ADASE
Advanced driver
assistance systems in Europe

Advanced Driver Assistance Systems in Europe

www.adase2.net

Guy FREMONT - COFIROUTE

The ADASE project

- A European research project, for the promotion of introduction and deployment of active safety systems
- 10 partners : car manufacturers, equipment suppliers, road operators, public authorities
- Coordinator : DaimlerChrysler
- Duration : 3 years (August 2001 – July 2004)
- Funding : EC DG-Infso :
  1,2 Mio € / IST FP5

The ADASE framework

White paper Transport Europe 2010

42 000 fatalities and 1,6 million injured / year is too high !

- reduction of fatalities by 50 %

  in the next 10 years.

eSafety

Action Plan

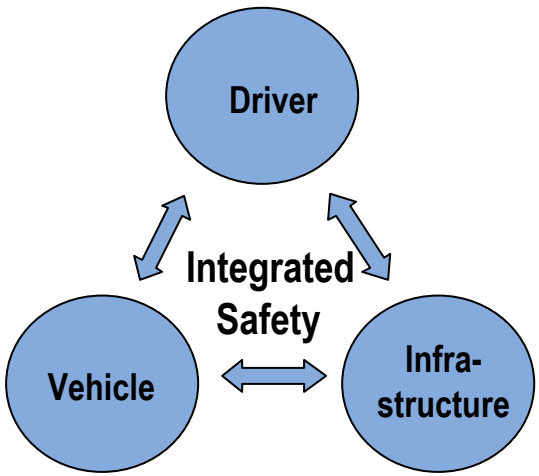
The passive safety systems will have only a marginal additional impact.

Objective : active safety systems made of on board equipment communicating and interacting with the infrastructure.

A global safety approach

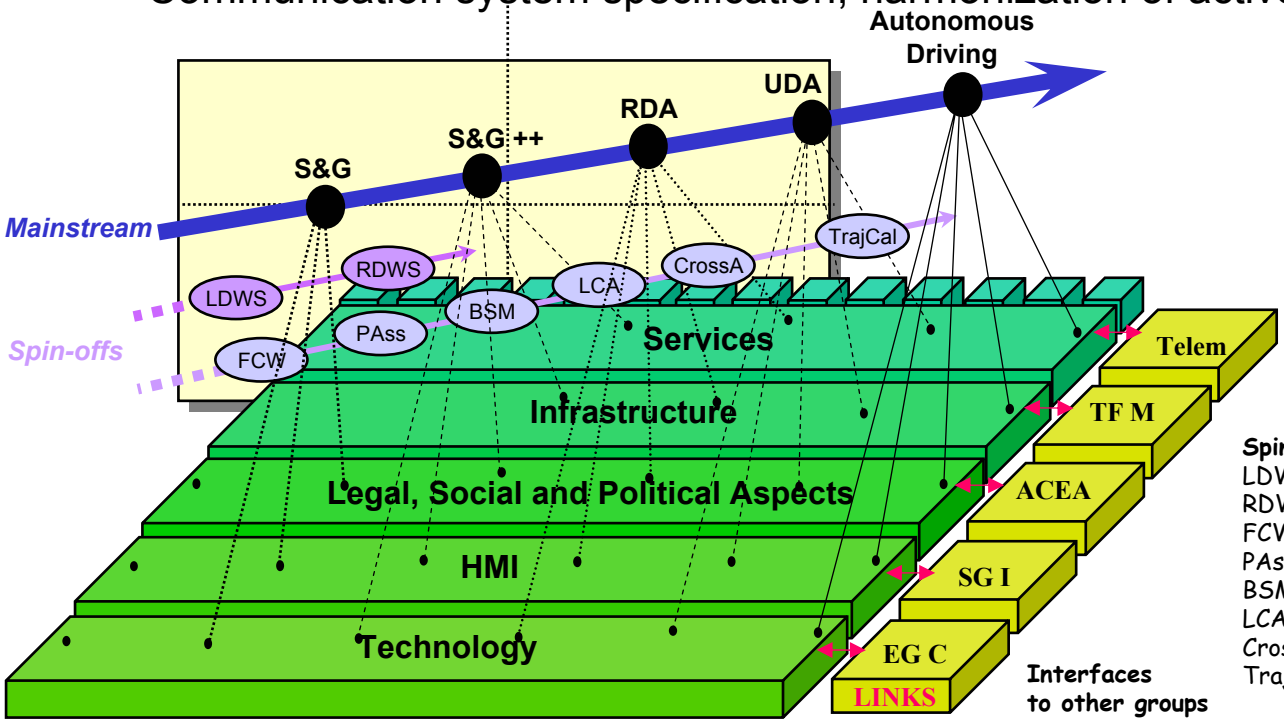
Vehicle safety standards are already very high !

- A significant increase in safety will be achieved by the consideration of all involved system components :
- Driver – Vehicle - Infrastructure



