

Kick Off Meeting

SeVeCOM

Meeting on 01. February 2006
Lausanne, Swiss

Rudy Mietzner
Softlab / BMW Group

Introduction Rudy Mietzner



Personnel:

- 45 years
- single

Education

- Business Administration and Computer Science
Berufsakademie Villingen-Schwenningen, 1990
Diplom Betriebswirt, BA
- Engineering and Technical Teacher,
Pädagogische Fachseminar Schwäbisch Gmünd, 1986

Employer History

- 87 - 91 **Mannesmann Kienzle, AUTOCOM GmbH**
Automotive, Villingen-Schwenningen
- 91 - 97 **Detecon GmbH**, Senior Consultant,
Intl. Telecommunications Consultant Company Bonn
- 97 - 97 **CSC- Ploenzke**, Management Consultant,
Management Consulting, Munich
- 97 - 00 **debitel AG** Manager New Services,
European Service Provider, Stuttgart
- 00 – cur. **Softlab GmbH**, Principal
System Integrator, Munich

Project history

Reference Softlab

- Process Manager - Roadmap
Mobilkom Austria, Mobile Operator
CRM Project
- Project Manager
Next Generation Billing
Swisscom, Fix line Operator
- Program Manager - CRM Audit
T-Mobile UK, Mobile Operator
Audit of CRM Project
- Project Manager - Order
Management
BT-Ignite, UK/D, Mobile Operator
- Program Manager - Roadmap
BMW AG; D, Car Manufacture
European Union – Research Projects

Focus

- Auditing and Review Management
- Budget & Finance Planning
- Business Development
- Contract negotiation and Licence Agreement
- Design & System Specification
- RFI & RFQ preparation
- Project Management and Project Coordination
- Joint Venture and Investment Business
- Strategy Planning
- Telecom Business

Pile-up on the A2 in January 2000



110 vehicles

Persons:

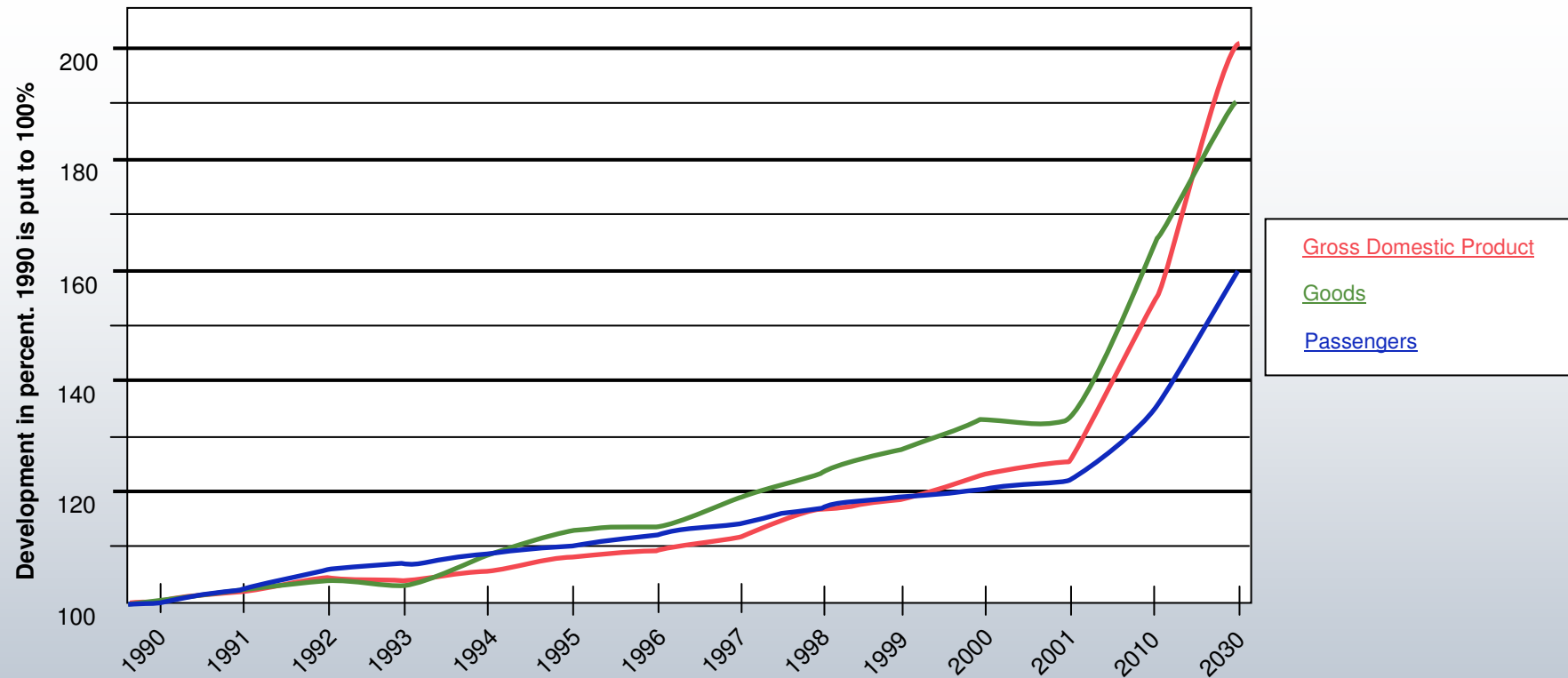
died 2

injured 73
(20 with heavy
injuries)

