



# Galileo / EGNOS Enhanced Driver Assistance

## System Design

The research leading to the results of the GENEVA project has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no 248198 of the European GNS S Supervisory Authority.



# Contents



1. Perception of the traffic situation
2. System architecture
3. System components
4. Local field of vision and map data
5. Localisation unit
6. System components teamwork
7. Application scenarios
8. Outcome
9. Team

# Human perception of the traffic situation



- This is the way we see the situation



# Car perception of the traffic situation - Today



- This is the way your car perceives the situation - today

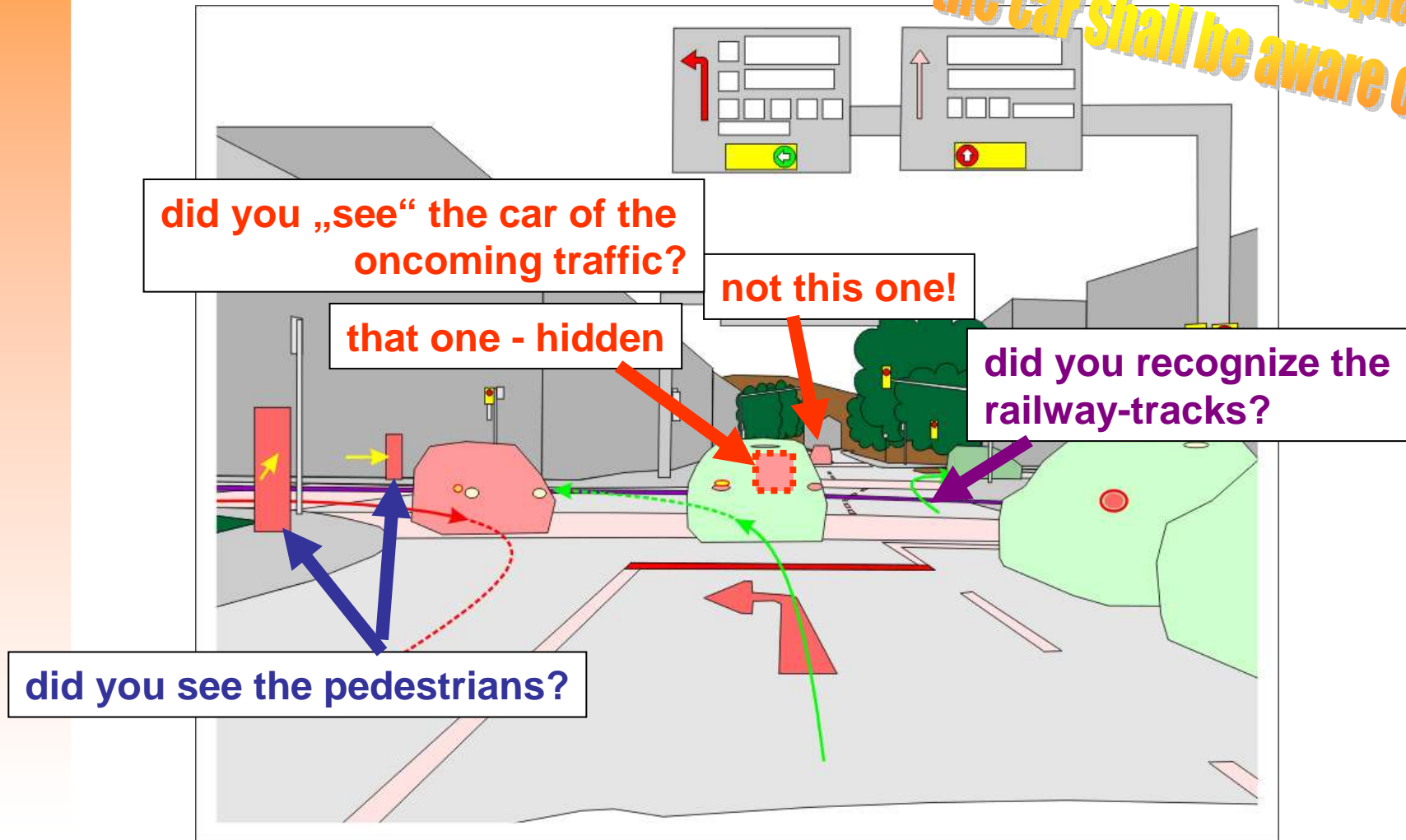


# Car perception of the traffic situation - Future

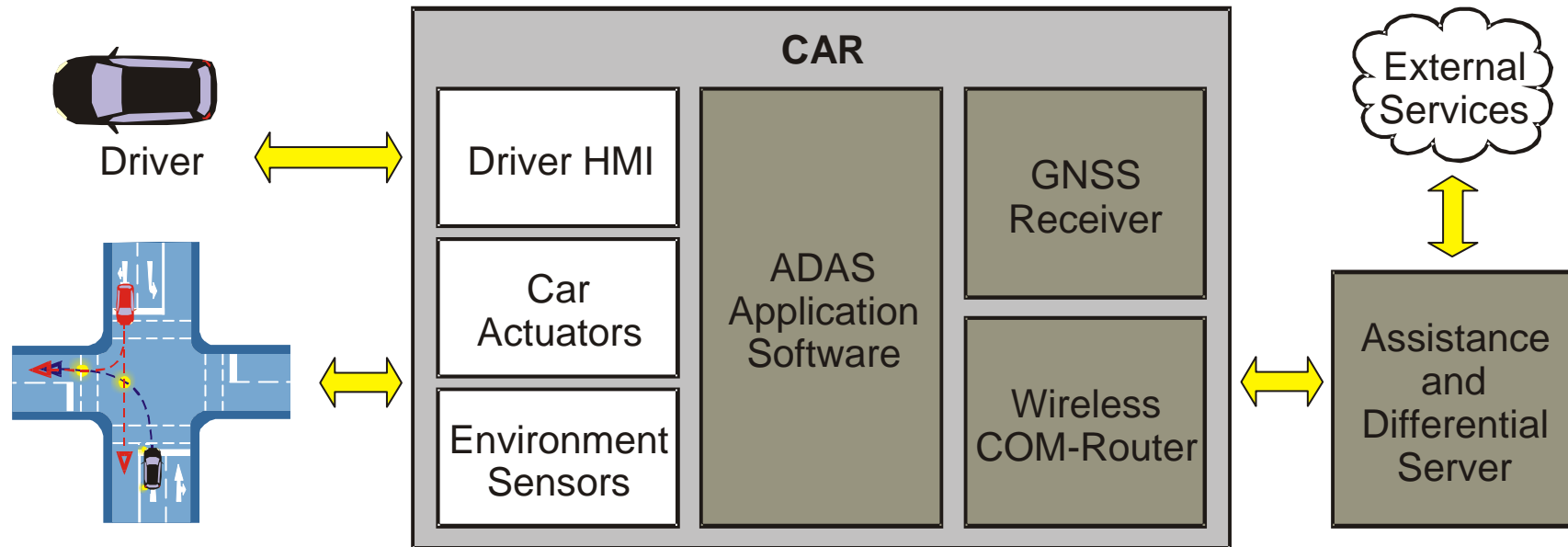


- This is the way we want your car to recognize the situation

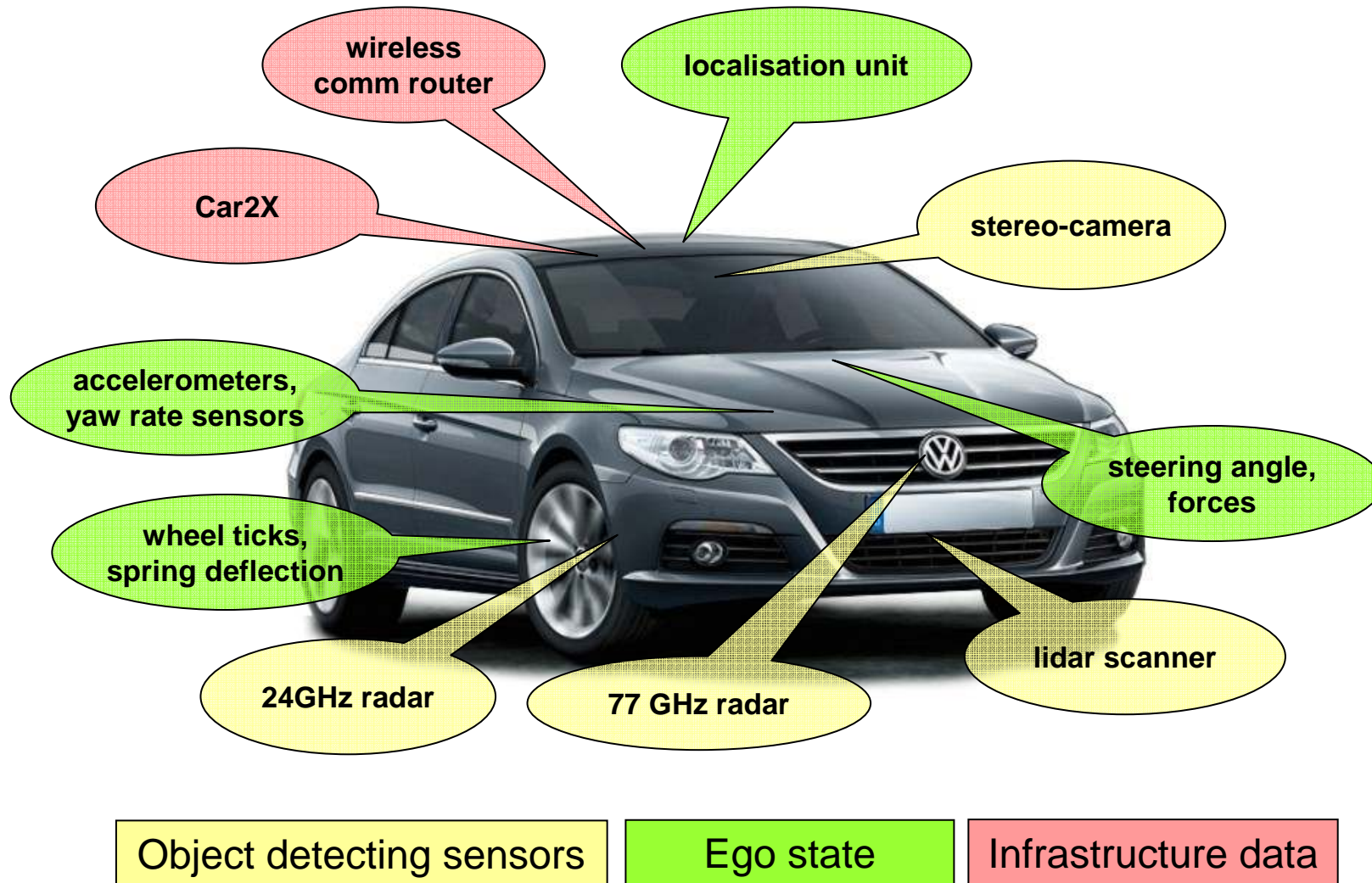
*not all information displayed  
the car shall be aware of*



