



CAR2X Communication for safety and traffic management solutions

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HTW



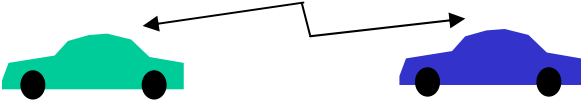



European Commission
Information Society and Media

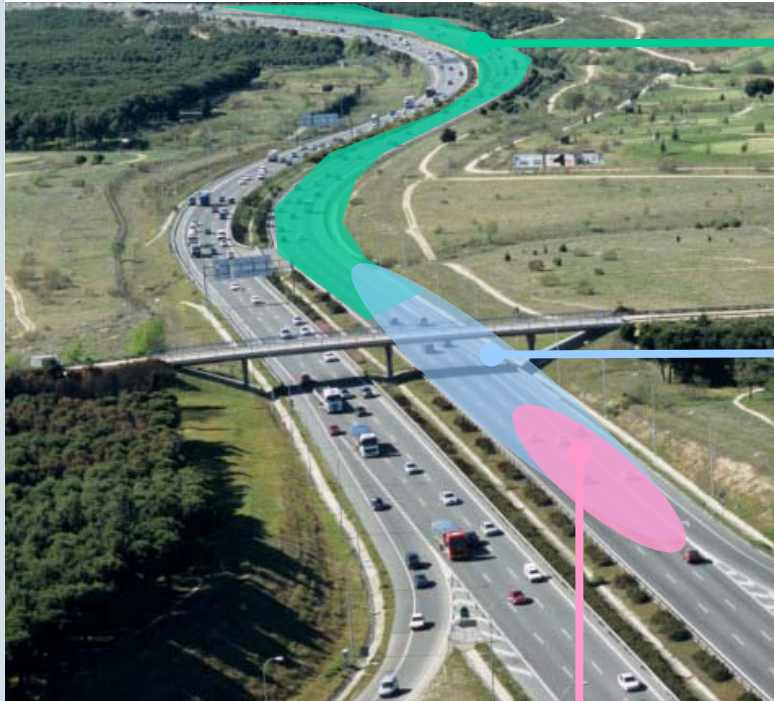


- Areas of Application for Vehicle-to-Vehicle Communication
- Foresighted Driving
- Vehicle-to-Vehicle Communication
- WILLWARN – Local Danger Warning
- Vehicular ad hoc Network
„What does it actually mean?“
- WILLWARN use cases
- Use Cases based on V2I
- Security
- Future communication architectures & related challenges
- Harmonization Work on European Level

Areas of Application for Vehicle-to-Vehicle Communication

<p>On the highway</p> 	<p>In city traffic</p> 	
<p>Danger warning</p>	<p>Intersection assistance</p>	 <p>Vehicle – Vehicle – Communication</p>
<p>Road works Traffic flow</p>	<p>Communication with traffic signals</p>	 <p>Vehicle – Infrastructure – Communication</p>

Foresighted Driving



In future, **telematics** (maps, communication and networking) will play an increasingly important role in safe and efficient driving.

Information spectrum	simple sensors	complex sensors	telematics
Traffic information	local forecast	regional forecast	wide-ranging forecast



Vehicle-to-Vehicle Communication



Requirements

- **Available everywhere**
- **Existing technology**
- **No operating costs**

Solution

- **Wireless LAN**
- **Available on every computer today**
- **Information distribution via ad hoc networks**

