

THE FULLY NETWORKED CAR



**Virtual Sub-Centre (VSC) –
Safety Concept for the European Road Transport**

**M2M-
Solutions**

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N2CS, Motorola

Geneva, 5-7 March 2008



Seamlessly Connect all technologies



ZIGBEE

MESH

CDMA

WCDMA

GPRS/GSM

UWB

802.11

Bluetooth

LTE

HSxPA

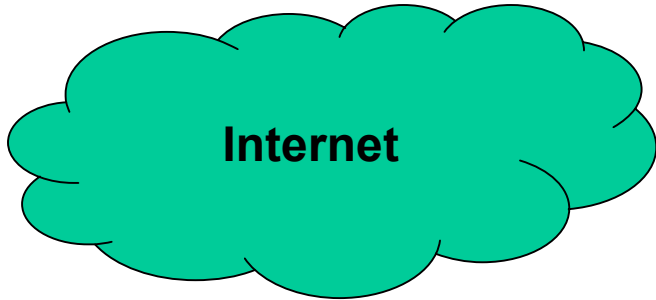
RFID

WiMAX



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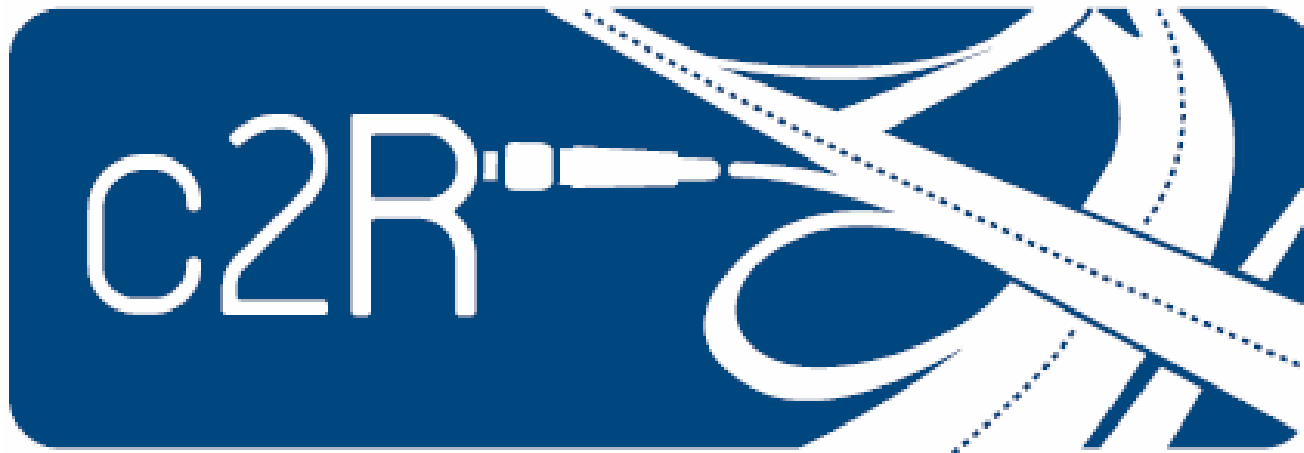


COM2REACT: Traffic efficiency and safety system



4

VSC - a middle control level For ITS V2V & V2C applications



Traffic efficiency and safety system



COM2REACT

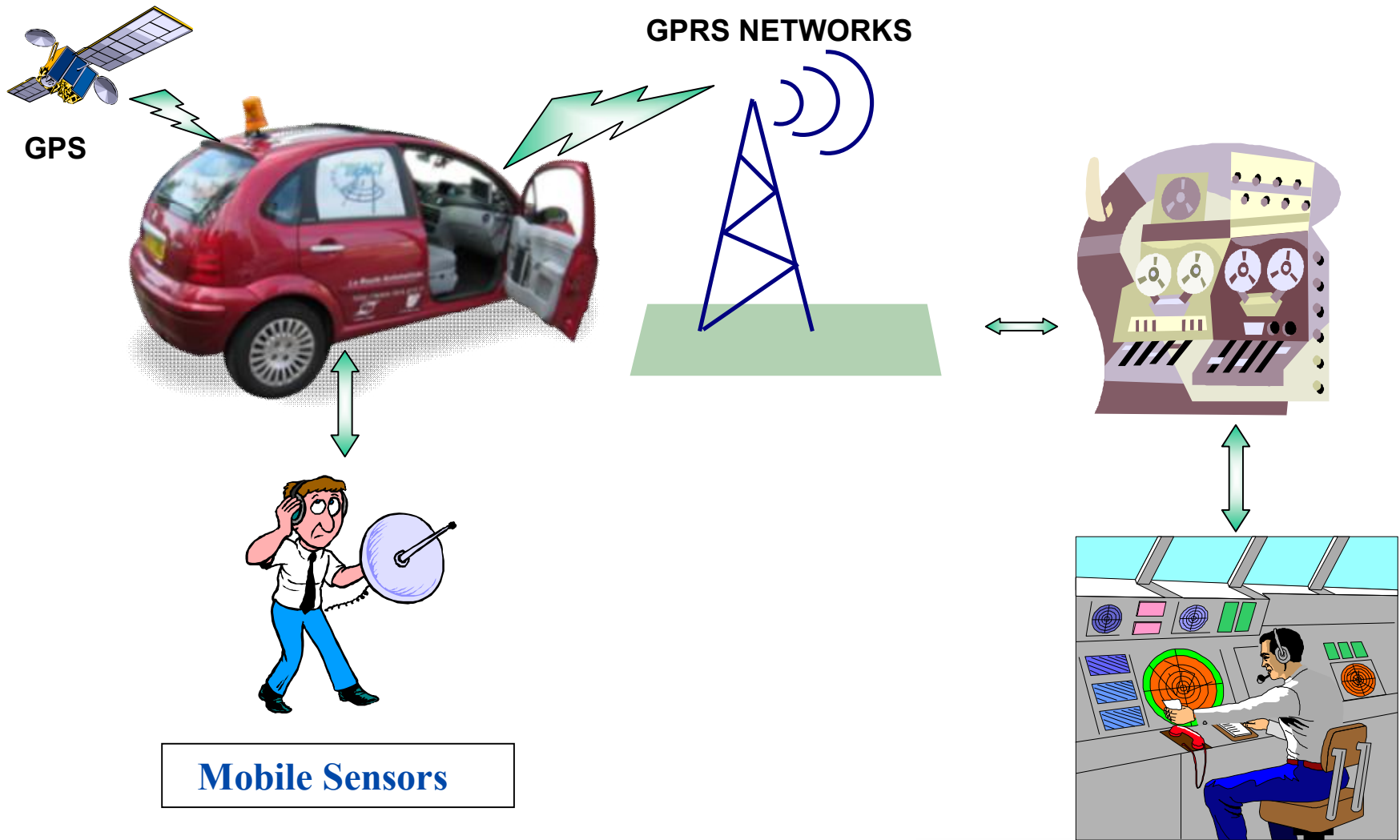
Virtual (Local) control Sub-Center (VSC)
Vehicle 2 Vehicle Communication

