oneM2M Standard provides a full (eco)system

Enrico Scarrone– oneM2M SC Chairman

C-DOT Foundation Day

New Delhi, August 26th-27th 2019

Internet of Things

It is a significant reality but it is far from expectations

Do you remember the forecasts?

-20 billion devices by 2020

-50 billion devices by 2025

It is a really a bigger promise

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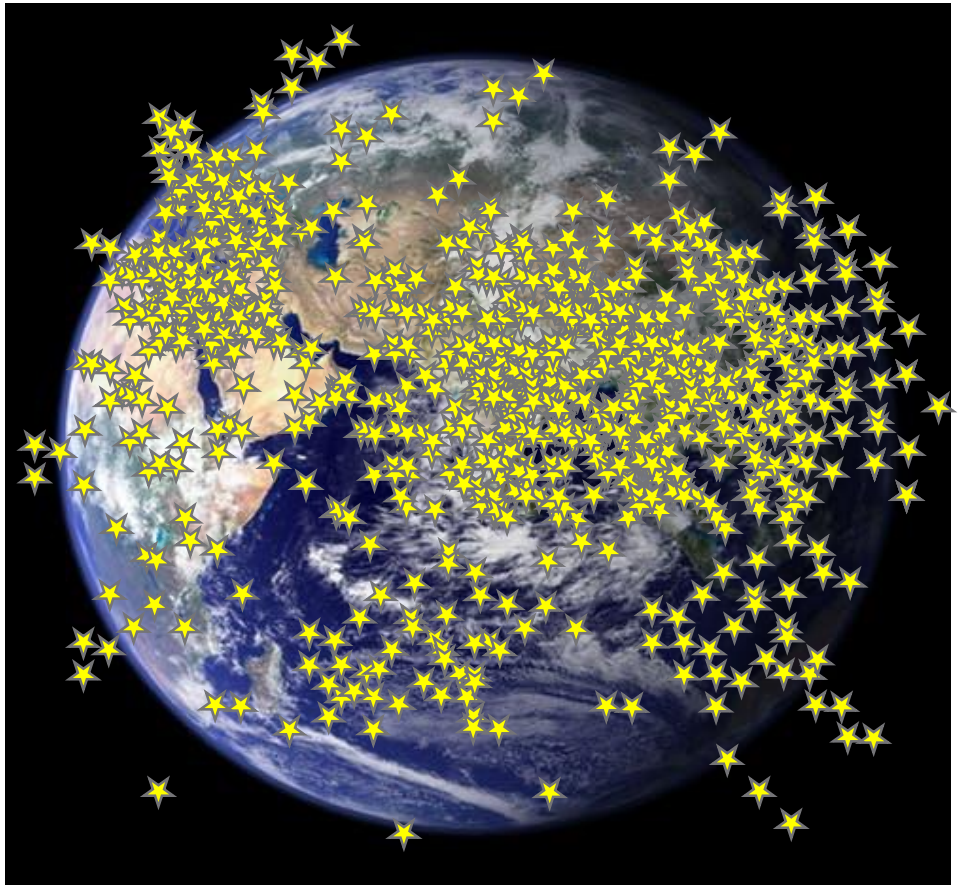
IOT is a really a bigger promise…

much more than 50 billion….

But WHEN? WHY is late?



Internet of Things

- Complexity: IoT services and systems are complex and require a lot of **different in deep know-hows** to **combine** the **information** from the different domains

But a lot of the complexity is artificial…..

Take a “simple” IoT example

- Car incident in a Smart City:
  - The incident is detected by the Car and by the road side sensors.
  - Traffic is rerouted controlling traffic lights and electronic signals
  - The ambulance and the emergency team are sent to the incident place.
  - The persons are rescued and their medical conditions are evaluated.
  - E-health consultation with the medical experts in the hospital.
  - The best hospital is selected based on availabilities, traffic conditions, position and expertise, and the patient(s) are transported
  - The overall traffic is controlled giving priority to the ambulance
  - During the transportation an initial set of examination are done
  - The relatives of the patient are alerted using the municipality information
  - Etc….

Internet of Things

- The main effort is today on **INTEGRATION** of **DATA PLATFORMS**, **TECHNOLOGY, COMMUNICATION PROTOCOLS**
- FRAGMENTATION is the major SHOW STOPPER:

FRAGMENTATION and solutions LOCKING

ARE DRAINING MOST of the IOT resources

- While the main effort should be on the SERVICES DEVELOPMENT and the INTEGRATION OF INFORMATION generated by the different data sources.