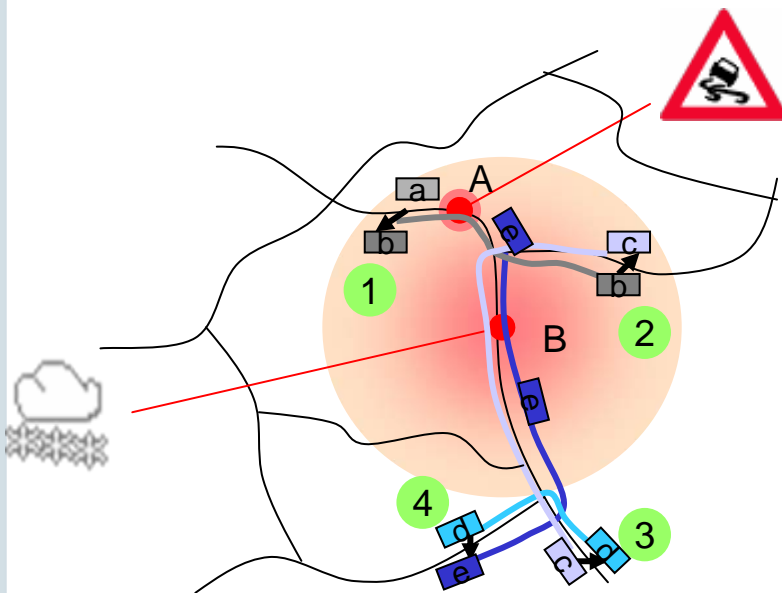


PREVENT WILLWARN – Local Danger Warning



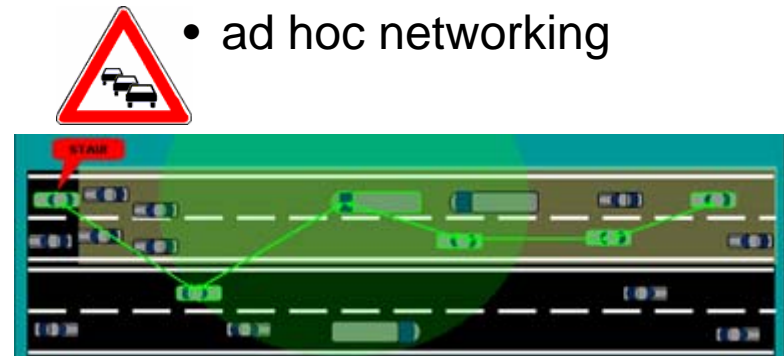
In rural areas:

- Store & forward



On highways:

