GALILEO

OREGIN Workshop

“ Galileo, the Road to Success”

Brussels - February 27, 2001

GALA Pilot Project "Road Safety & Mobility (ADAS)”

FIAT Research Centre

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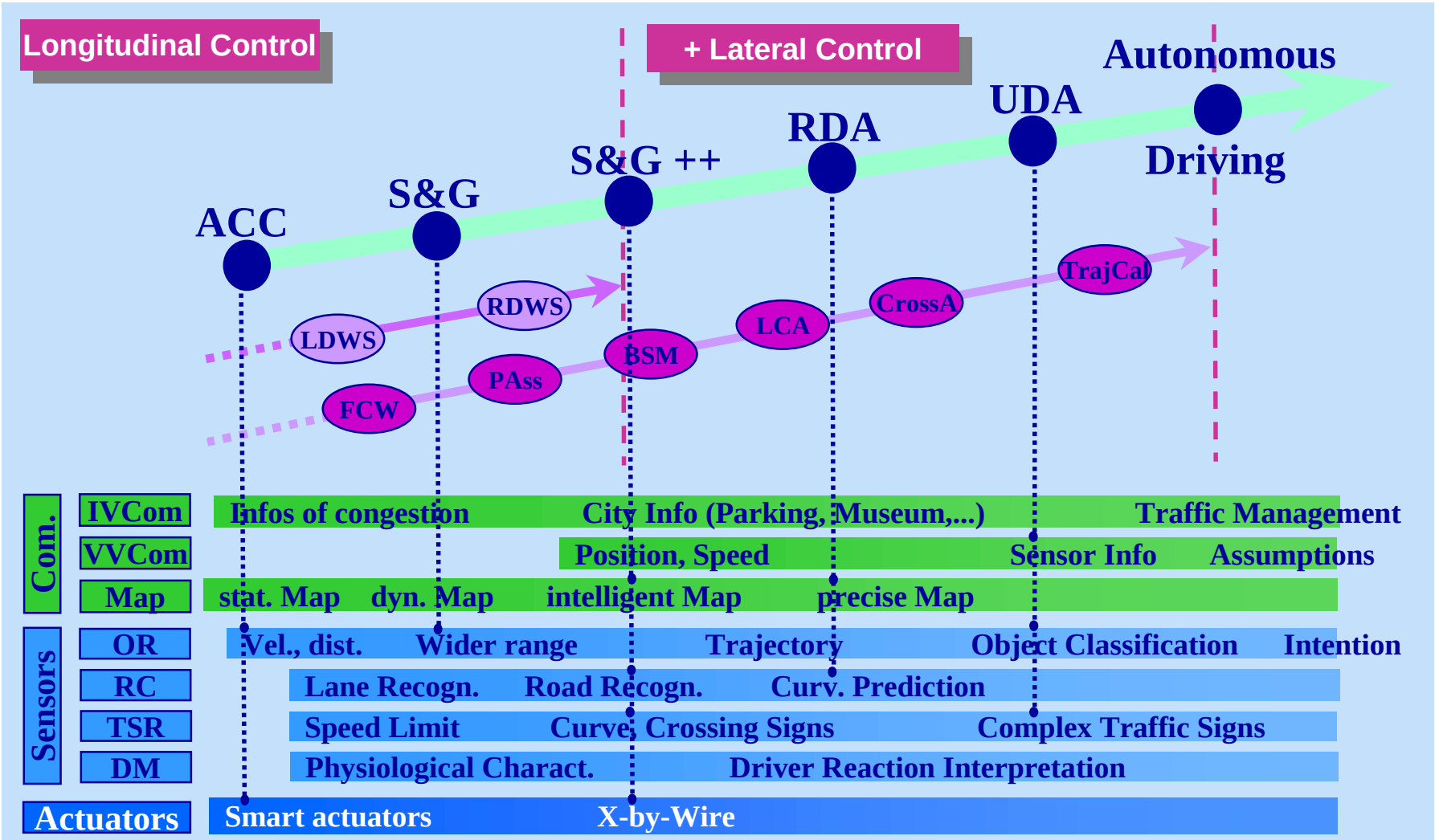
The overall scenario

- Sustainable mobility is the guiding principle of European transport policy. Transport safety and efficient mobility should play a dominant role in that passenger and good transport is a widespread and continually expanding phenomenon. A total growth of more than 50% is foreseen in the next 15 years.
- The estimated annual cost of accidents is around 1.5 – 2.5% of EU Gross National Product.
- The estimated annual cost of congestion is around 2% of EU GNP.
- The estimated annual cost of noise and pollution is around 0.6% of EU GNP.
- The total value is around 250 BEuro per year.
- The Road Transport attributable cost is around 90% of the total and the Human error attributable accidents are around 95% of the total.
- The above figures(*) give the dimension of the potential of driving assistance systems able to avoid, or reduce, the social impact of road transport.