Mat. damage:
2 million €

Traffic jam up
to 40 km in
both directions

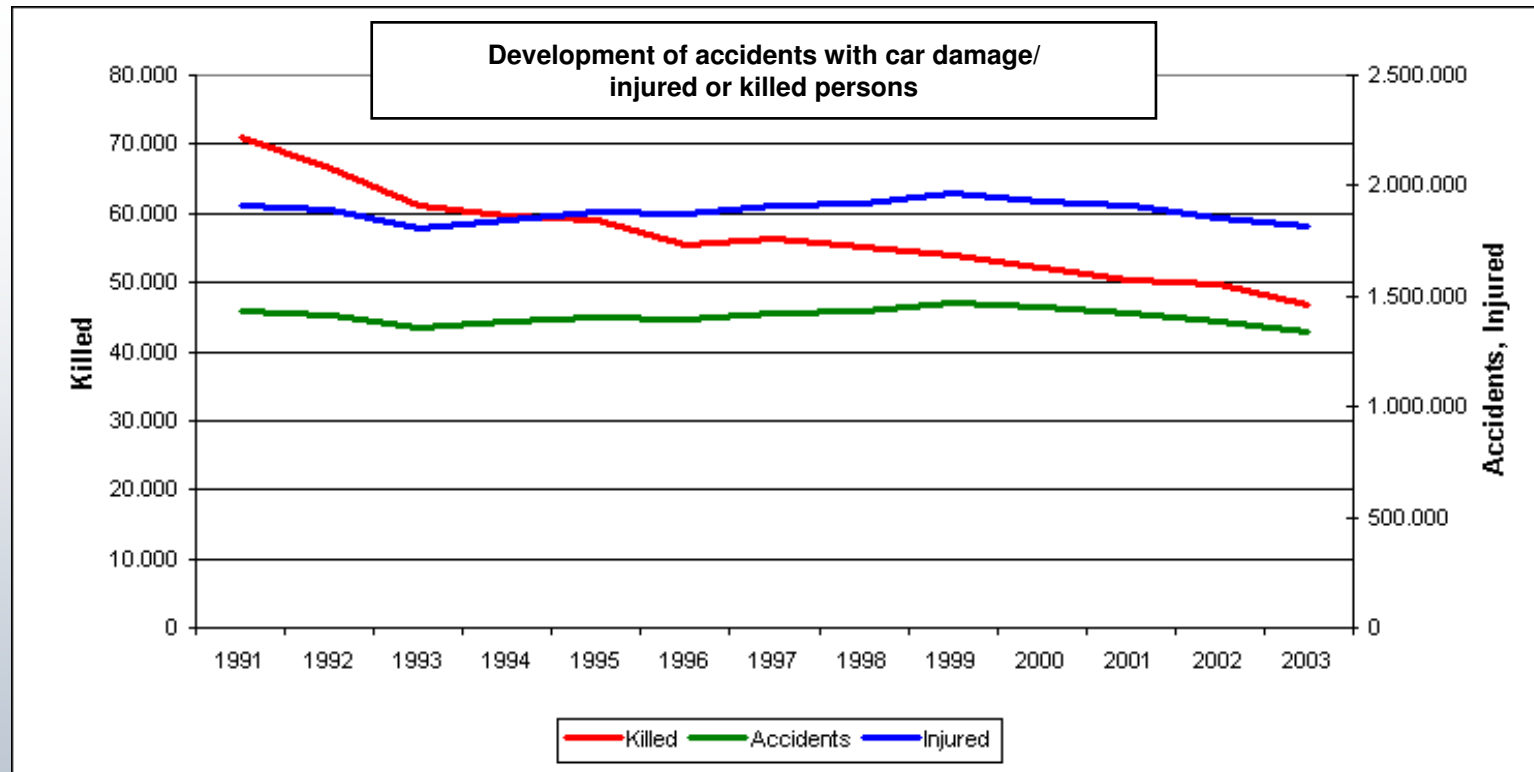
Transport Growth in the European Union



Source: 1990-2001: European Commission (EU-15), 2010,2030: DELPHI-Study
(Future and Mobility)

- Economic Growth will lead to increased traffic volume
 - Transport growth involves more traffic congestions
- ➡ Efficiency must be improved

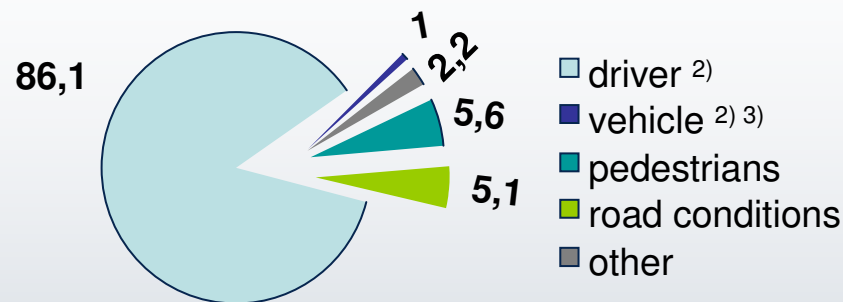
Traffic Accidents in the European Union



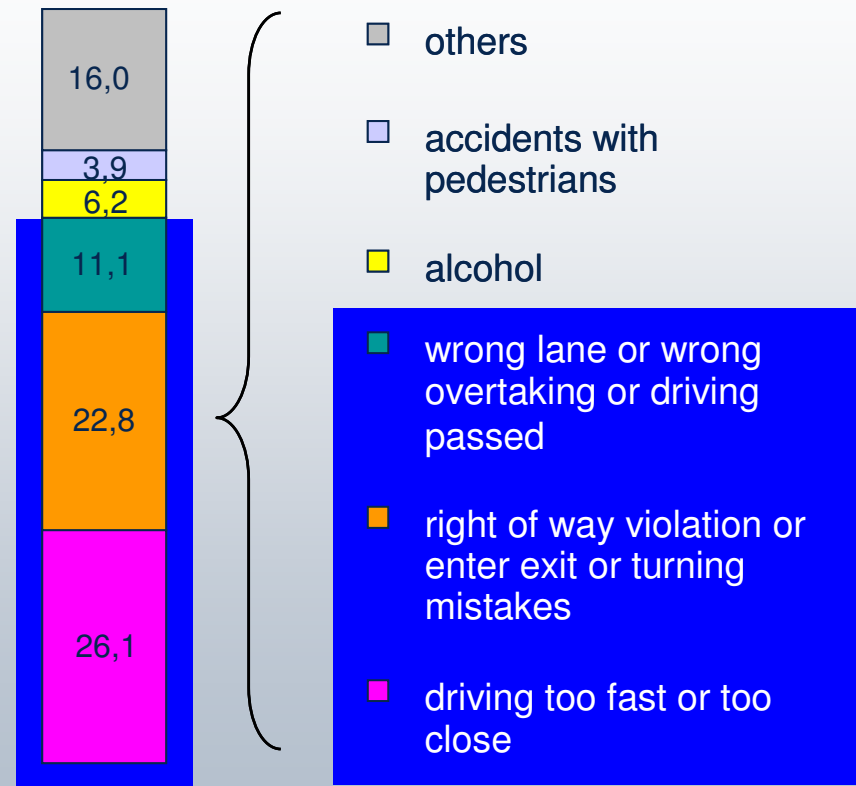
- Over the last decades passive safety systems have helped to reduce the number of fatalities.
- The further reduction of severe accidents will be achieved by adding active safety systems to vehicles.

Causes of accidents

Traffic accidents – Germany 2003 - Reasons for accidents with injured persons ¹⁾



**Capability for improvements
by Car2Car Communications**



Source: Verkehr in Zahlen 2003, Deutscher Verkehrs-Verlag

1) Cause of accident determined by the police 2) motor vehicles, motor cycles, bicycles and others 3) technical faults

Conventional Sensors are Limited

Radar, laser scanner, ultrasonic or vision based systems support current safety and comfort applications such as

- Adaptive Cruise Control
- Parking Assistance
- Lane-keeping applications



Usual sensors have disadvantages, they ...