- ad hoc networking

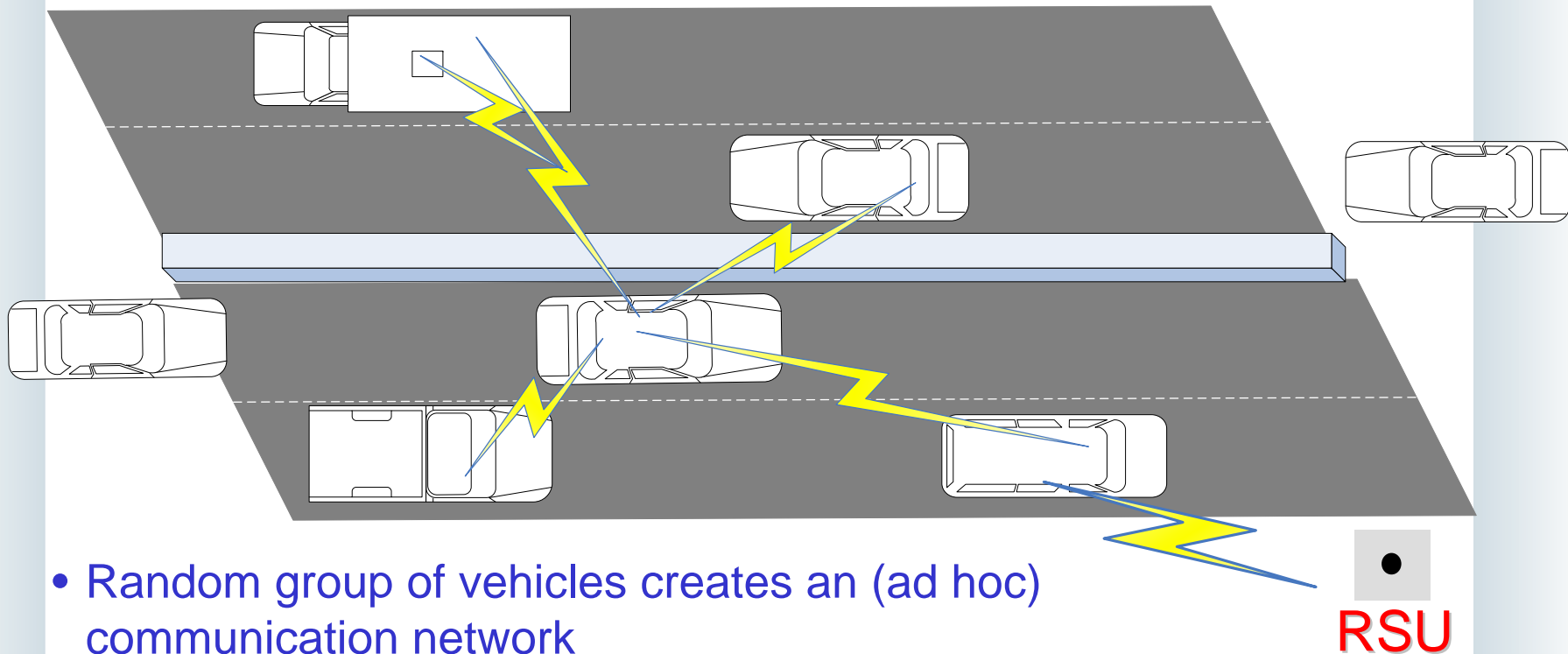


Routing protocols coordinated with the project NOW – Network on Wheels



Vehicular Ad-Hoc Network

„What does it actually mean?“



- Random group of vehicles creates an (ad hoc) communication network
- Some vehicles leave the network, others join it
- Communication between vehicles in new configuration
- Communication with Road Side Units

PReVENT WILLWARN – Use Cases

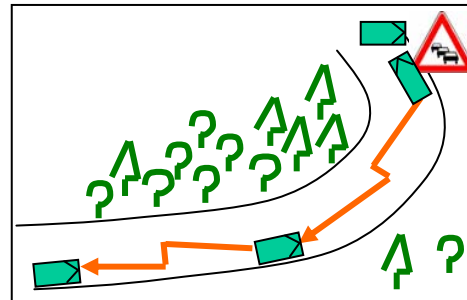


Danger Warning

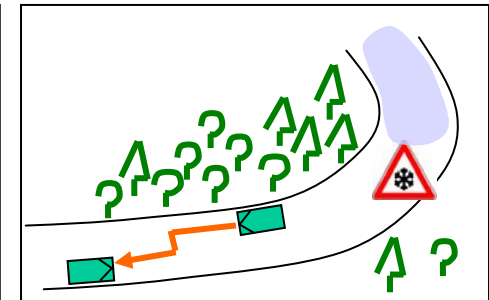
- Obstacle alert
- Warning in situations with poor visibility or reduced friction
- Warning at road works sites

