building automation, smart city – parking, waste management;	5~10	Deep indoor coverage	10s for control use cases; 60 sec for data collection.	Stationary	NB-IoT > eMTC > EC-GSM	**NB-IoT = Yes** eMTC= No EC-GSM= ?
Type 3 - b	Industrial – machinery control; agricultural / environmental– stationary data collection.	5~10	Extended rural coverage		Stationary	NB-IoT > eMTC > EC-GSM	**NB-IoT = Yes** eMTC= No EC-GSM= ?
Type 4	City lighting, consumer white goods, vending machines	<2	Outdoors and indoors	<30 seconds for most use cases except Vending machine privacy/data verification (<1s)	Stationary	NB-IoT > eMTC > EC-GSM > Cat0	**NB-IoT = Yes** eMTC= No EC-GSM= ? Cat0=No
Summary	**✓The M2M LTE based technologies (NB-IoT, eMTC, Cat0) can support the identified applications but with different costs, different battery life and different coverage requirements.**						**✓NB-IoT can meet the target cost for all the application family**
	✓eMTC and NB-IoT overlap in meeting the same requirements for LTE in-band but NB-IoT is 50% more cost efficient than eMTC						**✓UL PA efficiency is an important factor in reducing the NB-IoT module cost**
	✓ Analysis is taking into consideration the EU cost and power consumption requirements						

ETSI Participation in AIOTI

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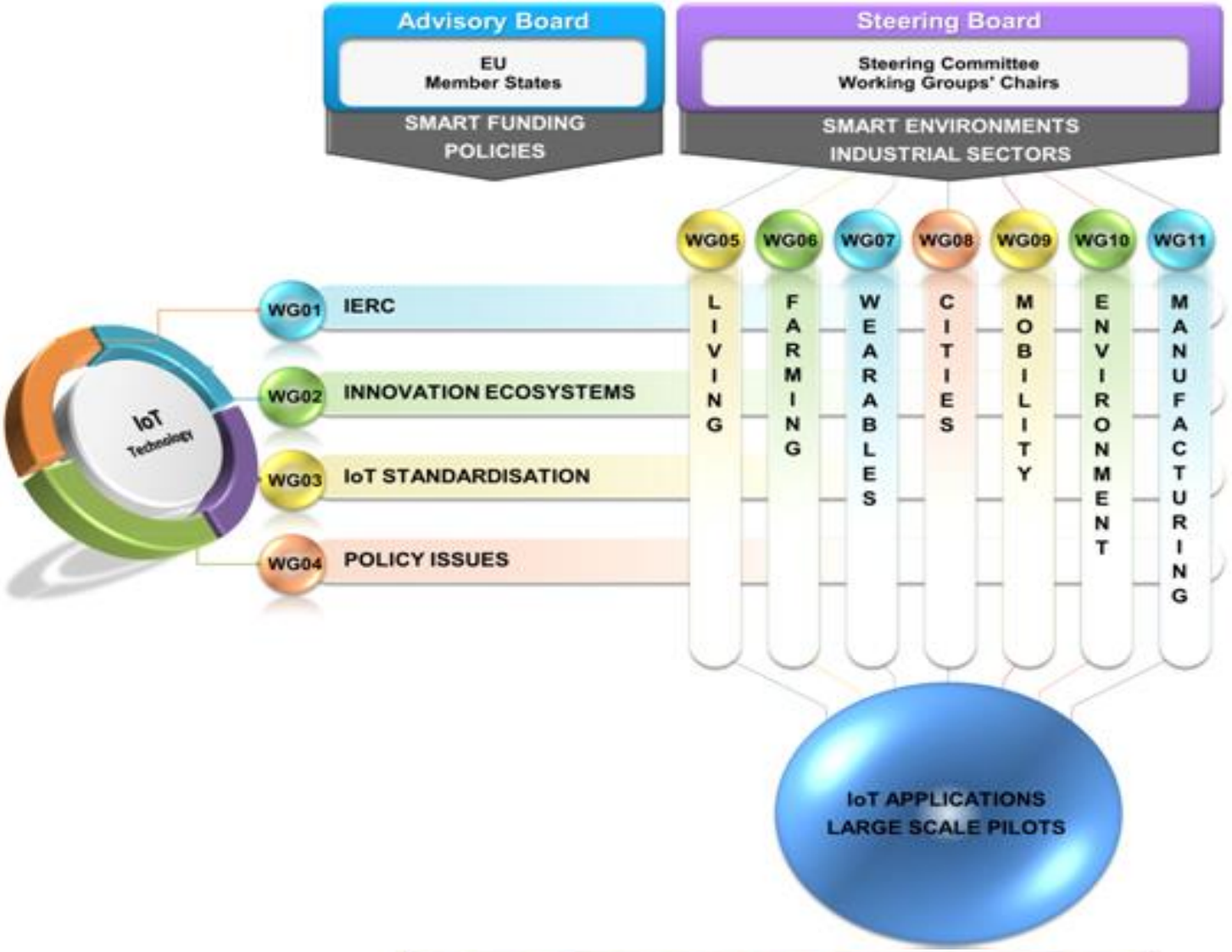
The AIOTI Initiative