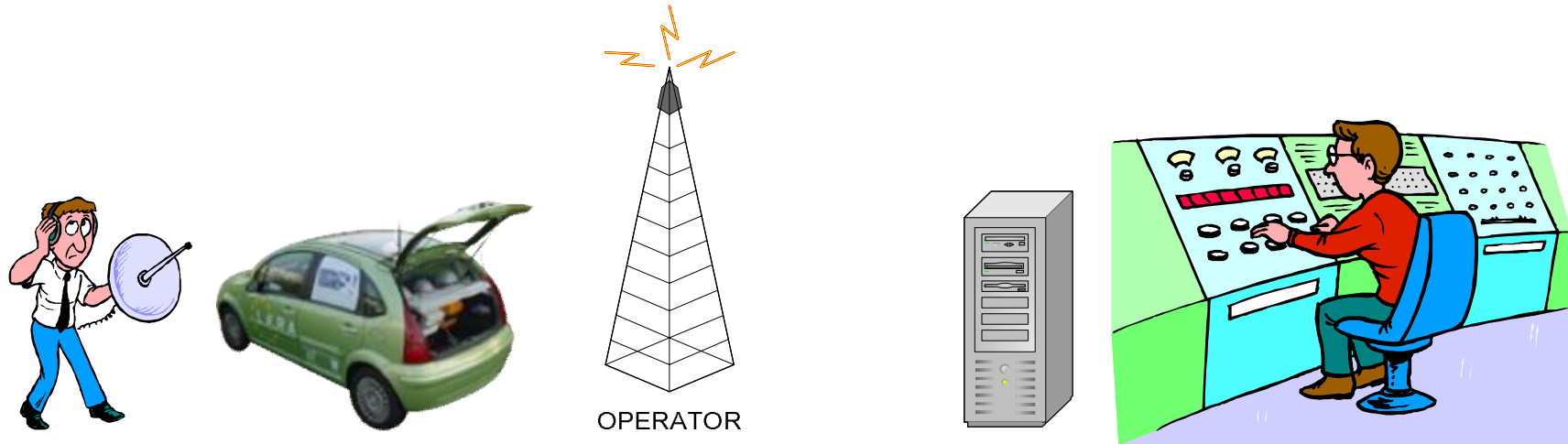


REACT

Regional Control Center (RCC)
Vehicle 2 Center Communication





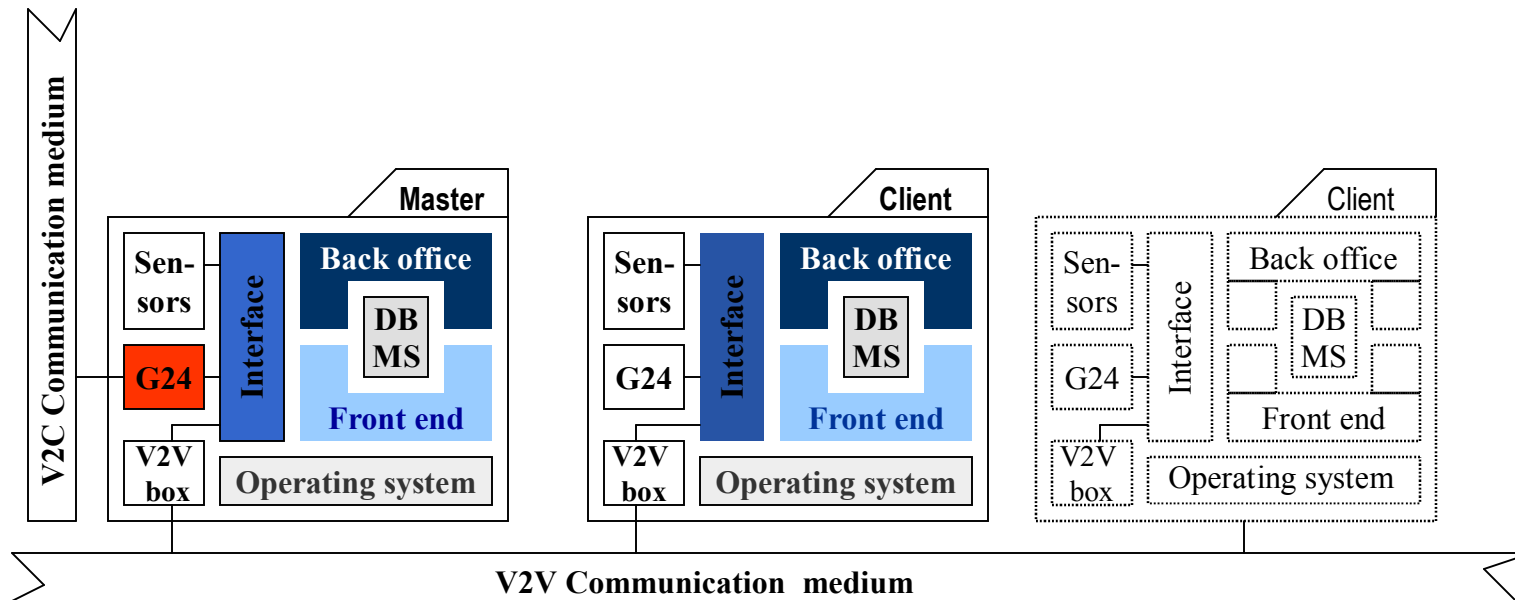



Logos of partner organizations and sponsors are displayed below the process flow:

- MINES PARIS
- INRIA
- Intempora
- NAVTEQ
- Telefonica
- TRANSVER
- vt
- TUM
- Sphericon Ltd.
- PSA PEUGEOT CITROËN

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- **Back office system** Provides application specific services.
Processes information to generate knowledge and advice.
- **Interface system** Offers appropriate interfaces for V2V- and V2C communication.
Pre-processing of sensor data.
- **Front end system** Special routing functionality and integrated positioning engine.
Responsible for visualization of warning messages and local route with respect to vehicle movement.

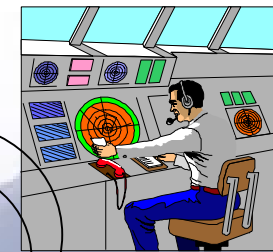
V2C - Vehicle to Center & V2V - Vehicle to Vehicle

