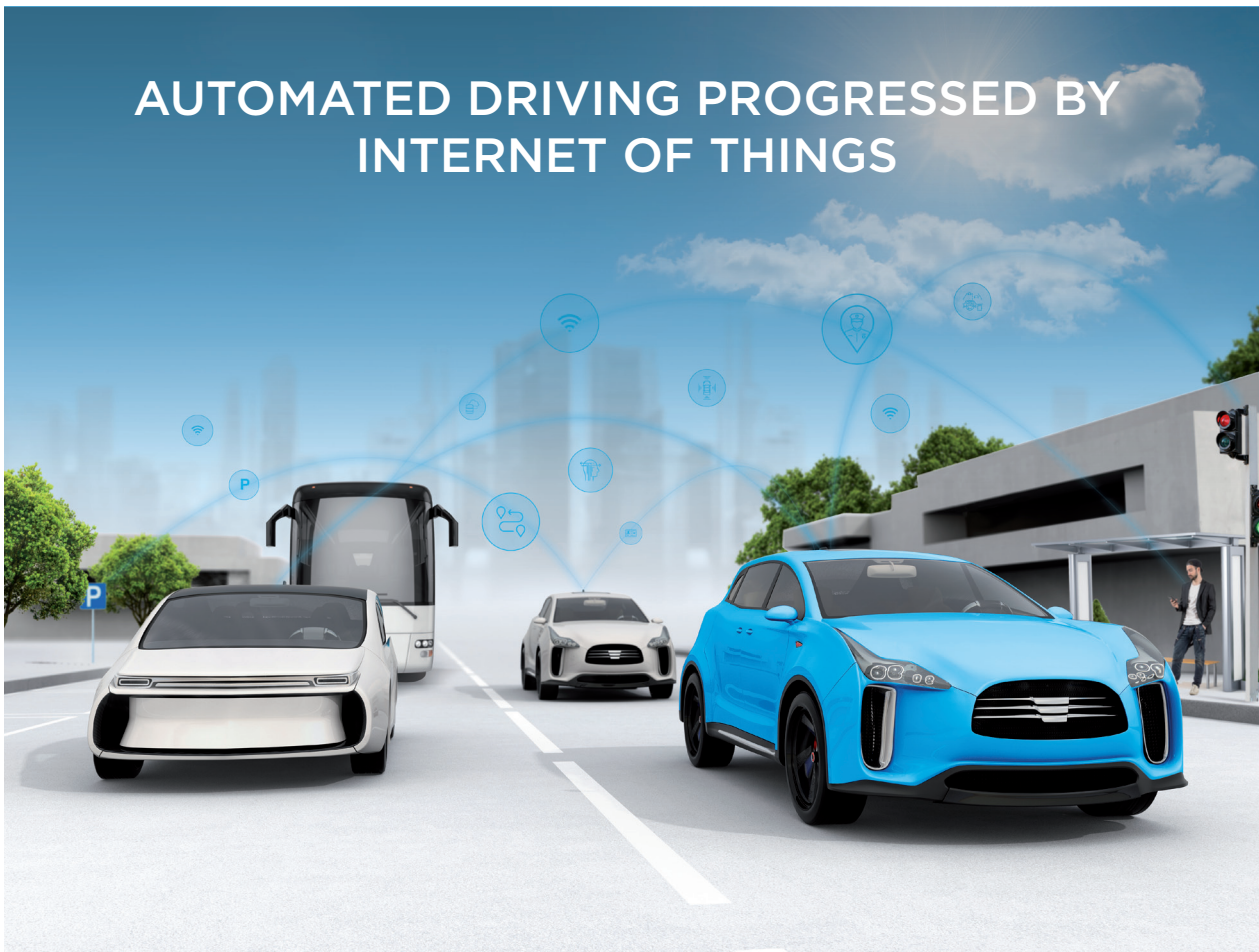




AUTOMATED DRIVING PROGRESSED BY INTERNET OF THINGS





Urban Driving



Valet Parking



Car Sharing



Highway Pilot



Platooning

**Unlocking the potential of the
Internet of Things to take autonomous
driving to the next level**



OBJECTIVES

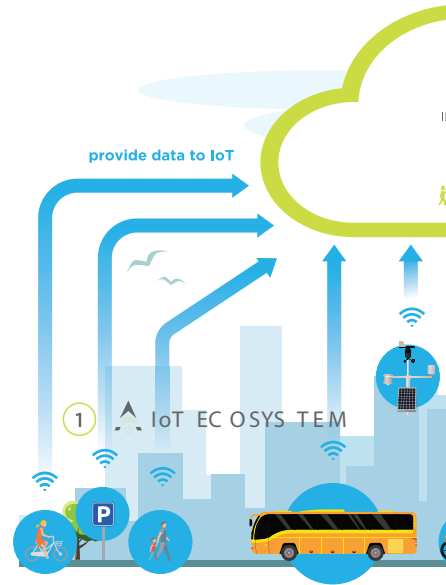
AUTOPILOT brings together relevant knowledge and technology from the automotive and the IoT value chains in order to develop IoT-architectures and platforms which will bring automated driving towards a new dimension

WHAT IS OUR VISION

- / Enhance the vehicle's understanding of its environment with IoT sensors enabling safer highly automated driving
- / Foster innovation in automotive, IoT and mobility services
- / Use and evaluate advanced vehicle-to everything (V2X) connectivity technologies
- / Involve users, public services, businesses to assess the IoT socio-economic benefits
- / Contribute to the IoT standardisation and eco-system

HOW DOES IT WORK?

- 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

is a platform of physical objects, which are capable of being identified and integrated into communication networks.

2 IoT PLATFORM

INTEROPERABLE STANDARDISED SECURE OPEN-ACCESS



3 DRIVING MODES



AUTOMATED
VALET PARKING



CAR SHARING



HIGHWAY PILOT



PLATOONING



URBAN DRIVING