ADASE objectives

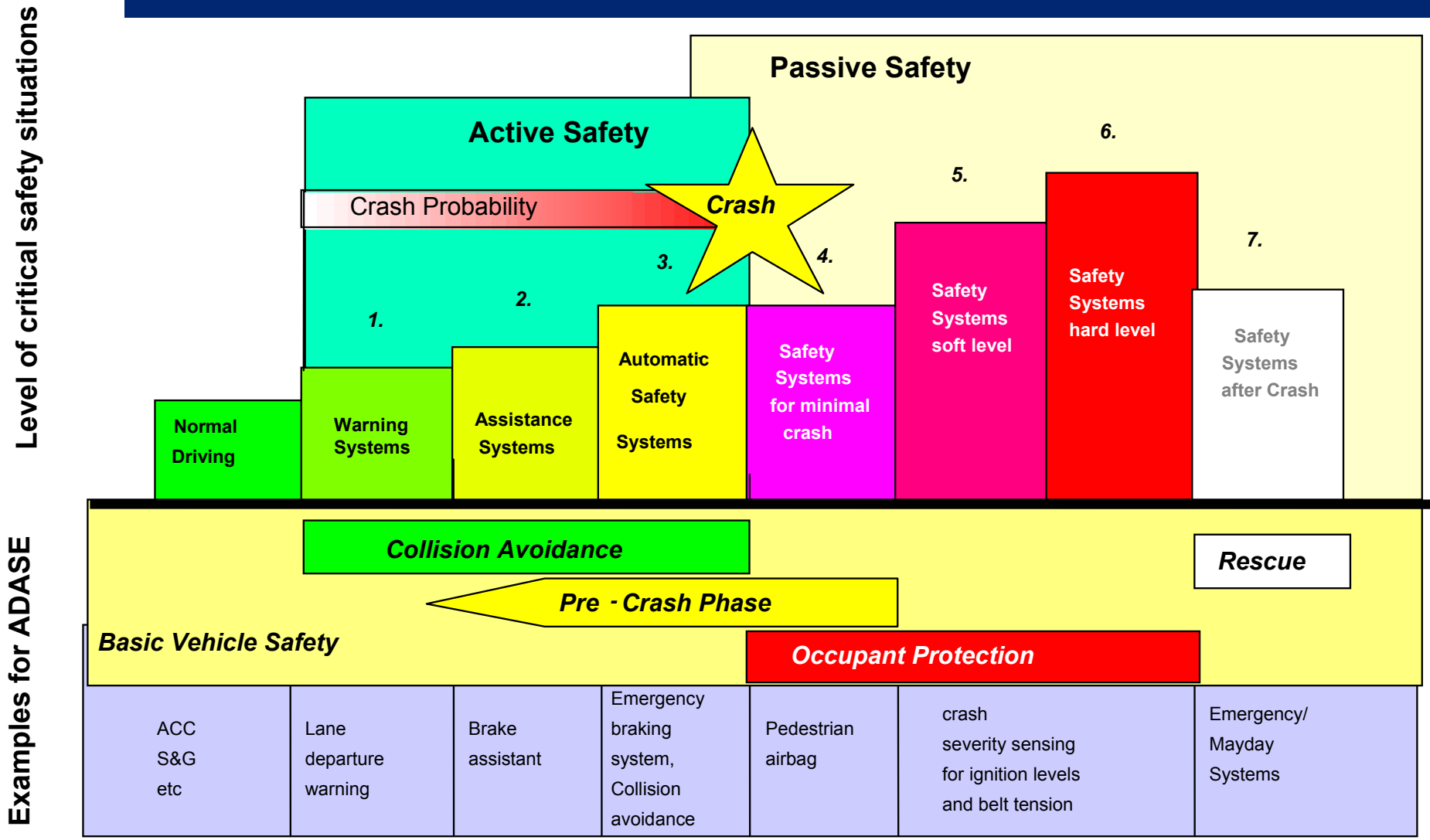
- Identification of main technological requirements / gaps
- Preparation of architectures, road maps, functions and interfaces standardization
- Communication system specification, harmonization of active safety functions



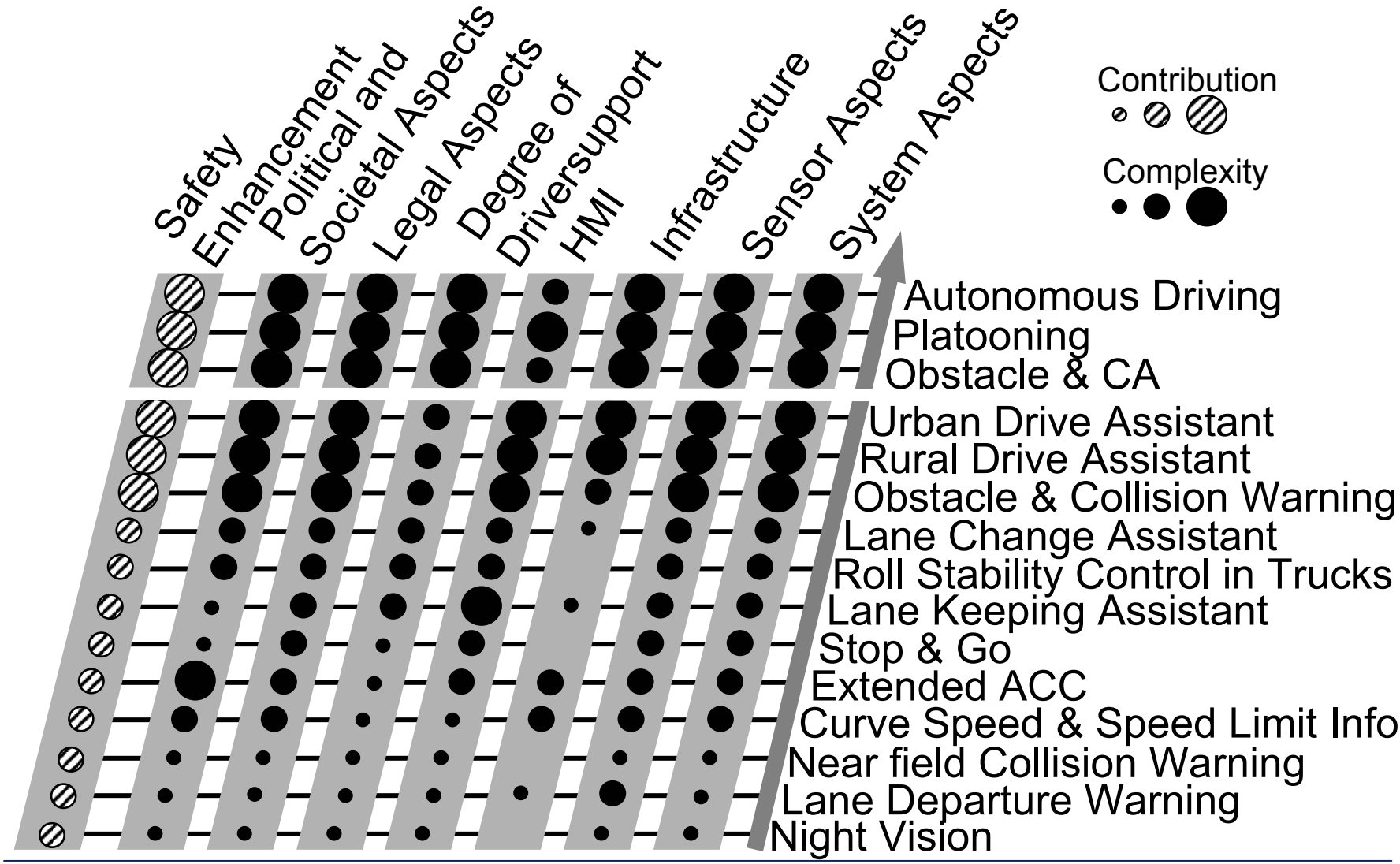
ADASE partners :

