Electronics and Components

The SAFESPOT System Monitor

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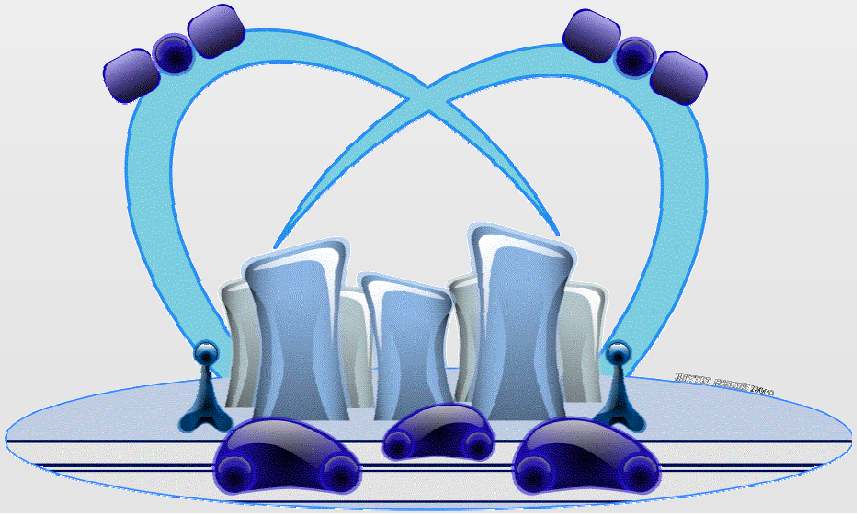
.:. The SAFESPOT Integrated Project

The SAFESPOT Integrated Project aims to understand how intelligent vehicles and intelligent roads can cooperate to produce a **breakthrough for road safety**.

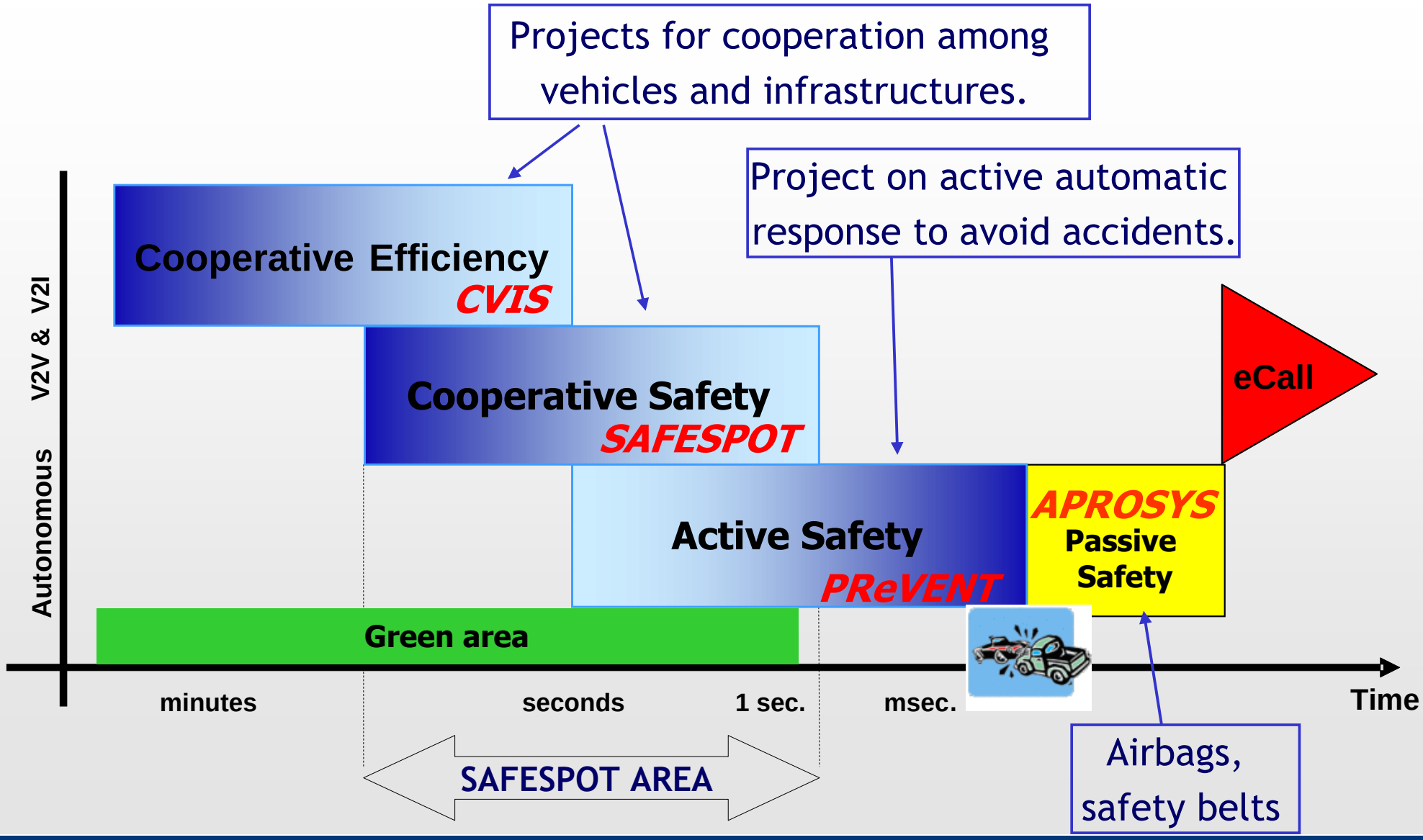
The goal of the project is to extend “in space and time” drivers’ awareness to **prevent road accidents.**