(*) Source: Green Paper of the Commission COM(95) 691 fin. “Toward a fair and efficient transport pricing”

Roadmap for ADAS between 2000 and 2012



The overall scenario

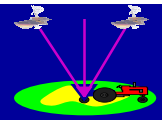
- Among the Pilot Projects planned in the GALA project, a major project is devoted to the application of Galileo to road transport safety and mobility (W8.2.1) in order to provide a concrete demonstration of the interest and potential of Galileo for user community and potential investors.

- Within the GALA project the demonstration related to this application was mainly based on computer simulation that confirmed the feasibility.

- The previous sentence came also from the strong experience of CRF in develop of ADAS applications, also in EU projects like Lacos, AC-Assist, Aware, Chauffeur, IN-ARTE, Darwin, Response, Lake, UDC.

GALA WP8 Pilot Projects

8.1.1/2 Fleet Management. - Precision agriculture
Specified with EC, developed by *Racal (UK)*

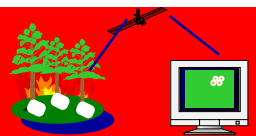
8.2.1 Road Safety and Mobility
Specified with EC, developed by *Centro Ricerche Fiat (I)*


8.2.2 Intermodal Freight Transport
Specified with EC, developed by *Telespazio (I)*


8.2.3 Train Protection and warning system
Specified with EC, developed by *Indra (E)*

8.2.4 Road Traffic Monitoring
Specified with EC, developed by *OHB (D)*

8.2.5 Crisis Management System
Specified with EC, developed by *Thales (ex Thompson-CSF) (F)*



8.2.6 Maritime application
Specified with EC, developed by *KTI (GR)*

ADAS - Project objectives

- The project is devoted to the demonstration and the evaluation of the benefits of the use of an advanced and certified Global Navigation Satellite Service (Galileo, the second phase of European GNSS) for improving road safety and mobility.
- The project will integrate the use of autonomous Advanced Driving Assistance Systems (ADAS) with the use of Galileo to reach the required degree of certified service level to offer, to the future drivers, Safety of Life grade assistance.
- The focus of the project will be clearly on the potential of Galileo leaving to the other sensors, that will equip the vehicles, only a co-operative function.
- The selected applications, implemented together on each vehicle, are:
  - Predictive Adaptive Cruise Control
  - Vision enhancement (by adaptive lighting)
  - Lane keeping
  - Collision avoidance
- The state of the art of ADAS is represented by the achievements of the EU 4FP and 5FP projects integrated with the participants knowledge.

The users

- The main users of the results of this project will be the road vehicles manufacturing companies and the electronic supply industries.
- The real end users will be all the drivers of future road vehicles.

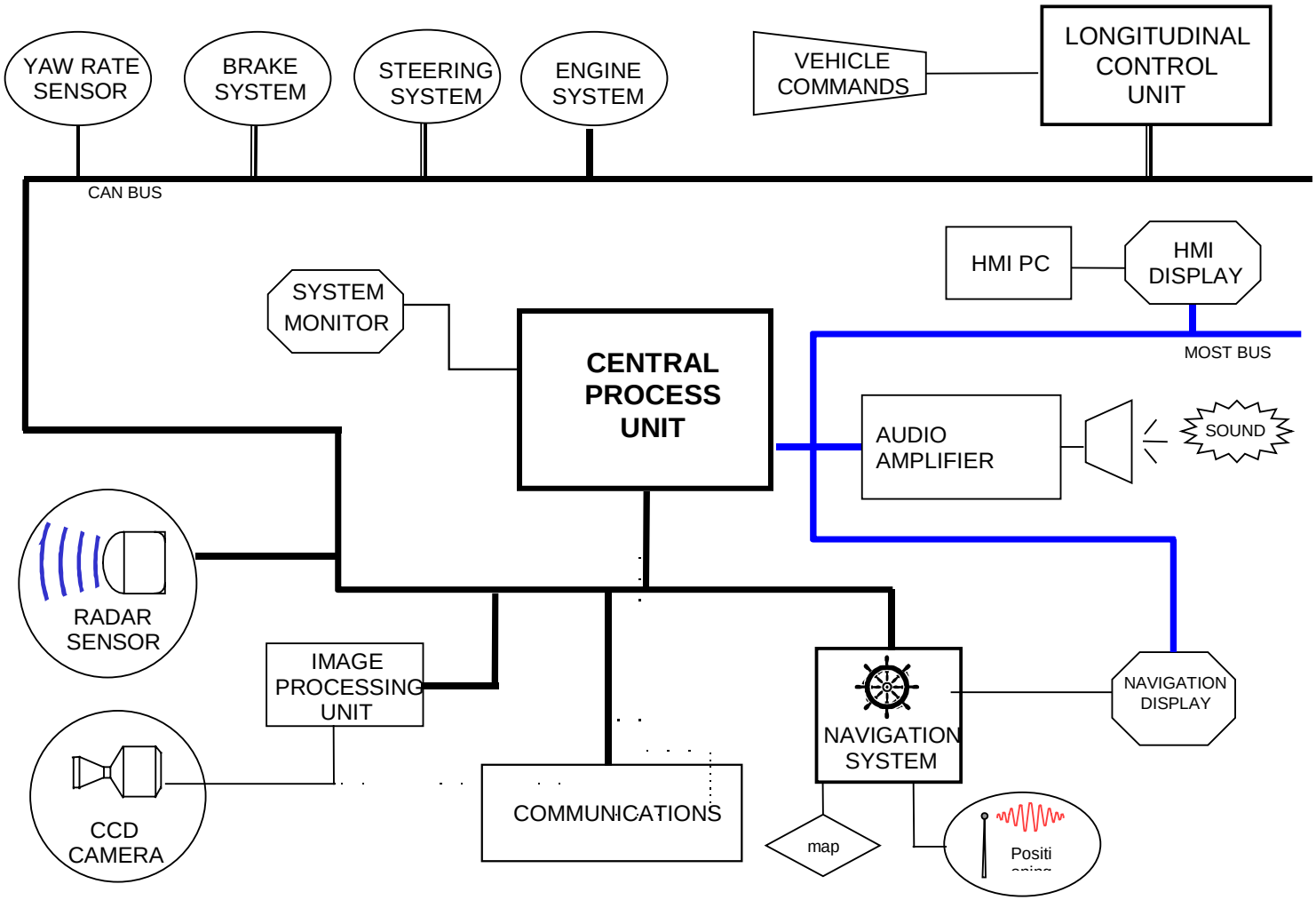
- Samples of technically aware drivers will be involved for the verification phase.
- Samples of ordinary drivers, including elderly and disabled, will be involved for the customer acceptance evaluation phase.