DaimlerChrysler (leader), BMW, CETE Med, CLEPA, Cofiroute, Fiat CRF, Jaguar, PSA, Renault, RWS

Integrated safety



The ADASE Road Map

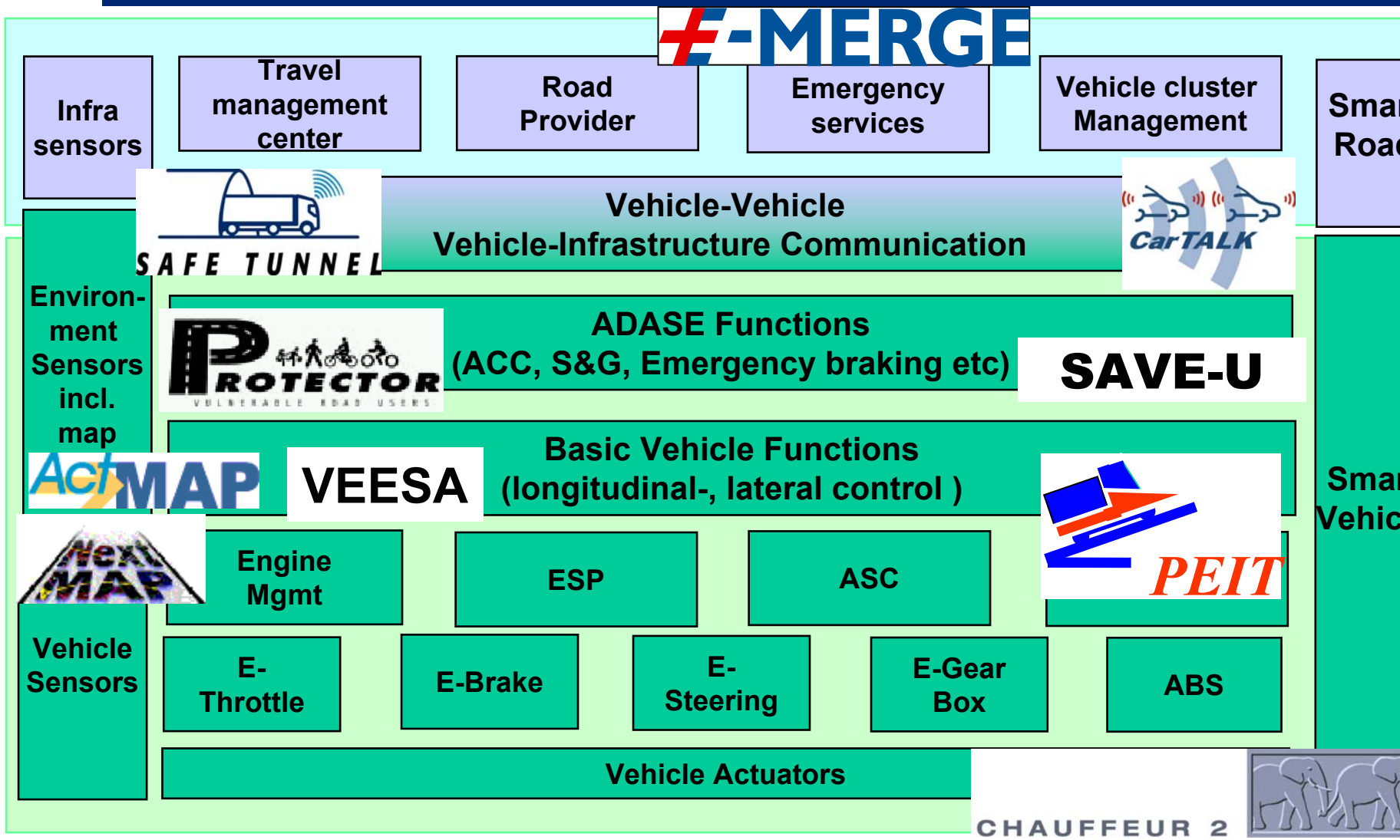


Expert workshops and concertation meetings

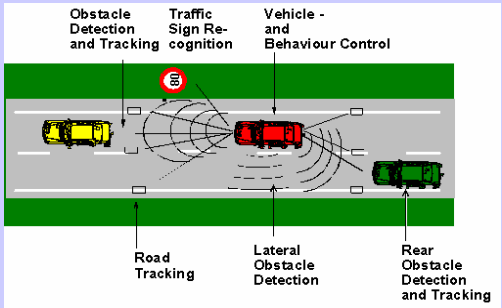
- Architecture and technology roadmap (Paris – March 2002)
- Legal aspects and Human machine interface - HMI (Brussels – October 2002)
- Vehicle to vehicle and vehicle to infrastructure communi-cations, systems and applications (Paris - February 2003)
- Sensor technologies -> Brussels - December 2003
- Effects on safety, throughput and comfort -> The Netherlands - April 2004

- Annual concertation meetings -> Brussels - Dec. 2003
  - presentation of the work progress and results of Technological R&D projects
  - discussions et exchange of information between projects and ADASE