The key technology used in the project to create an **Intelligent Cooperative System** is the **Vehicle to Vehicle (V2V)** and **Vehicle to Infrastructure (V2I) communication**.



.:. Time-to-Crash of the SAFESPOT approach

Comparison of the areas of action of the European projects under development.



.:. SAFESPOT Organization

Project type: Integrated Project (IP) 4th IST call of the 6th European Framework Program

Consortium : 52 partners (from 12 European countries):

6 OEM (trucks, cars, motorcycles)
7 ROAD OPERATORS
14 SUPPLIERS
17 RESEARCH INSTITUTES
8 UNIVERSITIES

Promoted by: EUCAR

Timeframe: 2/2006 – 1/2010

Overall Cost Budget : 38 M€ (European Commission funding 20.5M€)

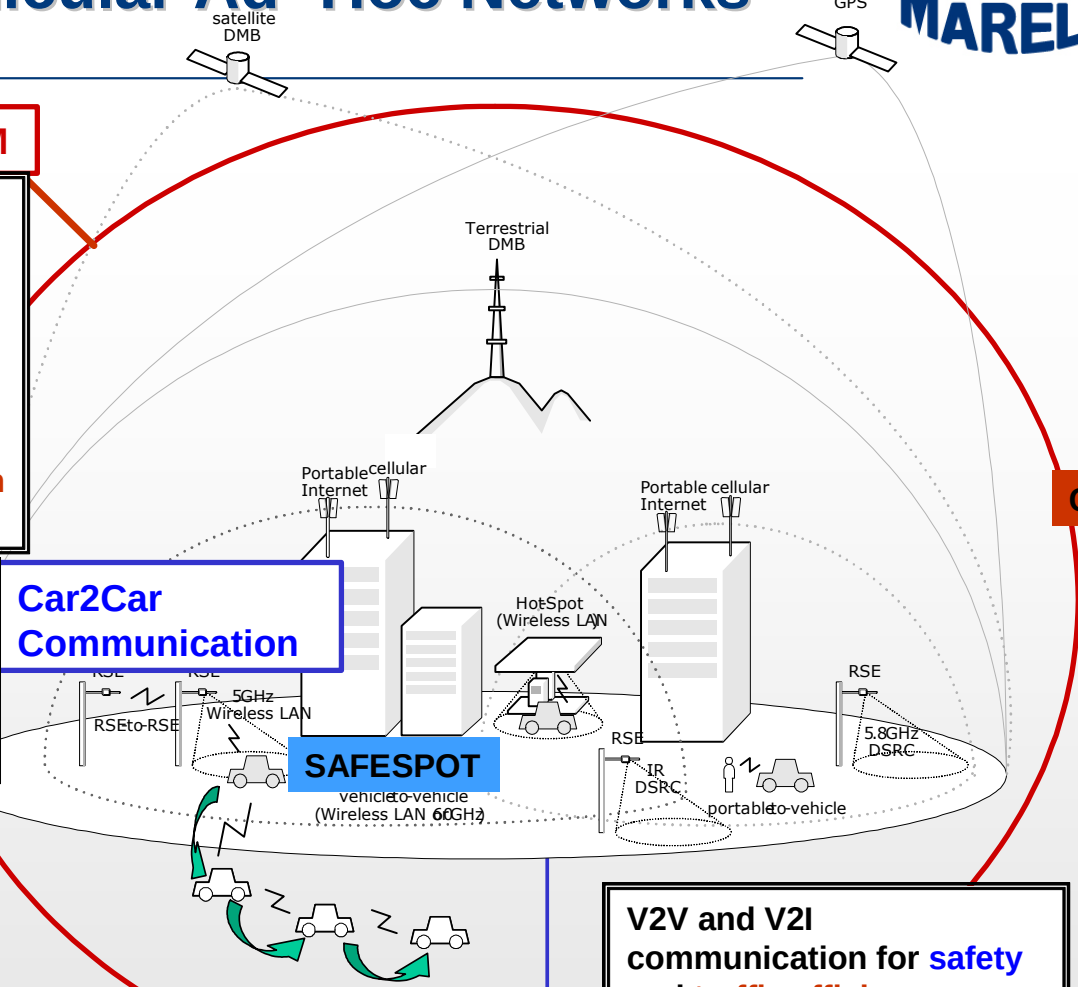
.:. The Key Technologies: Vehicular Ad- Hoc Networks