The role of Standardization for IOT

- **Simplify** the environment, **remove** the unnecessary duplicated solutions (economy of scale), **preserve** the necessary/opportune solution specialization by **interworking**

- Support the **developers community** accelerating the development of IoT
- Transfer the competition from integration and platforms **to services unlocking the market**
- Enable Inter-technology and inter-domain data sharing generating **new services and new business opportunity**

Reduce platform development and integration costs,
Enlarge the market,
Enable real competition on services

WHY to use oneM2M?

oneM2M is a global Standard
- It is open and not controlled by a single private company!

oneM2M is hugely complete
(is sharing the innovation effort and the experiences of hundreds of companies with more than 500 man years of work

Full chain:
open “de jure” specs – opensource-interoperability – certification-products and services

www.oneM2M.org
All documents and specifications are publically available

Industry-driven Open source implementations

LAAS-CNRS, Fraunhofer FOKUS, KETI, CISCO OPEN DAYLIGHT, atis OS-IoT
OM2M Connecting things, open mtc, OCEAN, IotDM

Examples of Commercial implementations, Prototypes, Trials

LG, C-DOT Centre for Development of Telematics, SIERRA WIRELESS, INTERDIGITAL, QUALCOMM, Deutsche Telekom
orange, kt, HUAWEI, SK telecom, sensinov, MODACOM, LG U+, Hewlett Packard Enterprise, John Deere
NEC, iREX, SAMSUNG, SAMSUNG SDS, DASAN, HANDYSOFT, GRIDNET
NTT, PILOT THINGS, HEALTHCONNECT, ICEPCO, ntels, TIM

Certification Test Houses and Test Tool Vendors

SPIRENT, TTA, DEKRA, Innowireless, KETI, Dt&C

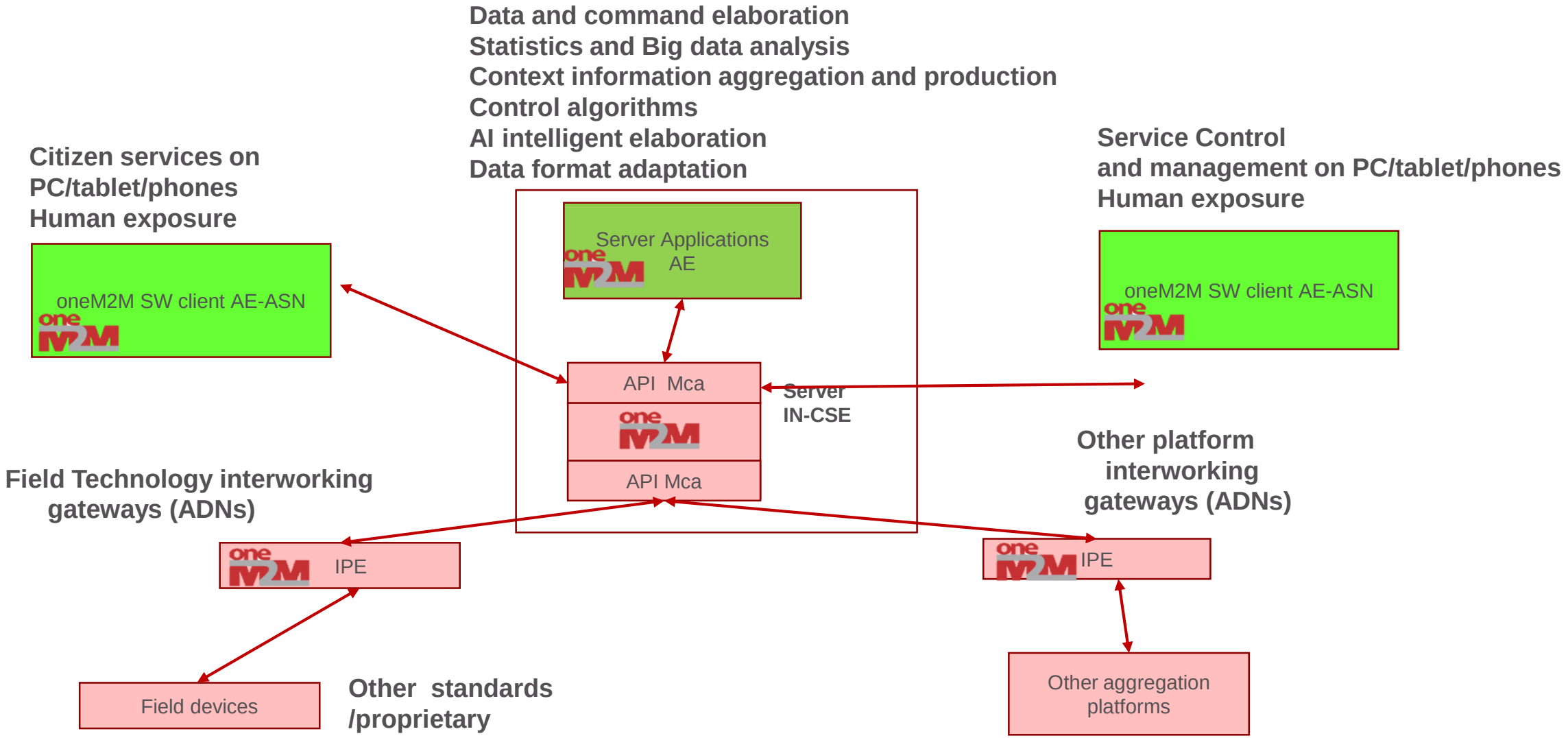
Regular Interop Events (6 Held from 2015-2018)