V2C

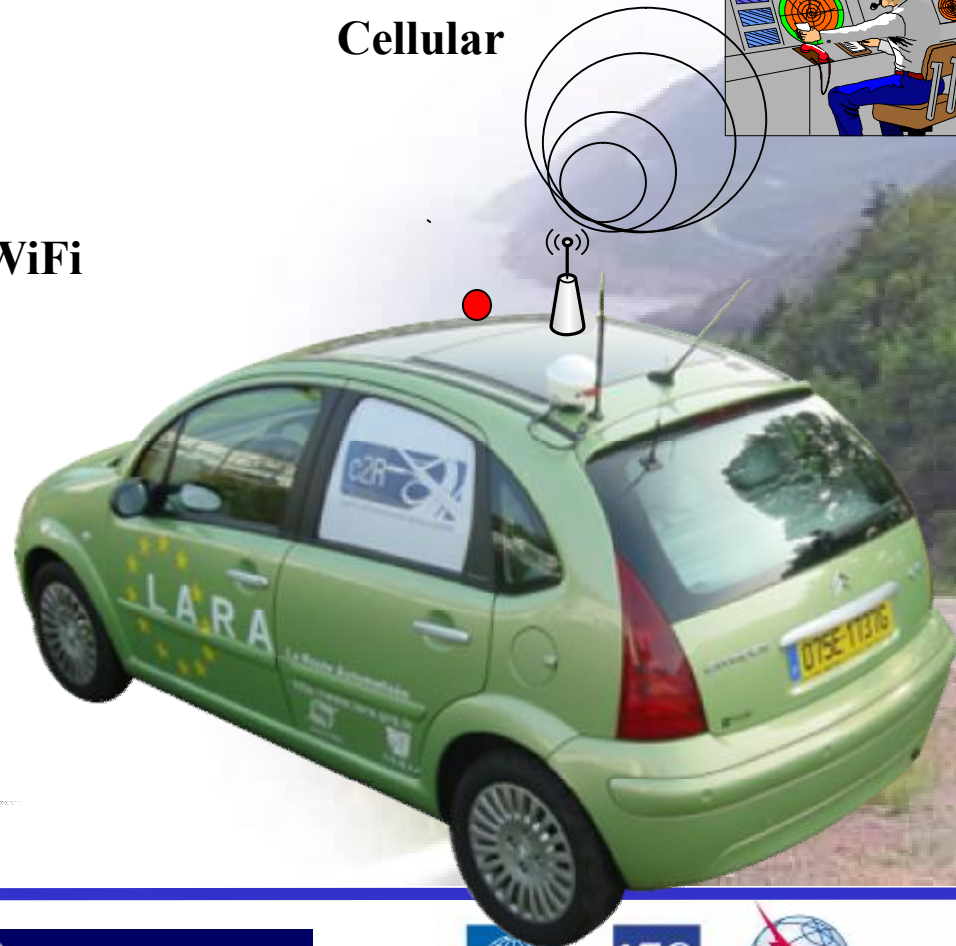
V2V



Cellular



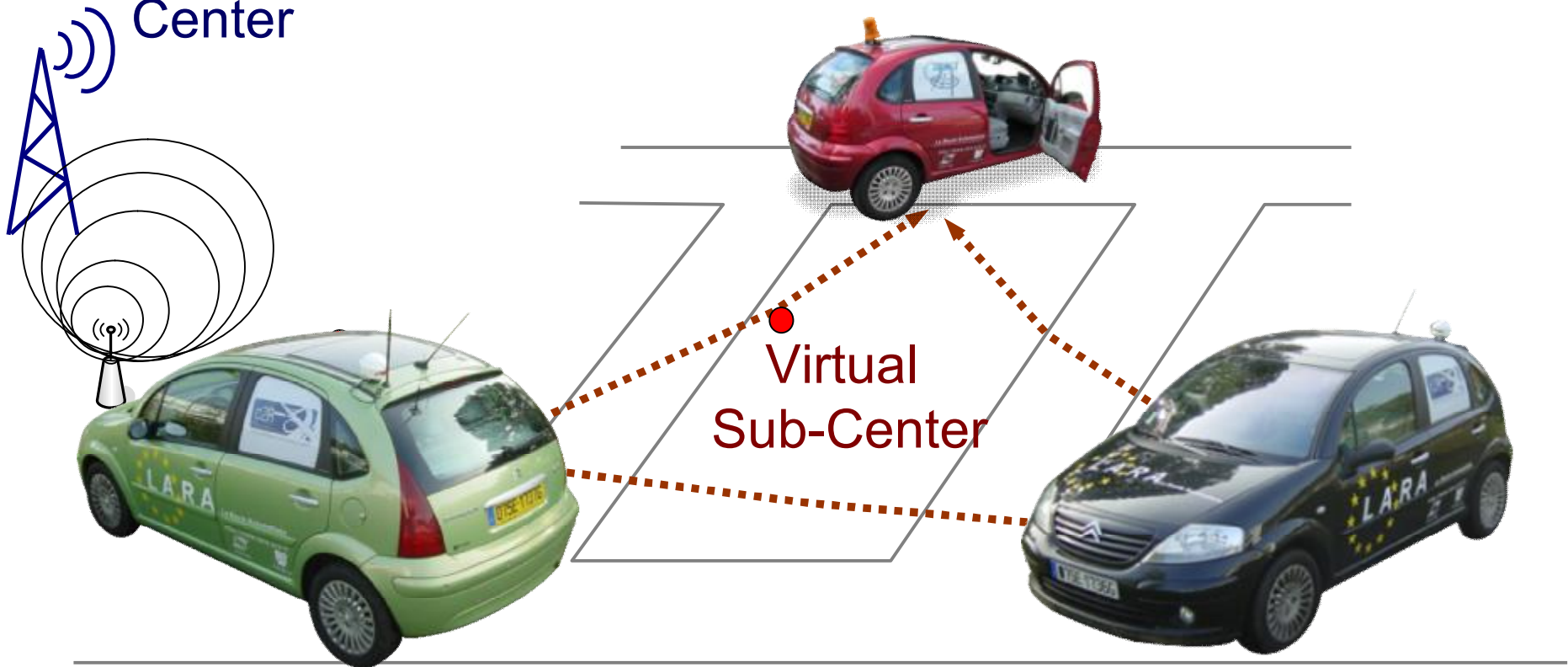
WiFi

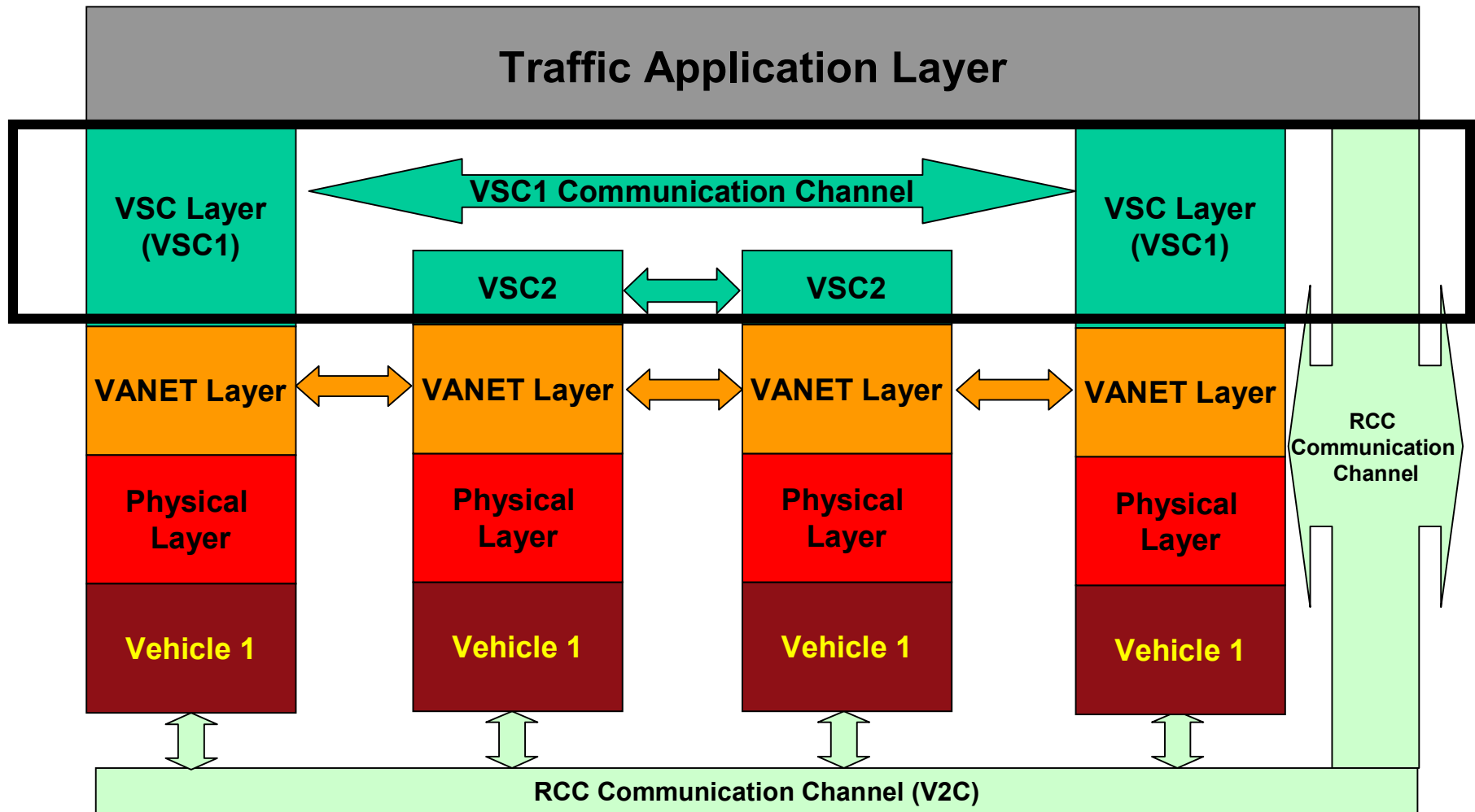


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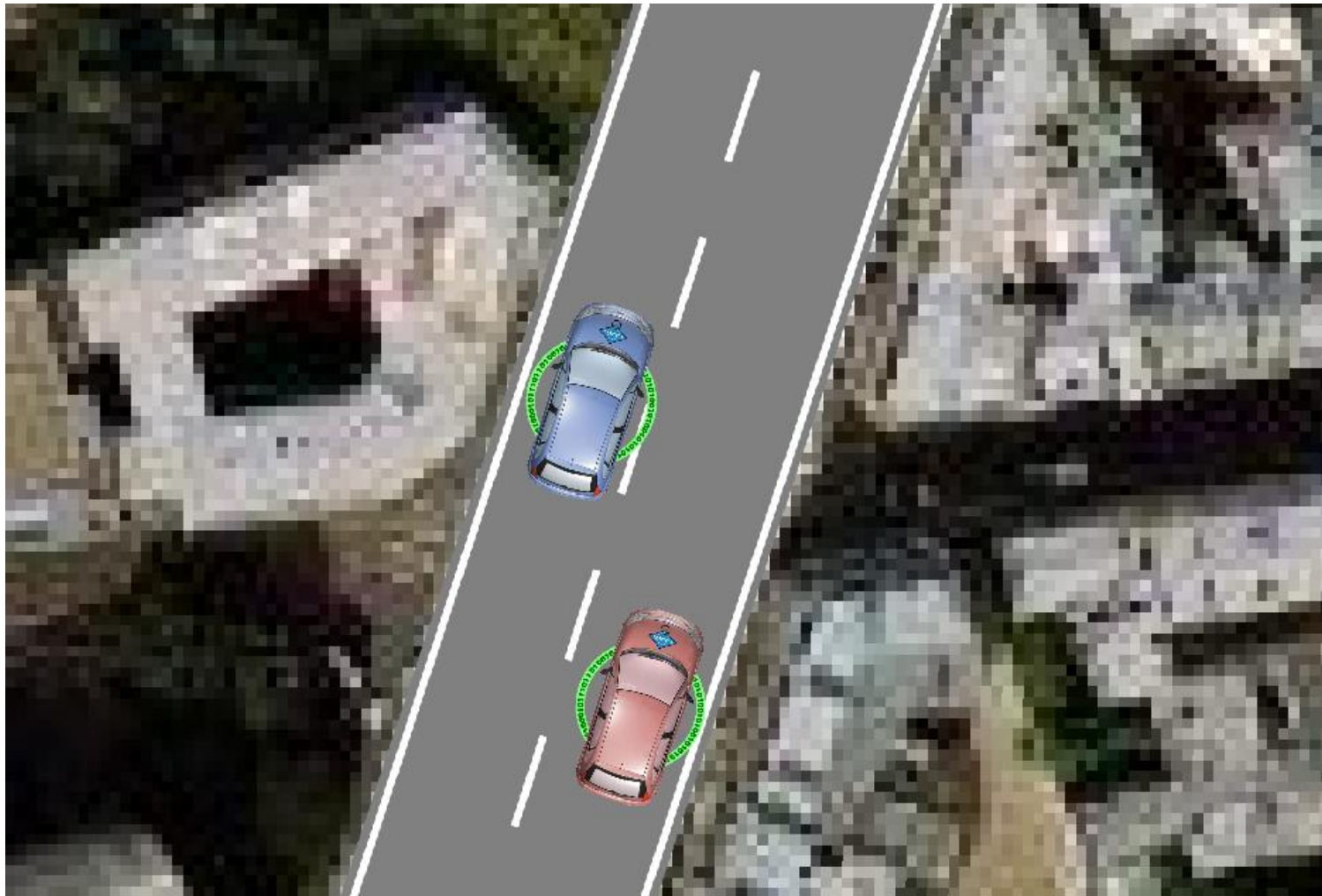
Regional Control
Center



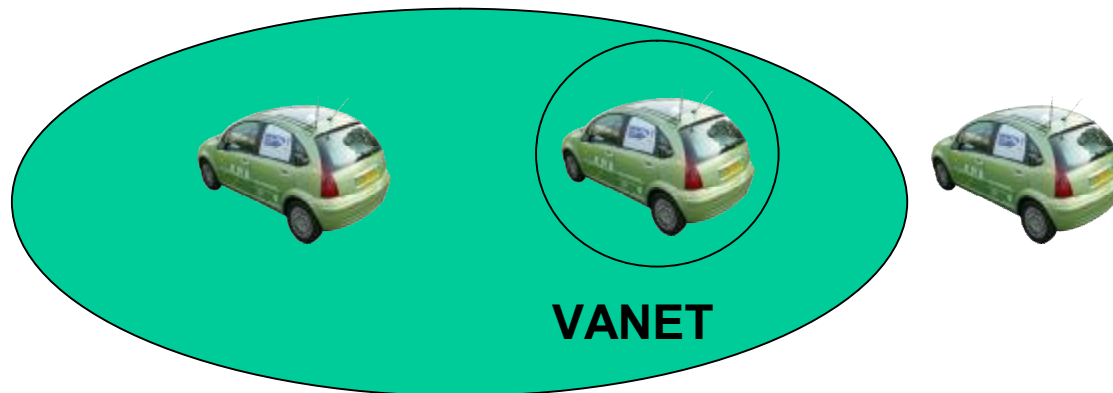
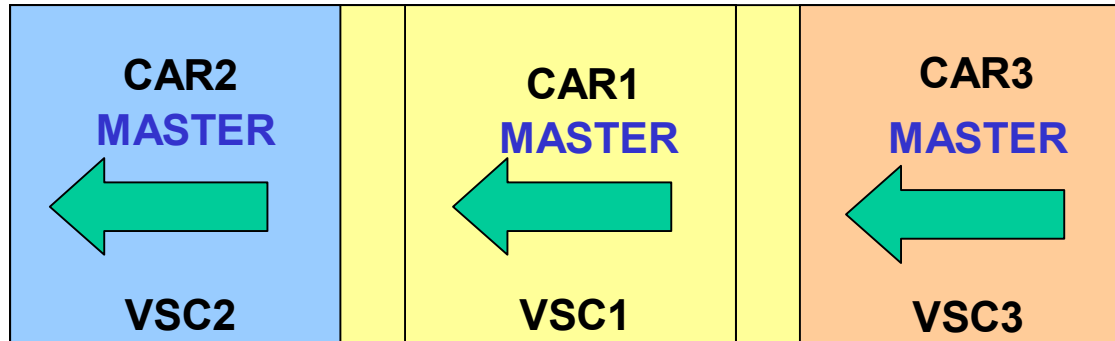