CALM

Support of ITS and Internet Services based on continuous communication over 802.11, GSM, UMTS, IR, IPv6, etc.
V2V and V2I communication when no routing is needed

V2V and V2I communication, based on geo-aware multi-hop routing

Car2Car Communication



CVIS

V2V and V2I communication for safety and traffic efficiency applications using car2car and CALM technologies

Candidate technology: IEEE 802.11

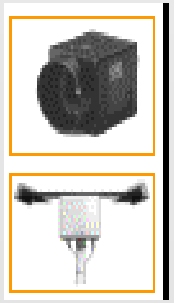
- Need for dedicated frequency band in the 5.9 GHz range for secure V2V and V2I, avoiding interference with existing consumer link
- Aligned to C2C-C and CALM standardization groups

.:. The Key Technologies: Positioning

A reliable, very **accurate** (sub-meter), **real-time** relative positioning:

- Use of satellite raw data onboard of different vehicles resulting in an enhancement of proven differential procedures (DGPS) without the need of stationary reference stations broadcasting correction data;

- Combination with other complementary sensor data (sensor fusion of laser scanner, image processing, etc.), including landmarks registered on digital maps, to bridge the gaps and errors of the satellite based system.

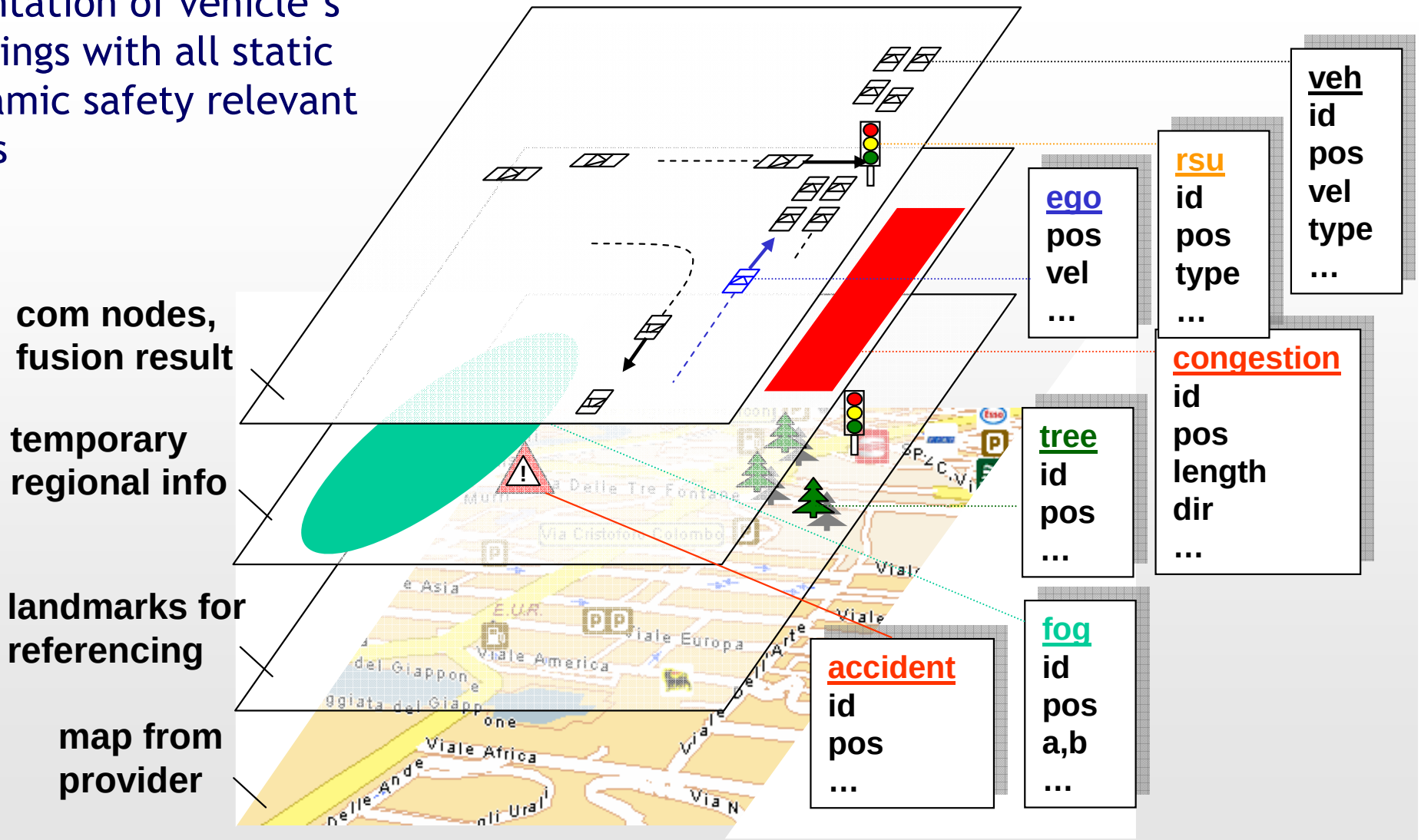


ROAD SENSORS
Laserscanner
Image processing

DATA FUSION ALGORITHMS
DGPS
Vehiclesensors'data
Landmarks
Othervehicles'positions