# System architecture



# Sensor data

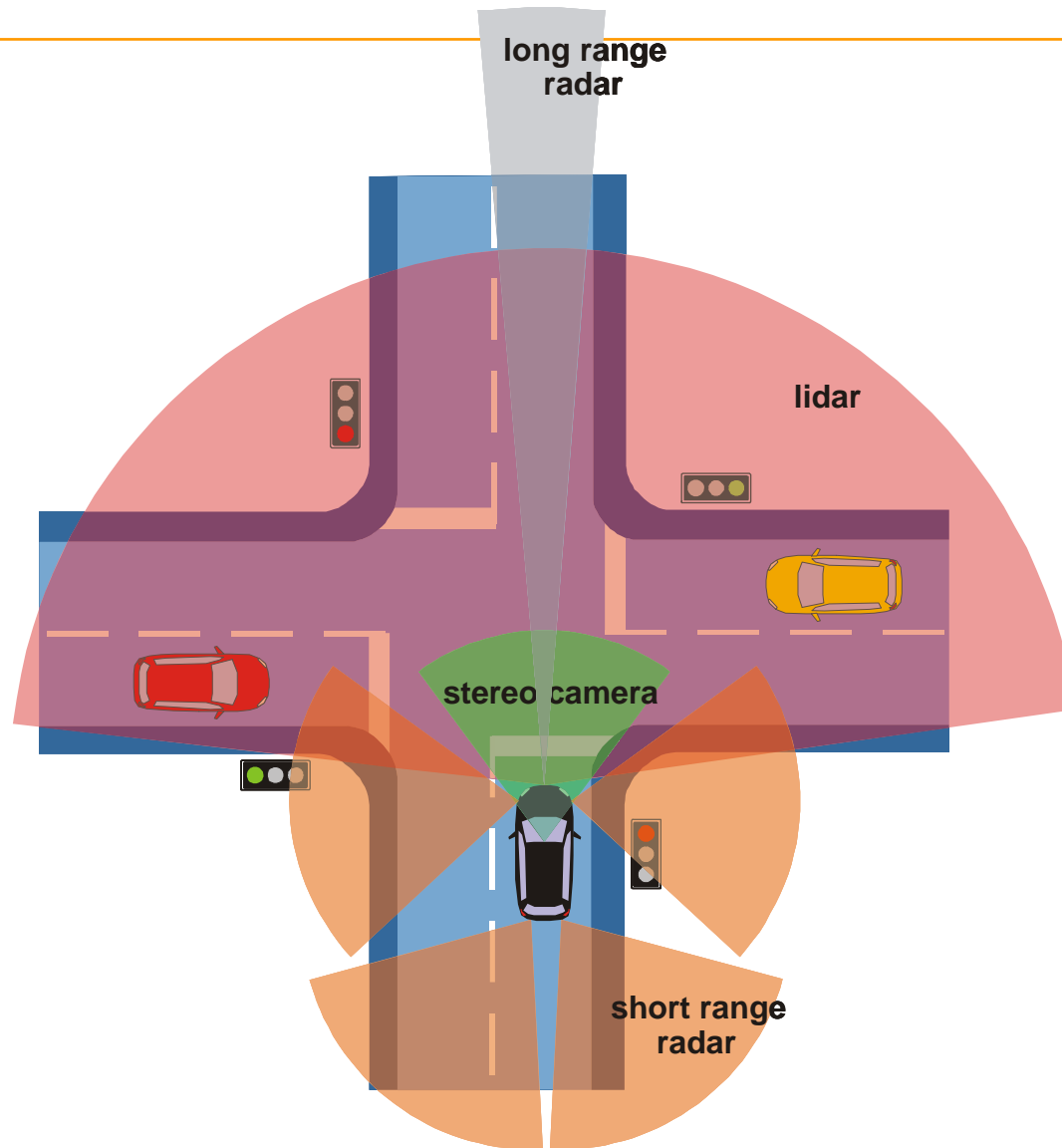


# GENEVA system components



- Vehicle Sensors: describe the current state of the car and the driver interactions by measuring wheel ticks, spring deflections, pedal states, or indicator states
- Localisation Unit: provides time stamped car state (position, heading, velocity, acceleration, yaw rate)
- Laser Scanner: detects stationary and dynamic objects in front of the car
- Image Processing Unit: detects road markings
- Car2X Unit: connects with infrastructure and other road users
- Environment Perception Unit: provides a consistent environment model of the surrounding of the car
- Interpretation Unit: interprets the traffic scene
- Application Unit: applies the appropriate warning strategies and collision avoidance measures