The ADASE thematic network

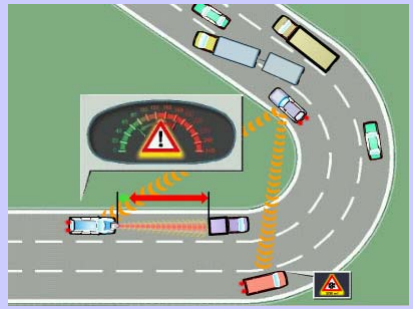


Need for a ADASE global open architecture



Board autonomous function

- **E/E architectures**
- **Dedicated Bus systems**
- **Sensing systems**



+ vehicle-vehicle communication

- **Communication system**
- **Frequency**
- **Protocols**

+ vehicle-infrastructure communication

- **Communication system**
- **Frequency**
- **Protocols**
- **Services**
- **Responsibility/Liability**
- **Costs sharing**

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Road to Vehicle Communications via DSRC : the AIDA system

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AIDA / MARTA : a success story

- **AIDA : a 4 years technological research project**
  - partners : COFIROUTE, RENAULT, PSA, CSSI
  - support of Ministry of Industry
  - 100 km of network equipped, 30 vehicles
  - 2 awards winner : PREDIT “Innovation for NTIC” 2001
    IBTTA “Toll innovation and Excellence” 2001
- **MARTA : a 3 years harmonisation project**
  - 9 partners, 5 countries, support of European Commission
  - interoperability tests in UK (Wales) : AIDA / RTA
  - Project Conference and demo in Cardiff (25/10/01

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The characteristics of DSRC

- **Two-way short range communication from vehicle to infrastructure (in Europe at 5,8 GHz)**
- **Communication standard dedicated to any road telematics application (CEN TC 278, ISO TC204)**
- **First application widely implemented:**
  - **Electronic Toll Collection (ETC)**
- **Future value added services:**
  - **Traffic and Travel Information, Emergency Warning, Incident and Traffic data collection, Intelligent Speed Adaptation, Electronic clearance, etc.**

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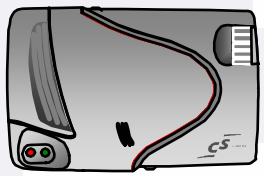
Information, safety, data collection

AIDA antennas



- Road information
- Safety messages
- Traffic and weather data collection
- Incidents detection

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AIDA : principles of data transmission

Data processing and transmission to the vehicles

Communication with the vehicles

The AIDA services

AIDA : an on-board system providing real time information dedicated to safe and comfortable highway driving

Traffic conditions
- accidents
- perturbances
- road works
- traffic jams

Road information
- sorties conseillées
- distance to next exits
- estimated time of arrival
- relief routes

Weather conditions
- fog
- low temperature
- heavy rain

Personalised traffic information
- tourist information
- petrol stations with brand and price
- service and rest areas

Interactive services
- incidents signalling

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Traffic data collection, incident detection

- **Travel times on motorway between 2 beacons**
  - **anonymously = without identification of the driver**
- **Statistic traffic data : origin / destination matrix**
- **Weather events : fog and hard rain**
  - **automatically = switch of the wind screen wipers or fog lights**
- **Slowing down (--> traffic jams)**
  - **measurement of a strong deceleration**
- **Interactive service : incident detection**
  - **accident, stopped vehicle, obstacle on the road, bad weather**

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Improving safety : alert functions

- **Automatic processing and transmission to the upstream beacons (in both directions) of the warning information collected by the vehicles**
- **On-board unit with screen :**
  - **spontaneous display of the safety messages on the screen + activation of the buzzer (or synthesised voice)**
  - **nature of the event and location**
- **ETC transponder :**
  - **activation of the buzzer and/or LED : immediate danger ahead**

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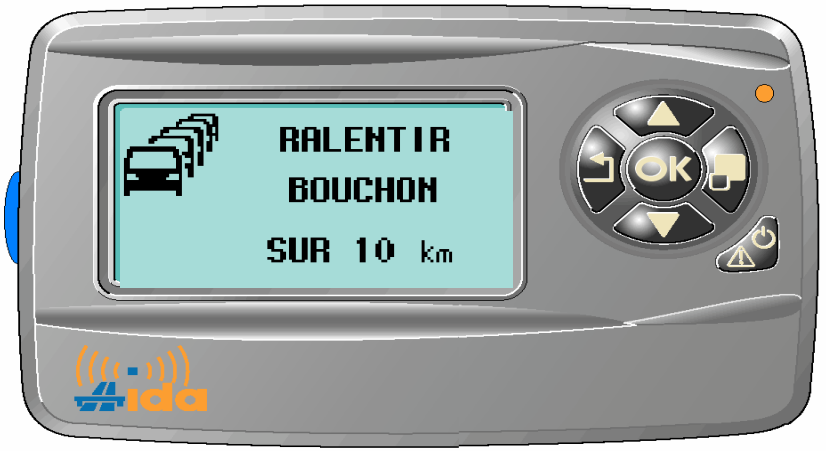
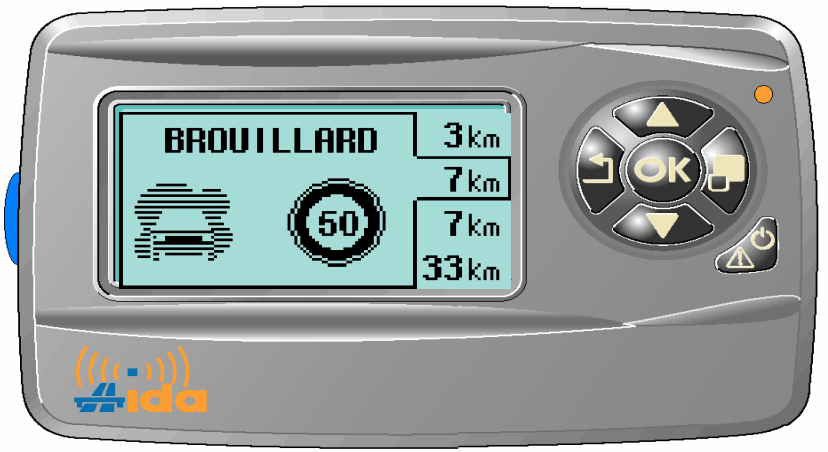
Display examples : safety services



Alert message corresponding to a traffic incident

Checking the list of incidents (here weather incident)