.:.The Key Technologies: Local Dynamic Maps

Representation of vehicle's surroundings with all static and dynamic safety relevant elements



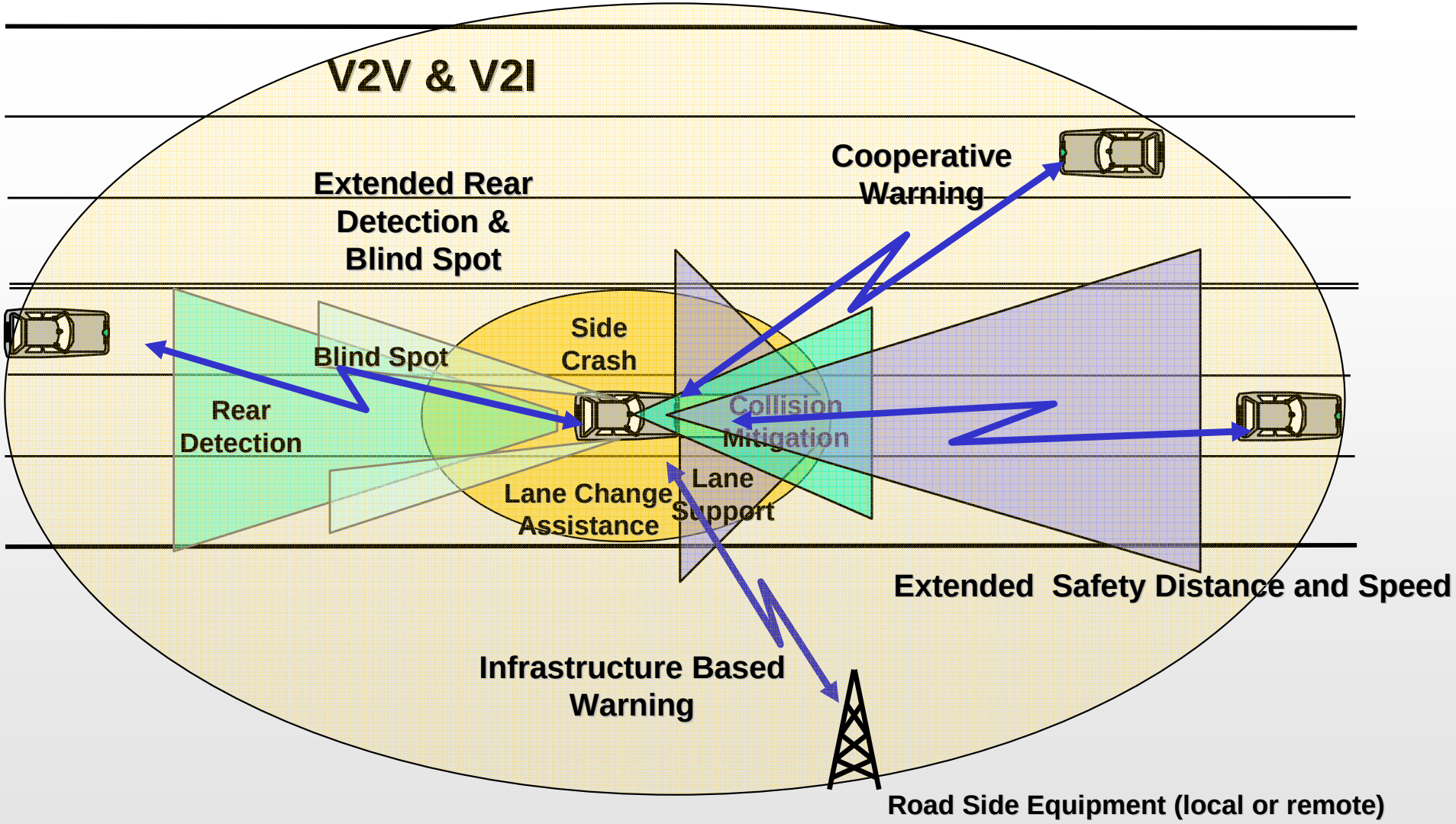
.:. SAFESPOT APPLICATIONS based on V2V and V2I communication

SAFESPOT applications will allow the extension of the "**Safety Margin**" that is the time in which a potential accident is detected before it may occur (e.g. in static and dynamic black spots, in safety critical manoeuvres).

The objectives are:

- To improve the range, quality and reliability of the safety-related information available to 'intelligent vehicles' by providing **'extended co-operative awareness'** through the real time reconstruction of the driving context and environment.
- To support drivers preventively to the proper manoeuvres in the different contexts.
- To manage existing incidents to minimise further negative safety impact.
- To increase the safety for all road users (including pedestrians and cyclists).

