GRUPPO TIM

IoT week

Bilbao, 4June 2018

IoT & 5G: the new MNO challange

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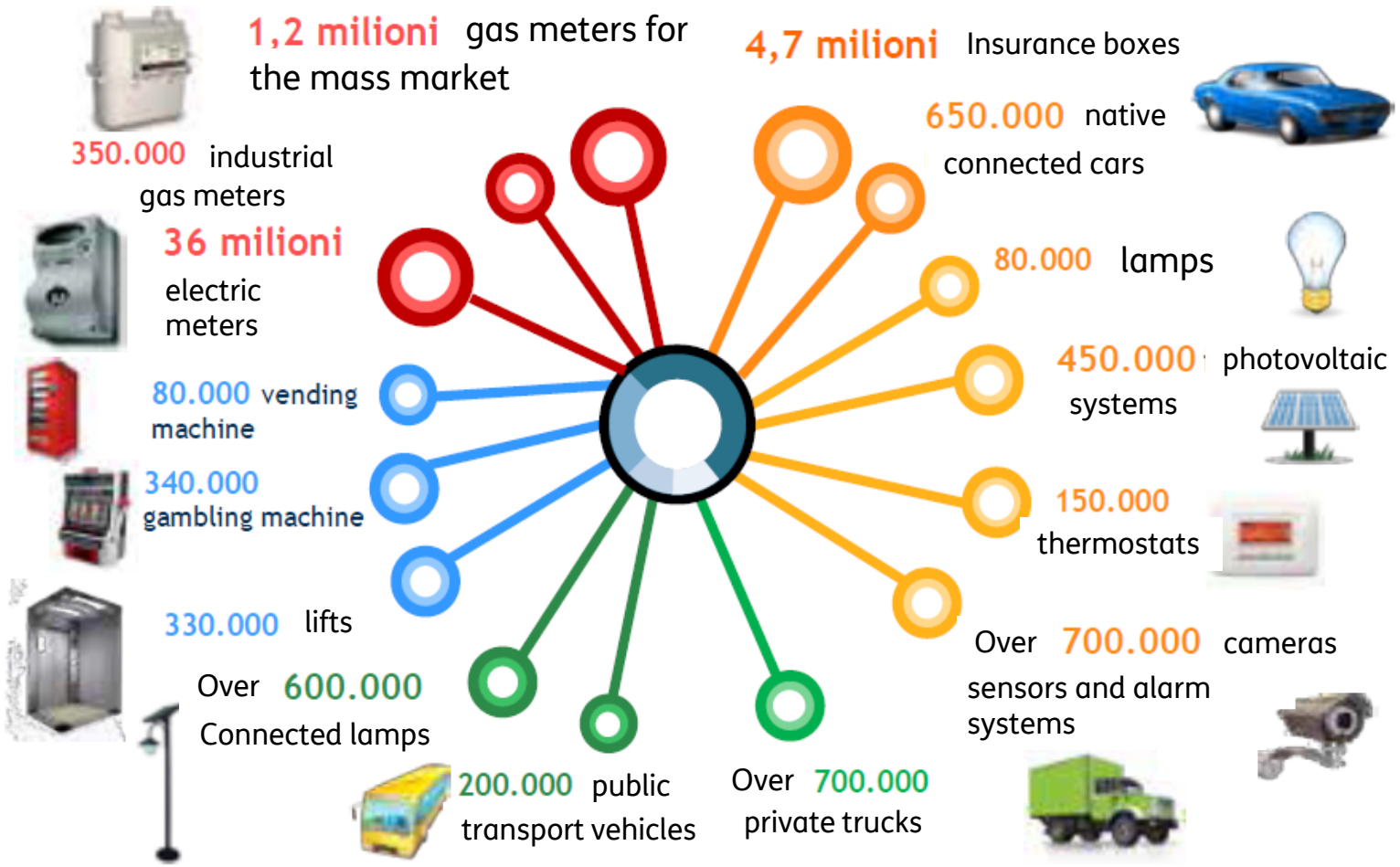
TIM

Agenda

- **IoT market and opportunities**
- Automotive sector
- 5G implementation
- IoT & 5G security concerns
- Conclusions

IoT – The Italian scenario



The communication more often happens between **people and ambient** more than **people and objects**

The Italian market is quite dynamic with **ICT increasing rates greater than EU avarage** – DESI(*)Index **-> Positive humus to IoT solutions adoption.**

This communication requires:

- **wireless technologies for data transmission** towards platforms (mobile networks)
- **Secure and integrated platforms**, able to collect/organize data and keep them available for new business

Source:Osservatori Digital Innovation – Politecnico di Milano – 12/2016
(*) DESI - Digital Economy and Society Index della UE – https://ec.europa.eu/digital-single-market/en/desi

A new digital wave: ICT in verticals

Virtual & mixed Reality

Virtual visit, Technical training, Virtual Shop, one to many interaction, Virtual meeting room

IoT & Smart City

Smart metering, parking & lighting, waste, Bus as a sensor, Control Room & Data Marketplace

