AUTOPILOT

AUTOmated driving **P**rogressed by the **I**nternet **O**f **T**hings
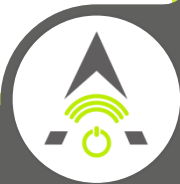
Project objectives and focus

Merging automotive and **IoT technologies** to move forwards **Automated Driving** towards a new dimension
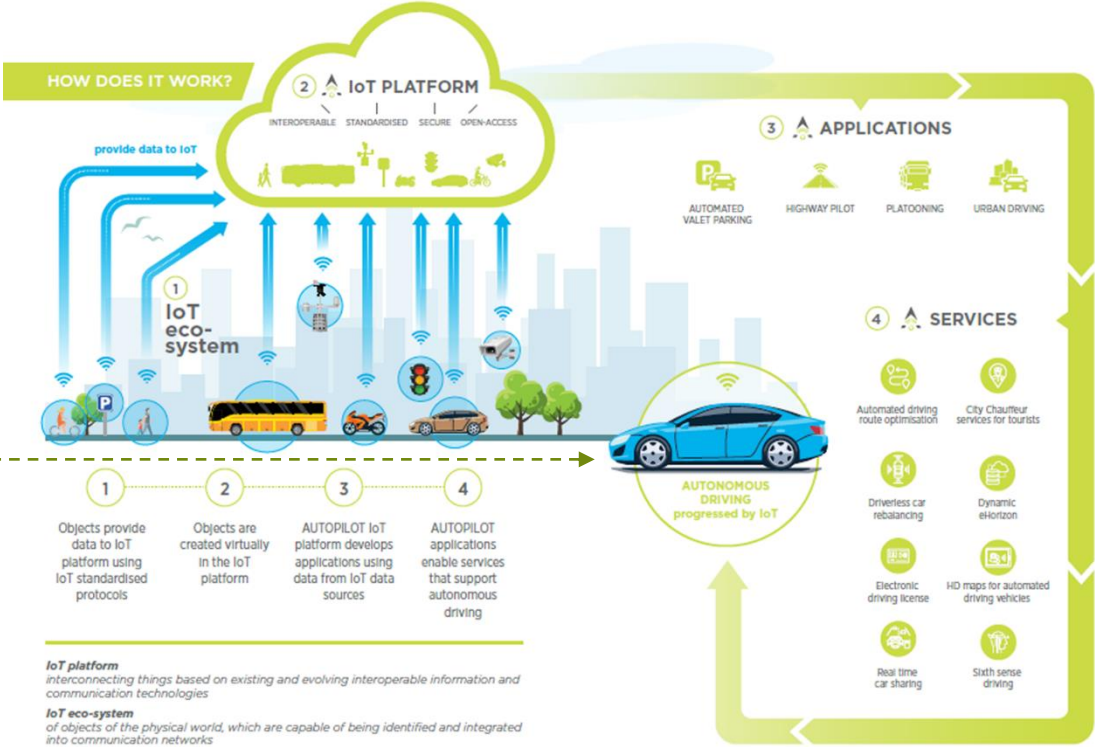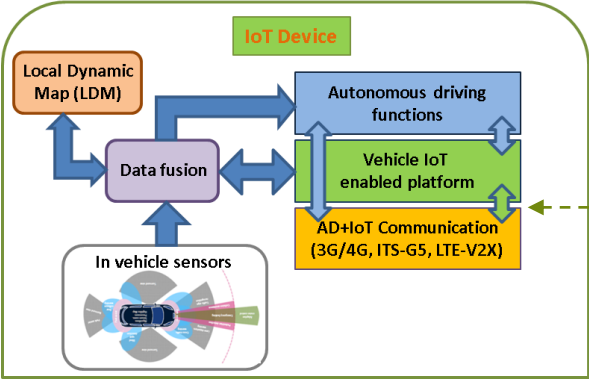
Enhance the driving environment perception using information from various "IoT enabled" sensors

IOT to transform automated driving

Vehicle IoT integration

IoT Device

- Local Dynamic Map (LDM)
- Autonomous driving functions
- Data fusion
- Vehicle IoT enabled platform
- AD+IoT Communication (3G/4G, ITS-G5, LTE-V2X)
- In vehicle sensors

HOW DOES IT WORK?

