

What's Happening Overseas? International Perspective on Safety Applications for Connected Vehicles



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SAFETY & SECURITY



CRASH AVOIDANCE



CRASH AVOIDANCE

- Front and rear crush zones absorb impact forces
- Comprehensive use of high-strength steel helps direct energy away from the passenger compartment
- Antilock brakes, front and rear with audible wear indicator
- Brake transmission shift interlock
- Brake Assist
- Automatic Daytime Running Lamps
- Automatic exterior lamp control
- Disc brakes, front and rear, audible wear indicator
- Door warning lamps or reflectors
- Fog lamps (optional)
- Halogen headlamps
- Window defoggers
- Inside auto-dimming rearview mirror
- Outside power rearview mirrors

What's Happening Overseas for Connected Vehicles?



- **Japan**

- Smartway
- Energy ITS
- Sky

- **Europe**

- Private Sector
- European Commission
 - ✦ Current projects
 - ✦ Outlook
- National projects

Japan



SmartWay



- **Mobility / Efficiency / “soft safety”**
- **Key Applications**
 - Information on Obstacles Ahead
 - Information on Conditions Ahead
 - Merging Assistance
 - Map-linked Services
 - Smart Parking
 - Internet Connection

1. Feature of Smartway

New Cooperative Road-Vehicle Systems

Smartway: New Cooperative Road-Vehicle Systems

ITS on-board units



car navigation - linked type



Stand alone type

DSRC roadside equipment

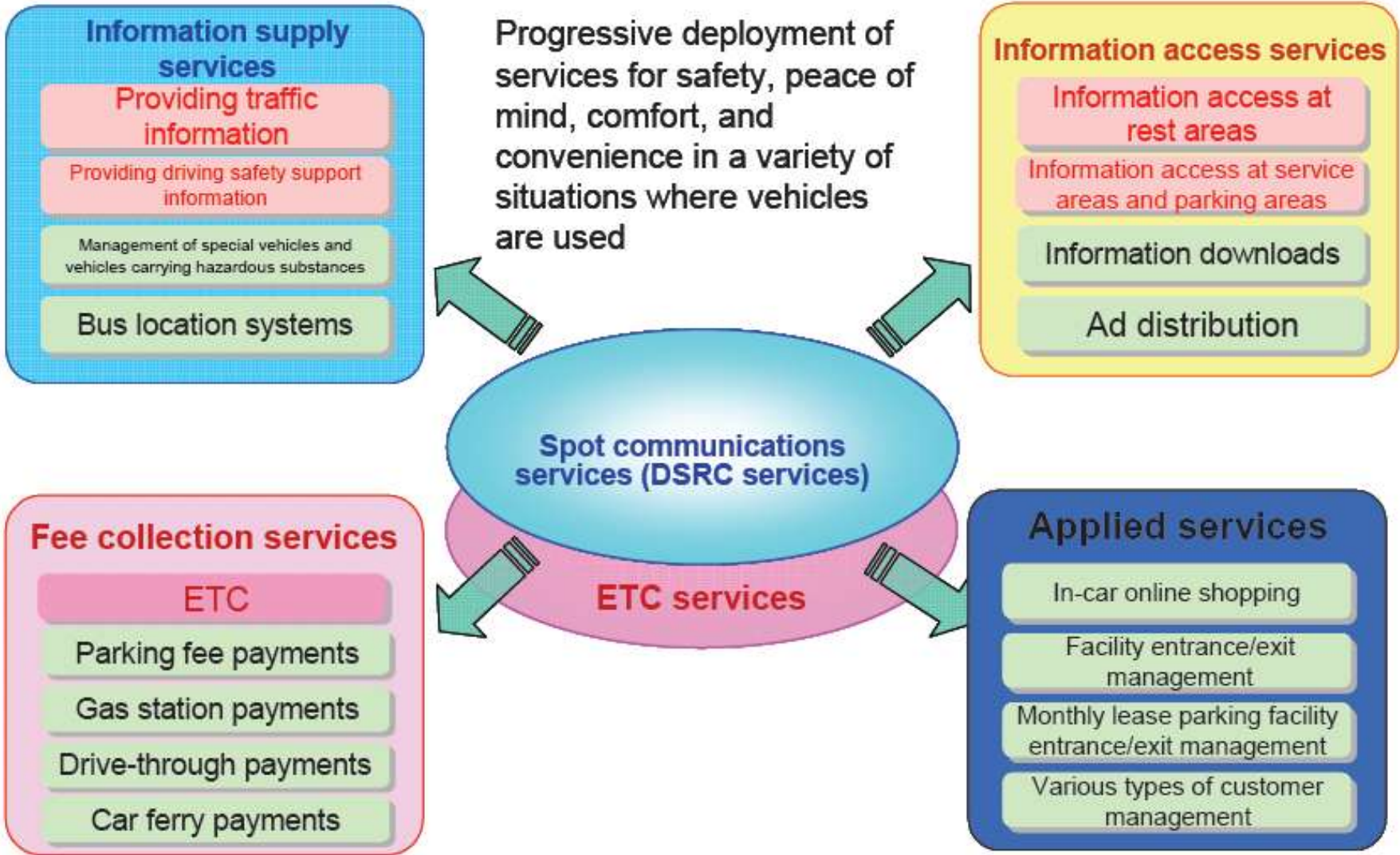


5.8 GHz DSRC
(Dedicated Short Range Communications)



1. Feature of Smartway