4 DRIVING 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

IoT ECOSYSTEM

is interconnecting things based on existing and evolving interoperable information and communication technologies.



AUTONOMOUS
DRIVING
progressed by IoT

OVERVIEW

PROJECT DURATION

01.01.2017–31.12.2019

CONSORTIUM

43 beneficiaries,
coordinated by ERTICO

PROJECT COST

€25,425,252

EU CONTRIBUTION

€19,924,984 under Horizon 2020
Grant Agreement no 731993



Urban Driving



Valet Parking



Car Sharing



Highway Pilot



Platooning



Brainport

Livorno

Tampere

Versailles

Vigo





Brainport Pilot Site



BRAINPORT PILOT SITE



Providing real-time car sharing with automated driving functionalities

DRIVING MODES

 Urban Driving


 Car Sharing


 Valet Parking

 Highway Pilot

 Platooning

DRIVING SERVICES

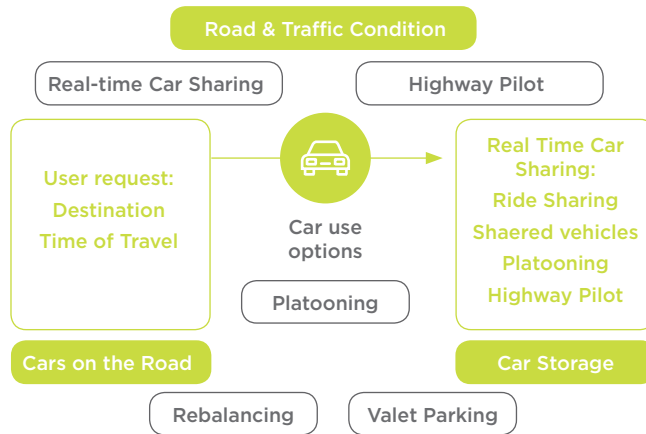
 Real-time Car Sharing

 Driverless Car Rebalancing

The Brainport permanent pilot site consists of three pilot areas: driverless car rebalancing service on the Eindhoven University campus, automated valet parking on the automotive campus parking and highway pilot and the platooning on the A270 motorway. We target users between two cities in the region of Brainport that are requesting car transport through different IoT enabled services. The user can select ride-sharing or car-sharing options, and can opt for different levels of automated driving.