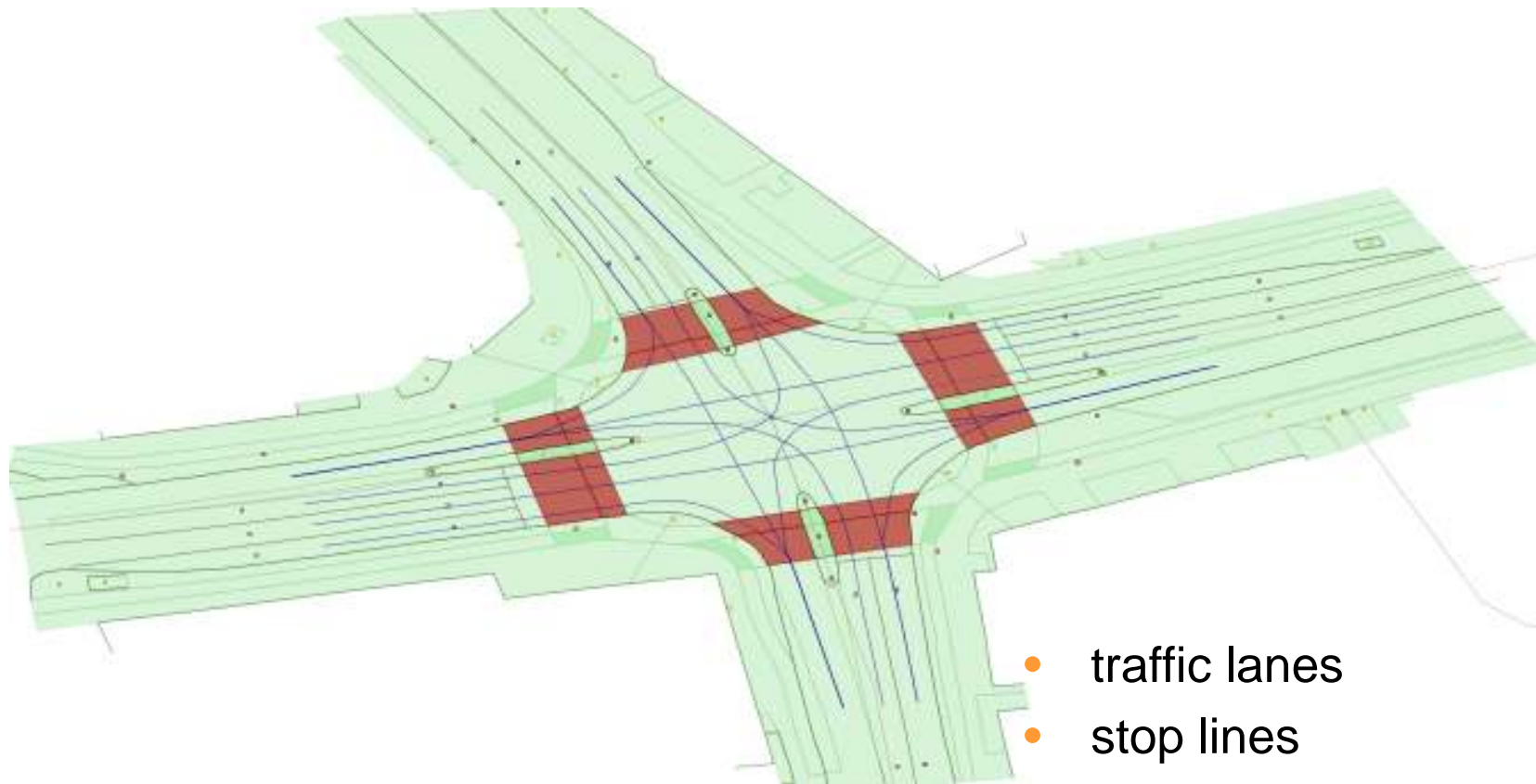
# Local field of vision



# Local field of vision



# Map data

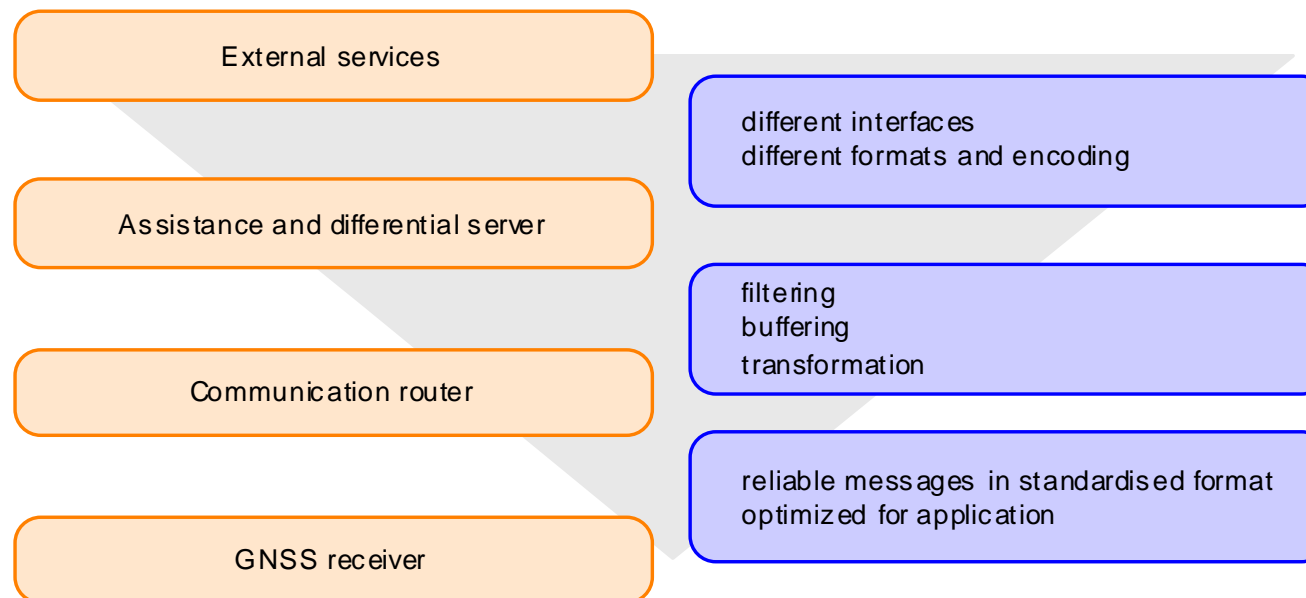


- traffic lanes
- stop lines
- traffic control systems
- ...



- the GNSS Receiver
  - acquisition and tracking of Galileo, GPS and EGNOS signals broadcast at the E1/L1, E5a/L5 and E5b frequencies
  - very fast signal re-acquisition strategies to cope with fast changing signal availability due to urban canyons
  - Increased robustness of tracking loops to cope with low signal power, high multipath, and fast changing environmental cond.
  - Acquisition aiding exploiting assistance data
- the Sensor Fusion Unit
  - Integration of vehicle sensors and GNSS measurements
- the Integrity Unit
  - Continuously monitoring measurements
  - Consistency checks
  - Fault detection and exclusion

- Connect to the Assistance and (NAV-) Data Server via the Wireless Communication Router



Information is filtered, transformed, buffered, and optimized for transmittance to the GNSS receiver