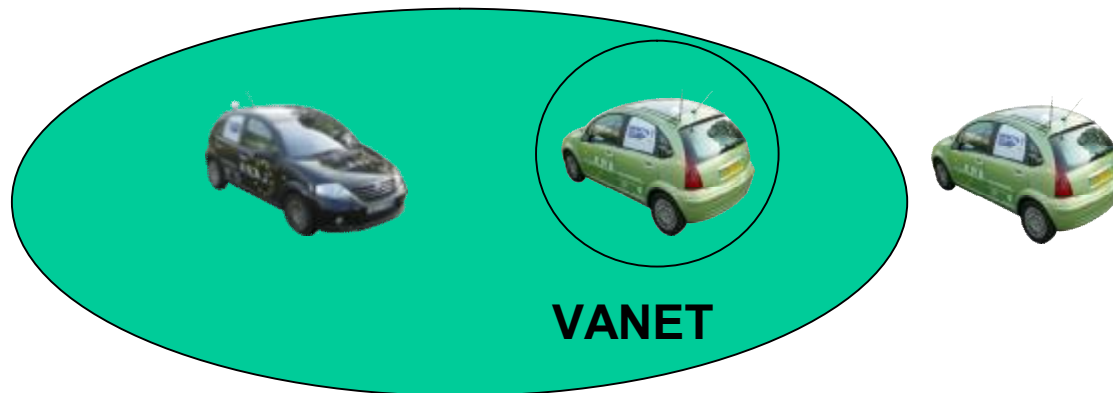
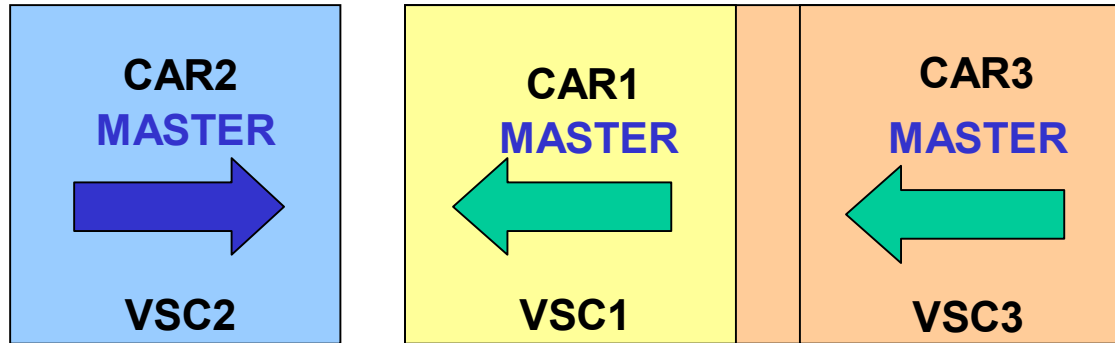
- VSC is:
 - a middle control level.
 - enhancing the reactivity of the systems by faster communication (V2V) and information processing.
 - It is a peer to peer software
 - It aggregates local information and communicates with RCC
 - Local traffic applications are built using this layer