- Sense only close vehicles in the line of sight
- Don't detect hidden and unrecognised relevant objects
- Are expensive

Idea: Extending the Driver's Horizon

The Car2Car Communication System is a new 'sensor':

- **look further ahead in distance**
- **get information earlier**
- **extract relevant information**



**Driver
is one step ahead**



Simple sensors:

Worse than the driver

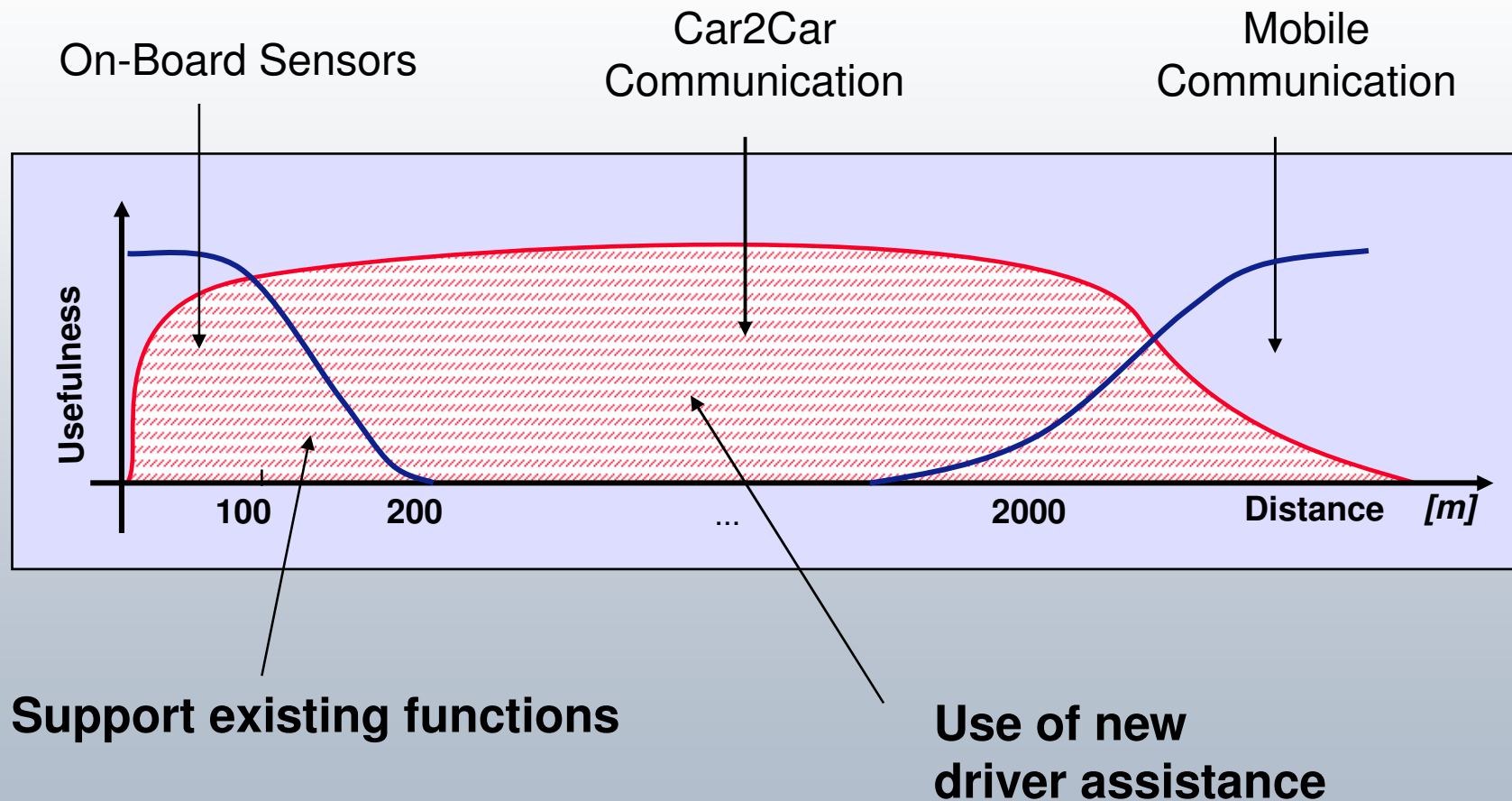
Communication:

Better than the driver

Complex sensors:

As good as the driver

Usefulness of Car2Car Communication



Motivation

European Commission

The European Commission initiated the eSaftey Program

- Reduction of the road fatalities by 50 % up to 2010
- Improving the efficiency of road traffic
- Promoting Intelligent Vehicle Safety Systems



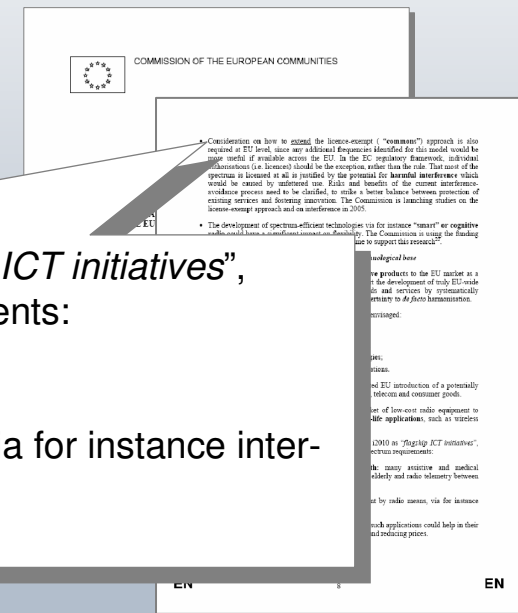
Automotive industry meeting the challenges

- The target set in the Commission White Paper: 50% reduction of fatalities by 2010
- Automotive industry has responded well to the challenges of sustainability and safety
- Key target for Europe: To maintain the competitiveness of this key economic sector

“A Forward-looking Radio Spectrum Policy for the [EU]: Second Annual Report.”

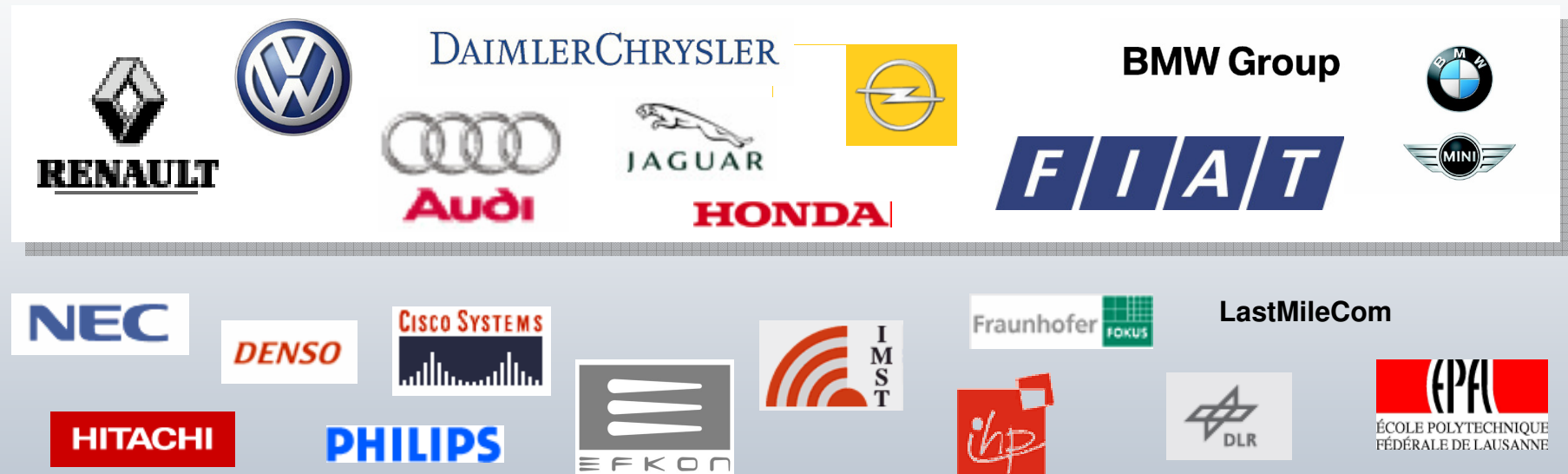
Furthermore, two areas identified by the Commission in i2010 as “*flagship ICT initiatives*”, will be considered for integrated actions to satisfy their spectrum requirements:

- ...
- **The intelligent car** shall interact with its environment by radio means, via for instance inter-vehicle communications (IVC).