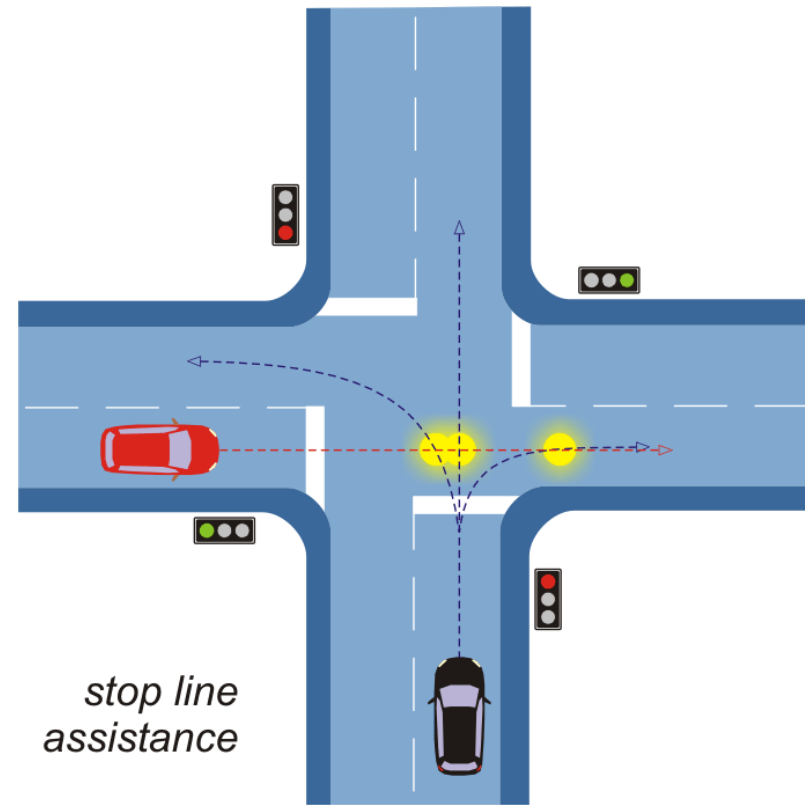
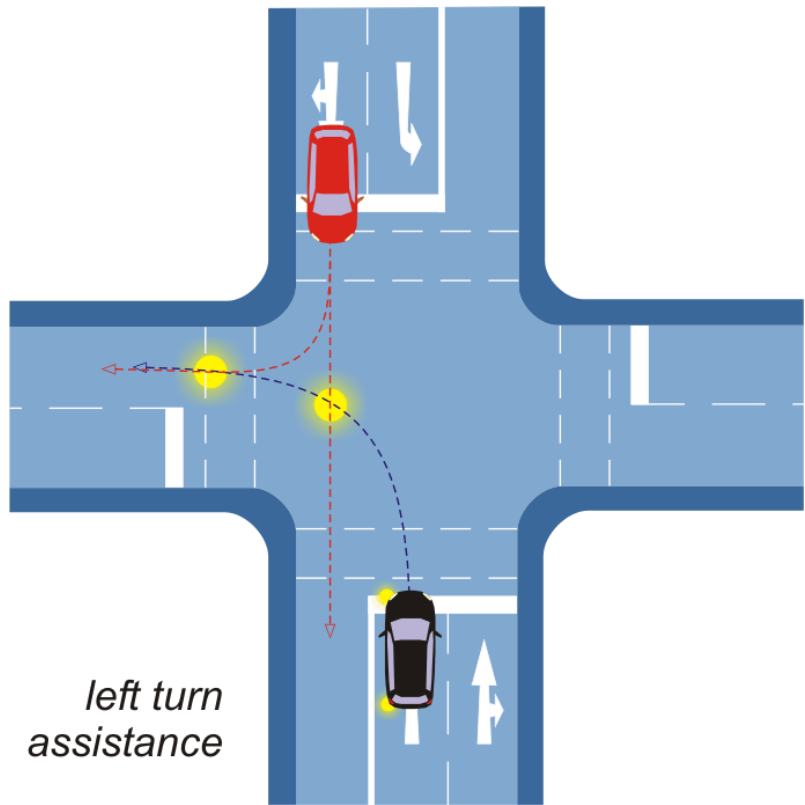
# System components teamwork



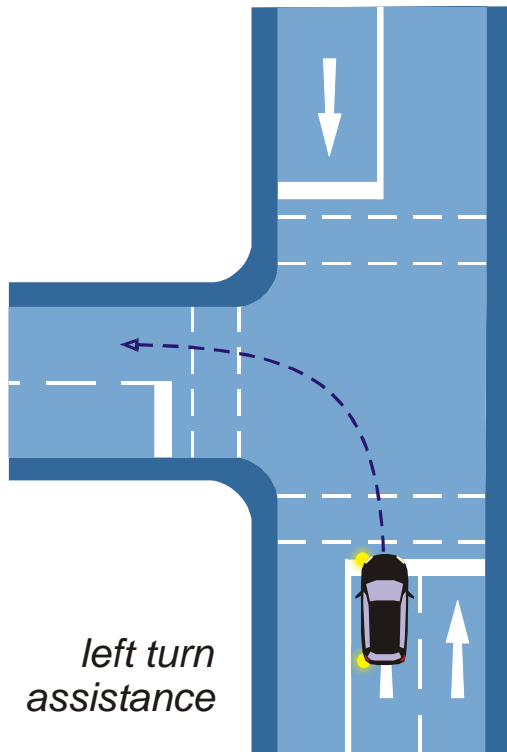
- The components are connected via CAN bus
- The sensor information is evaluated
- The traffic scene is interpreted
- Appropriate warnings are given to the driver depending on the scenario