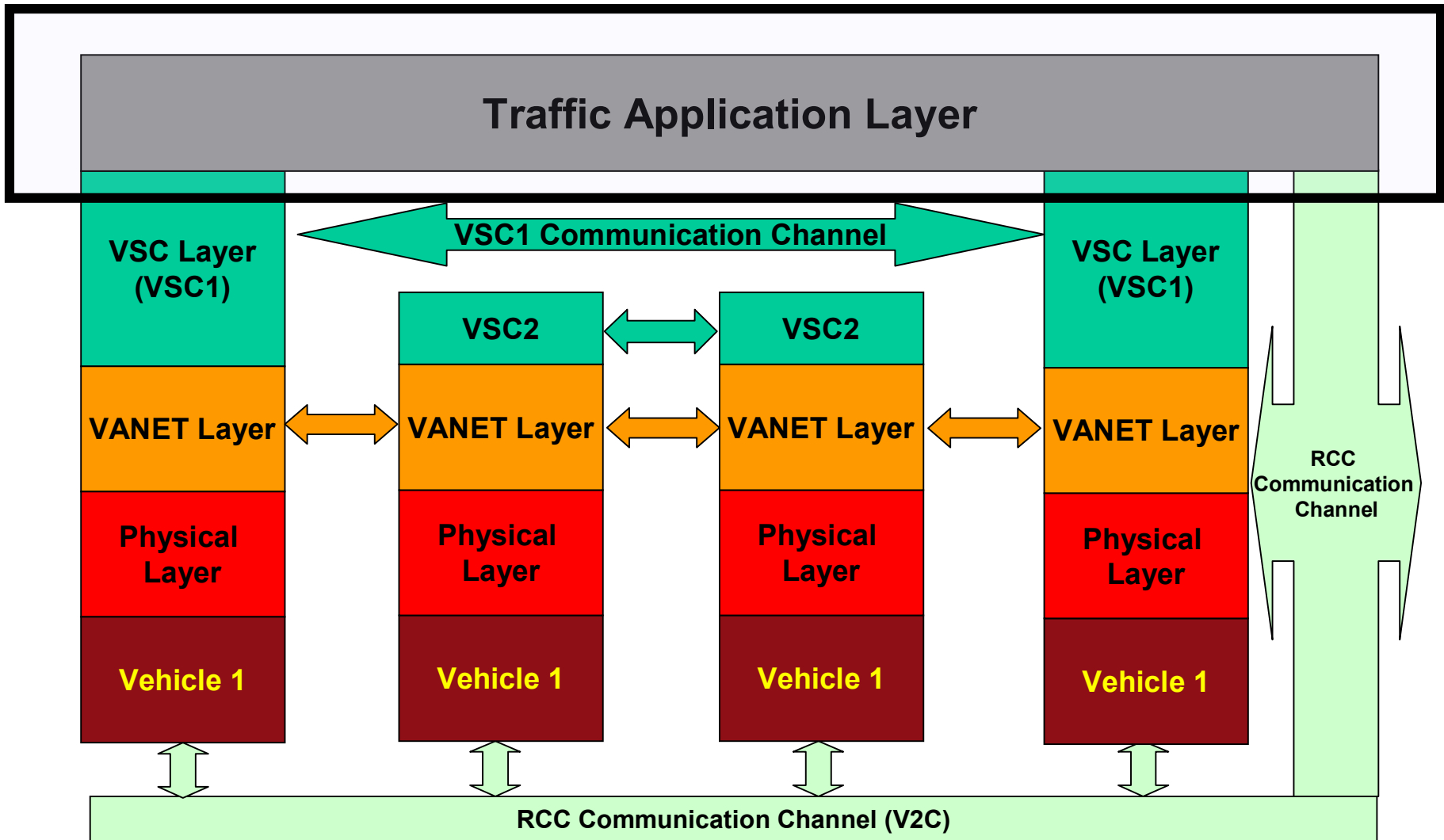
- It is not:
 - A communication system (or a part of it)
 - An application