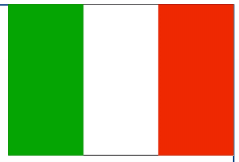
.:. The extended environment awareness



from the Autonomous Intelligent Vehicle to the Intelligent Cooperative System

.:. Test Sites for SAFESPOT

Italian TS



- CRF Test Track
- Motorway Torino-Caselle
- Motorway Brescia-Padova
- Torino Urban area
- Torino Rural area

Netherland TS

- Motorway Rotterdam-Antwerp
- Rural road

German TS, Dortmund

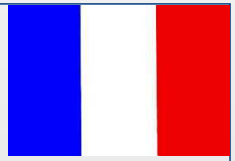
- Urban intersection

Swedish TS

Gothenburg

- Road tunnel
- Closed Test Track
- Road/Highway

French TS



- Rural road, Lyon
- Close track, Satory
- Motorway

.:. The SAFESPOT SYSTEM MONITOR: ESPOSYTOR

.:. Quick overview of ESPOSYTOR

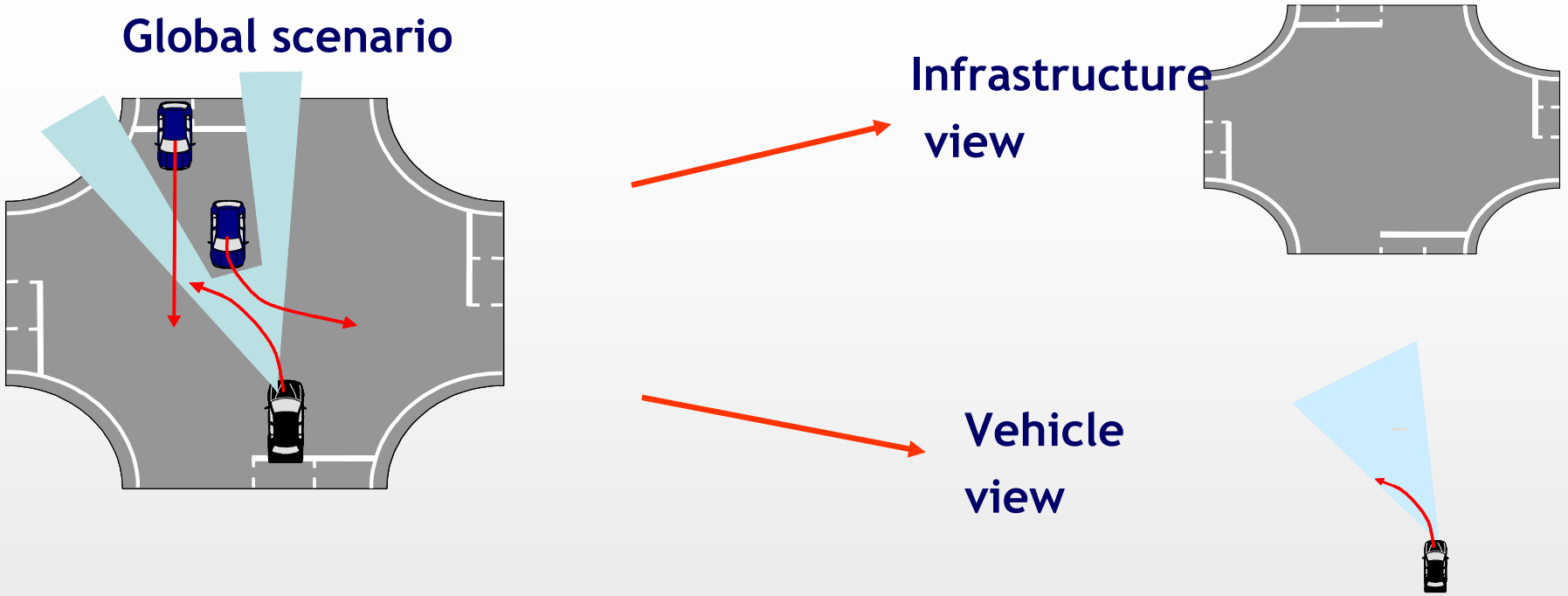
ESPOSYTOR is the System Monitor provided by Magneti Marelli.

It acts at SAFESPOT level by monitoring the work of the modules of the architecture for vehicles and infrastructures.

Its range of activity is at high level, with respect to other tools (CAN analyzer for vehicles, etc.)

.:. What ESPOSYTOR provides to the user

- An overview of the scenario, from different perspectives.