KEY PERFORMANCE INDICATORS

Urban Driving	Large community Vulnerable road user (VRU) detection (> 1000 persons)
Valet Parking	Three different vehicle types, variety of routes
Car Sharing	Waiting time less than 1 minute from reservation
Highway Pilot	Detection of 5 different road incidences
Platooning	Uninterrupted crossing of intersections



Extensive IoT Utilisation

A great variety of IoT sources are involved such as road-side cameras (e.g. from a270 test site), traffic lights, drones, Smart-phones (VRU and legacy vehicles), automated vehicles and more.

Integrated Services

The Brainport site will provide various options for car travel. Road and traffic situations are assessed, resulting in route options for automated driving. Different automated driving vehicles can be on-route or be obtained from storage or through rebalancing.

PILOT LEADERS

TNO innovation for life

IBM

DLR

TU/e Technische Universiteit Eindhoven University of Technology

Valeo

PILOT PARTNERS

gemalto security to live free

Gemeente Helmond

NEC

NEVS

NXP

HUAWEI

Technolution

TOMTOM

sensinov Global IoT Platform

vicomtech Your vision is our passion for technology



Livorno Pilot Site



LIVORNO PILOT SITE



IoT assisted automated driving (AD) in “smart roads”

DRIVING MODES



Urban Driving



Highway Pilot

The Italian permanent Pilot Site is a testing infrastructure encompassing the Florence – Livorno highway together with road access to the Livorno sea port settlement. IoT enabled manoeuvres are demonstrated with AD cars traveling from Florence to Livorno. “Sixth sense” IoT devices are deployed in the car and along the roads in both the Highway and the urban area. The Traffic Control Centre with DATEX-II node and the oneM2M platform are preeminent actors in the operations.

DRIVING SERVICES



Sixth Sense Driving



Connected E-Horizon

KEY PERFORMANCE INDICATORS

Urban Driving 2 km test track under real-life conditions

Highway Pilot More than 100 hours in real traffic situations

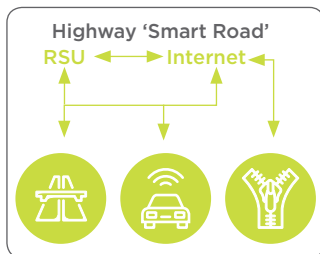
Communication 3G/4G, LTE, NB-IoT, 6LoWPAN, ITS G5 and 802.11 b/g/n networks

Traffic Control
Center App

Connected
E-horizon

Real Time Port
Monitoring App

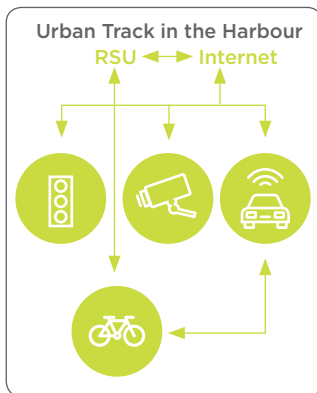
OneM2M IoT Platform



Highway scenario

The Highway SGC Fi-Pi-Li (Florence-Pisa-Livorno) has been adapted as “smart road” in order to allow the piloting activities:

- A DATEX II node has been deployed for real time traffic information;
- A pervasive sensing infrastructure has been deployed.



Urban scenario

A road circuit inside the free public area of Livorno Sea Port has been equipped in order to test vulnerable road users warnings at traffic light intersection.

PILOT LEADER

cnit

PILOT PARTNERS

avr

Continental

FCA

Red Bull

PSMB
Istituto Superiore Mario Sestini

THALES

TIM

SUPPORTED BY

REGIONE
TOSCANA

UFFICIO REGIONALE
DELLA REGIONE TOSCANA

AdSP MTS



Tampere Pilot Site



TAMPERE PILOT SITE



Traffic cameras assist in improving efficiency and safety of automated driving

DRIVING MODES



Urban Driving



Valet Parking

The permanent Pilot site in Finland is located in Tampere, which is the second biggest urban region in Finland. The city has taken strategic movement to be one of the major urban area test hubs for automated and connected cars.