- **Background**
- On 4th February 2015, the IoT industry together with the European Commission launched the **Alliance for IoT Innovation (AIOTI)** as a new global voice for IoT in line with European values. IoT industry committed to establish the most dynamic, agile IoT ecosystem in the world to address people's lives and societal challenges, and to stimulate growth.
- AIOTI is the biggest IoT stakeholder forum in Europe that identifies roadblocks for IoT deployment, gaps in standardisation and promotes cross-domain synergies by bringing together the telecom, internet sector, automotive, home, agriculture, health and smart city stakeholders.
- **AIOTI Status**
- 325+ members by October, 2015.
- **On AIOTI specific goals**
- AIOTI is a driver for the **IoT Large Scale Pilot projects**, which will dispose of public and private funding;
- Promotion of interoperability between standards.

ALLIANCE FOR INTERNET OF THINGS INNOVATION - AIOTI



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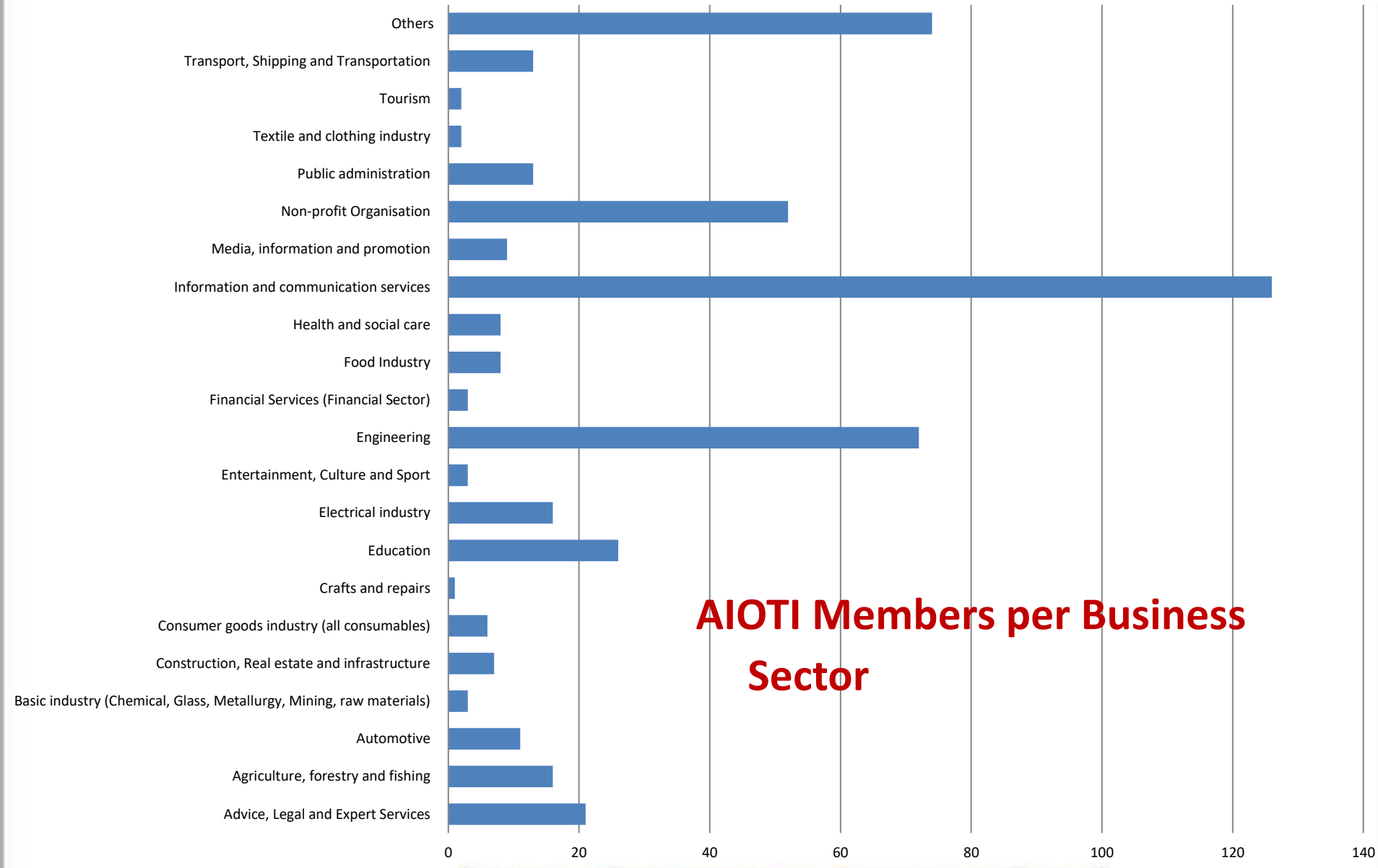