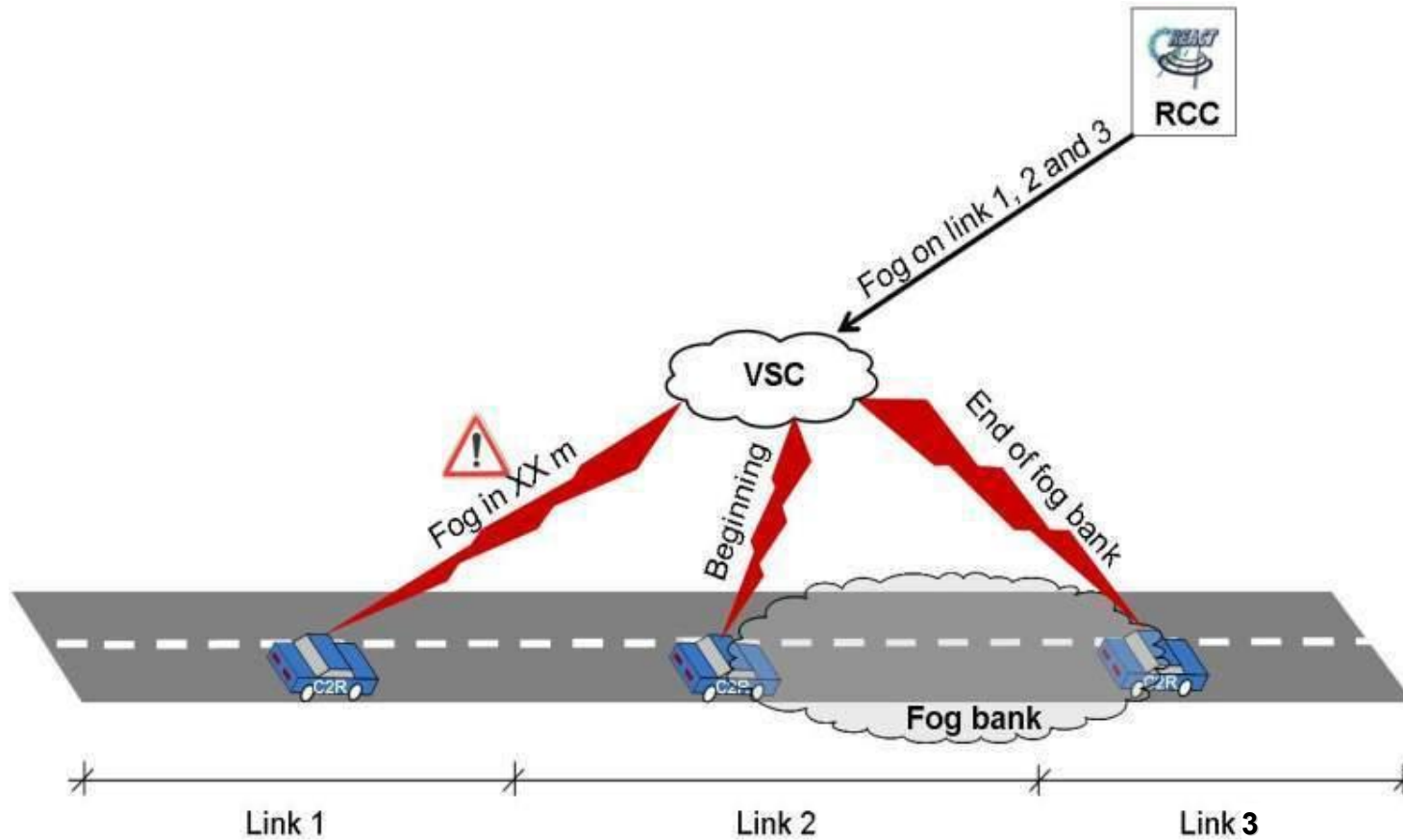


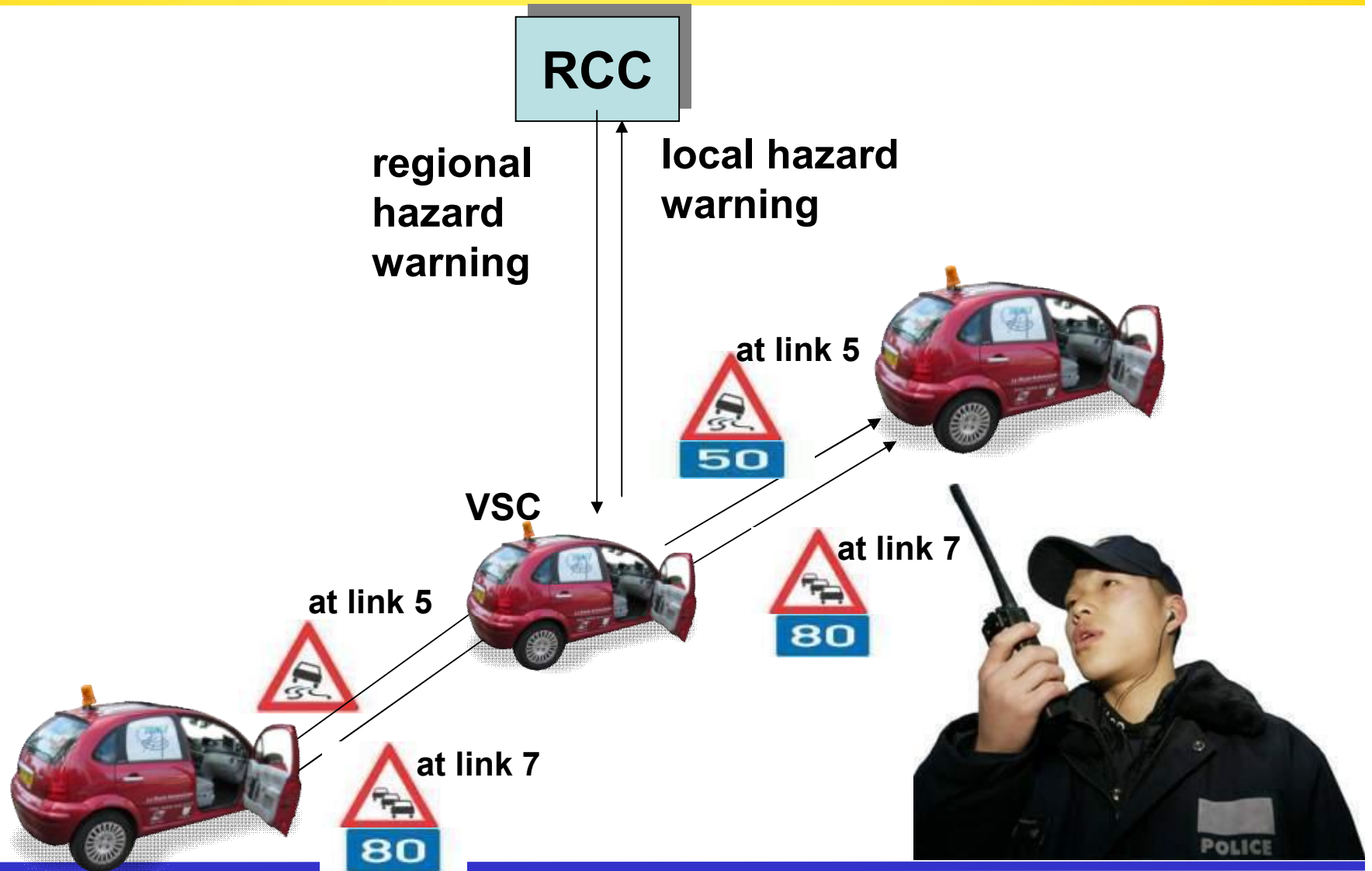
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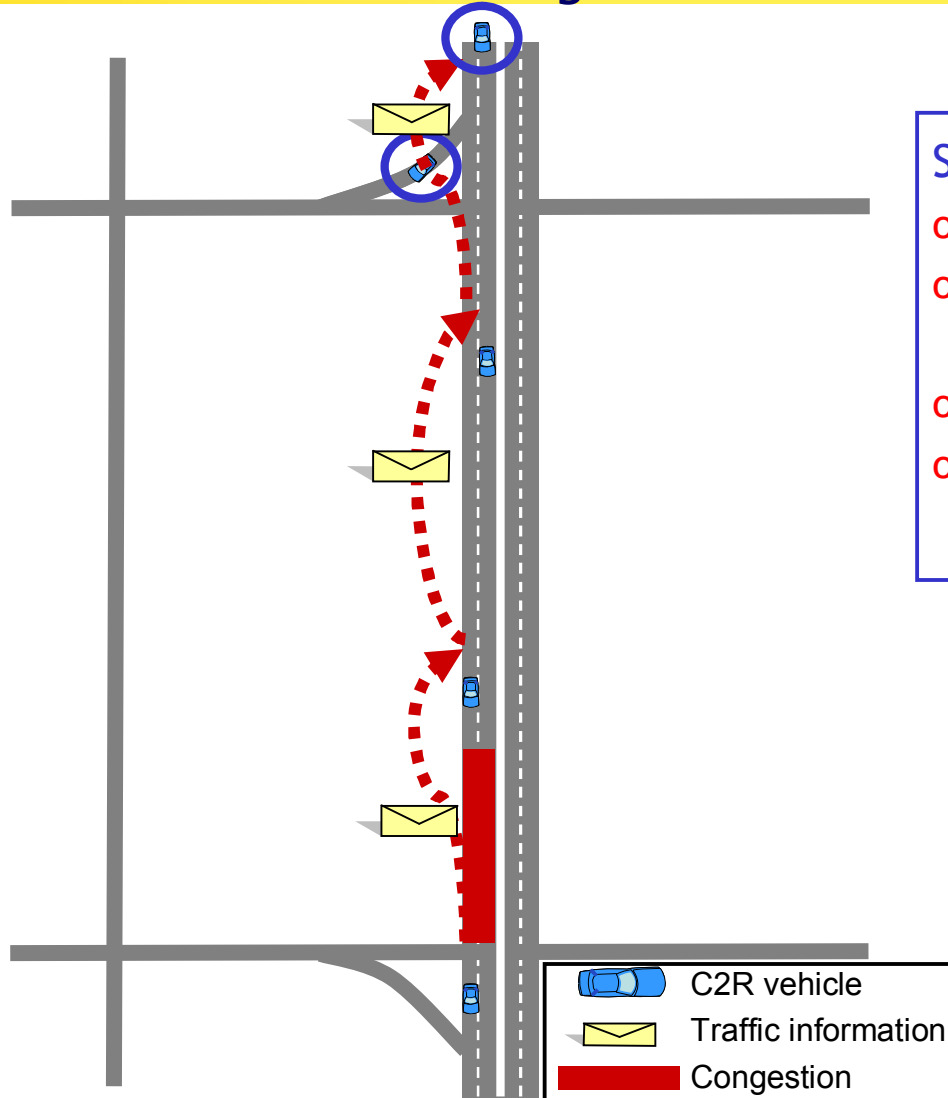