C2C-CC Members

- open for suppliers, research organisations and other partners
- different levels of membership



More Information

- www.car-2-car.org

The C2C-Communication Consortium

The Car2Car Communication Consortium is a non-profit organisation initiated by European vehicle manufacturers

Mission

- is to bring out the idea of working together for more safety on the road
- is to establish an open European industry standard for a Car2Car communication system
- is to promote the allocation of royalty-free European-wide frequency band for Car2Car applications
- is to enable the development of an open system supporting active safety applications as well as a broad range of information services
- is to take into consideration worldwide related activities
- is to develop realistic deployment strategies and business models to speed-up the market penetration

COMeSafety Project Members



DAIMLERCHRYSLER

FIAT



- AUDI
- BMW
- DaimlerChrysler
- Centro Ricerche Fiat CFR
- Renault
- Volkswagen AG
- Gesamtzentrum für
Verkehr Braunschweig e.V.

Organisational Structure

Partners

Steering Committee

Administration

Technical Committee

One representative per Working Group
appointed by the Steering Committee

**Secretary
General**

Working Groups

WG Architecture

**WG
Application /
Requirements
(APP)**

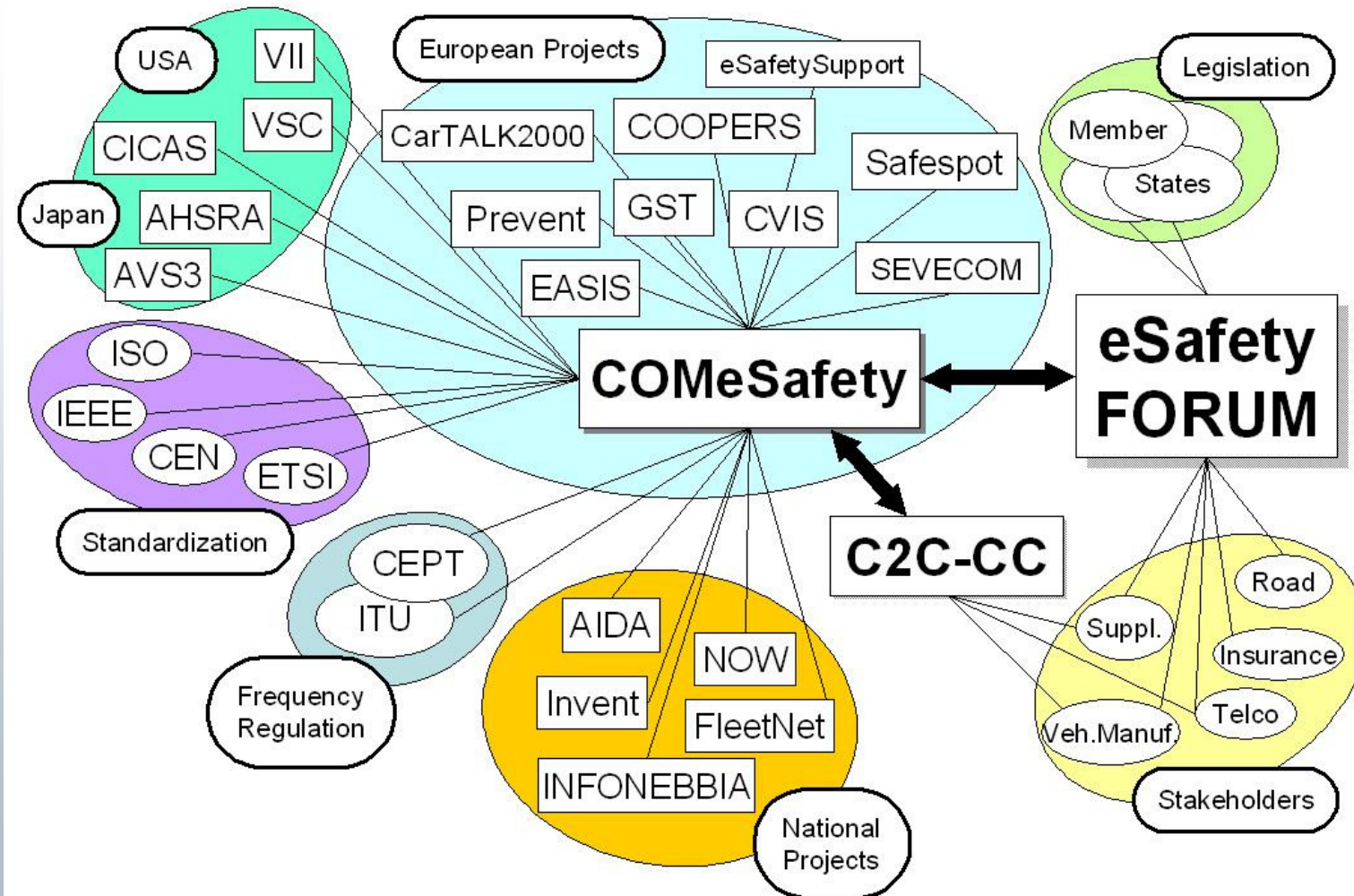
**WG
Security /
Middleware
(SEC+MW)**