... through
vehicle communication

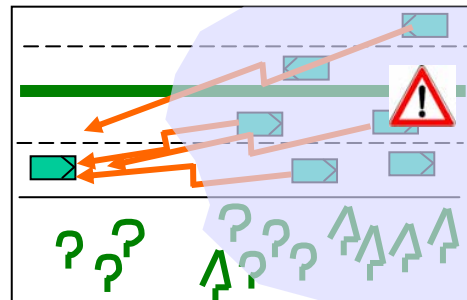
Obstacle behind a curve



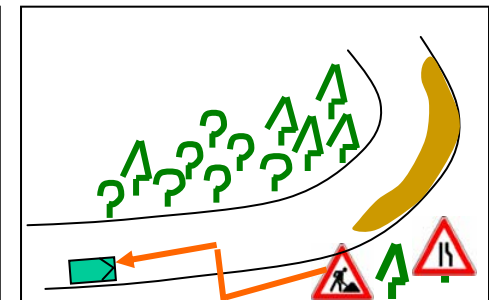
Low friction on rural road



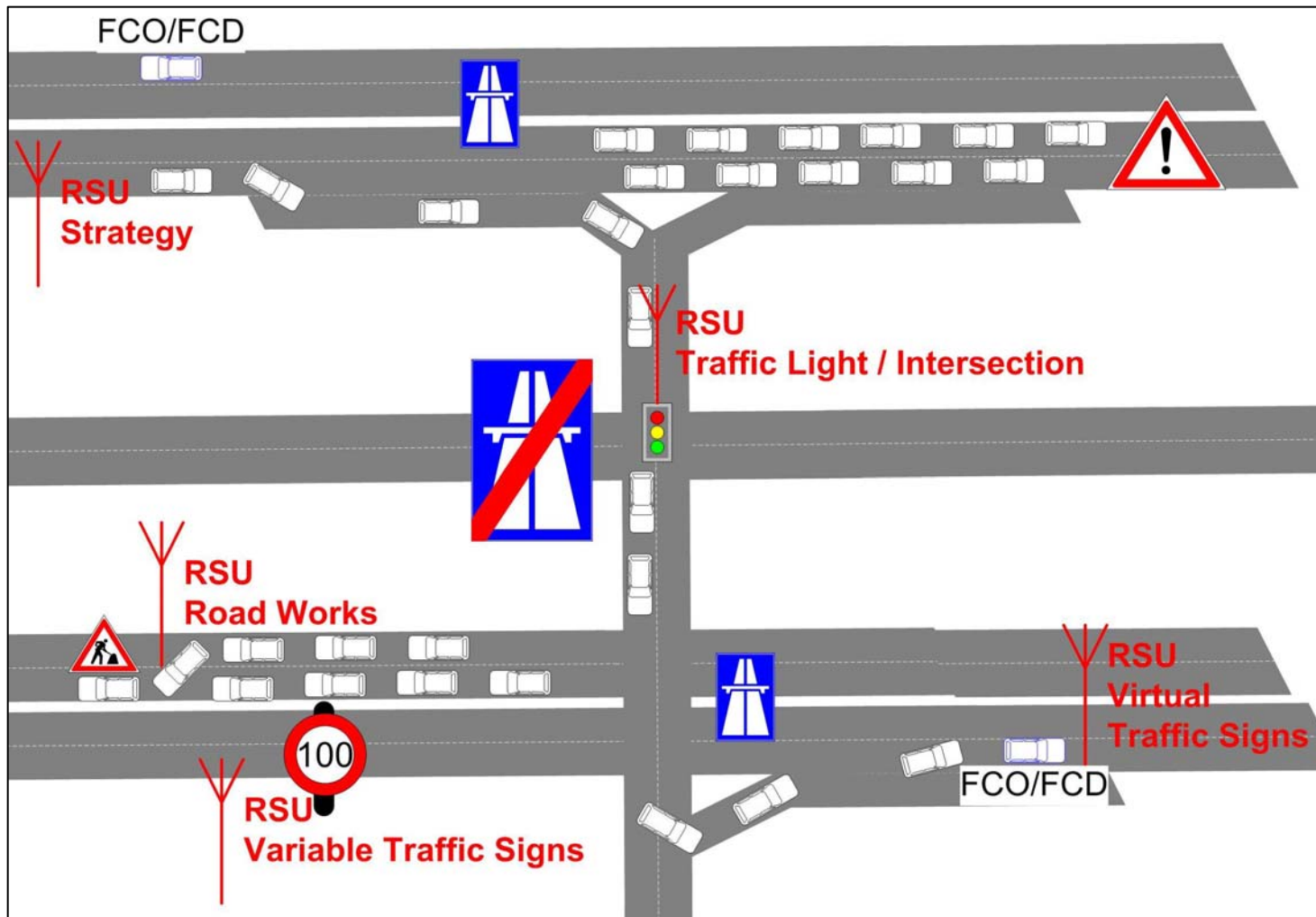
Low visibility



Construction area



Use Cases based on V2I



- **Security Challenges**
 - integrity of data
 - anonymity of the driver
 - (for some applications confidentiality of data)
- **Solutions we find in Projects like:**
 - GST
 - Secure Vehicular Communication
- **The Car 2 Car Communication Consortium has a special Working Group for security aspects**