Realizing Various Services by Road-Vehicle Cooperative Systems



2. Field Operational Tests

“ITS-Safety 2010” Large-Scale FOT in Tokyo

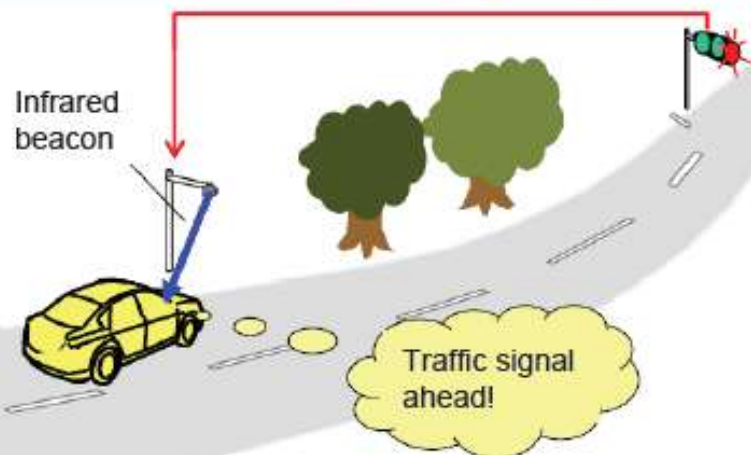


Road Bureau, MLIT: Smartway



V2I communication in expressway by radio wave (DSRC)

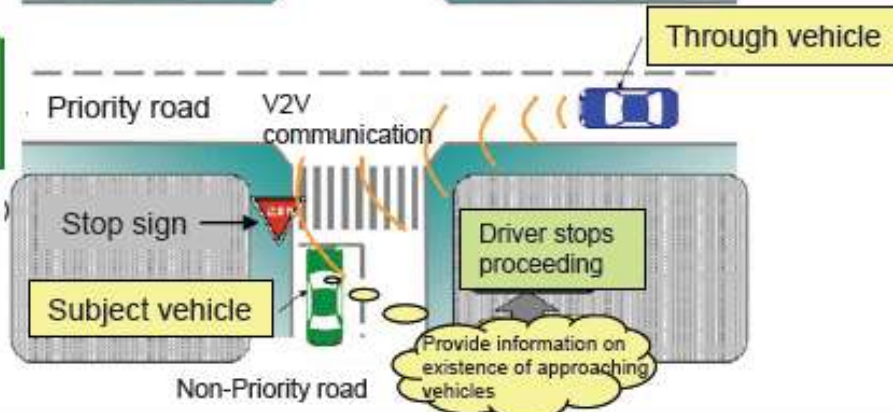
National Police Agency (NPA): DSSS



V2I communication in ordinary road by radio communication media, such as infrared beacons

Road Transport Bureau, MLIT: ASV

V2V communication by radio wave (5.8GHz, 700MHz)



ITS-SAFETY2010 Deployment Plan



- 1035 roadside units (IR beacons)
- 15B yen (about \$150M)
- Service starting April 2010

- Initial focus: verification of effectiveness
 - Monitoring driver behavior specific to situation
 - Included infrastructure-based measurement of vehicle movements
 - 2000 drivers

Nissan SKY Project

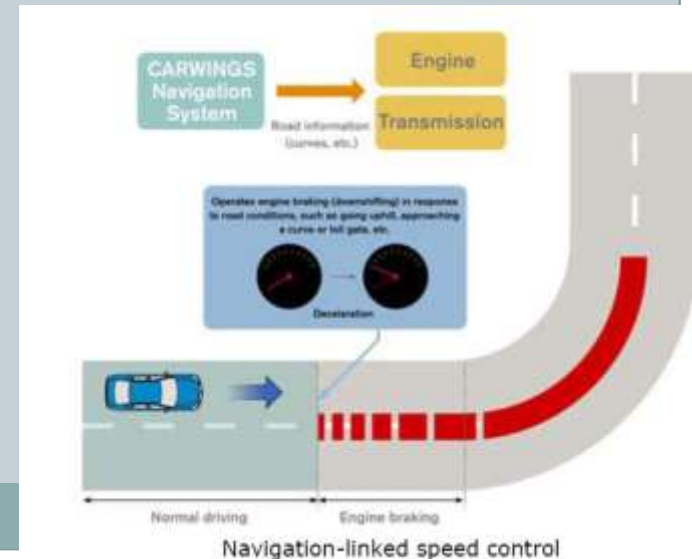


- Initially Nissan, now additional OEMs have now joined
- Using VICS IR beacon for communication
 - all V2I / I2V
- Applications
 - Intelligent Speed Advisory (school zones)
 - Intersection Collision Avoidance
 - Pedestrian Awareness using Mobile Phone
 - Dynamic Route Guidance using Probe Data
 - Opposite Direction Driving Prevention
 - Skid Incident Information Service

Nissan Product in Cooperative Safety



- Press release July 2009
 - 2010 Fuga model
- Applications
 - Warning approaching low visibility intersection (stop sign/ traffic signal)
 - ✦ IR beacons
 - School zone alerts
 - Navigation-linked speed control
 - ✦ Curves, toll-gates
 - Probe data