- However, before this stage, the responsibility for the evaluation of the ADAS, based-on or using the Galileo service, will be with the car manufacturers that are responsible (in agreement with the existing and with great probability also the future legislation) for the offer of the new functionality on the vehicles

Technologies and approach used

- **Autonomous on-board.**
  - Computer vision technology for lane recognition and lane keeping (lane / road departure control).
  - Computer vision, Laser and/or microwave radar technologies for lane change and collision avoidance.
  - Advanced Man Machine Interaction technologies for driver warning and information.
  - Drive by wire technologies for all the automatic vehicle controls (steering, brake, accelerator).
- **Satellite based.**
  - GNSS technologies (EGNOS and Galileo) for certified vehicle location on the road boundaries.
- **Integration.**
  - The efficient integration of the different technologies will provide the required performances and overtake some of the actual limitations. On-Board networking and impact in relative standards will be involved.
- **Advanced GIS (Geographic Information System) technologies for precise road mapping.**

Example of an enhanced ADAS architecture



Project breakdown

- **WP 1 - User analysis and application scenario**
- **WP 2 - Functional specifications and architecture definition**
- **WP 3 - Component specification and development**
- **WP 4 - Vehicles Integration**
- **WP 5 - Test site preparation and map capturing**
- **WP 7 - Procedures for technical verification**
- **WP 8 - Technical verification**
- **WP 9 - Exploitation and dissemination of results**
- **WP10 - Project management**

- The overall cost of the proposed project, assuming the participation of three car manufacturers, will be of 6400 KEURO.
- The total duration of the project is three years.

Expected benefits for the citizens

- Strong reduction of the social impact of road transport (accidents, pollution, congestion, pains, etc.).
- Improved vehicle control possibility for elderly and disabled.
- More efficient use of the transport infrastructure.

Expected benefits for the users

- Strong reduction of the risk of accidents.
- Improvement of safety for all the road users.
- Reduction of the driving workload and improvement of driver convenience.
- Better use of night time driving.
- Overall improvement of driving performances.

Expected benefits for the European Industries

- Establishment of new mass market applications for advanced satellite navigation systems and on-board sensors with strong benefits for the EU industries (Electronics, Space, Automotive, Telematics etc.).
- Improved competitiveness of the previously mentioned industries.
- Improved overall efficiency due to better transport flows.

Contribution to the EU policies

- Transport: enhancement of traffic safety and efficiency; sustainable development of the transport system.

- Socio-economic:
  - Quality of life, reduction of deaths and injuries due to road transport, pollution reduction, development of scientific and technological prospects.

- Industrial:
  - Improved competitiveness and technological advantage.

Conclusions

- The GNSS is the last plug for the realisation of the automatic driving system: please note that sensors, actuators and vehicle networking are already suitable for the application.
- With ADAS, the road transport mass market is entering the field of ‘safety of life’ applications. More than for other mass market applications (such as route guidance, road assistance, traffic information and management), ADAS require levels of performance which cannot be achieved with existing positioning systems.
- A challenge and opportunity for Galileo is to penetrate the multi-million user market where the cost/benefit ratio is a discriminating factor.
- Regulation and legislative support as well as the clear definition of service responsibilities are necessary for the success of this new positioning system.