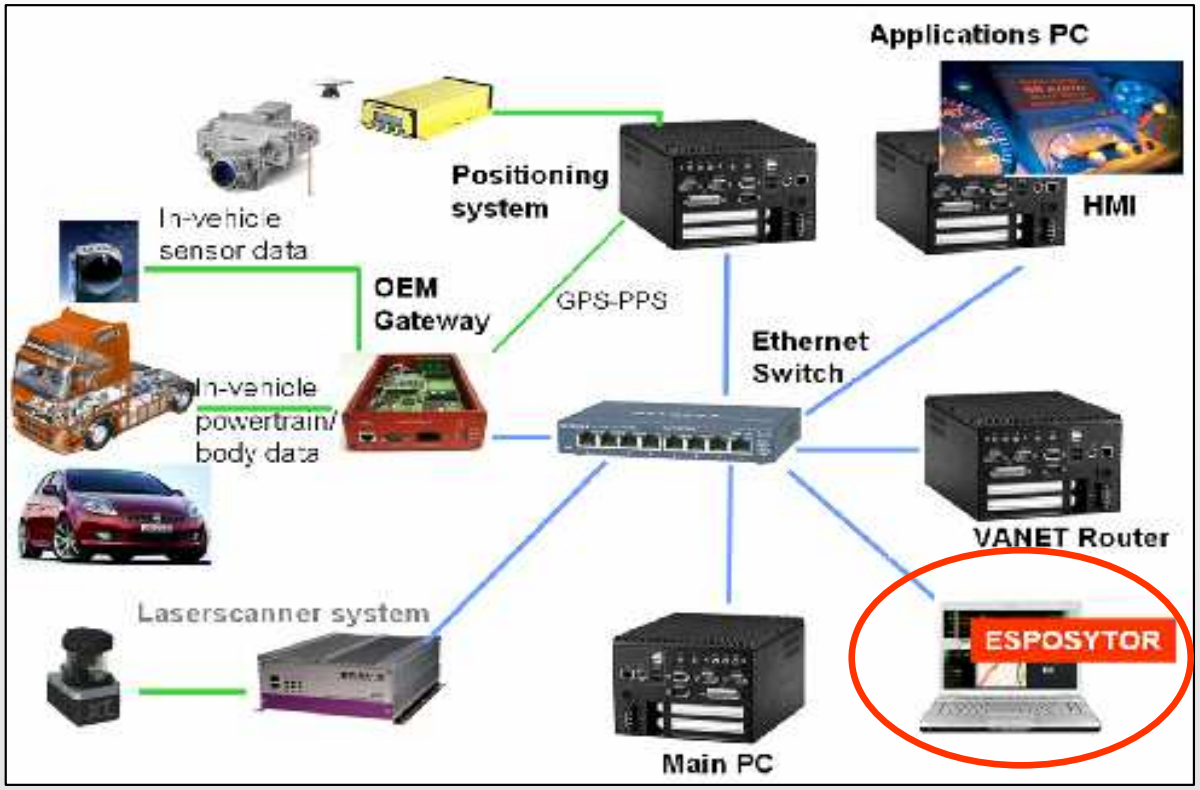


- A vision of the work done by the modules of the architecture on board, respectively for vehicles and infrastructure: positioning, VANET router, application modules, LDM.
- The status of the modules running on the network, with possible faults and anomalous behaviours.

.:. ESPOSYTOR visualization

ESPOSYTOR is organized as a set of pages, connected with the modules of the architecture, both for vehicles and infrastructures, and scrollable with a MENU.

Vehicle architecture



ESPOSYTOR pages:

- Main page (LDM)
- Positioning
- VANET
- Vehicle Applications

.:. ESPOSYTOR visualization

Menu to choose among the screen pages

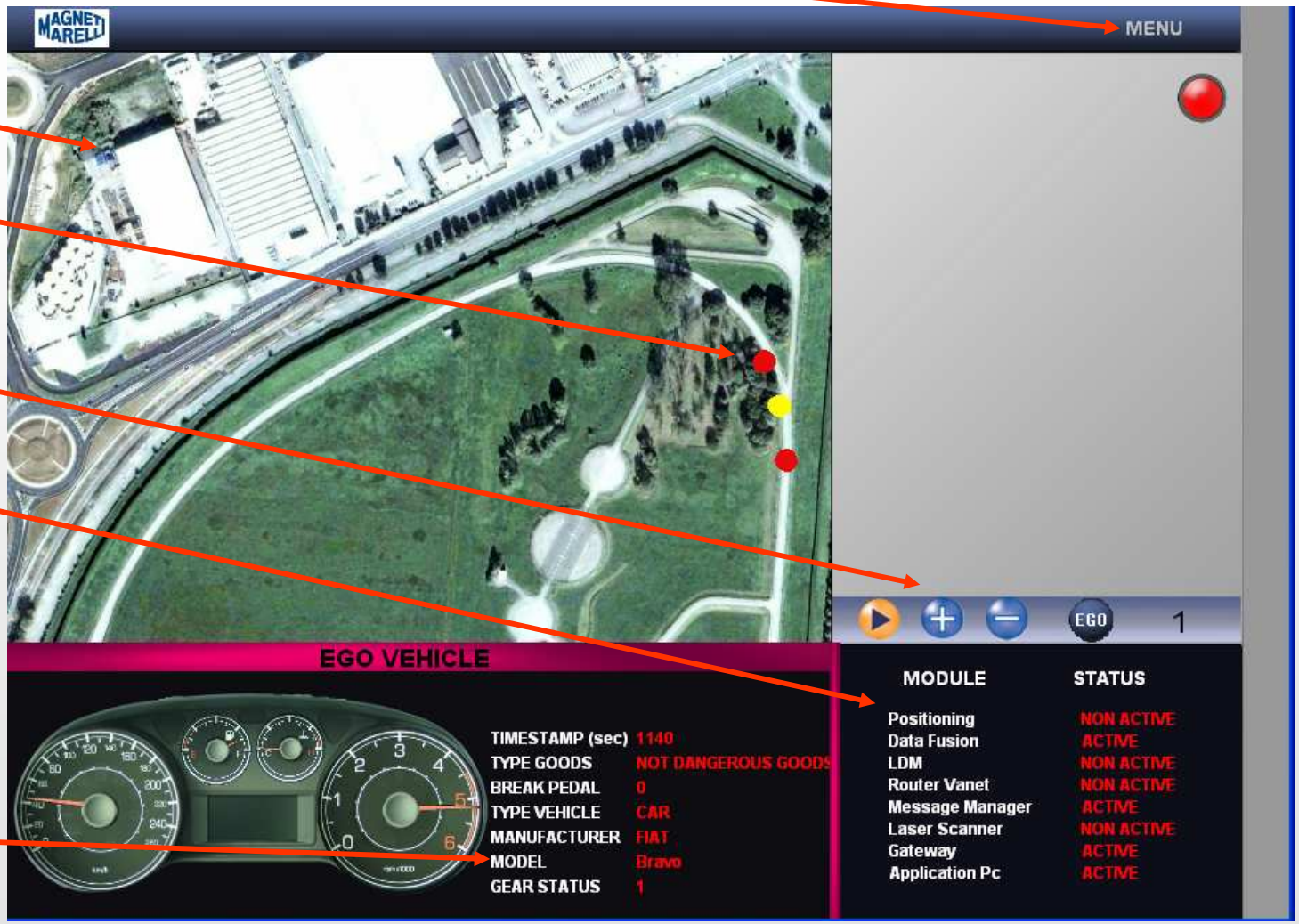
Test Site image or map

Vehicles and obstacles on the road.

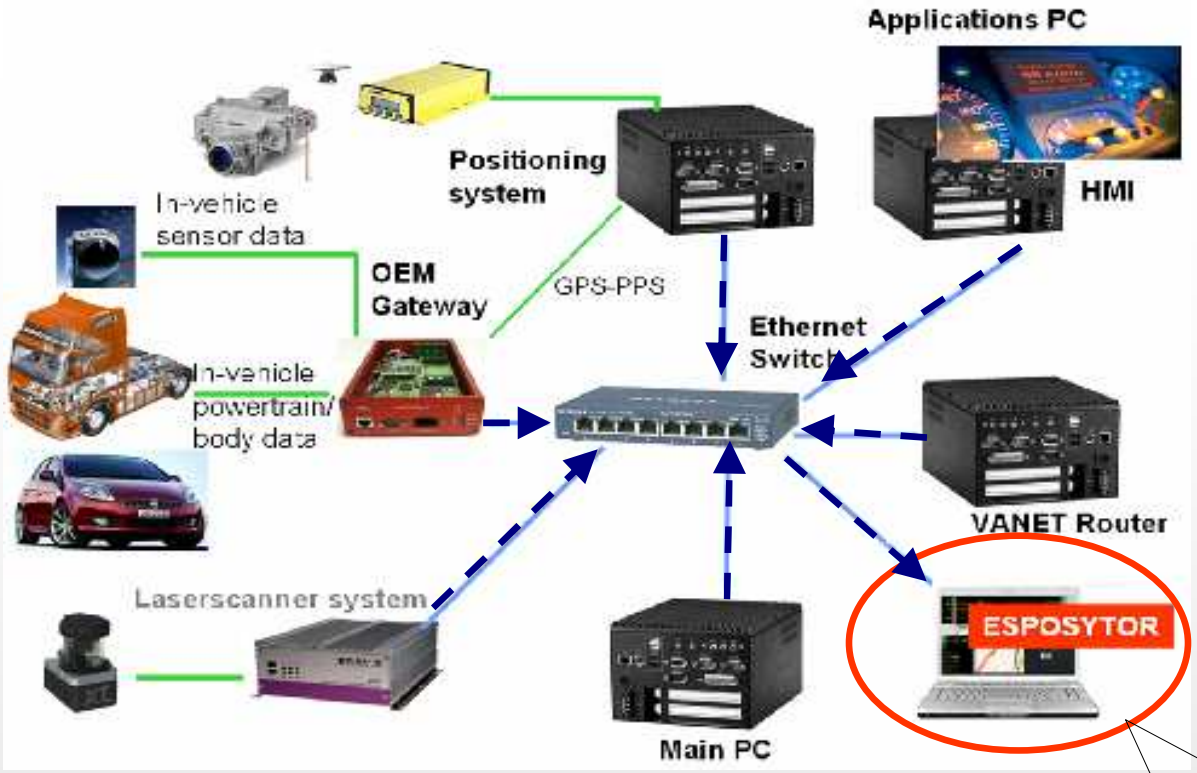
Zoom allowed

Status of the modules of the vehicle architecture.