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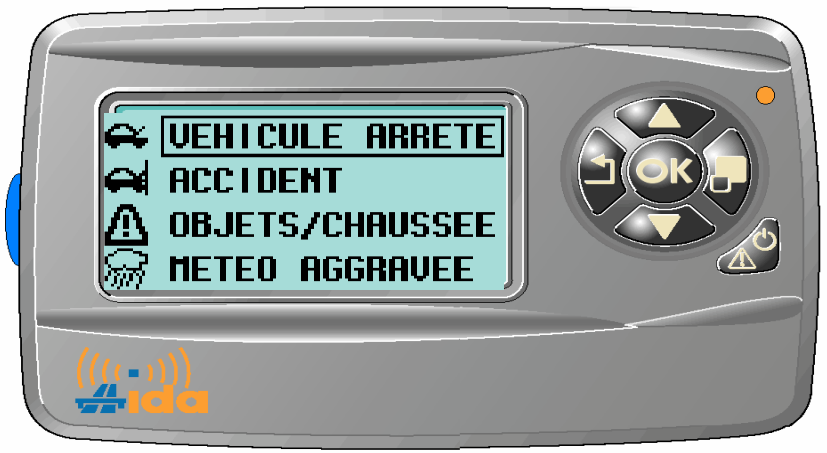
An “interactive” safety service



The interactive service…

… gives the possibility to inform the Traffic Information Centre of an incident that was seen on the motorway

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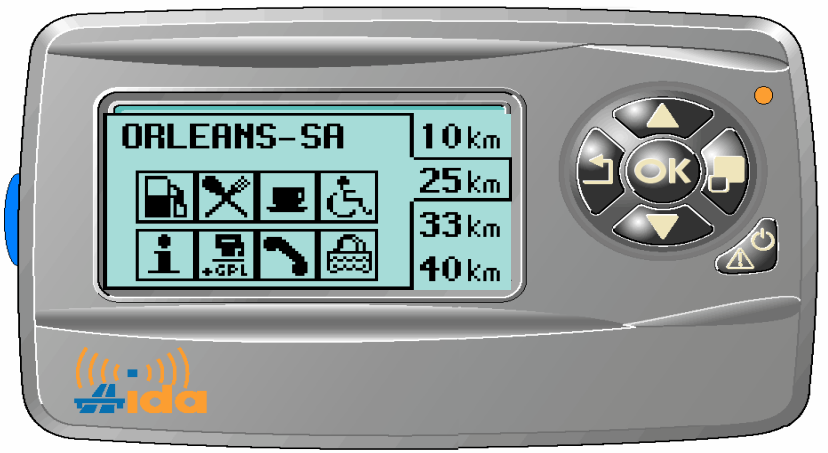
Display examples : comfort services

Distances to the exits, time to destination, traffic conditions

Information on rest and service areas



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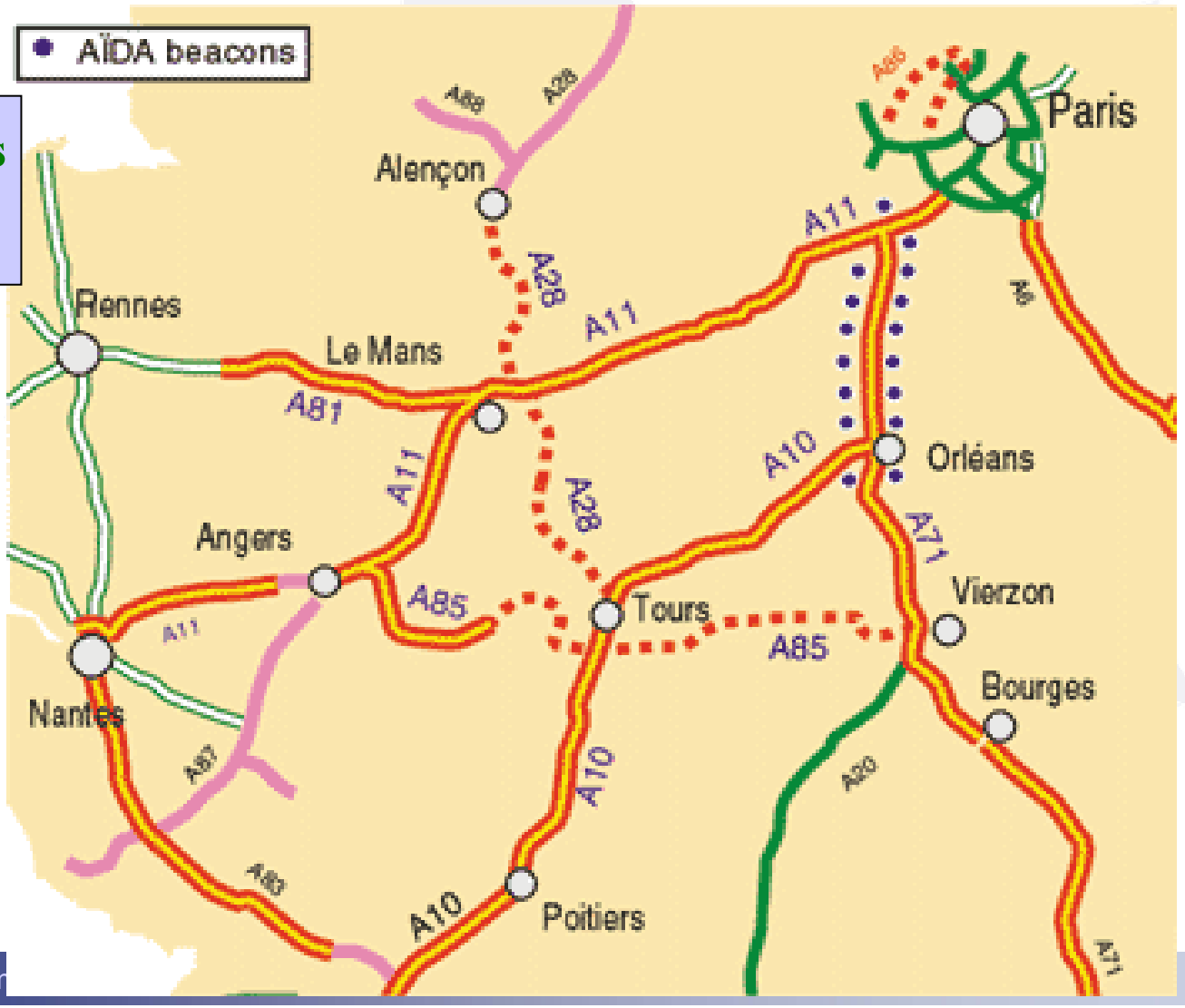
Cofiroute test site : 100 km / A10

