**SAFE STRIP end users are:**

- drivers / riders, infrastructure operators
- but also OEM’s Tier 1 suppliers, infrastructure solutions manufacturers/integrators, authorities, research academia.

**Impact**

- Improve existing vehicle “intelligence” through reliable personalised information to drivers/riders of unequipped vehicles, bringing a significant increase in safety and equal access to services.
- Release a new carrier for introducing micro and nano sensors in road applications, transforming pavement and other roadside markings and elements into a smart miniaturised integrated platform.
- To explore new I2V and V2V communication possibilities through the deployment of IEEE 802.11p standard ad hoc.
- Contribute to the most accurate hybrid estimation of actual road friction, without the need for additional on-board sensors, and therefore bringing great benefits to ADAS applications.
- Reduce infrastructure manufacturing and installation cost by 50% - 95%.

**Core Innovations**

**Sensors**

Intelligent infrastructure strips with networking capabilities, operating with minimum maintenance in all weather conditions.

**Applications**

C-ITS for all functionalities at low cost and with high reliability and extendability that addresses all vehicles – equipped and non-equipped.

**Operations**

More pragmatic approach to the design of emerging and future communication technologies focused on road/vehicle interaction.

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This project has received funding from the European Union’s Horizon 2020 Research and Innovation programme under Grant Agreement No 723211.
SAFE STRIP will be tested in six different test sites across four European countries:

- **CONTINENTAL** premises located in Toulouse have several roads connecting car parks and facilities to be used as the first test places for the friction coefficient estimation.
- **VALEO** premises in France will see testing of the integration of OBU in autonomous vehicles.
- **Fiat Chrysler Automobile Safety Track in Italy** is a closed track enabling up to two lanes scenarios. In addition, smart strips will be applied to selected road stretches of motorway scenarios.
- **Autostrada del Brennero – A22** is a 313.5km long motorway and it is one of the main North-South corridors in Europe. A22 will integrate SAFE STRIP solution in some closed areas and with some segments of the main highway.
- **Attiki Odos** is a 70 km-long urban motorway in Greece, fully access-controlled through 39 toll barriers and including a series of systems and equipment in place to ensure traffic management.

**SAFE STRIP** (SAFE and green Sensor Technologies for self-explaining and forgiving Road Interactive aPplications) will introduce an innovative technological solution to enable C-ITS applications through low-cost, integrated smart strips on the existing road infrastructure.

These strips will support Cooperative - Intelligent Transport Systems (C-ITS) services and applications as they will provide personalised in-vehicle messages for all road users (trucks, cars and motorcyclists) and in all vehicles types (non-equipped, C-ITS equipped and autonomous).

**SAFE STRIP will:**

- Develop a novel micro/nano sensorial system integrated in road pavement tapes / markers, providing advanced safety functions at a fraction of the current cost.
- Support predictive infrastructure maintenance, through dynamic road embedded sensors that will make road infrastructure: a) self-explanatory through personalised information and b) forgiving through key I2V/V2I information.
- Apply this solution to parking depot and key intermodal nodes, such as railway crossings, harbour loading/uploading areas, logistic depots and work zone areas.
- Reduce infrastructure installation and maintenance costs by orders of magnitude, making it energy autonomous and its modules fully recyclable.
- Provide information to C-ITS equipped and autonomous vehicles about road, weather and traffic conditions ahead, to support dynamic trajectory estimation and optimisation.
- Support a wide range of added value services and facilitate SAFE STRIP’s rapid market deployment and sustainability through efficient business models.
- Evaluate and test the system in controlled environments as well as real life conditions.
- Validate the performance, evaluate user interface and acceptance aspects of the system and assess its safety and European industrial competitiveness.

**SAFE STRIP system** will implement two complementary as well as alternative technological solutions. Equipped (including autonomous) vehicles will receive personalised information through an on-board HMI (left), while the non-equipped vehicles will be reached through via mobile services that will support a series of C-ITS functions (right).

**Infrastructure**

Each test site is composed of two main modules: On-Road Unit (ORU) and Road Side Bridge (RSB). The ORU essentially comprises a strip placed on specific points on the road as well as on the road pavement next to a zebra crossing area. Its role is to detect and transmit useful data (vehicle/pedestrian detection, road condition, etc.) to the RSB. RSBs are responsible to collect and enrich the data coming from the ORUs and spread the information to the vehicles and back-end services.

The vast potential of SAFE STRIP will be demonstrated and evaluated through applications for:

- Cooperative safety functions for equipped and non-equipped vehicles
- Road safety level and predictive road maintenance
- Road work zones and railway crossings warnings
- Merging/intersection support
- Personalised VMS/VDS and Traffic Centre Information
- Autonomous Vehicles Support
- Supportive added value services (Virtual Toll Collection & Parking booking and charging)

**Infrastructure communication interfaces:** ORU with RSB via BLE, RSB with EQveh via V2X (ETSI ITS-G5 standard), RSB with Non-EQveh and Backend services via LTE.

**In real traffic conditions**

25 & 15 will test the system

with equipped vehicles & with non-equipped ones along with TMC/road operators and authorities’ representatives.