WHY to use oneM2M?

- THE ONLY STANDARD “DE JURE” DEDICATED TO ENABLE HORIZONTAL IOT INTEGRATION
- DATA MANAGEMENT - DATA HISTORIZATION - INFORMATION SHARING
- VERY DYNAMIC PRIVACY AND ACCESS CONTROL
- SECURE: MULTIPLE SECURITY LEVELS
- STORAGE AND EXPOSURE FOR
  - Historical data
  - Data search and aggregation
  - Context information
  - Dynamic data
  - Real time control and actuation
  - Field device management
  - Network technologies independence
- EASY DB AND CLOUD INTEGRATION
- NATIVE DEVICE MANAGEMENT (DM; TR 069)
- FLEXIBLE IN THE DEPLOYMENT to adapt to the requirements of the various domains
- SCALABLE ARCHITECTURE
- INTER-PROVIDER NATIVE SUPPORT
- DESIGNED BE AN INTERWORKING FRAMEWORK FOR
  - Legacy field and core server technologies
  - Other technologies
  - Proprietary solution

  -> Not an additional solution, but a standard to integrate the different solutions
- SEMANTIC ENABLED TO SHARE INFORMATION
- INTERNET FRIENDLY FOR HUMAN INTERACTION
- SIMPLE if you use the core functions and know your deployment architecture

Some examples of REAL USE



Some Project integrated in TIM

Livorno Smart City (Harbor) and Connected Car Project (2016)

Firenze Smart City funded Project (from 2016 to 2021)

Torino Smart City Project: Living Lab (2016-2017)

MONICA Project
Torino + 5 european cities
(from 2017 to 2020)

Torino Smart City EC funded Project: Almana (from 2013 to 2016)

REPLICATE

Firenze
San Sebastian
Bristoly

Nilufer
Lausanyne
Essen

AUTOPILOT

Brainport
Firenze
Pisa
Livorno
Tampere
Versailles

TIM

OPEN AIR LAB

C-ROADS

Austria
Belgium,
Czech Republic
Denmark
Finland
France
Germany
Hungary
Italy
Netherlands
Norway
Portugal,
Slovenia
Spain
Sweden
United Kingdom