“Energy ITS” Project

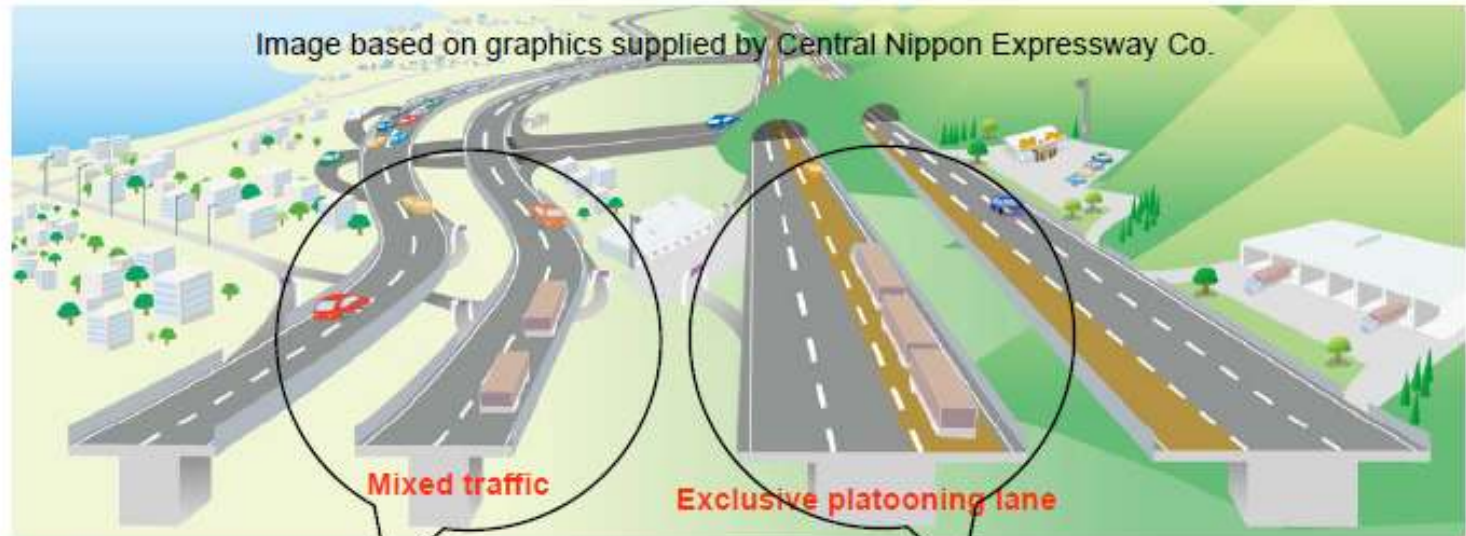
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- Objectives: CO₂ emission reduction
- Period: 2008 – 2012
- Funding: METI & NEDO, about 5 billion yen in 5 years
- Themes
 - Automated vehicles and automated platoon
 - Evaluation of effects of ITS on CO₂ emission reduction
- Contractors
 - Japan Automobile Research Institute
 - Universities, research institute, private companies