AUTOPILOT explores how new Connectivity Technologies can support autonomous vehicles at intersections and parking places.

DRIVING SERVICES



Parking Reservation



Intersection Support

KEY PERFORMANCE INDICATORS

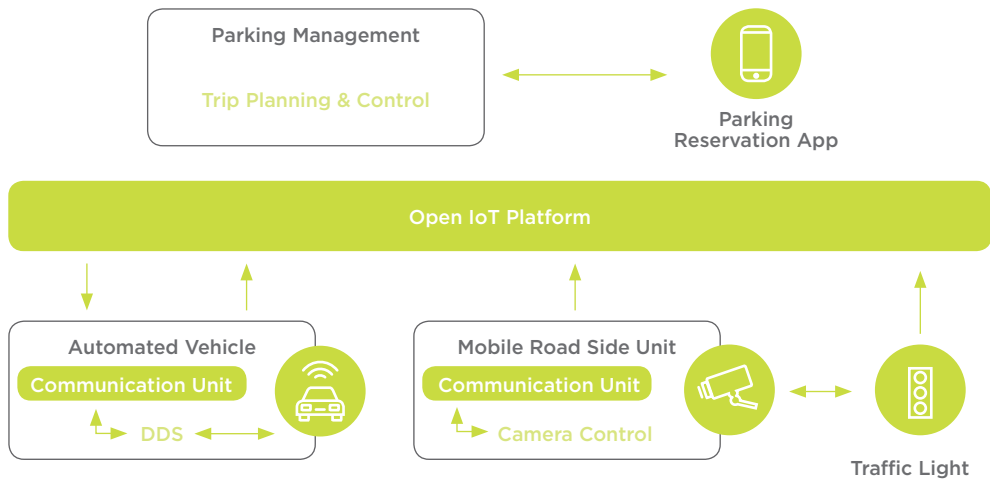
Valet Parking Improved efficiency through camera support

Intersection Improved safety through VRU detection by

Support camera

VRU 3G/4G

Communication



Traffic cameras

Assist in detecting objects and Vulnerable Road Users outside the range of the vehicle sensors. They hence provide valuable information for planning parking tasks incl. routing and for assuring the safety of all road users at intersections.

Parking space reservation

A parking space reservation application assures a place is available for the automated vehicle when arriving at the parking area.

PILOT PARTNER

VTT



Versailles Pilot Site



VERSAILLES PILOT SITE



Provide mobility services for touristic applications

DRIVING MODES



Urban Driving



Platooning

AUTOPILOT enables tourists to explore the city of Versailles and the Castle's gardens. Visitors pick up a ride in a connected and autonomous vehicle at one of the two car sharing stations via a smartphone application. While driving through the city, the vehicle alerts the tourist of interesting spots in their surroundings. At the Castle's gardens, the user can switch to a fully automated driving mode before giving the car back at another station. AUTOPILOT will also evaluate the added value of IoT and AD technologies in a business model of fleet management (automated fleet rebalancing).

DRIVING SERVICES



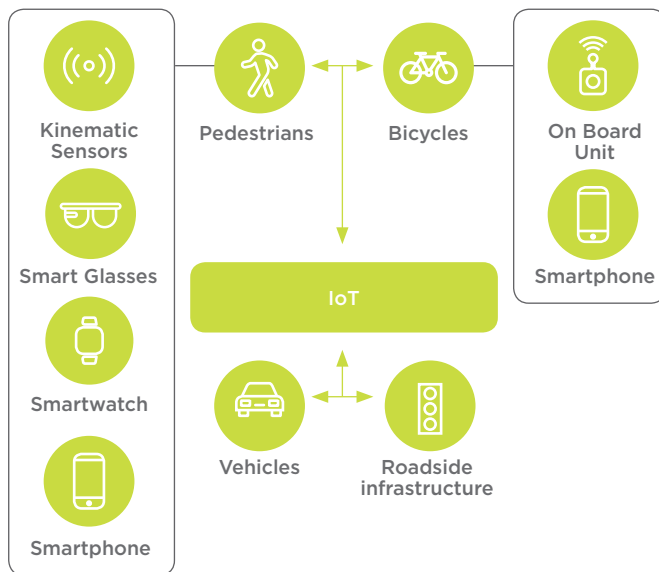
In City Chauffeur
Service for Tourists



Driverless Car
Rebalancing

KEY PERFORMANCE INDICATORS

Platooning	3 identical vehicles, 20 km/h
Urban Driving	10 km of urban driving including 2 km of autonomous driving
VRU	3G/4G, LTE V2X and 802.11 OCB networks
Communication	