Existing beacons
Phase 1 = 18
Phase 2 = 27



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Types of evaluation

- **Man-Machine Interface and driver behaviour aspects carried out by INRETS in 1998**
  - **legibility of text and icons displayed,**
  - **no interference with the driving task**
- **Assessment of some AIDA functions by simulation**
  - **traffic simulation + individual driver behaviour + AIDA model**
- **Field trials in real traffic conditions**
  - **qualitative evaluation through questionnaires and enquiries**
  - **quantitative evaluation through data records in the TIC and in the on-board units (smart card)**

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Field Trials

- **Duration : from May to July 2001**
- **Location : a section of 100 km (A10 motorway of COFIROUTE network between Paris and Orléans)**
- **30 vehicles fitted with AIDA devices**
- **Several thousands of vehicles equipped with ETC tags**

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First results of qualitative evaluation

- Safety services are considered the most important
- The driver becomes an actor in the improvement of road safety through incident signalling (as a witness)
- Accurate and local information received
- Complementary media with motorway advisory radio (107,7 MHz)
- Liability of the system to be improved
- Integration of On-board unit in the vehicle expected

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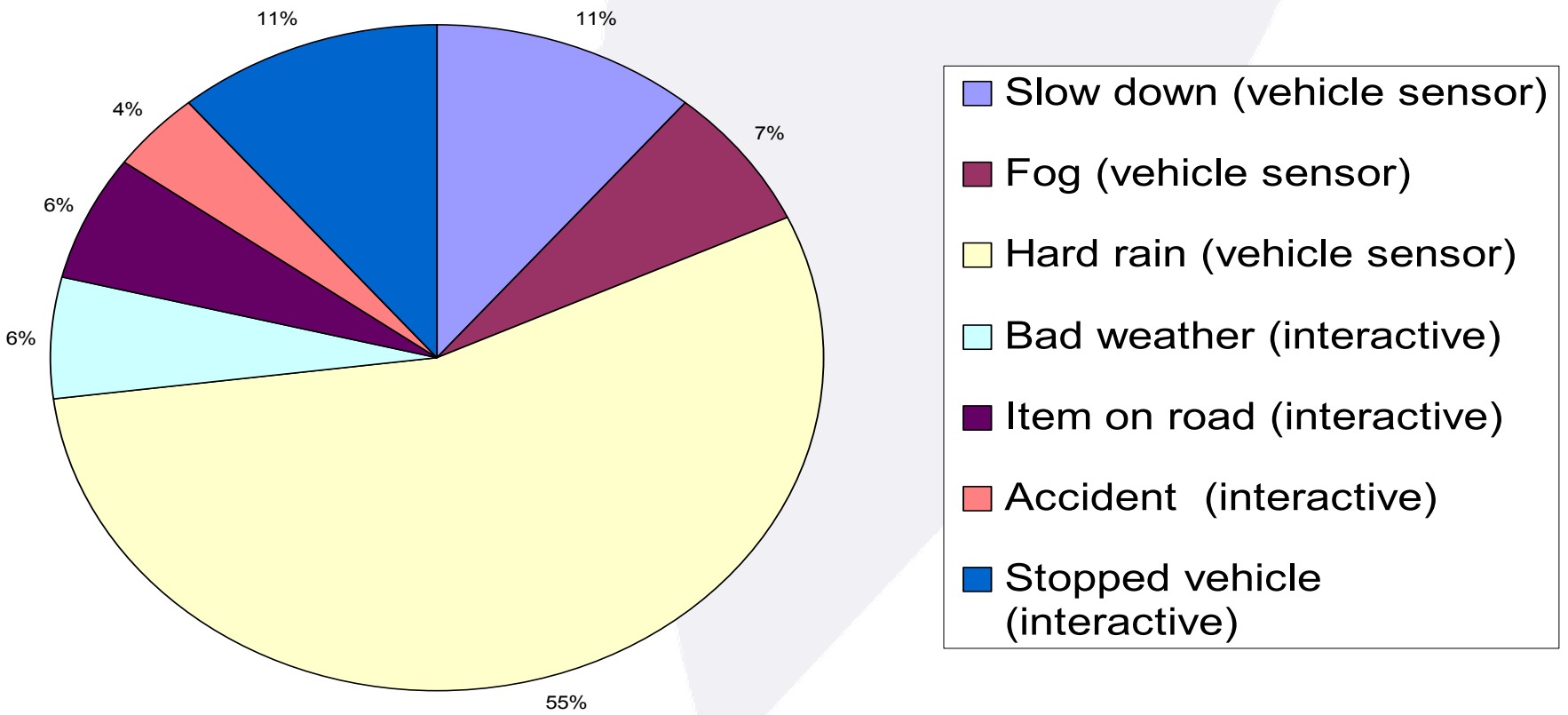
Transmission of events