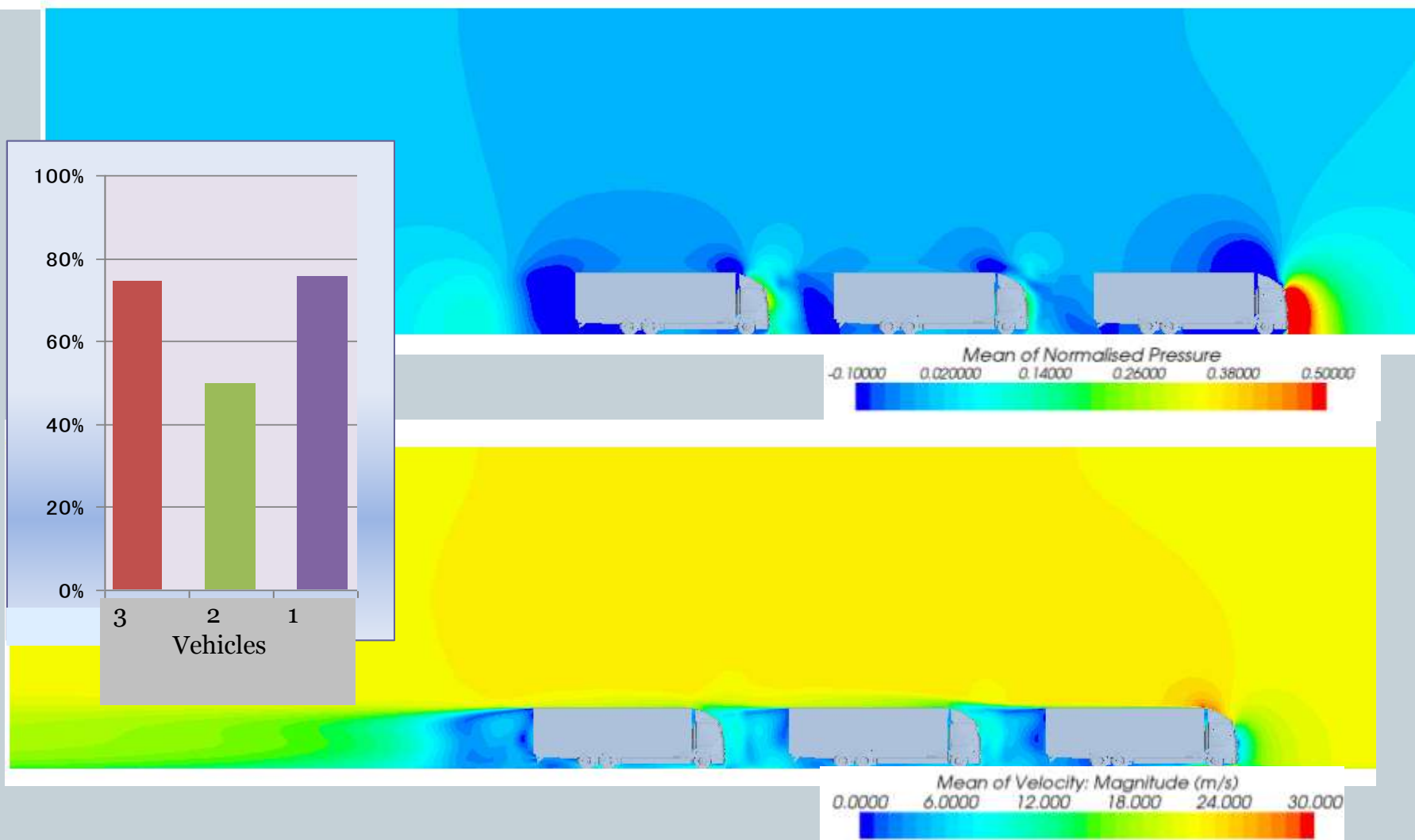
Concept of Vehicle Platooning

Three-version Concepts according to Aims and Target Dates



Major conditions	Concepts I & II	Concept III
Aim	Fuel-saving platooning in mixed traffic	Automated platooning on main expressways with exclusive lanes
Platooning type	A platoon of 2 or 3 vehicles	A platoon of 3 or more vehicles
Driver presence	Drivers present in all platooning vehicles The driver's role: Partial driving operations, safety check, emergency operations	A driver present in the leading vehicle only The driver's role: Safety check, emergency operations
Required technology	Auto-driving control, vehicle ambient recognition, etc.	Auto-driving control, drive reliability technology, etc.

CFD Result of 3 Truck Platoon of 4m Gap at 80 km/h



European Projects



PRIVATE SECTOR PROJECTS
EUROPEAN PROJECTS
NATIONAL PROJECTS

Car2Car Communications Consortium



- Promoting cooperative systems for safety
- Defining open European industry standard for a Car2Car communication system
- Enabling an open system supporting active safety applications plus information services
- Developing deployment strategies
- Developing business models to speed up the market penetration
- Major demo in 2008 provided driver warnings:
 - urban crossroads with line-of-sight obstruction when a motorbike is approaching
 - construction sites
 - disabled vehicles

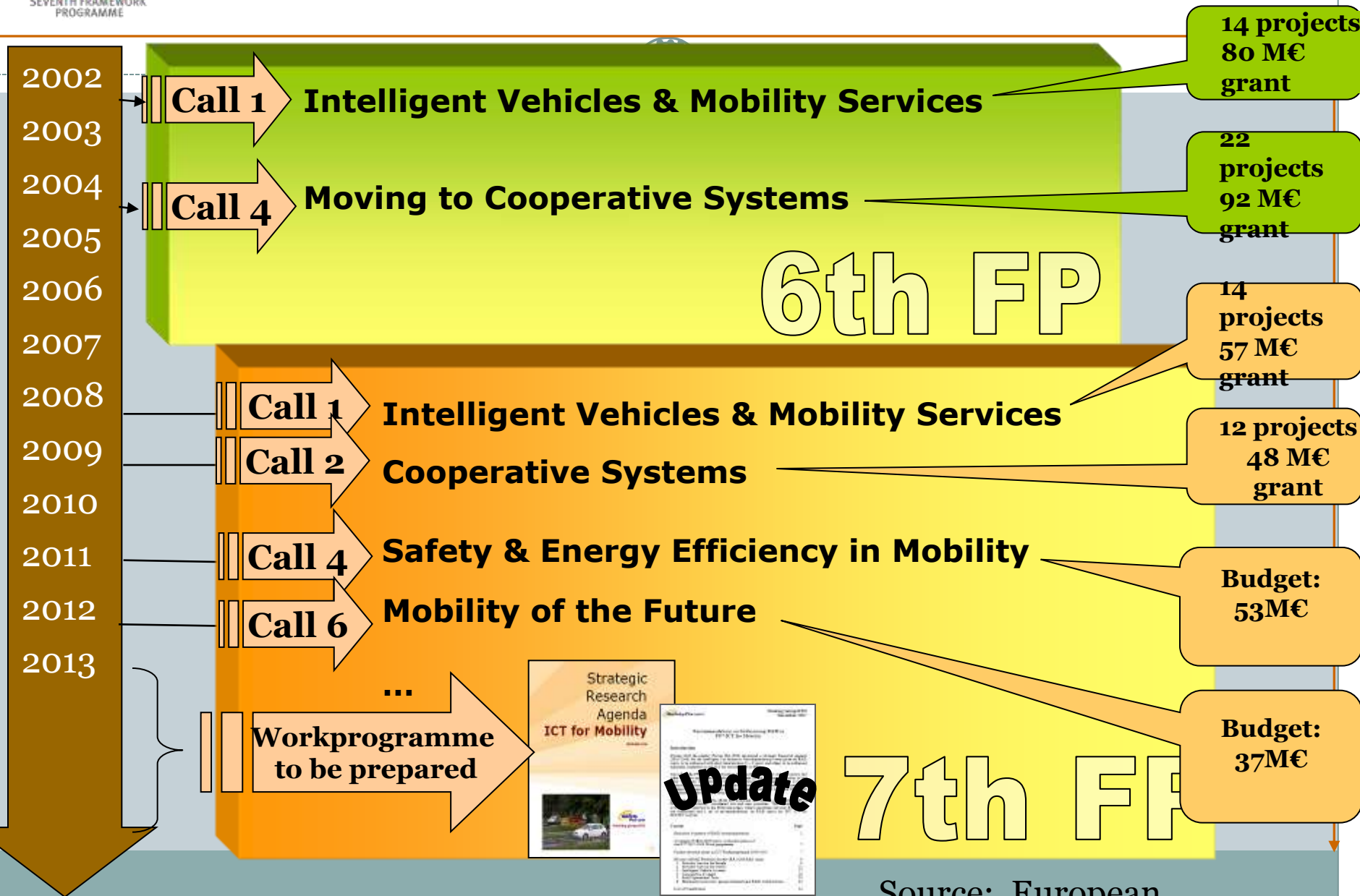
European Commission: Significant R&D Investment in Crash Avoidance