② IoT PLATFORM — INTEROPERABLE · STANDARDISED · SECURE · OPEN-ACCESS

③ APPLICATIONS — AUTOMATED VALET PARKING · HIGHWAY PILOT · PLATOONING · URBAN DRIVING

provide data to IoT

① IoT eco-system

④ SERVICES — Automated driving route optimisation · City Chauffeur services for tourists · Driverless car rebalancing · Dynamic eHorizon · Electronic driving license · HD maps for automated driving vehicles · Real time car sharing · Sixth sense driving

AUTONOMOUS DRIVING progressed by IoT

1. Objects provide data to IoT platform using IoT standardised protocols
2. Objects are created virtually in the IoT platform
3. AUTOPILOT IoT platform develops applications using data from IoT data sources
4. AUTOPILOT applications enable services that support autonomous driving

IoT platform
interconnecting things based on existing and evolving interoperable information and communication technologies

IoT eco-system
of objects of the physical world, which are capable of being identified and integrated into communication networks

Enhancing driving modes and enabling new services

Driving Modes

- Urban Driving
- Highway pilot
- Platooning
- Automated Valet Parking

IoT enabled Services

- Vulnerable Road User sensing
- Automated driving route optimisation
- Real time car sharing
- Driverless car rebalancing
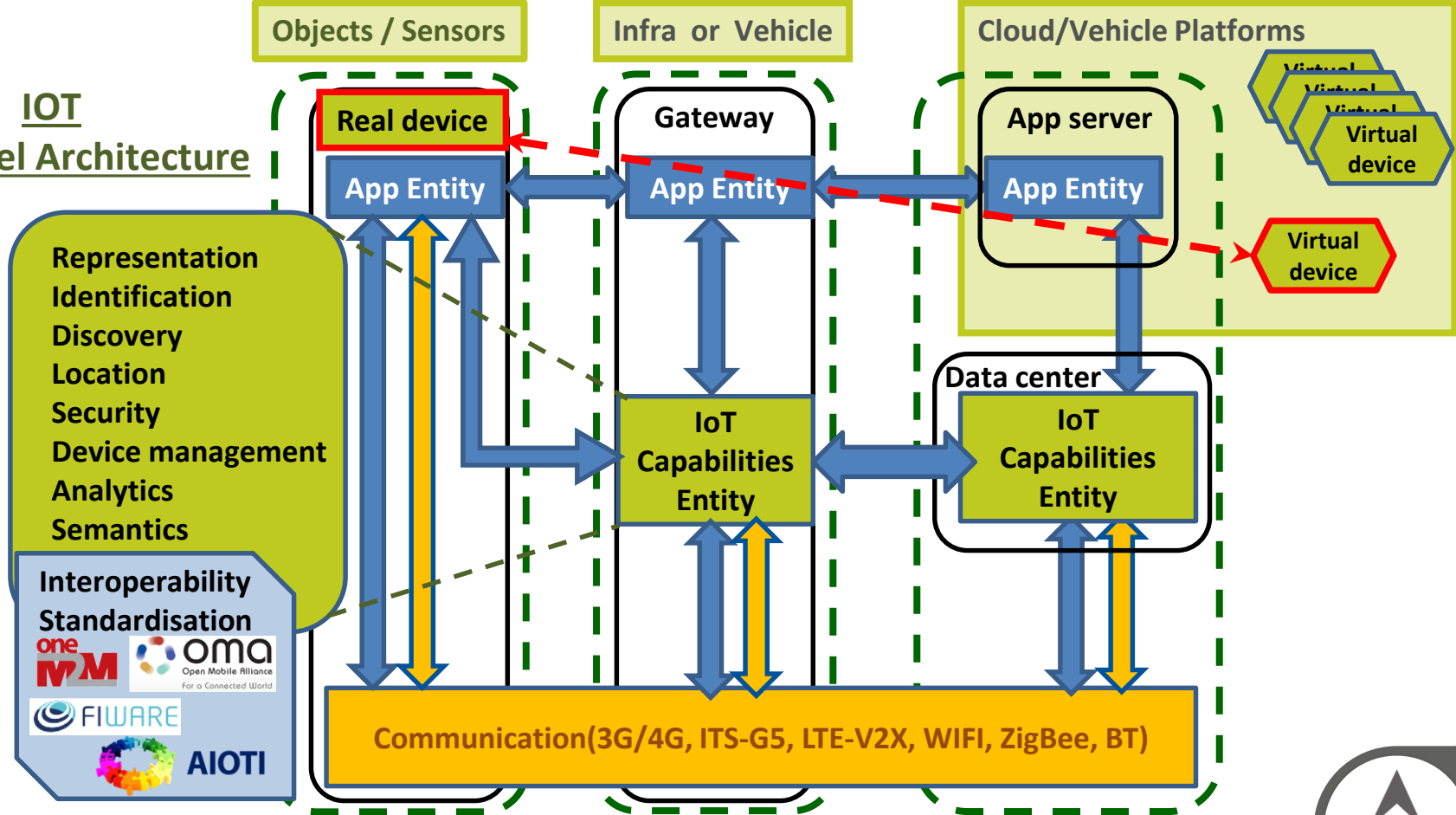- HD maps for automated driving vehicles
- 6th sense driving
- Dynamic eHorizon