Public Safety

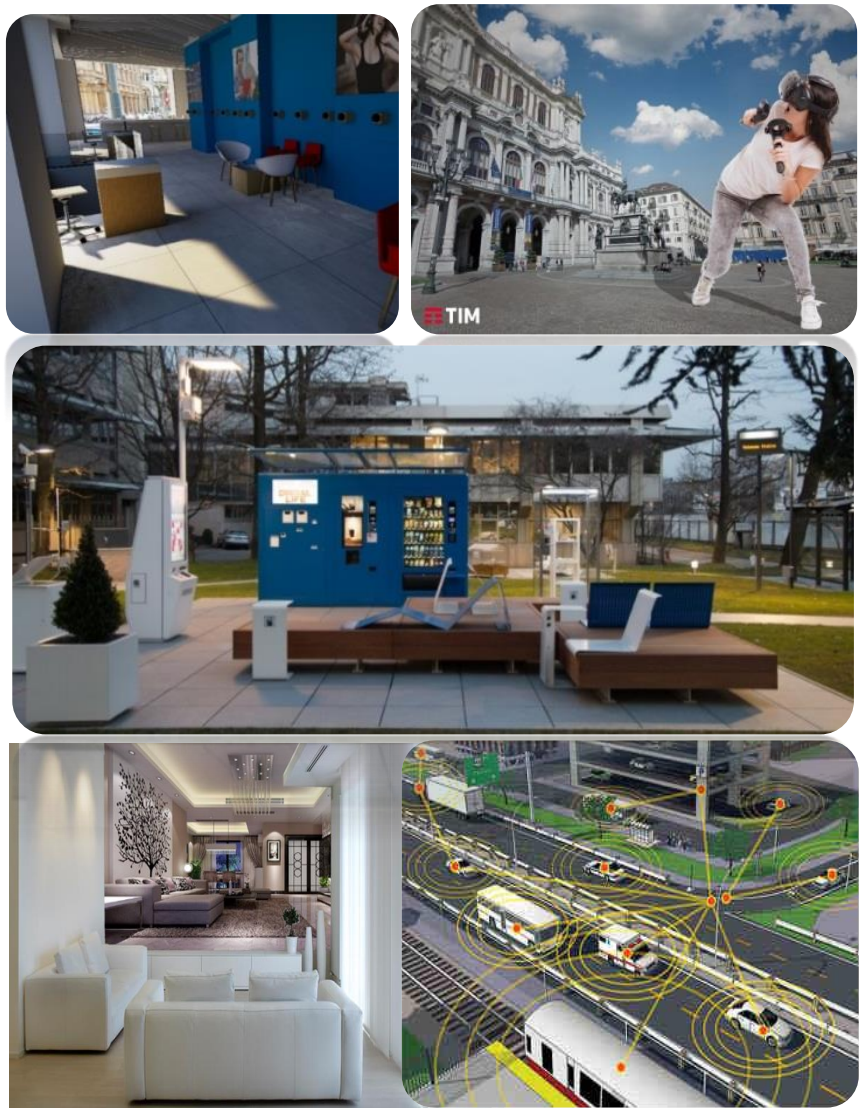
Wearable bracelet & cameras, ultraHD camera with automatic detection, acustic sensors

Industrial Internet

Smart Factory, Industry 4.0, Smart Agriculture, Energy management & aggregation, Smart grid

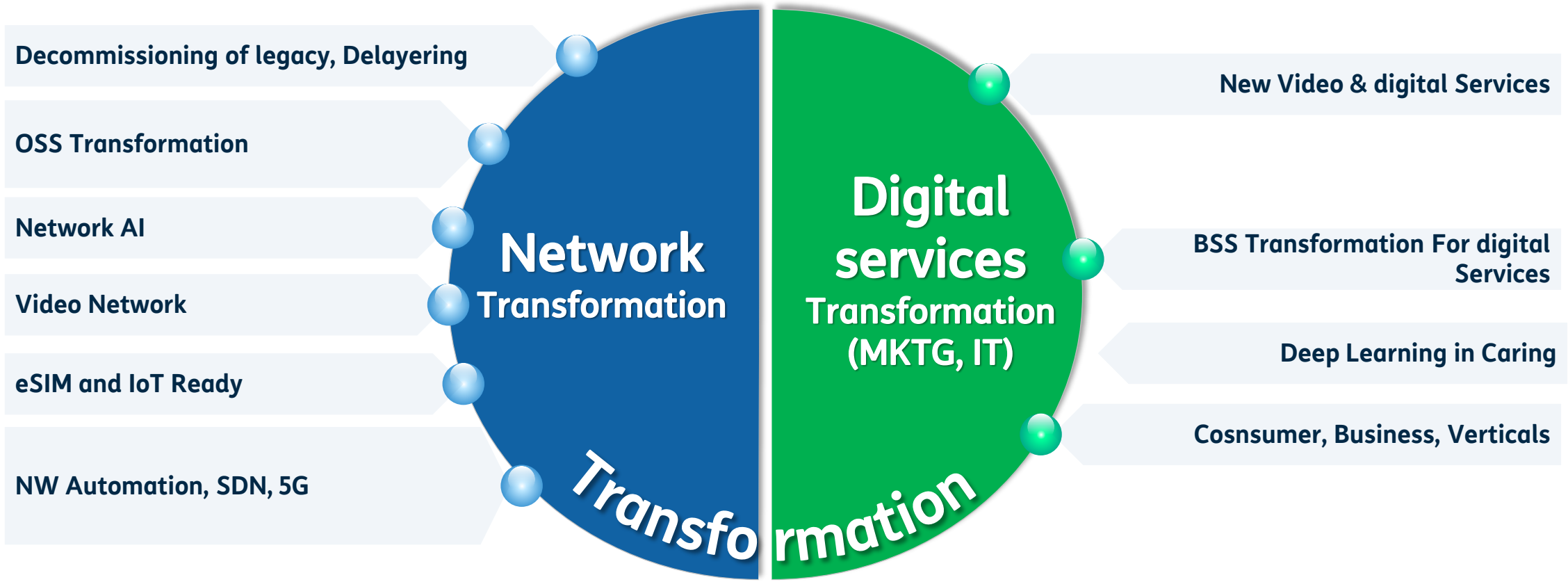
Assisted Vehicles

V2V & V2X, Road Safety, Traffic & Environment efficiency, Goods delivery, Cooperative-ITS



DigiTIM and Network Transformation

An Agile & Flexible Network platform for 2020 digital services



Process Adjustment (both for Technology department and Company overall)

Skill and organization review (e.g. service creation evolution, planning & authorization, testing, purchasing ...)