- History
- Current Projects
- Future Outlook



European Commission Information Society Directorate R&D in the 6th and the 7th FP



Source: European

Major EC-Funded Cooperative Systems Projects

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- **Cooperative Vehicle-Infrastructure Systems (CVIS)**
 - 70M euro
 - 60 partners
 - Cooperative vehicle highway systems
 - Both safety and non-safety applications
- **SafeSpot**
 - 49M euro
 - 20 partners
 - Stronger focus on vehicle-vehicle communications for safety
- **COOPERS**
 - 16.8M euro
 - Brings together road operators to focus on cooperative systems
 - Non-low-latency soft safety plus mobility applications
- **INTERSAFE2: Cooperative Intersection Safety**
 - 6.5 M euro

Funding Levels for Selected European Projects

Framework Program	Project	Funding Level (euros)
6 th Framework First Call	PREVENT	~70.0 M
	AIDE (adaptive HMI)	12.4 M
	Cybercars 2	4.2 M
6 th Framework Cooperative Systems Call	CVIS	41.0 M
	SAFESPOT	38.0 M
	COOPERS	16.8 M
	SEVECOM	5.3 M
	TRACE	4.1 M
	FeedMAP	3.7 M
	eIMPACT	2.7 M
	eSafety Support	2.0 M
	COMeSafety	1.8 M

OEM & Major Supplier Participation in Selected European Projects

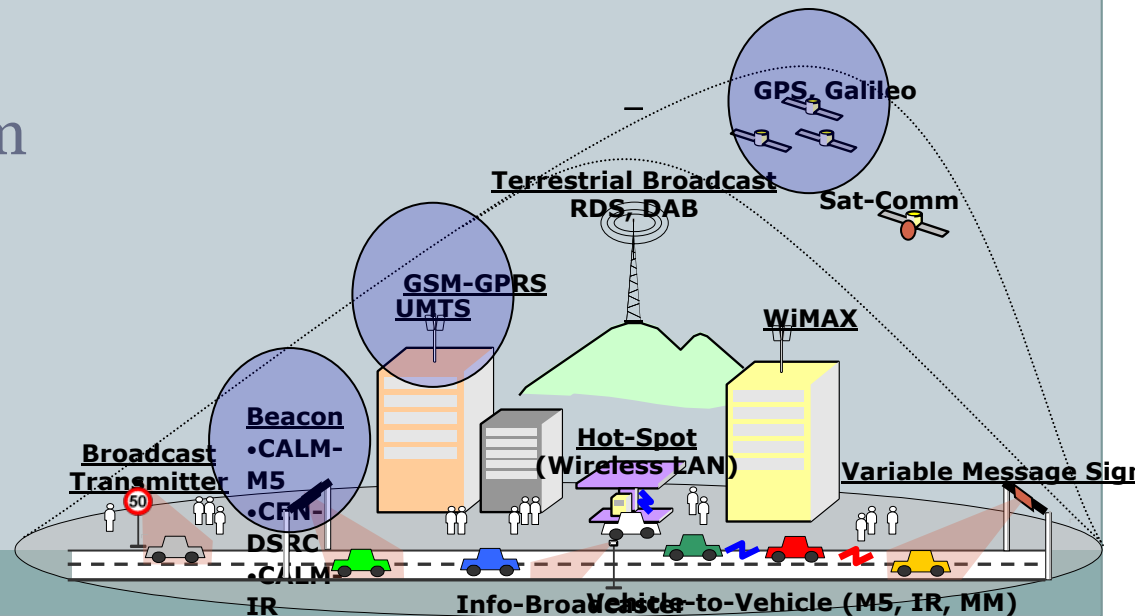
Project	Vehicle Manufacturers														Major European Suppliers						
	Audi	BMW	Daimler	Ford Europe	Ford/Jaguar	Ford/Volvo	GM/Opel	GM/Saab	Fiat	PSA	Renault	VW	Volvo Trucks	Bosch	Continental	Hella	Siemens	TRW	Valeo	Other	
AIDE HMI		●	●	●		●	●		●	●	●			●							
Car2Car CC	●	●	●				●		●		●									Honda	
COOPERS		●																		Navteq	
CVIS		●	●			●			●		●			●			●			DAF Trucks, Navteq, Teatlas	
PREVENT	●	●	●	●		●			●	●	●	●		●			●	●		Navteq, Teatlas	
SAFESPOT			●			●			●		●			●						Navteq	