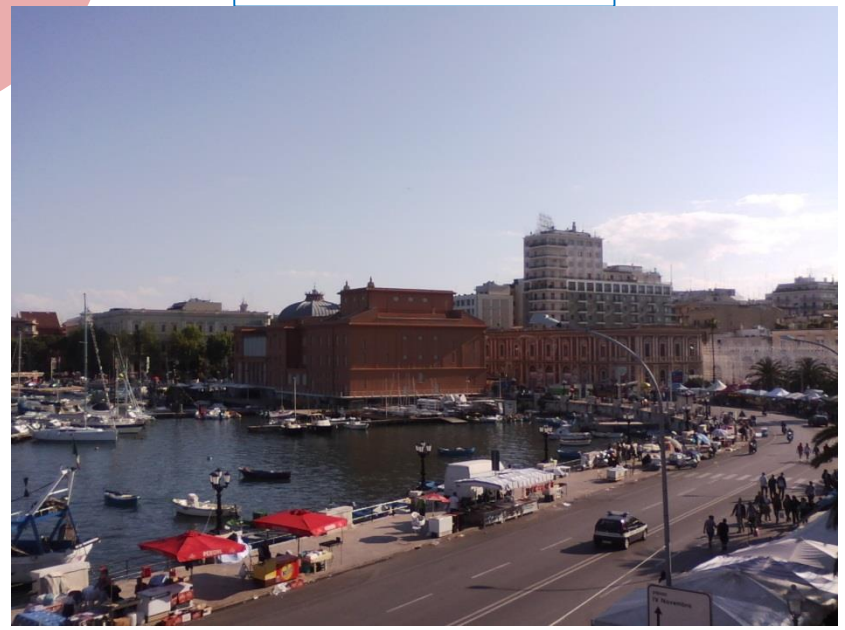
MONICA

Torino
Lione,
Bonn
Amburgo
Stoccolma
Copenaghen

Integration with the 5G Trials in TIM

Torino 5G

Bari/Matera
5G MISE



San Marino 5G

A comprehensive CityLab

Demo Areas in Genova, Roma, Naples

Torino first 5G Italian city

San Marino first European Country

Some use cases:

- Virtual Reality
- Public Safety, Push-to-drone
- Environment monitoring,
- Smart City Control Room: IoT platform and control center
- Public Safety wearable CAM & Bracelets
- Smart Parking, Assisted Driving
- Connected Factory in the Cloud
- Smart Waste

Bari/Matera 5G

MEDIA - VIRTUAL REALITY
Media fruition and Distribution

SMART PORT
Multimodal Logistics

SMART CITY
City sensing, ITS

SMART AGRICULTURE
Precision Agriculture

PUBLIC SAFETY
nologies for Public Authorities anc loca police

70 Use Cases
56 Partners
60 ME Value
2018-21

INDUSTRY 4.0
ory automation in selected industry settlement

HEALTH 5.0
Remote diagnosys

SMART URBAN MOBILITY
Assisted Driving, MaaS

CULTURAL HERITAGE
Augmented reality, Smart tourism

ENVIRONMENT PROTECTION
Smart Environment, Sensors

Contact details

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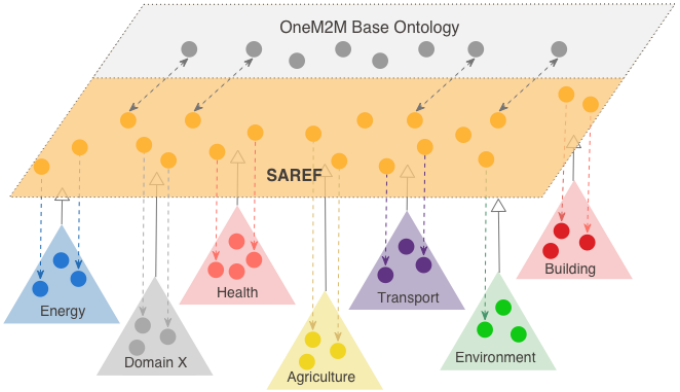
IOT:

The key is to share the information and its meaning among different systems and applications , and among different business sectors !

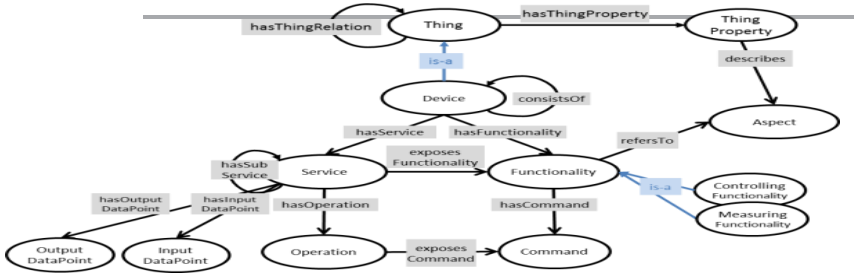
Thank you!