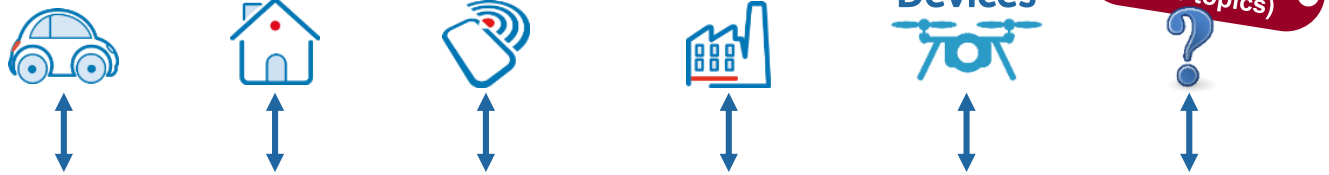
The Programmable Platform Target

Network Transformation

New operation model and technologies for increased business efficiency and agility

New Customers + traffic growth

Automotive | Domotics | Sensors | Factories | Smart Devices | Unpredictable (new topics)



E2E Service Orchestration

Design / Build / Deploy / Operate Automated Closed Loop

Design → *Build & Test* → *Creation/ Activation*

Voice Services | Mobile Data | IP & Transport | Service Platforms

Telco Cloud

Service: Voce & Intelligent Services | Dati & Radio | New Services (SD-WAN, Video, NB IoT)

Resource: **Telco Cloud**

Operation Orchestration & Automation

Network Orchestration | IP Automation

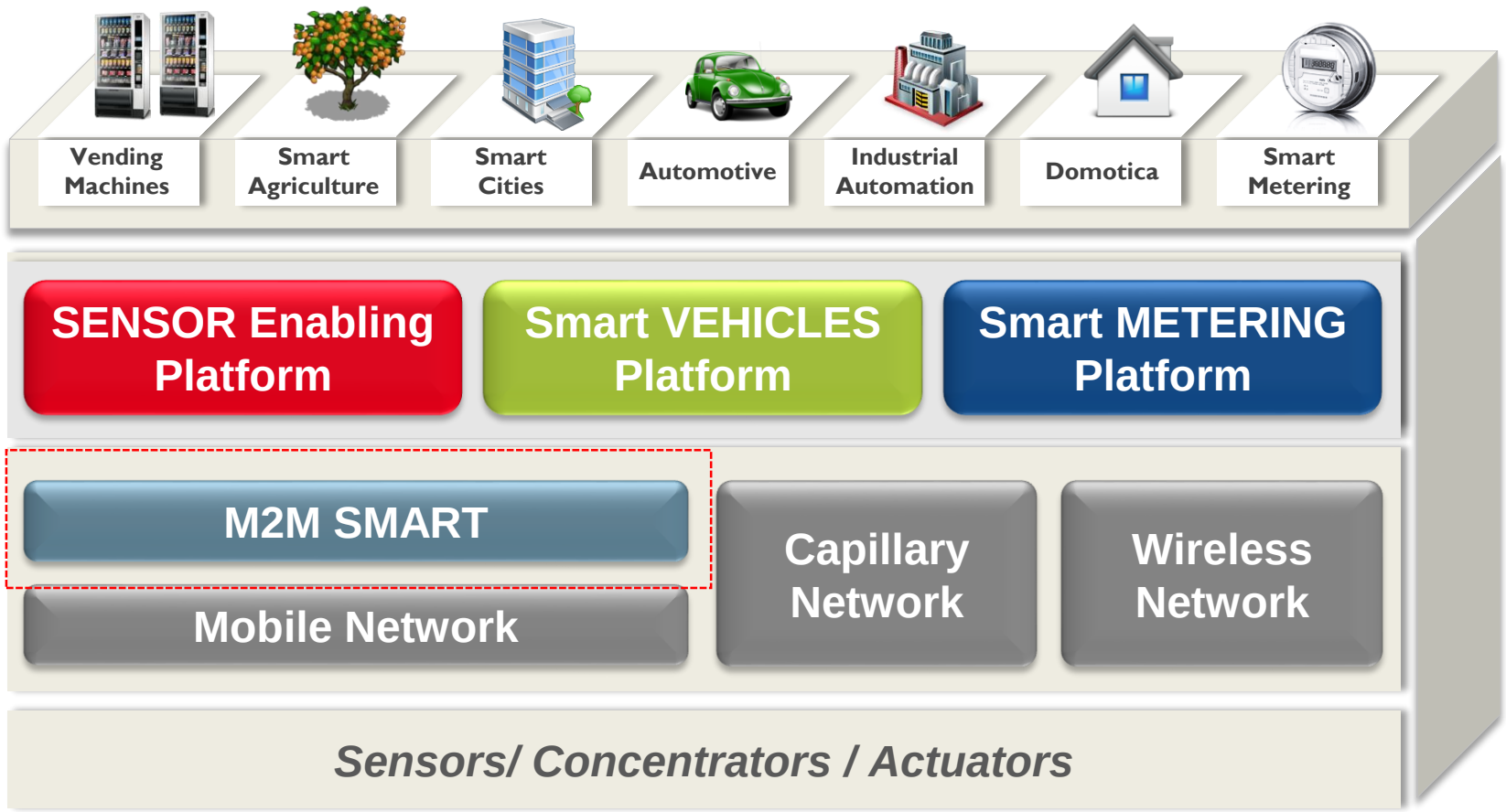
Telco Cloud Automation Framework

All IP network

Data Driven Automation and Analytics

TIM for the M2M environment

TIM is promoting the adoption of M2M applications in different sectors to boost the IoT world