● = core partner, • = associated partner

CVIS

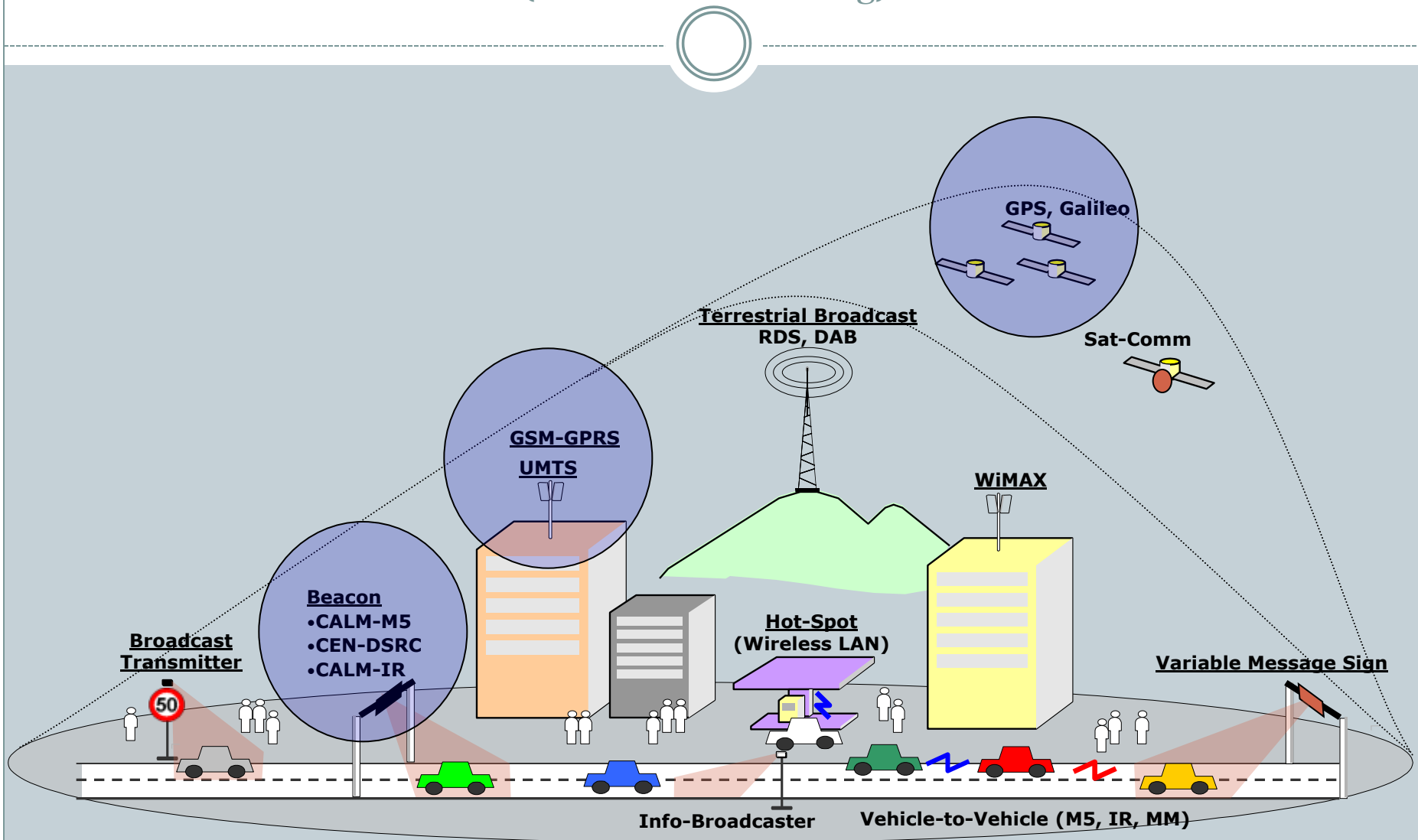
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- Multi-media seamless connectivity
- Significant pre-deployment of roadside infrastructure
- Test sites in
 - France
 - Germany
 - Italy
 - Netherlands/Belgium
 - Sweden
 - UK



CVIS: Vehicle-infrastructure communications

(CVIS in blue shading)