Sensoric Equipment

Collaborative perception considers information exchange among VRUs and the AD car in order to enhance its perception and improve the VRUs safety. To be part of the IoT, the VRUs will be equipped with smart devices.

Point of Interest Notification

The pilot cars are equipped to generate announcements for local touristic points of interest based on close-range detection (Bluetooth Low Energy beacons).

PILOT LEADERS



PILOT PARTNERS



SUPPORTED BY





Vigo Pilot Site



VIGO PILOT SITE



To offer new services for autonomous vehicle through IoT and connectivity technologies in urban and indoor parking scenarios

DRIVING MODES



Urban Driving



Valet Parking

The permanent Spanish test site is located in Vigo, Galicia, in the north west of the country. As a result of the participation in European Compass4D & CO-GISTICS and through local initiatives, the city integrates the urban part of SISCOGA corridor (120km). AUTOPILOT will explore how new Connectivity Technologies will enhance the perception and the functional behaviour of autonomous vehicles in complex scenarios.

DRIVING SERVICES



Vulnerable Road
User Sensing



HD Maps for
Automated Vehicle

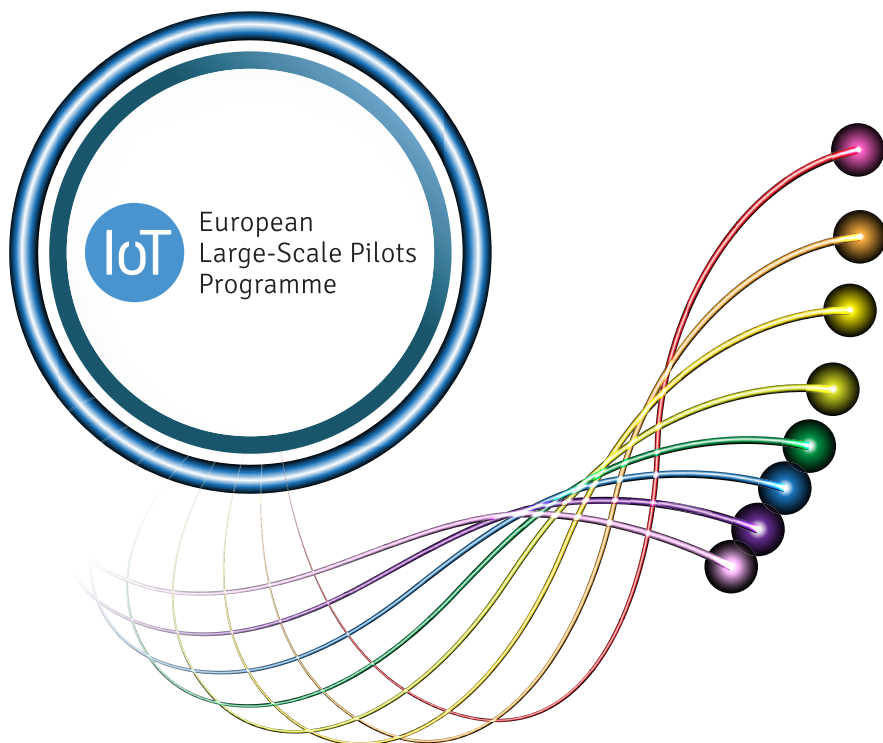
KEY PERFORMANCE INDICATORS

Urban Driving Improved safety, user acceptance and fuel efficiency

Valet Parking Enhanced comfortability, safer parking and time saving autonomous driving

VRU IoT, 3G/4G, ITS G5, C-V2X

Communication



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