Universal semantic interoperability SAREF/oneM2M

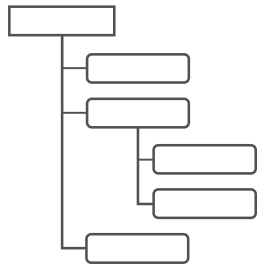
Specific Abstraction Models, grouped around a core common ontology



General base Ontology



OneM2M resources
Semantic annotation of data



1) Vertical ontologies support → **SAREF and its extensions**

2) Semantic Support → **IoT base ontology + Data annnotation**

3) Communication Framework → **IoT Data sharing**

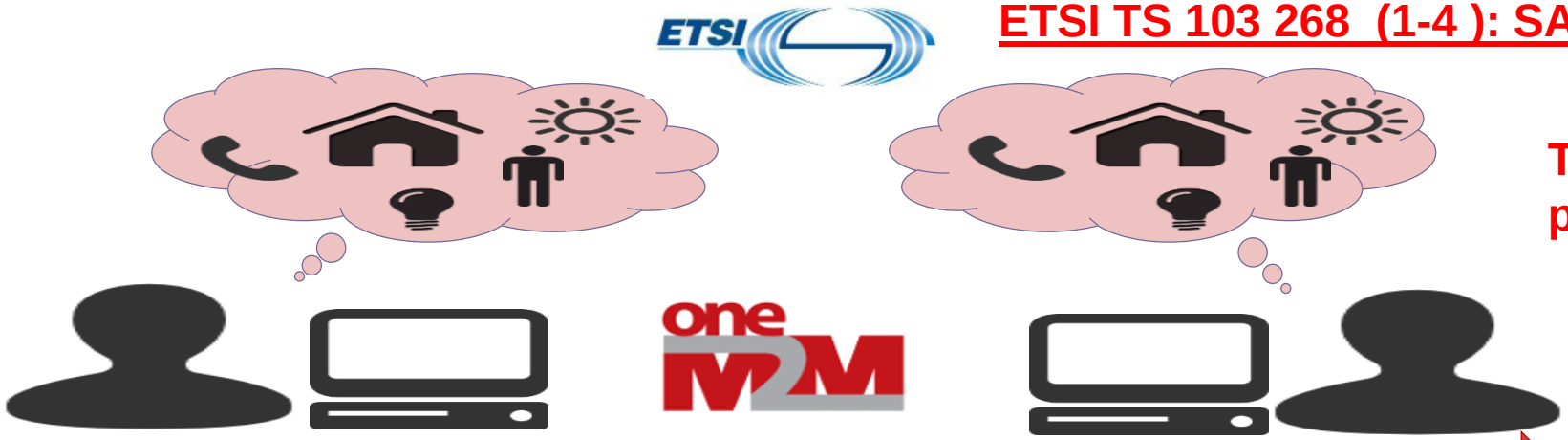
SAREF/oneM2M and its extensions

ETSI TS 103 264: SAREF and oneM2M Mapping

ETSI TS 103 410 (1-10): SAREF extensions

ETSI TS 103 267: SAREF Communication Framework

ETSI TS 103 268 (1-4): SAREF Test Suite



TS 103 548 SEAS reference ontology patterns

Semantic interoperability

SAREF Core

Energy

Building

Environment

Smart Cities

Industry & Manufacturing

Smart Agriculture

Automotive

E-Health/ Aging Well

Wearables

Smart Water

01/2017

Q3/2019

Q2/2020

How the Smart Applications REFerence ontology was built

- **SAREF** specifications are developed and maintained in **TC SmartM2M** and are dependent of **oneM2M** - the interworking framework used by SAREF -, under stimulus and support of the **EC DG Connect.**
- The **specific ontologies** to be integrated in SAREF are **developed by the industry stakeholders** - by **companies**, **associations**, and other **SDOs.**
- **The input from the stakeholders** has so far been conveyed
  - **through STFs** in 2016-2017-2018-2019 supported by ETSI,
  - and in 2019-2020 will be expanded **through a new STF** supported by EC DG Connect,
  - **by ETSI members belonging to industry** (e.g., Digital SME),
  - and **through liaisons and inputs** received by TC SmartM2M as a group or by participating TC SmartM2M members.

How to contribute to Smart Applications REFerence ontology

- **Ontologies are dynamic structures** constantly evolving with the technologies and the products, so **direct contributions from stakeholders are needed** to sustain SAREF evolution.

- TC SmartM2M is working on the development of an **open portal to gather direct contribution to SAREF, a sort of "open source" project** dealing with ontologies instead of source code.
- The stakeholders' data model inputs will be then **reflected in the ETSI SAREF and oneM2M specifications by TC SmartM2M.**

- **Requirements and prototype are under development , with the goal of making it operative in 2020.**