IoT Open Lab… together

…to develop, integrate, demonstrate IoT solutions on TIM Mobile Network: from NB-IoT to 5G

Started in Turin, November 2016

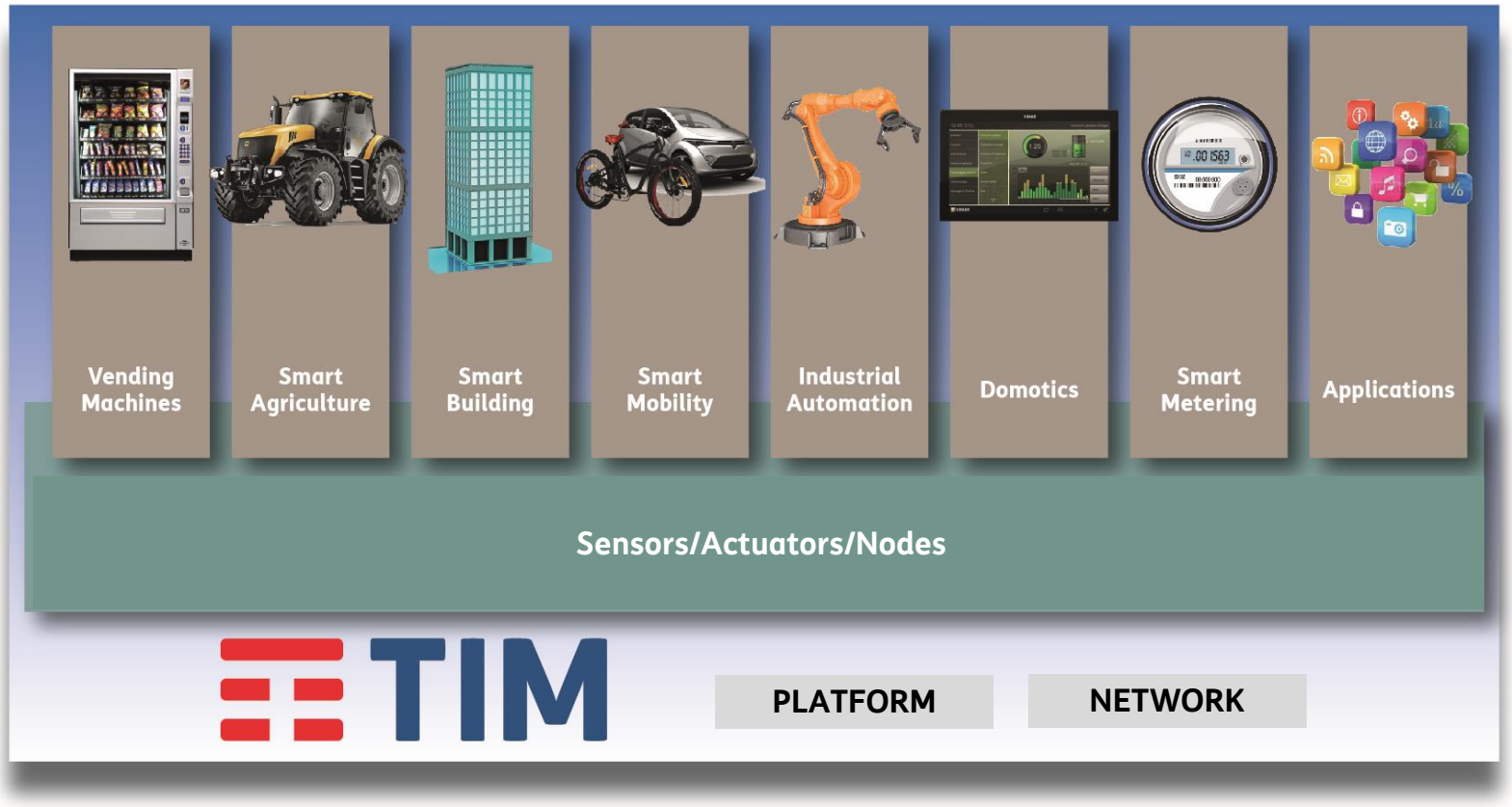
openlabiot@telecomitalia.it

An **Innovative IoT Accelerator** open to

- Vendor (Device, Technology)
- Service Provider (App, Verticals)
- Customers & Partner (start up, Universities)
- Institutions (PA, PAL)

- An **Integrated lab** to jointly develop IoT use cases starting from NB-IoT and with the opportunity to easily interconnect to the TIM live Network
- A **catalogue of specialised skills**, training, certification and validation schemes, closely tied to the International context (GSMA, 3GPP, GCF, OneM2M, …)