AIOTI Members per Business Sector

List of Large Scale Pilots

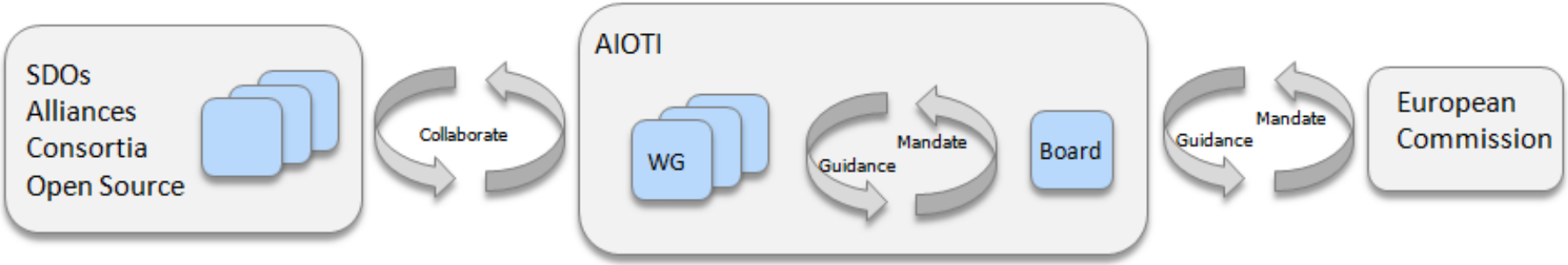
- **EC plans to have 6 Large Scale Pilots :**
  - Ageing Well being *(to be incorporated in H2020 IoT call)*
  - Wearables *(to be incorporated in H2020 IoT call)*
  - Farming *(to be incorporated in H2020 IoT call)*
  - Smart City *(to be incorporated in H2020 IoT call)*
  - Autonomous Vehicle in Connected Environment *(to be incorporated in H2020 IoT call)*
  - Smart Manufacturing *(to be incorporated in Factory of the Future (FoF) PPP call)*

Note - the H2020 call associated with these LSPs (thus all above except Smart Manufacturing) will be launched in Q1'2016 .

WG3: IoT Standardization
Chairman: ETSI, co-Chairman: Schneider

- **Objective:** Implies the mapping of existing IoT standards and gap analysis, as well as strategies and use cases to develop (semantic) interoperability.

- High level view of Collaboration between AIOTI Working Groups (WG3 will be relevant for all the AIOTI WGs)



Activity status of AIOTI WG3

- **Objectives for 2015:**
  - Development of a **H2020 IoT LSP call** accompanying document (by the end of 2015)
  - Deliverables already made available to the EC and officially published by it on 26th of October):
    - ✓ "High Level Architecture (HLA)"
    - ✓ "IoT LSP Standard Framework Concepts"
    - ✓ "Semantic Interoperability"
- **3 Sub-WGs**
  - SDO & Alliance Landscape including Open Source Initiatives) picture & segmentation development - team lead by Huawei.
  - High level IoT Reference architecture - team led by oneM2M Technical Plenary Chairman / ALU
  - IoT Semantic Interoperability development team led by Landis+Gyr.

Thank you for your attention!