Breakdown of the events transmitted by the AIDA vehicles



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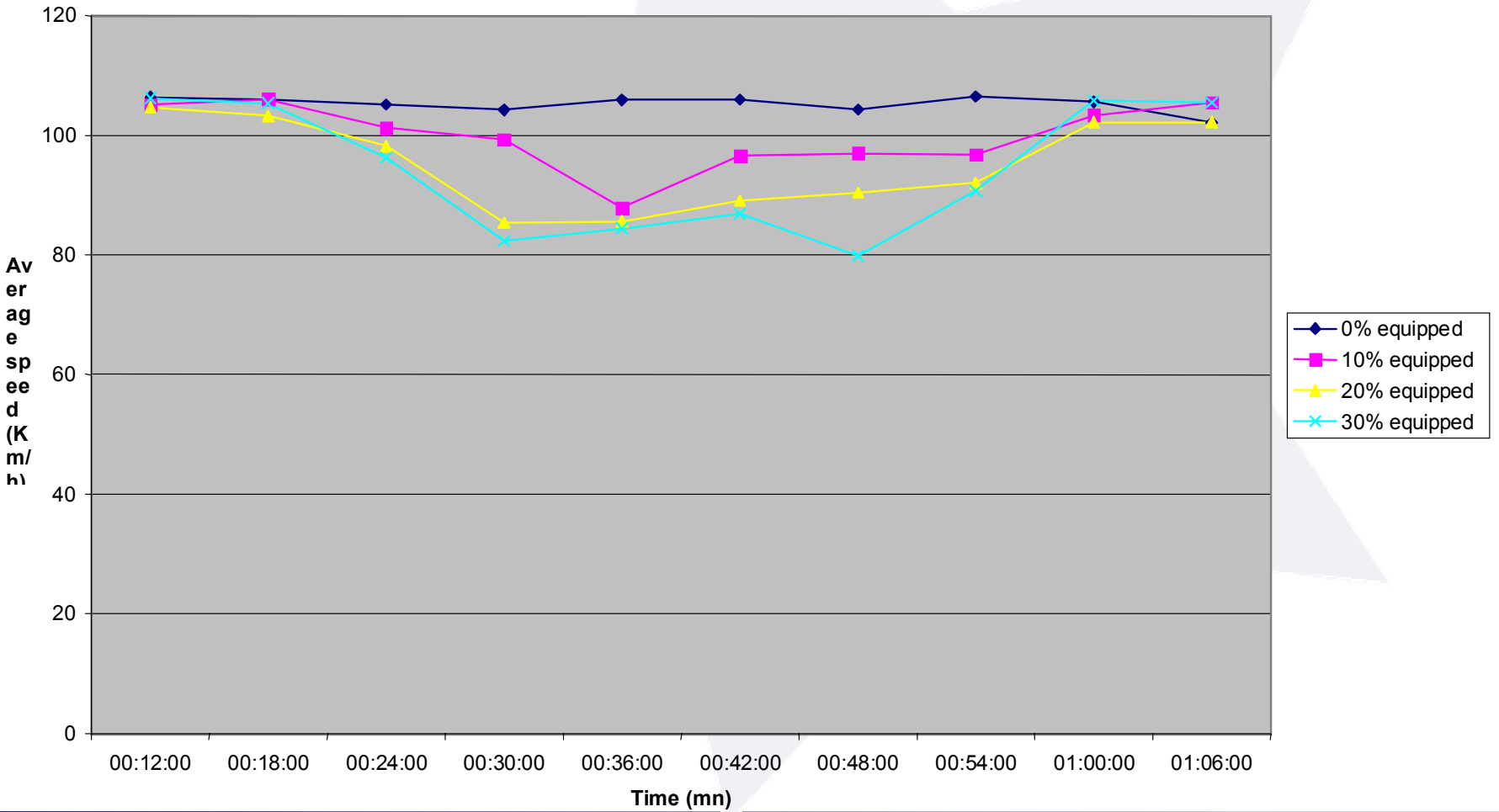
Traffic simulations (1)

Case 1 : Average speed against time ; 1 km before incident (flow of 1275 veh/h)



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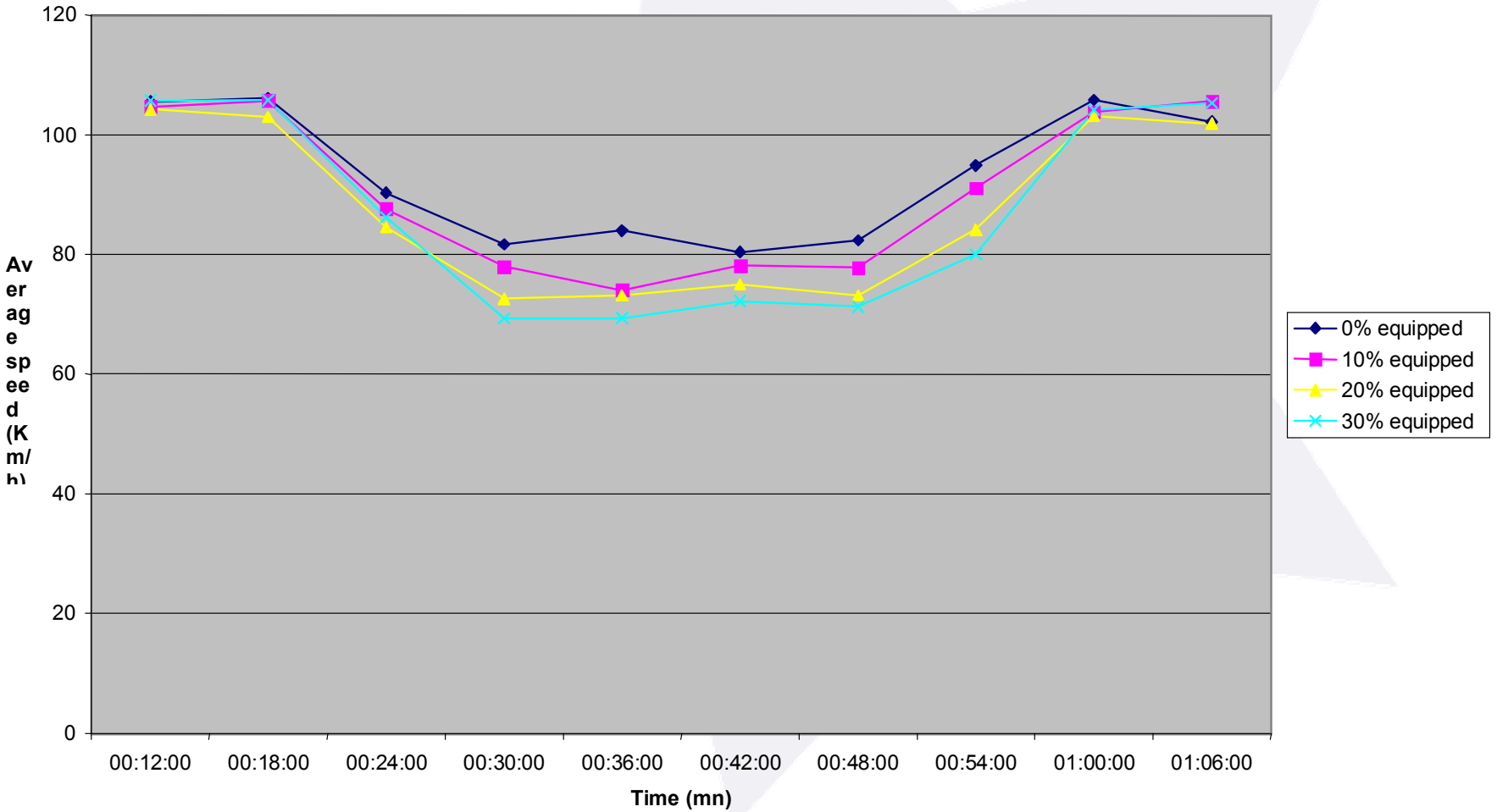
Traffic simulations (2)