**WG
Network Layer
(NET)**

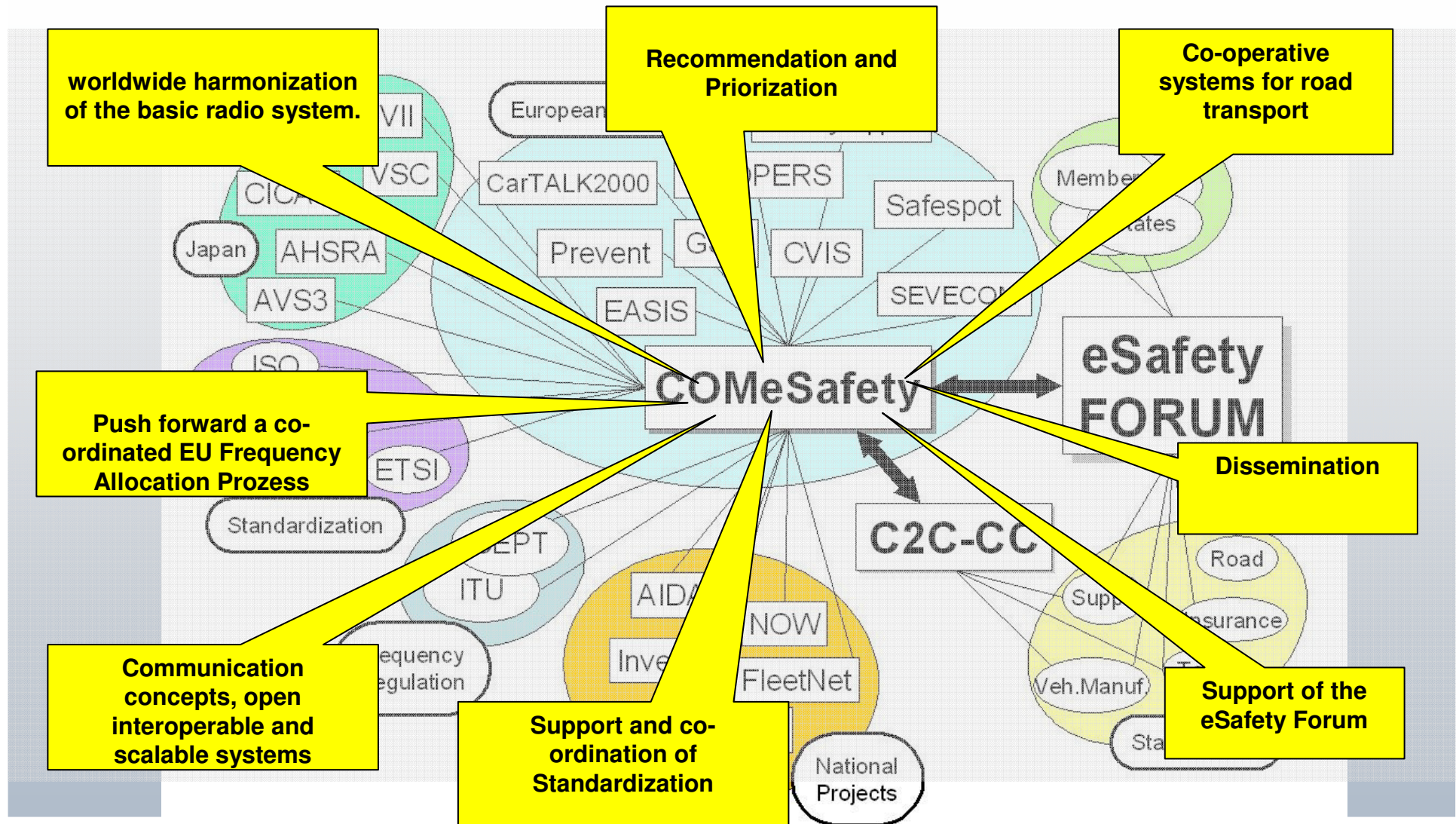
**WG
Physical Layer
(PHY+MAC)**

**WG Standardi-
sation
(STA)**

Related Projects



Overview of the collaboration



Project Goals & Objectives

- Co-ordination and consolidation of research results and their implementation

Co-ordination and consolidation of the results emerging of the European and national projects as well as the outcomes of initiatives like the Car-to-Car Communication Consortium (C2C-CC) to prepare the standardization process with respect to all technologies for vehicle-to-vehicle and vehicle-to-infrastructure communications

- eSafety Forum support

Support of the Forum, especially the Working Group Communications, by promoting information flows, summing up major research results, giving feedback on implementation progress, forwarding and explaining recommendations from the Forum and providing input concerning deployment strategies.

- Worldwide harmonization

Harmonization with activities and initiatives elsewhere in the world, particularly with the VSC and VII consortia in the US and programs like AHSRA and ASV3 in Japan

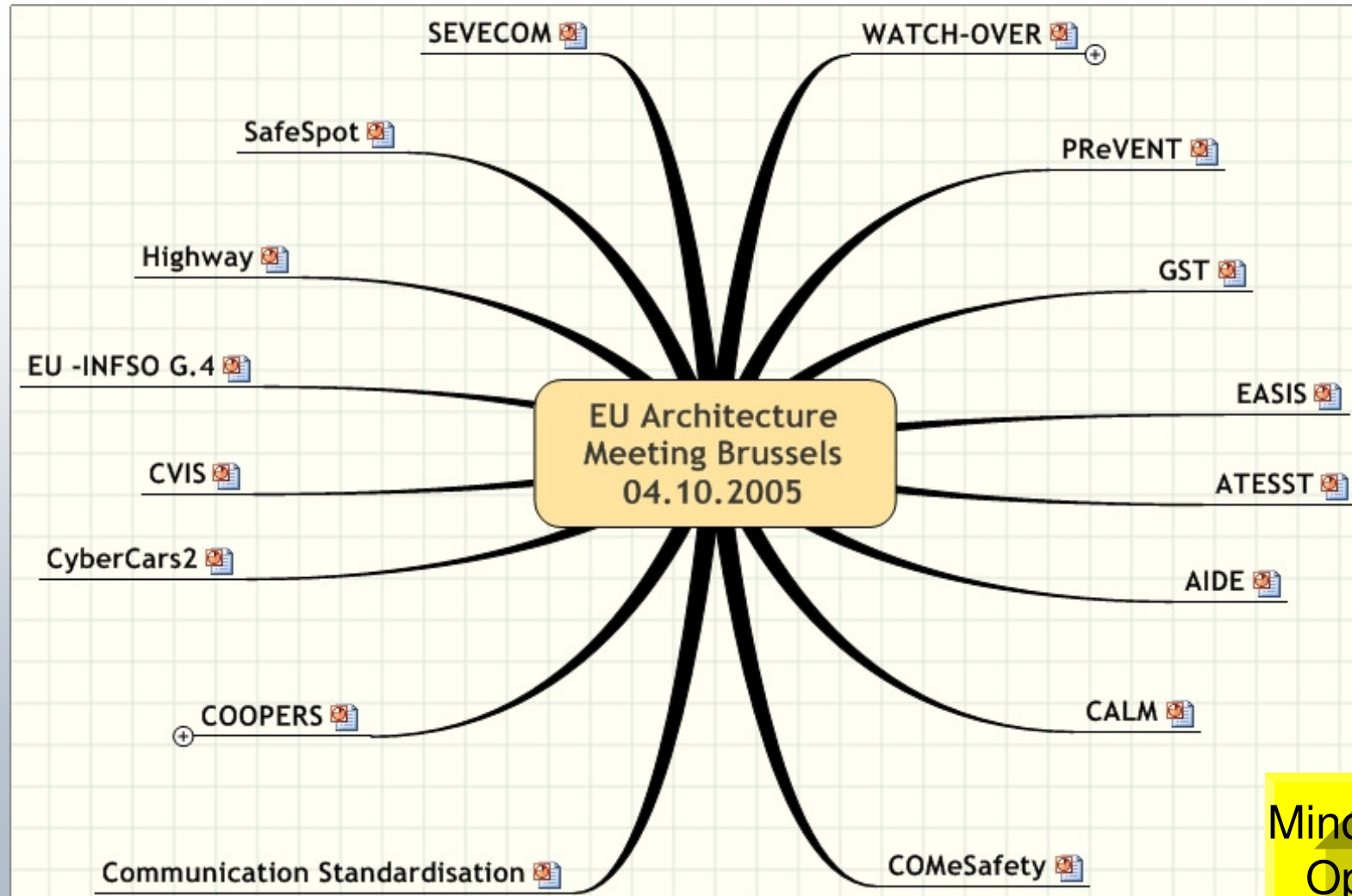
- Frequency allocation

Support to allocation of a dedicated frequency band with effective protection for safety related car to car/infrastructure communication through cooperation with the European regulation bodies and the technical WGs of ETSI