TIM Open Lab for IoT

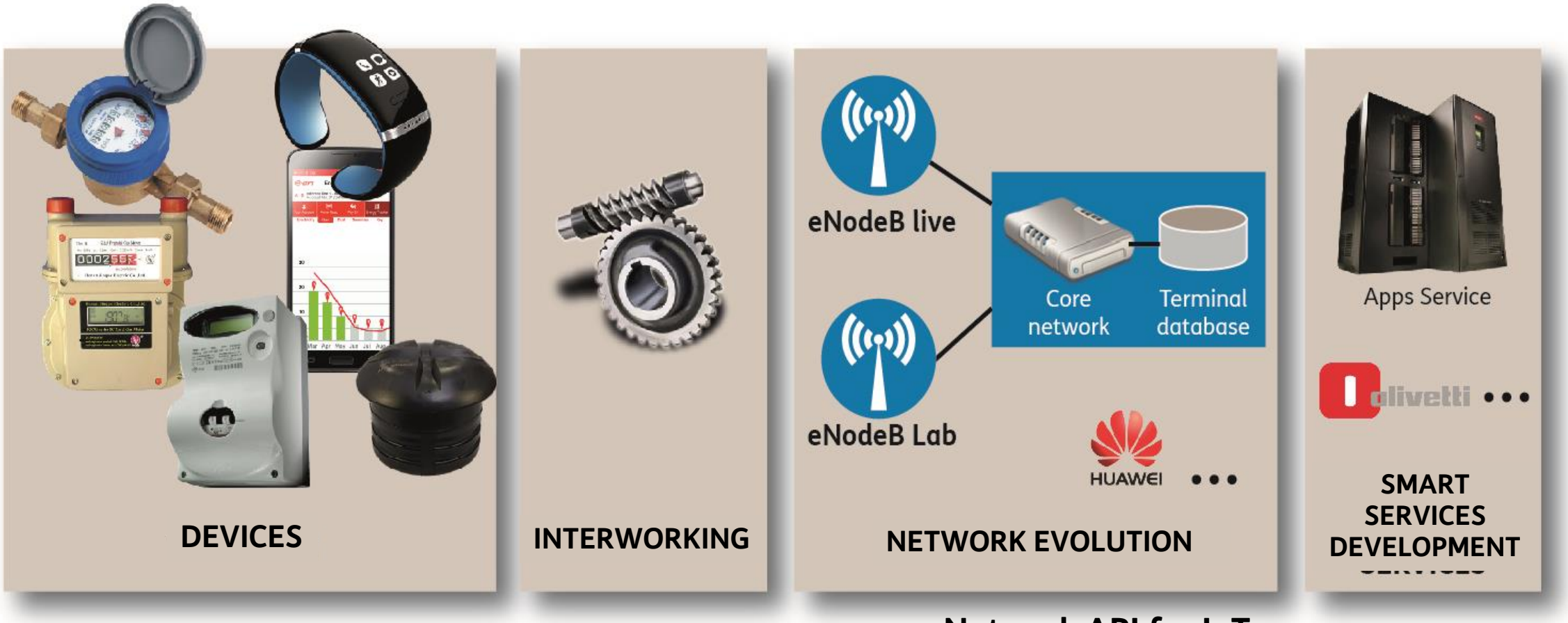


Strenghts:

- **Wireless data technologies**
  - from traditional 2G
  - **to actual Nb-IoT**
  - to future 5G
- real network **for pre commercial tests**
- **Open and secure platform** for data management
- Integrated laboratory with **joint Partner application development**, testing and validation ina controlled and **real network** environment
- **Specific skills, training and qualified certifications** based on international framework (GSMA, 3GPP, GCF)

… to build up an innovation accelerator to enable SMART Services business

TIM IoT Open Lab: architecture



ICON – Iot CONnectivity platform

TIM platform to manage IoT connectivity and data collection

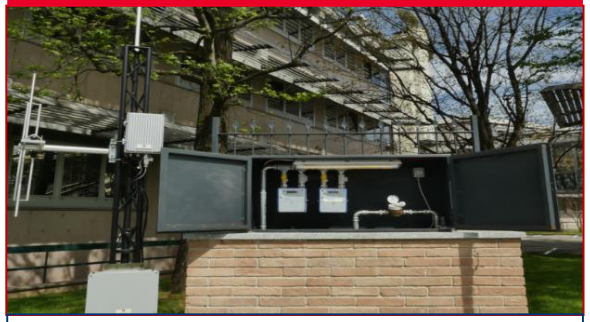
- Integrated with TIM network
- Exposition of connectivity functionalities to third parties and related big data analytics, compliant with OneM2M standard

Network API for IoT

- Customer & SIM Management
- Traffic Policy
- Company navigation profile
- Data Exchange (Store & Share)
- Reporting and Analytics
- IoT Device Management

IoT Open Lab – some active partnerships

Smart Metering (Gas & water)



Utilities (IREN, Genova Reti Gas, Aimag, Erogasmet)

Smart bench and Cyberhead

Municipalities (Torino and Firenze)

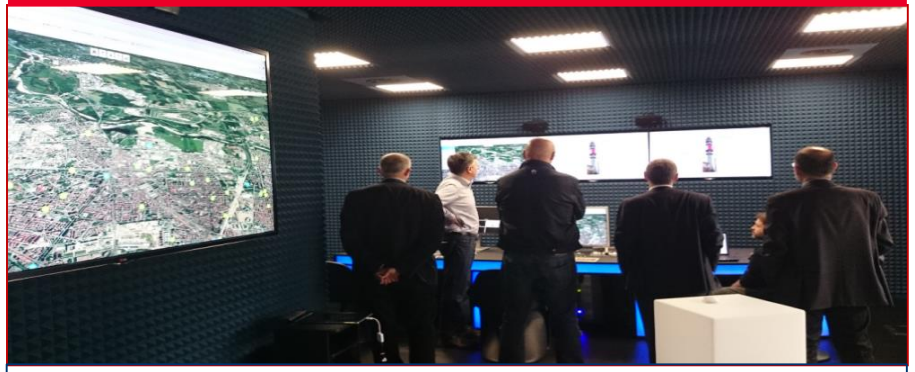
Smart Parking and electric mobility

Municipalities (Firenze)