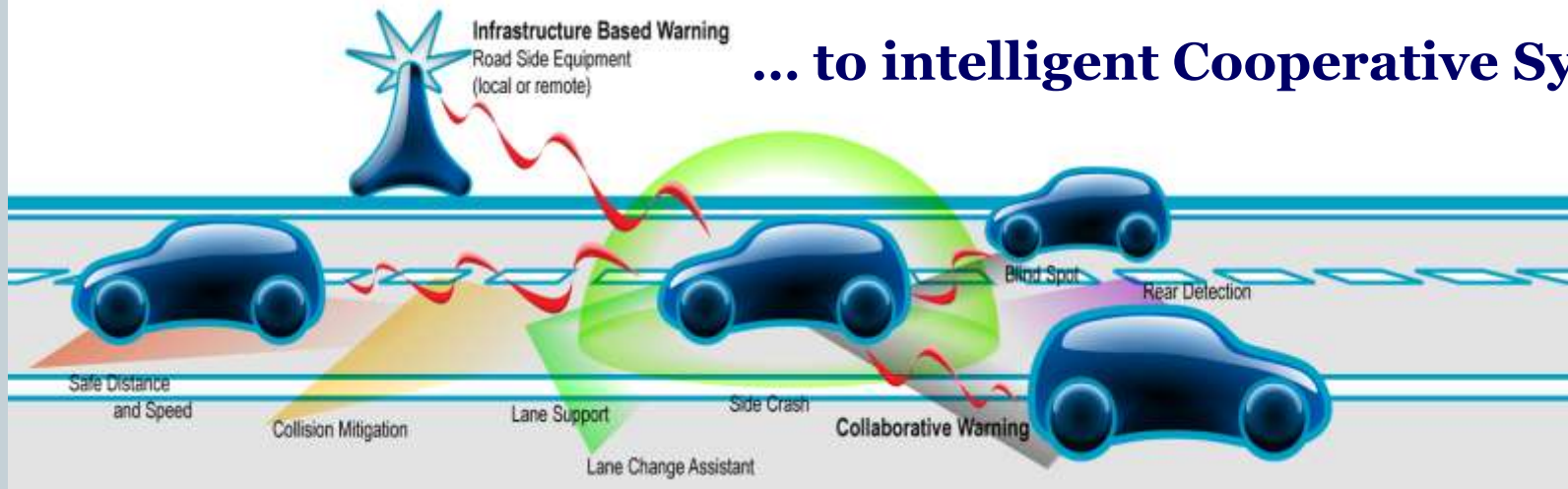


SAFESPOT

**The SAFESPOT CONCEPT:
from the autonomous intelligent vehicle...**



... to intelligent Cooperative Systems



SAFESPOT

- Communications: low-latency DSRC at 5.9 GHz
- Application focus is crash-avoidance safety
 - “softer” safety than USDOT program
 - non-crash imminent scenarios (2+ seconds)
- SAFESPOT works closely with CVIS for interoperability

Application	Cluster
Road Intersection Safety	Lateral Collision - LATC
Lane Change Manoeuvre	
Safe Overtaking	
Head On Collision Warning	Longitudinal Collision - LONC
Rear End Collision	
Speed Limitation and Safety Distance	
Frontal Collision Warning	
Road Condition Status – Slippery Road	Road Departure - RODP
Curve Warning	
Vulnerable Road User Detection and	Vulnerable Road Users - VURU

The communication framework

satellite
DMB

GPS

CALM

CVIS

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

Car2Car protocol SAFESPOT

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

Candidate technology: IEEE 802.11p
Need for dedicated frequency band in the 5.9 GHz. range for secure V2V and V2I, avoiding interference with existing consumer links

Terrestrial
DMB

Portable cellular
Internet

Portable cellular
Internet

HotSpot
(Wireless LAN)

RSE

RSE

5GHz
Wireless LAN

RSEto-RSE

RSE

5.8GHz
DSRC

vehicle-to-vehicle
(Wireless LAN 60GHz)

RSE

IR
DSRC

portable-to-vehicle

COM Safety



V2V and V2I communication for safety and traffic efficiency applications using Car2Car and CALM technologies

COOPERS



- **COOPERS (COOPerative SystEms for Intelligent Road Safety)**
- Road operator focus for cooperative systems
- Non-low-latency soft safety plus mobility applications
- Testing conducted public motorways in France, Belgium, the Netherlands, Germany, Austria, and Italy.



COOPERS Information Exchange



- **I2V:**
 - Traffic jam warning and guidance, including alternate routes
 - Weather alert information
 - In-car display and alert of area-specific speed limits, including intelligent speed adaptation
 - Lane specific, selective ban of trucks
 - Estimated time of arrival, based on current traffic situation on the network
 - Car breakdown/emergency services
- **V2I:**
 - Floating car data

COOPERS Communications Media



- Broadcast Media
- DAB (Digital Audio Broadcast)
- DVB-H (Digital Video Broadcast Handheld)
- Cellular Communication Media
- GPRS (2.5G Cellular Networks)
- WiMAX (Metropolitan Area Networks)
- Short-range Communication media
- Infrared (CALM IR)
- Microwave (5.9GHz)

See CVIS / SAFESPOT / COOPERS Live!!!