- Dissemination

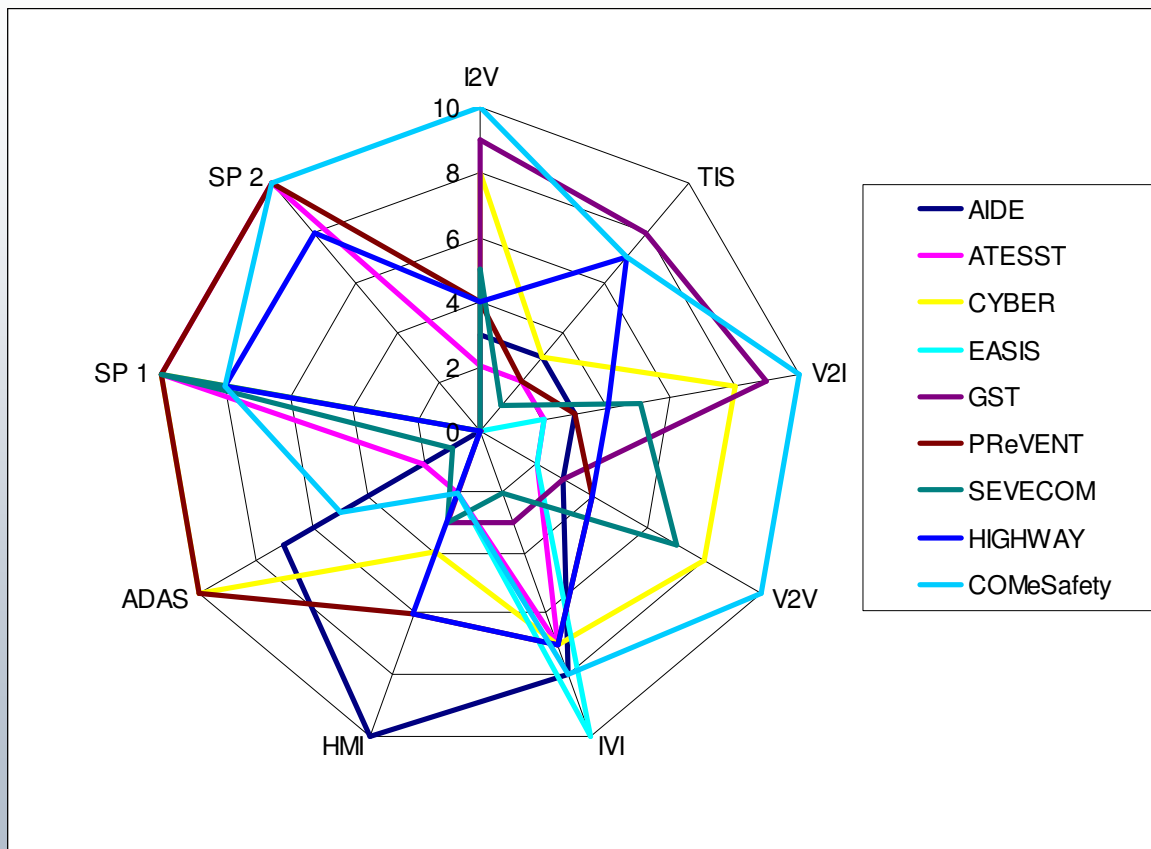
Dissemination of system properties towards all stakeholders, e.g. general public, industrial players, road operators, European and national authorities etc. to prepare system introduction

Related EU Projects



MindMap
Open

Project Overlap Overview



I2V – Infrastructure to vehicle communication
TIS – Traffic information service provider
V2I – Vehicle to infrastructure communications
V2V – Vehicle to Vehicle communication
IVI – In vehicle integration (standards, function)
HMI – In vehicle human-machine-interface
ADAS – Autonomous system (ADAS)
SP 1 – Special topics 1
SP 2 – Special topics 2

Contribution to COMeSafety

Goal/messages of the cooperation ???

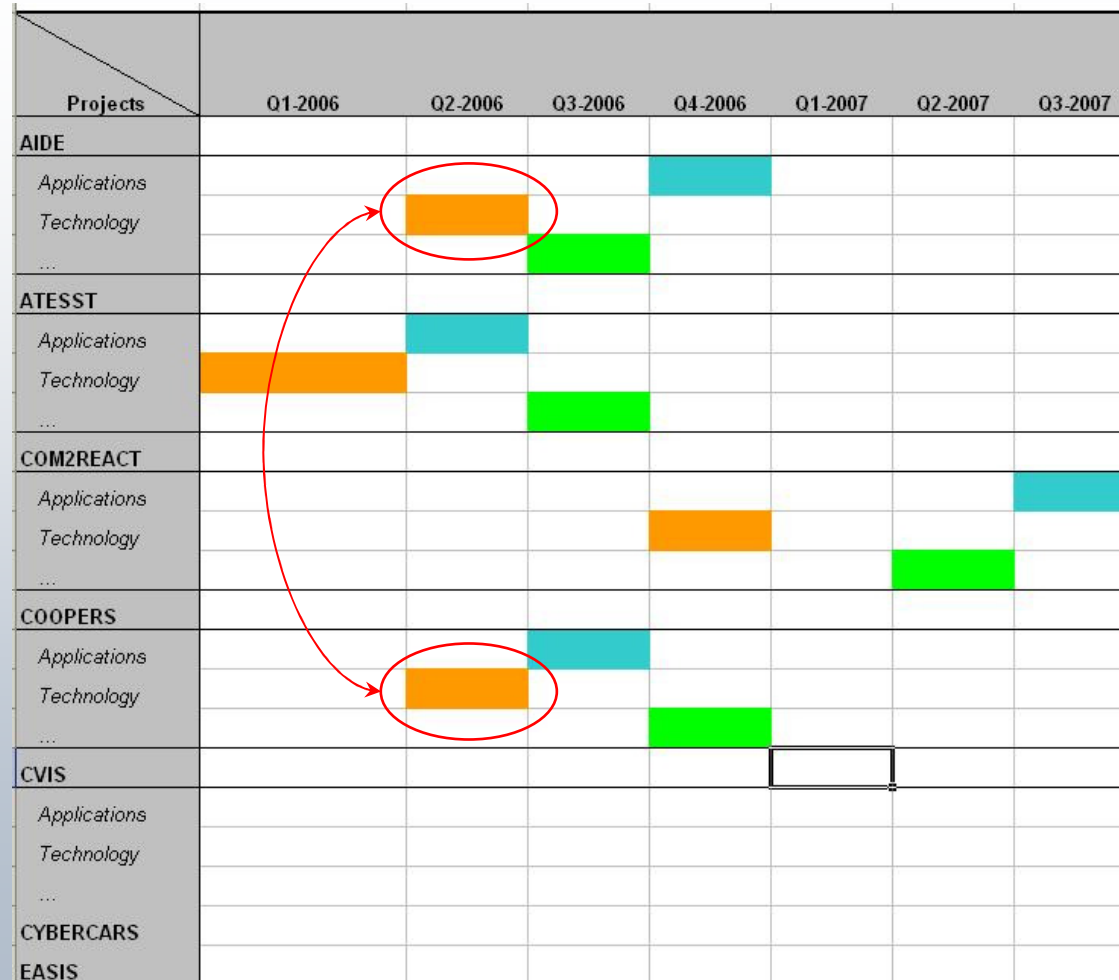
- Projects Fact Sheet / Template
- Contact details
- Responsible Contact Persons