Smart Light, and video surveillance

Municipalities (Torino e Firenze), Gestori Illuminazione Pubblica (Silfi)

Smart City control room and control platform



Municipalities (Torino and Firenze)

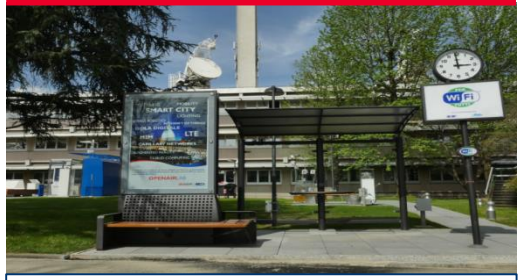
Smart waste

Municipalities (Torino e Firenze),(AMIAT and Quadrofoglio)

Smart green

Municipalities (Torino e Firenze)

Smart Bus stop



Municipalities (Torino)

IoT Open Lab Portal

IoT Open Lab Portal

Public site to promote partnership activities devoted to «Innovative Services»

Offered Services

- Development
- trial
- testing
- tour

Available at:
http://www.telecomitalia.com/tit/it/innovazione/i-luoghi-della-ricerca/Iot-Lab.html

Mail contact: openlabiot@telecomitalila.it

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M2M: The Automotive market is leading the growth

- Connected cars market will be worth almost €40 billion globally in 2018 (up form €13 billion in 2012)
- The embedded SIM technology will drive the monitoring experience and 90% of vehicles are expected to have connectivity on board by 2023
- The introduction of e-SIM was mainly driven by the automotive use case as real benefits could be appreciated:

  - No replacement costs for subscription change;
  - Profile updates when a veichle changes ownership or location;
  - Multiple subscription management in case of no coverage (eCall);
  - New services enablement after market issue;
  - Enabling wide range of mobile services in safety, security, navigation traffic updates and infotainement;
  - Optimized testing procedures;
  - High convenience for 10-15 years car life cycle.

M2M: The Automotive use cases

from initial provisioning to network provider switchi to activation on deman to adapt subscription on location

Carmaker builds cars and ships them to various local car distributors

Local distributor asks local mobile operator to provision SIMs

Local mobile operator delivers connectivity to the connected car

The car is sold to the customer with local connectivity

Carmaker negotiates connectivity contract with MNO A and sells a connected car to the end user

Customer uses car with connectivity from MNO A

Carmaker can switch connectivity over the years in response to regulatory constraints or change in ecosystems

SIM and device manufacturers sell non-provisioned SIM and portable gaming device to the MNO

MNO ships portable gaming device with non-provisioned SIM to local stores and additional retailers

Customer buys portable gaming device equipped with SIM

When needed, activates SIM on chosen offer

User subscribes to an offer within the portfolio of local MNO

User travels to another country in the EU with his phone

User can choose to switch on local network

If selected, local network delivers connectivity to user

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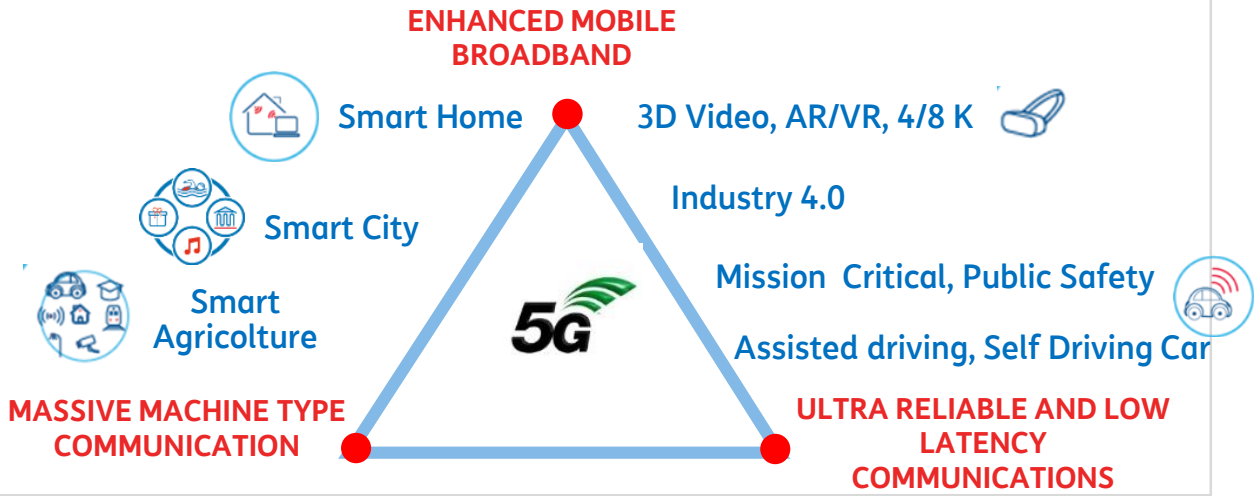
Transformation through Innovation : the 5G Challenge

MAIN TECHNOLOGY INNOVATIVE FEATURES

- Native **security**
- Frequencies 100's MHz, New Radio, mmWave
- Network **Slicing**
- **Milions devices per km²**
- **Batteries lifecyle > 10 years**
- 1000's Small Cells
- **1/10th LTE latency** (few ms)
- Relay Devices ➔ massive IOT
- **Speed 10x**LTE ➔ Ultra Broadband