IOT High Level Architecture

Objects / Sensors — Infra or Vehicle — Cloud/Vehicle Platforms

Real device — App Entity
Gateway — App Entity
App server — App Entity
Virtual device

Representation
Identification
Discovery
Location
Security
Device management
Analytics
Semantics

Interoperability
Standardisation
oneM2M
OMA Open Mobile Alliance For a Connected World
FIWARE
AIOTI

IoT Capabilities Entity

Data center
IoT Capabilities Entity

Communication(3G/4G, ITS-G5, LTE-V2X, WIFI, ZigBee, BT)

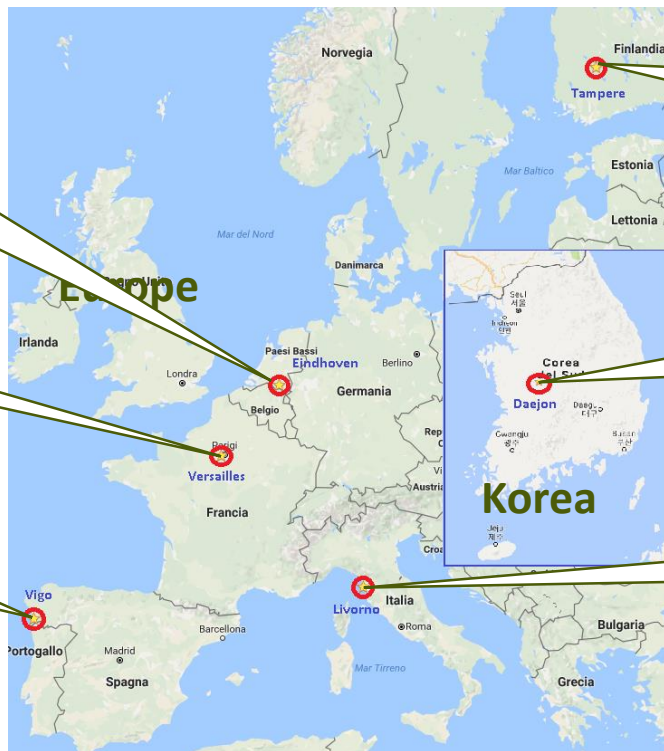# Pilot sites

Eindhoven, NL

Versailles, FR

Vigo, SP

Tampere, FI

Daejeon, KR

Livorno, IT

AUTOPILOT challenges for testing

- AD functionalities not only pending on the vehicle but on a complex environment of decentralised sensors

- Use of information instead of data coming from IoT platforms

- Impossible to test situational conditions with HW on the loop but need to test all components and devices

Testing approach - Pilot readiness verification

Verification of components and solutions

- Testing of IoT platform, IoT device and application functionality and interoperability

- Testing of communication devices inter-operability (ITS-G5, LTE, LTE-V2X)

- Verification of autonomous driving vehicle safety

Verification of pilot readiness

- The end-to-end system test ensures the overall readiness in terms of functionality, robustness and performance for piloting

Thank you

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