Harmonizing Implementation and Design issues

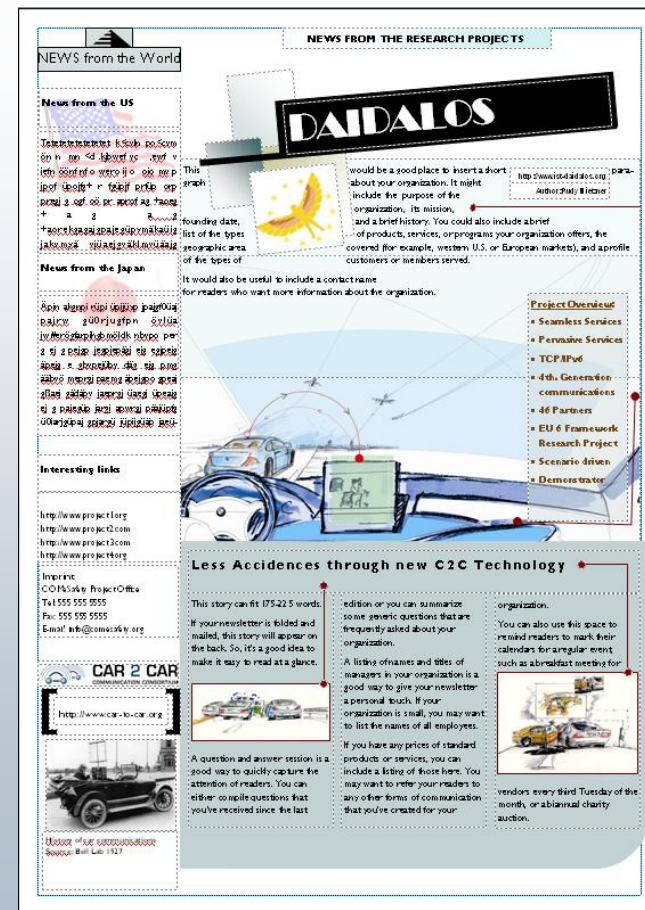
- cross-project schedule
- component depend abilities between different projects made explicit
- Applications
- etc.

Cross-Project schedule

→ Concept / Idea



Dissimination → Newsletters & Webpage (Example)



Newsletter & Webpage

Collecting Subjects / Rubrics / etc.

- 1) Announcements
 - Events, Show, Fairs, Trials
- 2) Standardization / Frequency
- 3) News from ...
 - Architecture, Security, Design, Application, etc.
- 4) Interviews / Person / Politic / Regulation
- 5) News from the eSafety Forum

Car-to-Car Communication Consortium

Applications, Technology, and Security Challenges

C2C-CC Frequency Objectives

- **No license fee for car to car communication**
- **IEEE 802.11a/p should be the basis:**
For economical reasons direct use of WAVE-hardware₁ (US) as far as possible
⇒ **5 GHz band**
- **Protected spectrum of 20 MHz for safety applications**
- **Spectrum for information and peer to peer applications may be shared with others:**
⇒ **use of the 5.470 – 5.725 GHz WLAN frequencies in compliance with the existing regulations (DFS, TPC, max. TP 30 dBm e.i.r.p)**
- **Support of hotspots and infrastructure communication**
⇒ **(IEEE 802.11a/b/g/..., IEEE 802.16 or 802.20)**
- **Safety relevant applications must have the highest priority and should not be influenced by the hotspot communication.**

1) **WAVE: Wireless Access for the Vehicular Environment**

Car2Car Communication System

Car2Car communication, based on the IEEE 802.11(p) Standard (WLAN),

- enables time critical safety applications
- has very low data transmission delay
- is independent from infrastructure
- uses royalty free frequencies and is free of charge

in contrast to common communication technologies like GSM or UMTS.

Applications

C2C-CC Applications Overview

The C2C Communication Consortium is looking at several categories of applications:

- **Safety Applications**
 - Relevant to road traffic safety
 - Cooperative nature, require sufficient penetration across all vehicle brands
 - Car-to-car, car-to-infrastructure
 - Will be rigidly standardized
 - Optimized protocol stack, no TCP/IP
- **Comfort/Deployment Applications**
 - Will have to follow existing standards, use of TCP/IP
 - Integrate into commercial hotspot networks
 - May be proprietary per OEM or service provider
- **Other**
 - Might be brought into discussion by third parties, e.g. law enforcement and tolling

C2C-CC Safety Applications

- (Geo-)Broadcast: major category of C2C-CC applications
- Requirements
 - Communicate safety-relevant messages to all recipients in a certain area
 - Model: non-discriminatory broadcast/geocast
 - Must contain event or situation information
 - Must contain location information
 - May contain speed, direction of movement or historic trajectory information
- Examples
 - Accident site warning
 - Slippery road condition warning
 - Approaching emergency vehicle warning
 - ...

Application-specific security requirements

- **Overall**
 - Protecting on-board systems against illegal intrusion
- **Safety Applications**
 - No need for confidentiality
 - High need for trustworthiness: dependable safety-critical decisions must be possible (trust in accuracy, trust in correctness, trust in source)
 - Plausibility: multiple sources and context to verify plausibility and enhance dependability of decision
 - Car-to-infrastructure communication can be assumed an integral part of the system.
- **Comfort Applications**
 - Require confidentiality and integrity, mutual authentication
 - Secure payment
- **Other Applications**
 - Privacy must be protected against un-authorized access
 - Access to identity and other personal information sufficiently hard to prevent regular intrusion
 - Secure payment for e.g. tolling

Security Challenges & Questions ?

- How can privacy be effectively protected?
- How can illegitimate recording of movement profiles be prevented?
- Do we know all attack paths for the system?
- How can we design an approach to security now, that will uphold for min. 20 years of system lifetime?
- For safety applications, how we trade off efficiently cryptographic technology against other measures, such as plausibility checking?
- How do we prevent the transparent citizen on the road?