MAIN ENABLED USE CASES

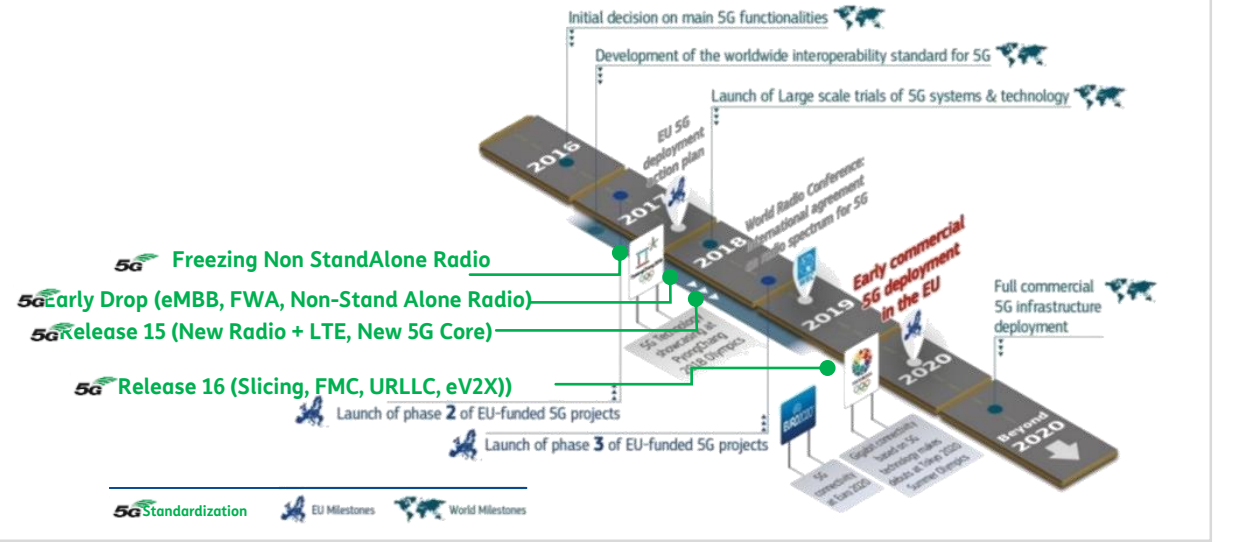


TIM 5G INNOVATION ACTIVITES

- **ENGAGE PARTNERS THROUGH DEDICATED MOUs**
  Main Network and System Suppliers
- **SET-UP DEDICATED LABS IN TORINO**
  5G Slicing, 5G Radio, Machine Learning, IoT, Giga BB, FutureNet
- **PRIORITIZE AND FOCUS TECHNICAL STANDARD ACTIVITIES**
  3GPP, IOT, Open Communities
- **JOIN INTERNATIONAL PROJECTS**
  (H2020, EIT DIGITAL, MIUR, ...)
- **DESIGN AND RUN TECHNOLOGICAL AND FIELD TRIALS**
  TORINO, SAN MARINO, BARI(MATERA), ...

5G EC Action Plan Ready

GLOBAL 5G ROADMAP



5G on field: TIM trials

Torino first 5G Italian city

San Marino first European Country

Demo Areas in Genova, Roma, Naples

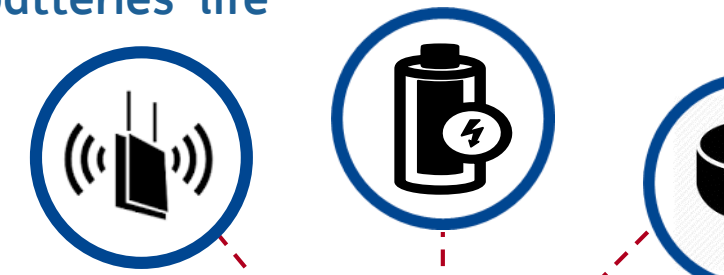
MISE Trial : Bari Matera (with Fastweb, Huawei and 52 partners)

5G TIM 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

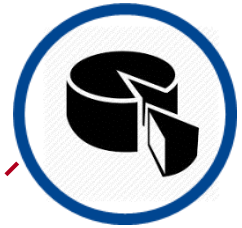
Many H2020 Projects…
R&D with 10 Universities…

Tomorrow: 5G for massive IoT and industrial internet



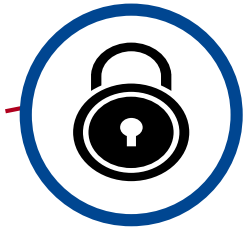
+10 years
batteries' life

1000s
small cells



Network slicing
for heterogeneous services (SLA, quality, differentiated liabilities)

RelayTerminals
no coverage limits for IoT

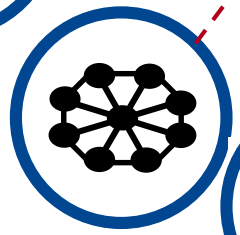


Liability and Security
for mission-critical & IoT services

New radio e new frequencies
< 6 GHz e mmW

UltraHD & Cloud Computing
Speed up x10 compared to LTE (**20 Gbps/cell DL**)

Millions of devices
for km2 (**10^6 devices/km^2 in urban area**)



Latency/ 10 LTE, for innovative services such as self-driving cars and drones (**1 ms UP per 0,99999 %**)