Parameters characteristic of each vehicle



.:. ESPOSYTOR architecture



Display

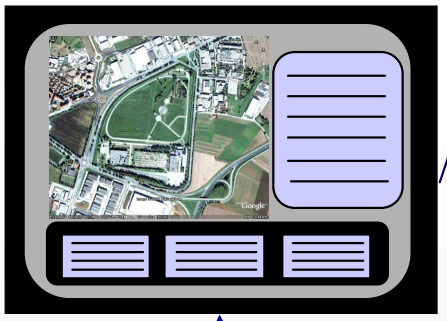
Data logger

Internal DB

External virtual data generator

data flow

.:. ESPOSYTOR Performed activities



Display

Developed with Altia Design.
Page of the MENU about the visualization of LDM content:

- Static object: CRF Test Track at Orbassano (Italy)
- Map geo referenced
- Animations for vehicle moving on the map.
- Zoom provided.
- Tables of parameters related to the visualized vehicles.

External virtual data generator

Internal DB

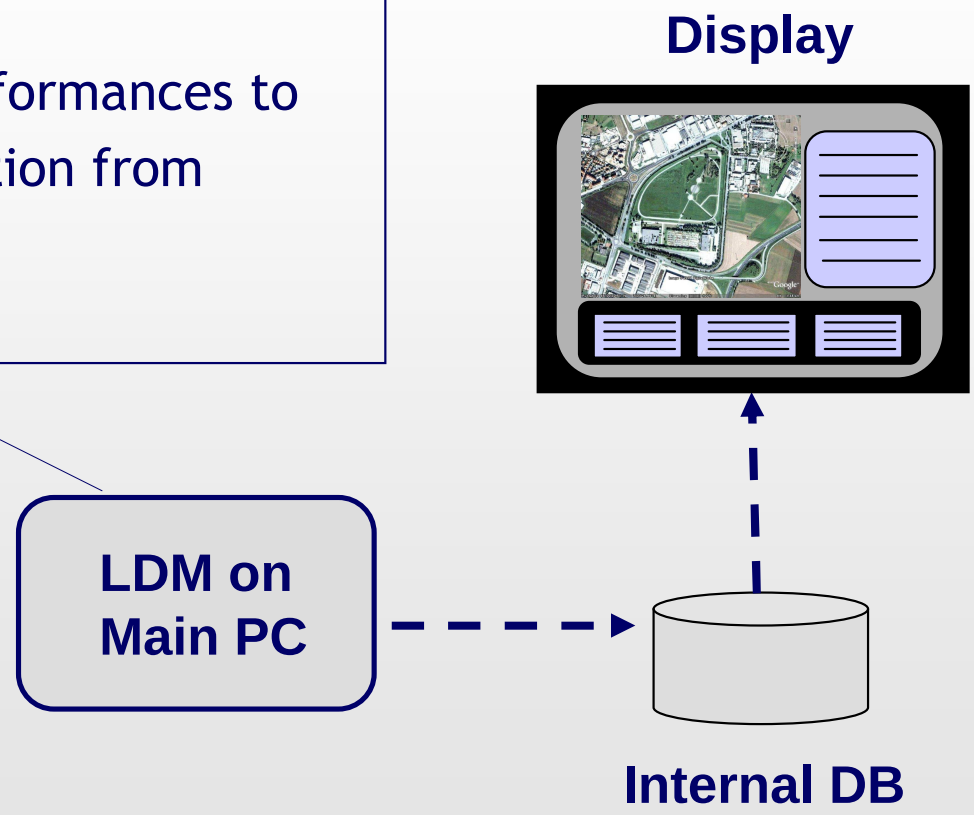
Developed in SQL.
Filled with data provided from the external virtual generator.

Defined from the CRF Test Track GPS coordinates, it contains the trajectories of three vehicles and the parameters of each vehicle.

.:. ESPOSYTOR Current activities

Connection with the LDM:

- acquisition of real data from the LDM;
- feeding of the Internal DB;
- visualization of LDM data
- analysis of the real time performances to define the periodical acquisition from LDM.



.:. Year 2 EC Review – CRF (Turin), May 2008

Objectives
- Provide a first demonstration of components integration
- Highlight potential criticality in the integration

Demonstration:
- Two FIAT Bravo move on the test track.
- Positioning system on board,working with a camera.
- Router on board, sending some basic information.
- Main PC acquires the info and writes on LDM.
- Esposytor gets information from LDM and visualizes it.