Case 2 : Average speed against time ; 300 m before incident (flow of 1275 veh/h)



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Lessons learned from evaluations

- **Accuracy of probe-measured travel times within motorway traffic management and control**
- **Impact of AIDA equipment rate on average speed of the whole traffic (avoid pile-up accidents)**
- **Potential reduction of detection time to improve the incident management chain**

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The MARTA project

- **Co-ordination between the test sites (AIDA, RTA), from a point of view of functional specifications and test methods**
- **Definition of common applications on the test sites in the framework of traffic and travel information and specification of guidelines of common use**
- **Development of a European draft standard in the framework of the CEN TC278 - WG 4, WG9**
- **Demonstration of interoperability between the AIDA and RTA systems**
- **Ensure that the existing standards are taken into account and contribution to standardisation work within the TC278 WG4.2**

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The DELTA project

- Integration of the DSRC tag in the vehicles, at the factory
- A project supported by the European Commission
- An answer to the non compatibility between the ETC systems and the metallised windshields (attenuation of 7 dB)
- Development of a standardised interface between the DSRC tag and the other vehicle equipment
- Determination of the optimum location of the tag antenna in the vehicle

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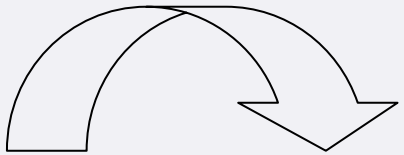
DELTA = integration in the vehicle

Objective : Integration of the DSRC as standard equipment in the vehicle



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The TRAVIATA project

- An attempt to perform a vehicle to vehicle communication using the same DSRC systems
  - emergency warnings between vehicles
- Results did not meet the expected level
  - good communication at 20 m
  - probability of good communication at 50 m if messages repeated 100 times
  - communication not possible at more than 100 m
- Vehicle equipment will remain too expensive for large market introduction

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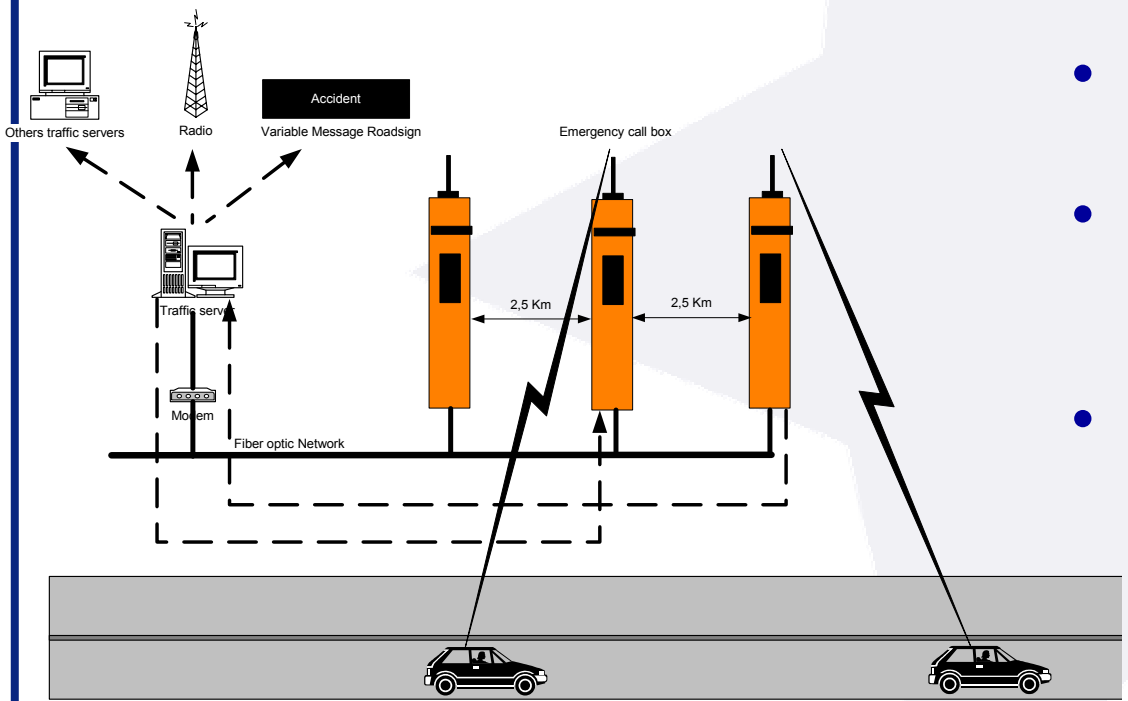
IVHW

IVHW
Inter-Vehicle Hazard Warning



- **Transmission of alerts between vehicles**
- **Communication : up to 1 km**
- **System activated manually or automatically in case of airbag release**
- **Alerts can be transmitted to / from the road operator, thanks to IVHW systems installed in the emergency call boxes**