Connecting Smart Vehicles with Intelligent Infrastructure

HOW THE DEPLOYMENT OF COOPERATIVE SYSTEMS FOR EUROPE
WILL ENHANCE ENERGY EFFICIENCY, SAFETY AND MOBILITY

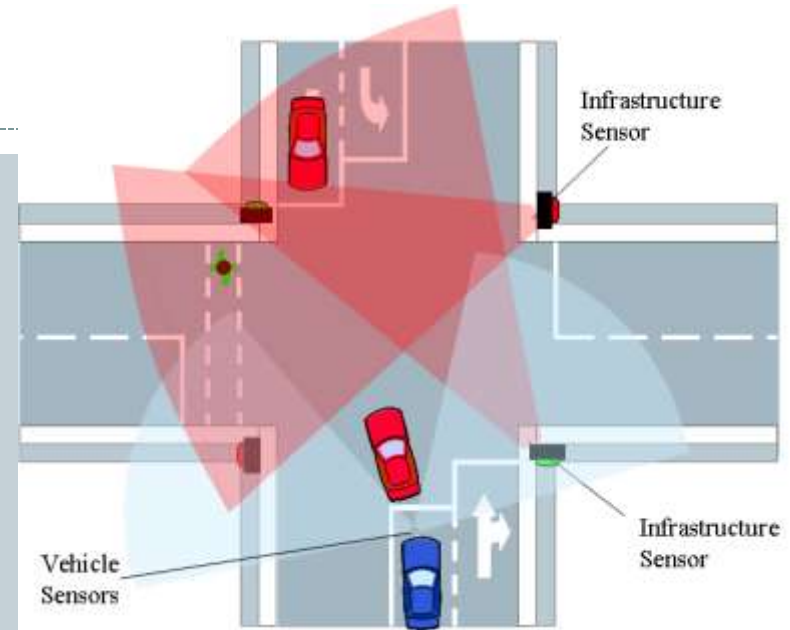
23-26 March 2010 Amsterdam RAI, The Netherlands



The “connected vehicle” is no longer a dream, and the “intelligent transport infrastructure” is already appearing on Europe’s roads. Brought together through a new generation of mobile communication technologies, they make up the future world of “Cooperative Mobility”. For four days in March 2010, the combined results of three major European R&D projects, CVIS, SAFESPOT and COOPERS, will be showcased in Amsterdam.

Intersection Collision Avoidance: INTERSAFE2

- 3 Demonstrators
 - 2 passenger cars (VW, BMW) and
 - 1 heavy good vehicle (VTEC truck)
- Bidirectional V2X communication
- Cooperative sensor data fusion
- Relative intersection localisation
- Intersection object tracking and classification
- Risk assessment and warning/ intervention strategies
- 2 Test sites (Germany & Sweden)



New EC Projects in Near Term



- Current call for proposals closes in April
- New projects expected to start late 2010
- Major cooperative systems FOT(s) expected

EC Long Term Strategy



- 8th Framework Program starts ~2014
- “European Large Scale Actions” -- ELSA
 - focused projects of significant scale and duration
 - cutting across the innovation cycle
 - developing modern pan-European service infrastructures
- Key focus: transport

EC Long Term Strategy



- **Transport ELSA**
 - Freight and logistics
 - ICT for clean and efficient mobility
 - Fully electric vehicles and associated infrastructure
 - Cooperative systems for safety
 - Assisted and automated driving
 - ✦ Better traffic flow and CO₂ emissions reductions

German Projects



- **Funded by German Ministry of Research or Ministry of Economy and Technology (not Transportation Ministry)**
- **AKTIV (60M euro)**
 - World-leading work in ADAS and CVHS.
 - Driver assistance and traffic management are emphasized.
 - The traffic management work is aimed at reducing traffic jam risk by 15% while increasing traffic capacity by 10%.
- **CoCar (4M euro)**
 - Developing cooperative applications based on cellular communications
 - ✦ Using newest cellular technology with message latencies as low as 80 ms
- **SIM-TD (53M euro)**
 - Safe Intelligent Mobility - Test Platform
 - focusing on vehicle-to-vehicle and vehicle-to-infrastructure communication
 - ✦ 802.11p and cellular protocols
 - ✦ soft safety applications

Netherlands Projects



- Major FOT is underway for heavy trucks
 - 2500 vehicles
 - Basic active safety systems (non-cooperative)
- Grand Cooperative Challenge stimulating work in cooperative systems (TNO)
 - Support from Dutch Ministry of Economic Affairs
 - Modeled on U.S. DARPA Challenges
 - Planned for 2011
 - www.gcdc.net



Contrast with USA



- USA leads with the focus on crash-imminent crash avoidance supported by communications
 - Automatic actuation within 1 second or much less
 - “Most stressing requirements” will stimulate a wide range of applications
- Japan / Europe initial focus on “developing crash situations”
 - Advisories several seconds ahead of potential event
 - Walk before you run?

A Final Word: Check Out “Thinking Cars”

- One hour TV documentary
- Produced by H3B Media
- Funded by European Commission
- Intended for broadcast (2010?)

- **Watch the trailer!**
- www.thinkingcars.com

Questions?
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Cadillac 2010

CTS Sedan, CTS Sport Wagon, CTS-V