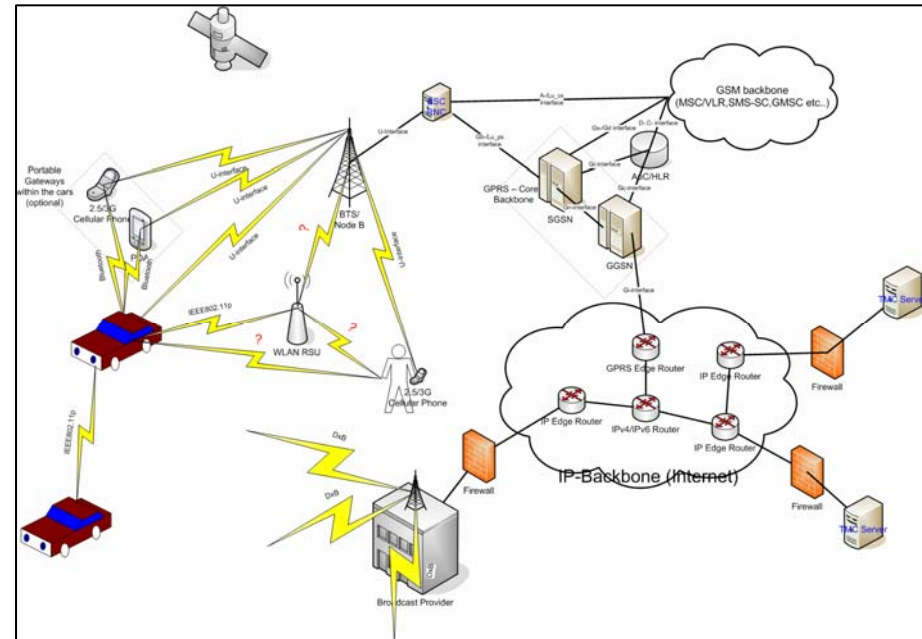
First solutions are public private key infrastructure.

The WILLWARN protocol is prepared for security aspects.

Beyond the basic Security Mechanisms, each C2C Application should have an Plausibility Check of the received Data.

Future communication architectures & related challenges

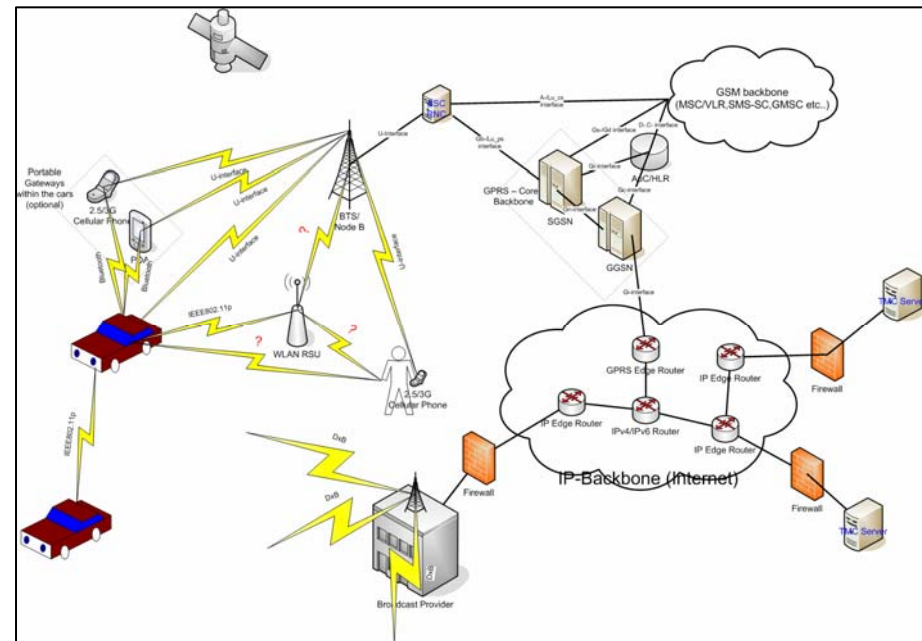
- Local communication (Ad Hoc) has to be harmonised to infrastructure communication
 - Way from WILLWARN Scenario to AKTIV scenario
- Applications (Traffic-, Fleet Management, etc) will function via seamless access to various communication technologies
 - Interfaces, handover procedures, delay etc!