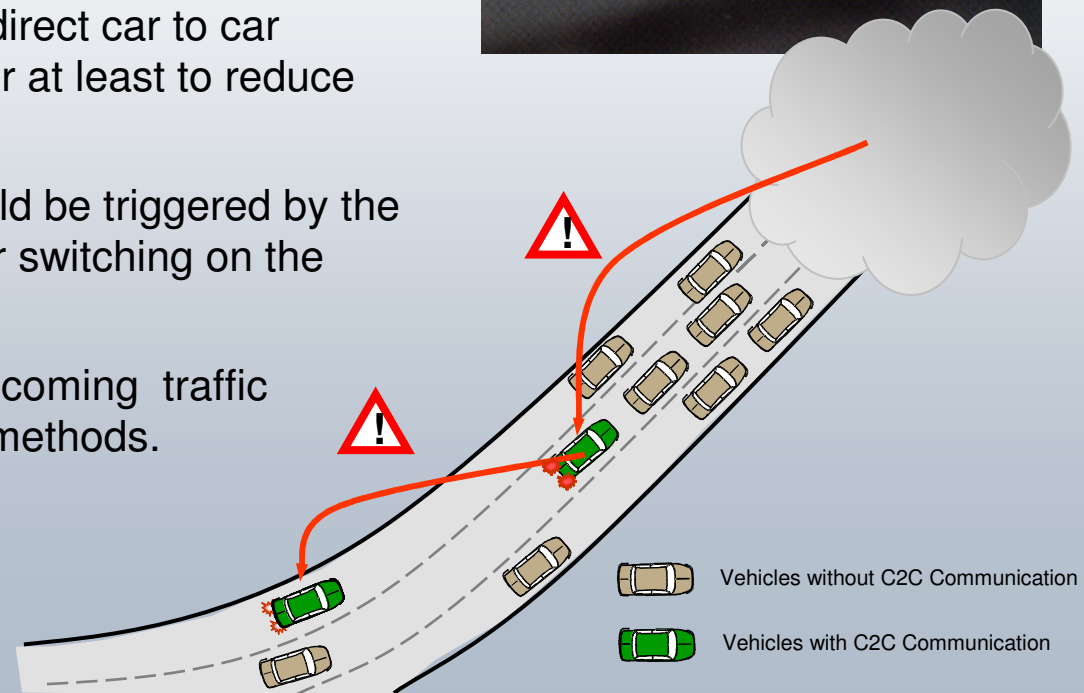
Hazardous Situations

Problem

- Rear end collisions are caused by carelessness, poor visibility, unexpected slippery roads or breaking maneuvers, etc.

Solution

- Immediate hazard warning via direct car to car communication helps to avoid or at least to reduce the consequences of accidents.
- The information distribution could be triggered by the airbag-sensor, friction-sensor or switching on the warning flashers.
- This information reaches the upcoming traffic much faster than conventional methods.



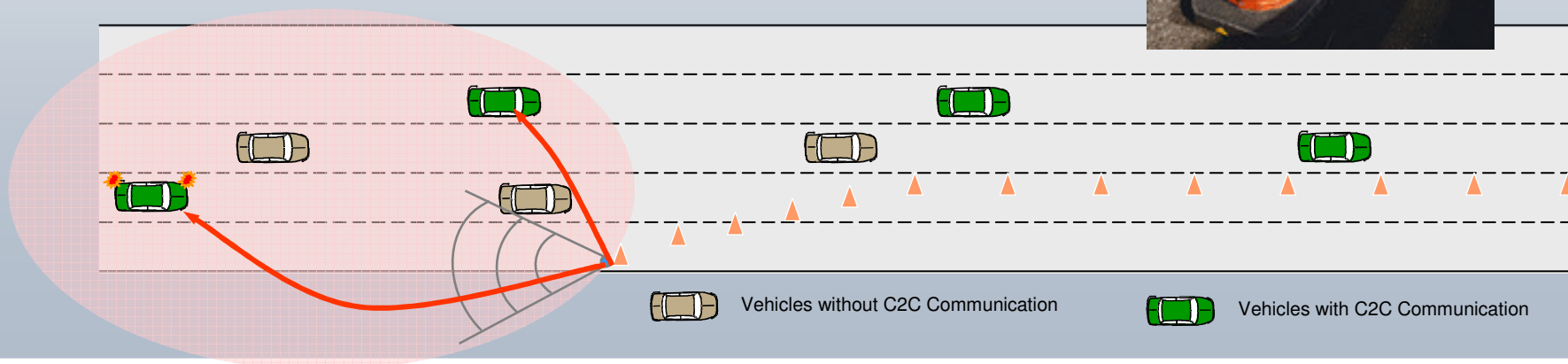
Road Works

Problem

- Construction sites and temporary maintenance work are accident black spots, because traffic signs are ignored or realized too late.

Solution

- Road maintenance vehicles and special cones in road construction sites should be equipped with a communication unit and send out information about lane closures or speed limits.
- The Car2Car Communication System receives this information and assists the driver.



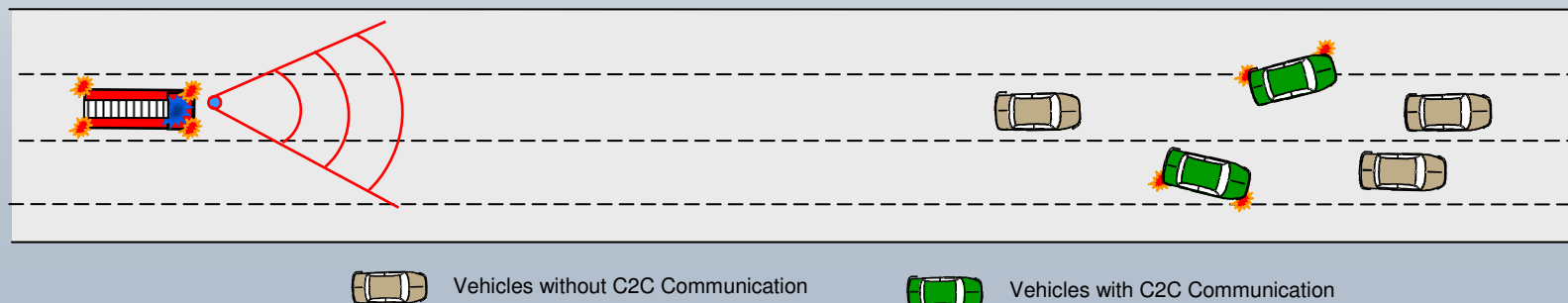
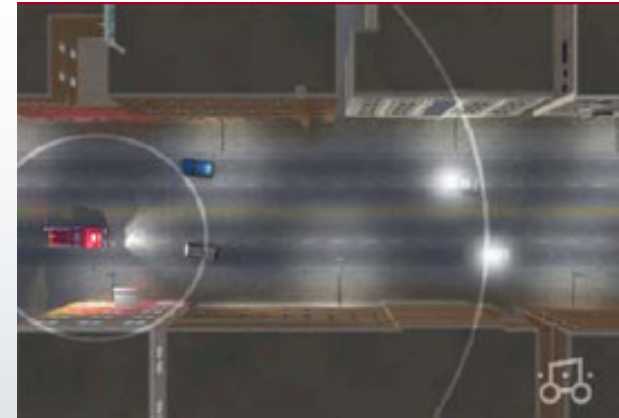
Emergency Vehicles in Operation

Problem

- Emergency vehicles in operation are often obstructed by other road users

Solution

- Early warning when an emergency vehicle is approaching



Infrastructure to Car Communication

At Intersections

- Communication of information about stop signs or traffic lights
- Acoustic or visual warning will prevent the driver missing stop signs or red traffic lights

Along Roads

- Communication of the traffic sign information to allow traffic sign violation warnings
- The knowledge of speed limits might be used as input for automatic cruise control
- Provision of by-pass information
- Provision of parking information

The Car2Car Communication System receives information and assists the driver if needed.



Applications for Market Introduction

Car to Enterprise

- Wireless Diagnosis
- Automatic Payment
- Hot Spot Access
- Local Map Update



Car to Car

- Personal Travel Information
- Virtual Caravan
- Chat



Car to Home

- Media Download
- Route Data Download