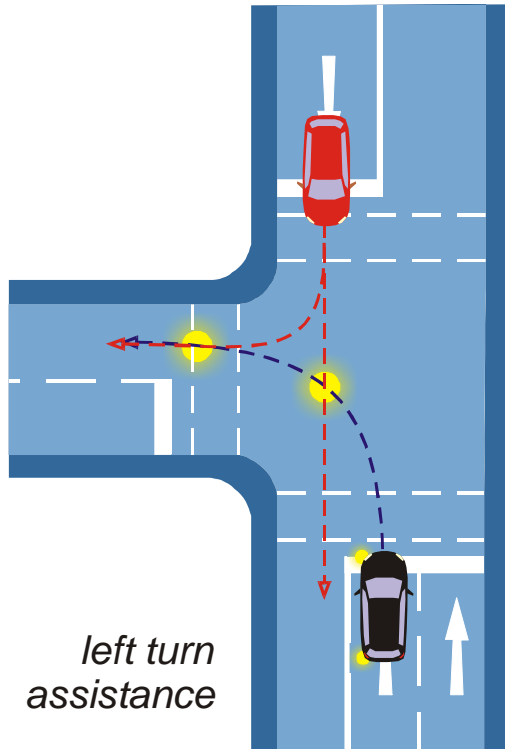
# Application scenarios



# Application scenario



# Application scenario





- The Goal of GENEVA is to disburden the driver in critical traffic situations
- high accuracy positioning
  - with innovative GNSS technology
  - car sensor fusion
  - adaptive Local Dynamic Map (LDM)
  - integrity monitoring
- high up-to-date-database
  - permanent connection to Assistance- and (Nav-)Data Server
  - fast update on construction site

# Team



- 9 companies
- 5 EU member states
- Industry, SMEs, and research institutes

The logo for OECON, featuring a green globe with a grid pattern and the word "OECON" in black capital letters above it.	The logo for VOLKSWAGEN, featuring the word "VOLKSWAGEN" in black capital letters above the word "AKTIENGESELLSCHAFT" in smaller black capital letters.	The logo for NavCert, featuring a blue and purple stylized arc above the word "NavCert" in black.
The logo for Fraunhofer IIS, featuring a green square with white diagonal lines to the left of the word "Fraunhofer" in black, with "IIS" in smaller black letters below it.	The logo for TeleConsult AUSTRIA, featuring the word "TeleConsult" in white on a blue background above the word "AUSTRIA" in black on a white background.	The logo for Tele Atlas, featuring the word "Tele Atlas" in black above a black silhouette of a bird in flight.
The logo for INSTITUT DE GEOMÀTICA, featuring a grey globe icon to the left of the words "INSTITUT DE" above "GEOMÀTICA" in black, with a small red square containing a white letter "R" to the right.	The logo for The 425 Company Ltd, featuring the text "The 425 Company Ltd" in black inside a blue-bordered square.	The logo for IFF, featuring the letters "IFF" in a stylized font inside a circular emblem with other text around the perimeter.



[www.geneva-fp7.eu](http://www.geneva-fp7.eu)

Mr. Andreas Kahmann  
tel: +49-531-35444-37  
fax: +49-531-35444-16  
[kahmann@oecon-line.de](mailto:kahmann@oecon-line.de)

The research leading to the results of the GENEVA project has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no 248198 of the European GNS S Supervisory Authority.