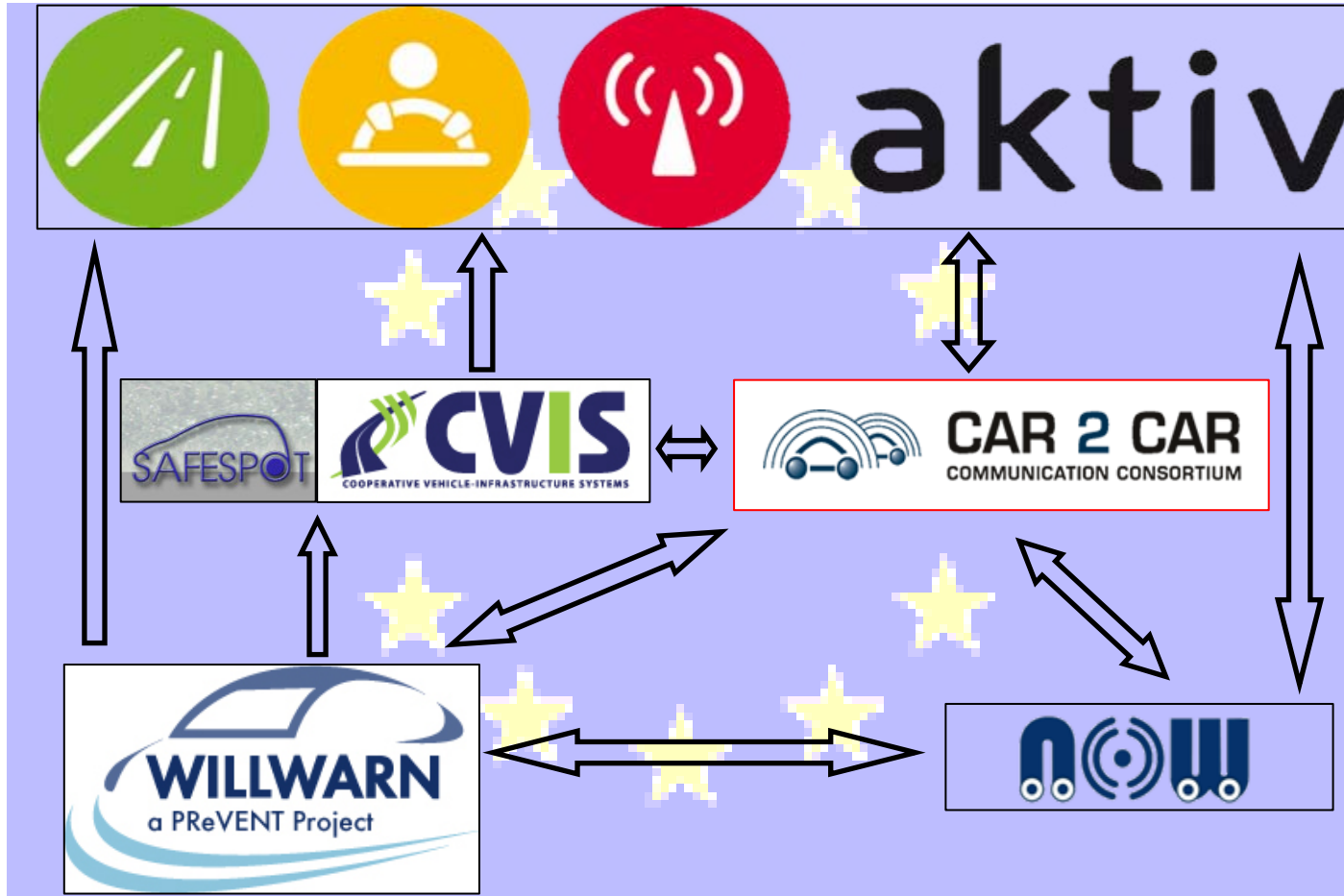
Future communication architectures & related challenges

- Integration of personal mobile devices (PDAs) has to be ensured
 - **Evolution** from vehicle-to-vehicle communication to road user to road user communication (R2R-Com)
- Systems will be very complex
 - Have to be adequately explained to the driver
 - Shall be easy to handle so that the driver can concentrate on his main task, which is...

...driving the vehicle!



Harmonization Work on European Level



Thank you for your attention



- **WILLWARN Group**

DAIMLERCHRYSLER

BMW Group
Forschung und Technik



Hochschule für
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PHILIPS