Remote Subscription Management
for dynamic profile update

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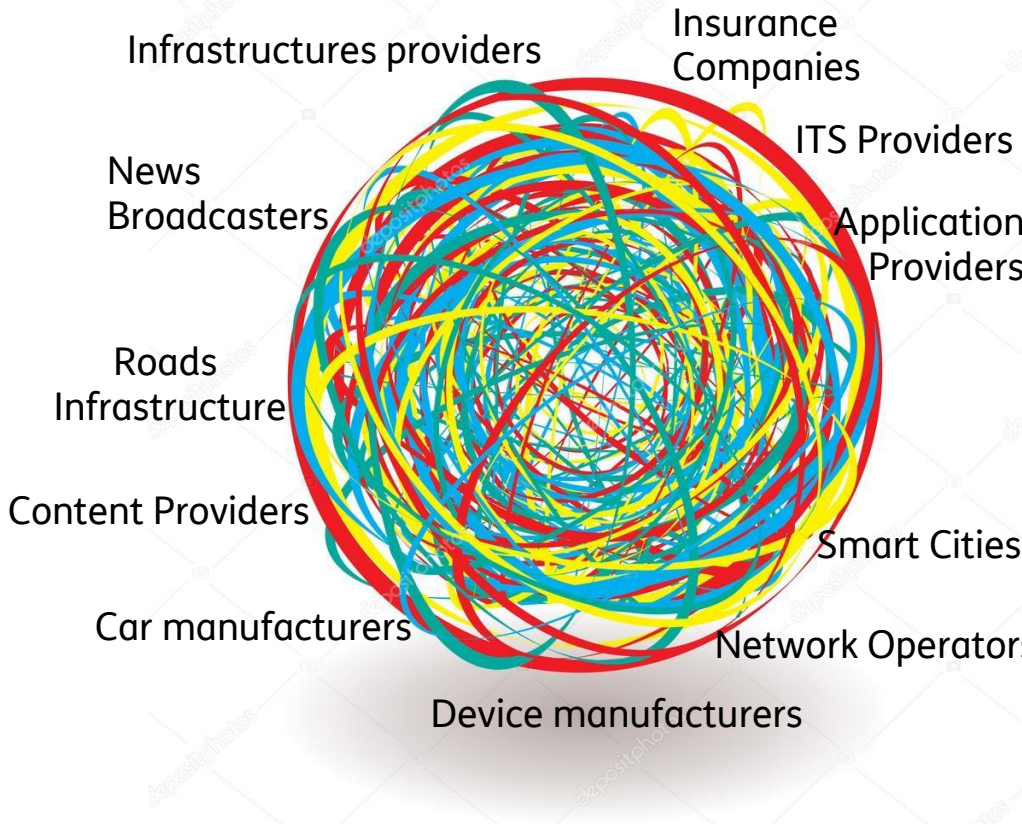
IoT: e2e security

- The proliferation of SDOs which are taking care of protocols and security mechanisms have not yet identified an end2end layer of security across the different devices/networks/servers/applications.
- The service functional interconnected environment shows multiple sources of information (sensors/vehicles/smart cities/application providers/…) which influence each other and provide a potential automotive experience
- The communication layers (slices) could be hybrid (licensed/unlincensed) with different authentication schemes

- Different industries could adopt heterogeneous security mechanisms based on their own services' requirements (verticals) without any cross functional risk evaluation
- The need of trusted sources and certified information is mandatory to avoid potential massive attacks on infrastructures/individuals
- The speed of proliferation of fraudolent attacks grows esponentially with the growth of interconnected devices
- The life cycle of IoT /automotive products is longer than exsisting consumer electronics products so long term vulnerability analysis should be assessed
- A potential weak entry point of the service chain can compromise the entire system

IoT: e2e security what's missing

- ✓ Promoting a global framework for interfunctional services evaluation to create an interoperability layer and develop enhanced automotive use cases.
- ✓ Assessing all the different security schemes trying to find a common level of trust and liability.
- ✓ Leveraging on trusted authentication mechanisms and extending the avialble ones to third parties (Authentication as a Service).
- ✓ Promoting a certification process for all the different products (sensors/devices/ vehicles/.....) involved in the services implementation.



- ✓ Identifying self security procedures to isolate potential risks and avoid massive proliferation of fraudolent attacks (e.g. exporting methods just adopted into infrastructure management).
- ✓ Creating best practices to reduce the impact of cybersecurity attacks protecting each service element.

Traditionally Telco services are based on standards and it's necessary to establish a cross functional environment with the key players to harmonize security aspects, and lead a cybersecutity culture to guarantee trusted IoT services .

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Conclusions

- The Telco sector is facing a distruptive challange and digitalization is widely changing the business scenarios.
- IoT, Web services, mobile applications are the new ways to enable a customer digital experience.
- Exposure to digital risks is exploding due to the customer level of knowledge and social phenomena.
- Huge volumes of new interconnected devices will allow the development of new services but will also increase the risk of cybersecurity attacks expanding their targets (B2B/B2C).
- Customer sklills improvement will be the base to create a risk mitigation/prevention culture.
- Knowledge sharing and technology cross fertilization between sectors will help to improve level of security in advanced services transforming risks in business opportunities.
- Today all the IoT sectors are designng their own sloutions without an end2end vision (devices/networks/ servers/ application/API for third parties/…) which could expose them to fraudulent attacks
- The Telco sector can provide different enablers to protect and secure digital environments to preserve customer trusted digital experiences.

A common approach for interoperable and secure solutions for all the different markets is a must to avoid fragmentation and to boost the evolution of digital services.

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