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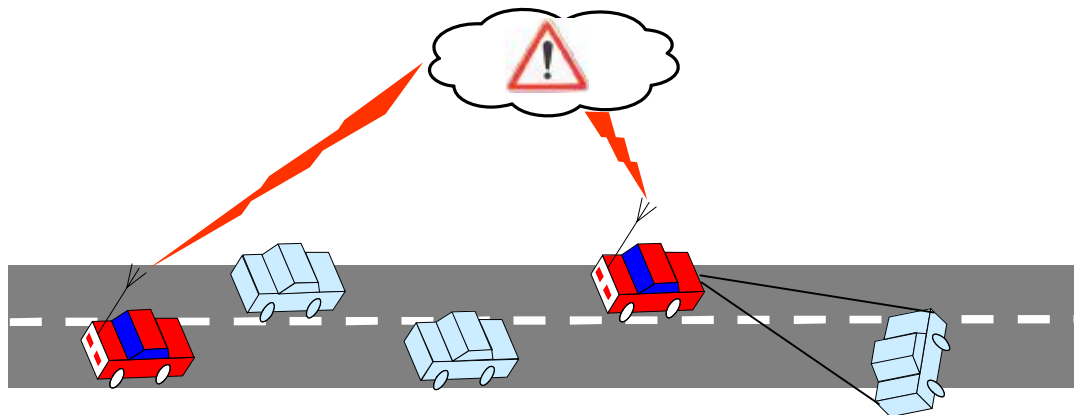
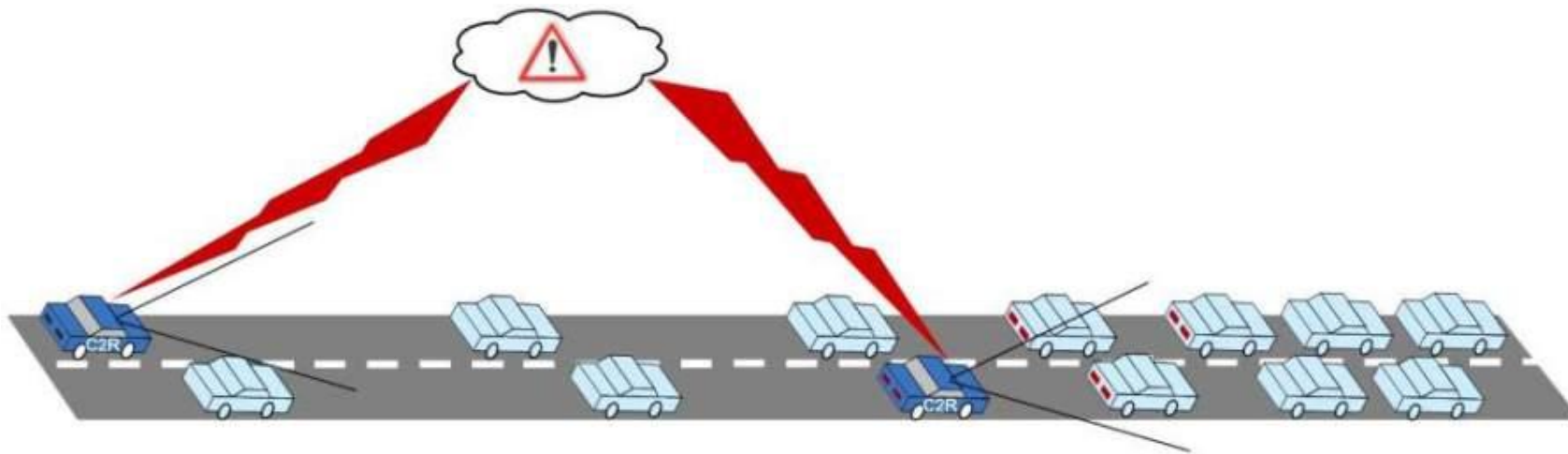


Scenario parameters

- o Dual two lane motorway
- o Traffic volume: 2 000 veh/h and 3 000 veh/h per direction
- o 15 % heavy vehicle traffic
- o COM2REACT penetration rates 0 %, 5 %, 10 %, 25 %

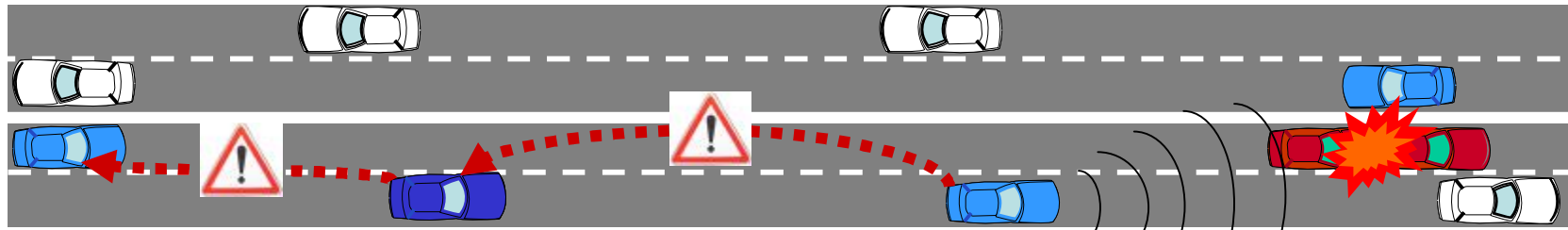
Traffic efficiency indicators






- o Queue length
- o Travel time
- o Travel speed



Collision Warning

Scenario : Accident on motorway



-  Unequipped vehicle involved in an accident
-  C2R Client Vehicle
-  C2R Master Vehicle
-  Unequipped vehicle
-  Hazard message

Scenario parameters

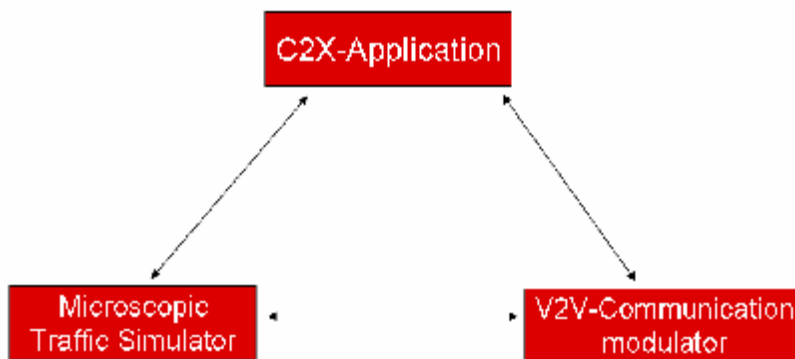
- o Dual two lane motorway
- o Traffic volume: 1 000 veh/h
- o 15 % heavy vehicle traffic
- o 30 minutes
- o COM2REACT penetration rates:
0 %, 5 %, 10 %, 25 %, 85 %

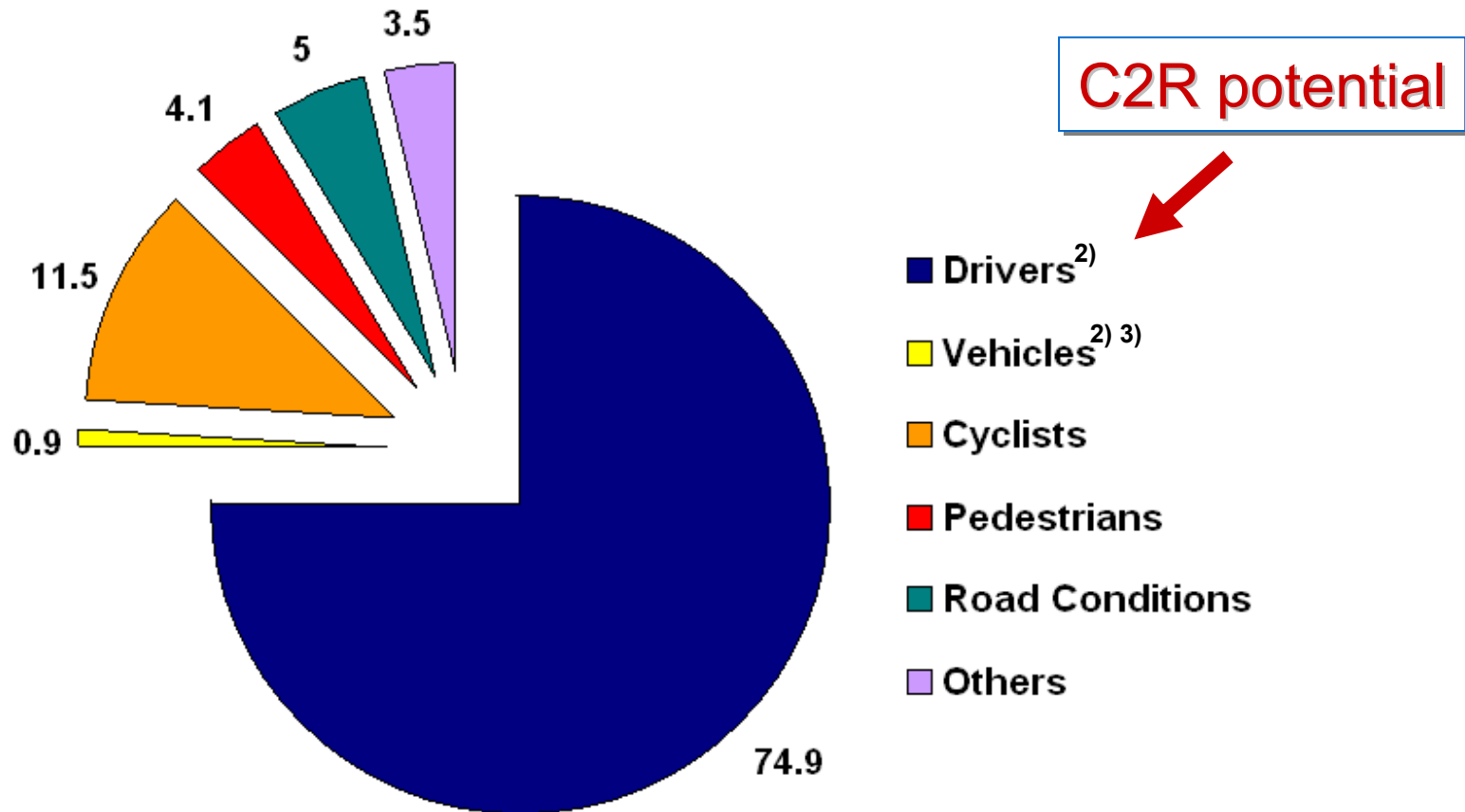
Road safety indicators

- o Location of lane change from lane 2 to lane 1
- o Time-To-Collision (TTC)

Traffic efficiency indicator

- o Travel speed

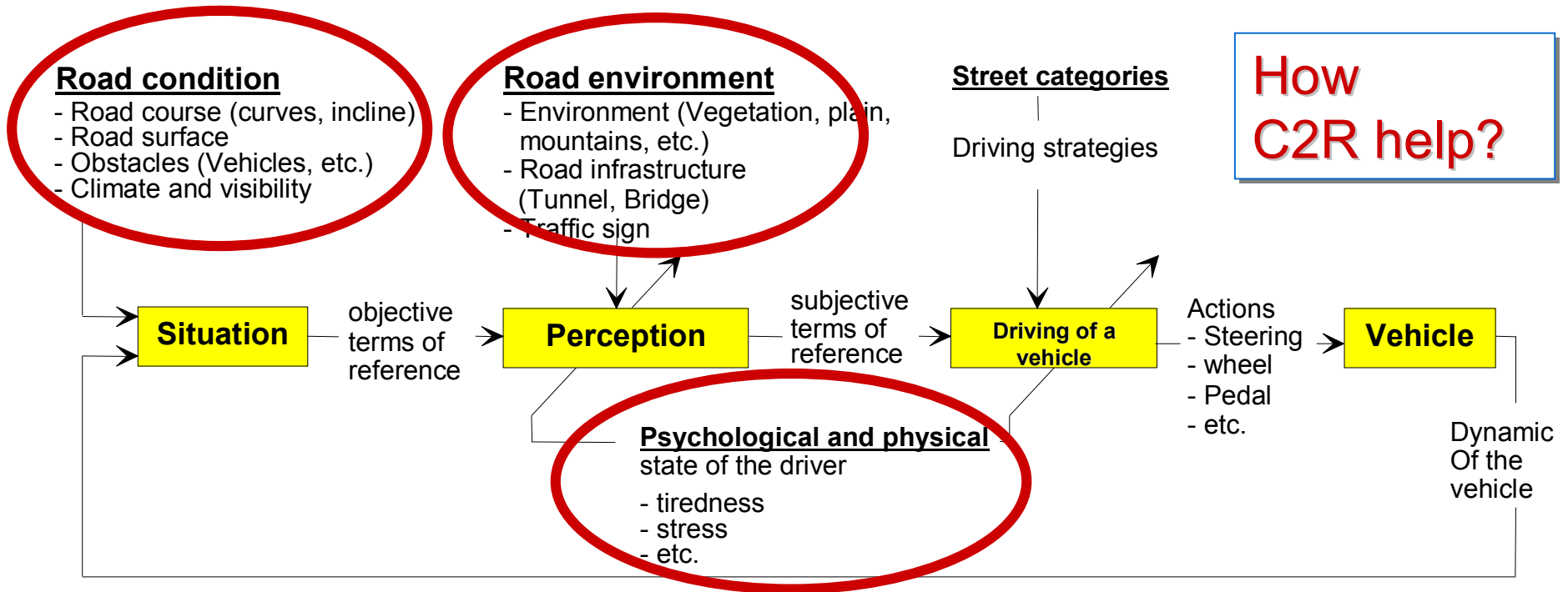




1) Causes of accidents reported by the police 2) Vehicles including motorbikes

3) Technical or maintenance faults

[Federal Statistical Office of Germany, 2006]

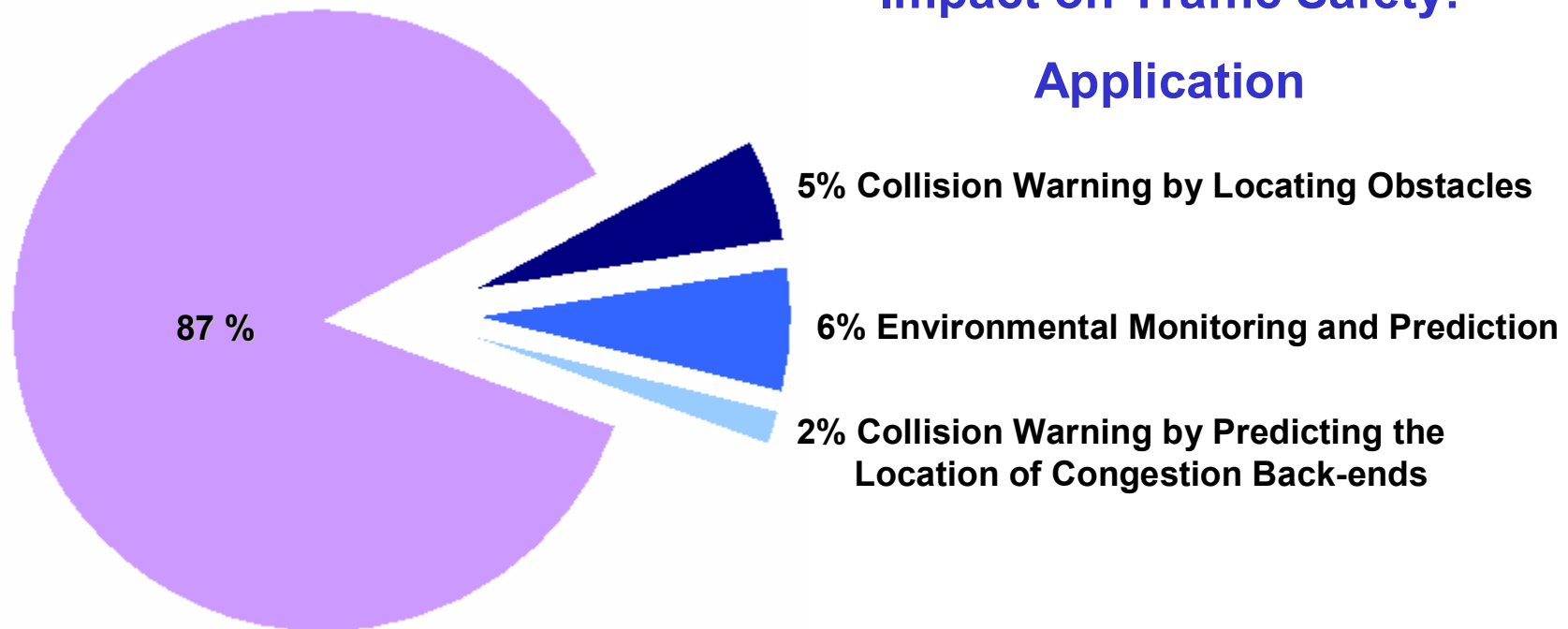


[Todoskoff et. al., 1996]

- Drivers of C2R vehicles are warned against
 - Environmental hazards
 - Obstacles like broken down vehicles or congestion back-ends
- → Situations are not unexpected
- Drivers of C2R cars are warned against inattentive drivers

Years 2003 to 2005

Impact on Traffic Safety: Application



VSC, a “Standard Protocol” For Cooperative Applications ?

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Thank You



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MOTOROLA

V2C Communication



ARTTIC

Project Management



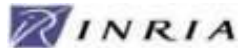
TRANSVER

VSC & Traffic Model



VT-TUM

Traffic Simulation &
Hazard Assessment Model



INRIA

Networking & Experiment



ARMINES

Sensors & Experiment



EVERIS

Business Model



In Car System Support

Telefónica – I+D

V2V Communication System



NAVTEQ

Digital Map & Map-Matching



INTEMPORA

In Car SW Integration



Sphericon

Driver Alertness Sensor



Jerusalem Transportation

User Needs Definition