



# CoEXist

## Planning for connected and automated vehicles

Joint CoEXist / MAVEN / TransAID Workshop,  
Brussels, Belgium, 10.10.2017  
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#H2020CoEXist

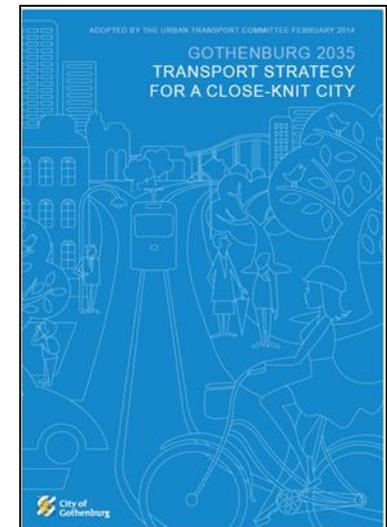
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 723201-2

# Automation-ready cities?

- Current hype creates unrealistic expectations of the technology due to a Pro-innovation bias: only seeing the benefits, but ignoring the limitations and weaknesses.
- Timeframe is unrealistic, level 5 sharing systems are still far away, whereas level 4 PT with adjusted infrastructure is possible.
- (Connected) Infrastructure requirements are not clearly formulated yet.
- Long transition phase where conventional vehicles coexist with partially and fully automated vehicles.
- Unclear impacts, at which point will vehicle kilometres increase or decrease.
- **Result of uncertainties → CAVs are not mentioned in SUMP's or other planning documents**



# CoEXist in brief

- **Objective:**

- The mission of the H2020 CoEXist project is to systematically increase the capacity of local authorities and other urban mobility stakeholders to get ready for the transition towards a shared road network with increasing levels of connected and automated vehicles (CAVs)

- **Automation-Ready:**

- Micro- and Macroscopic Transport Modelling



- Hybrid Road Infrastructure



- Local Authorities



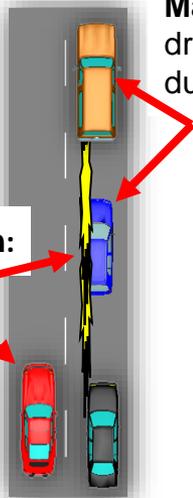
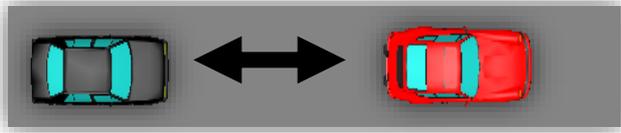
# Project Details

- Programme: EU H2020-ART05
- Duration: May 2017 – April 2020
- Total Budget: 3,474,065 €
- Strategic Aim:
  - To bridge the gap between automated vehicles (AVs) technology and transportation and infrastructure planning by strengthening the capacities of urban road authorities and cities to plan for the integration of AVs on the same network.
- Partners:
  - **16 partners from 7 European countries** (Belgium, France, Italy, Germany, Netherlands, Sweden and UK).

## Project Partners

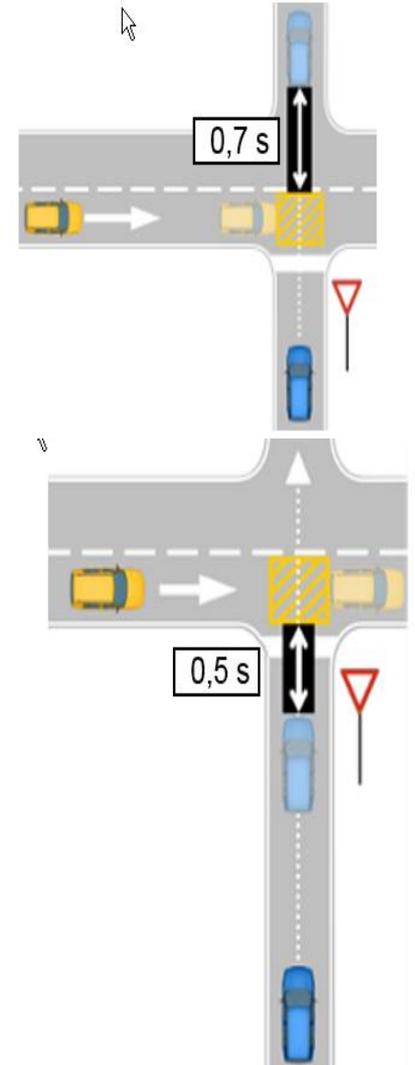
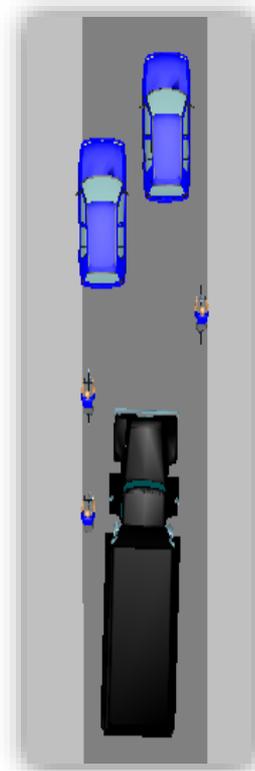
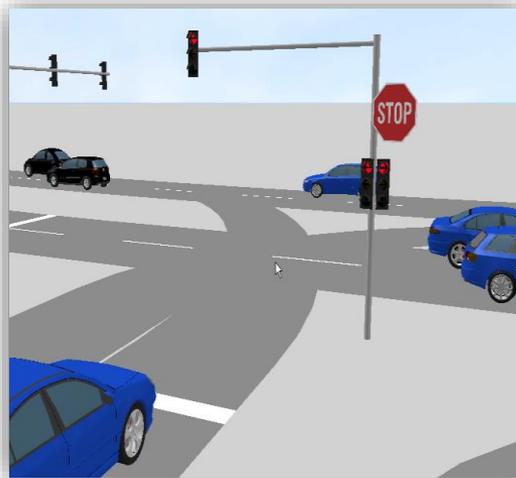


# Automation-Ready Modelling: CAV-Behaviour

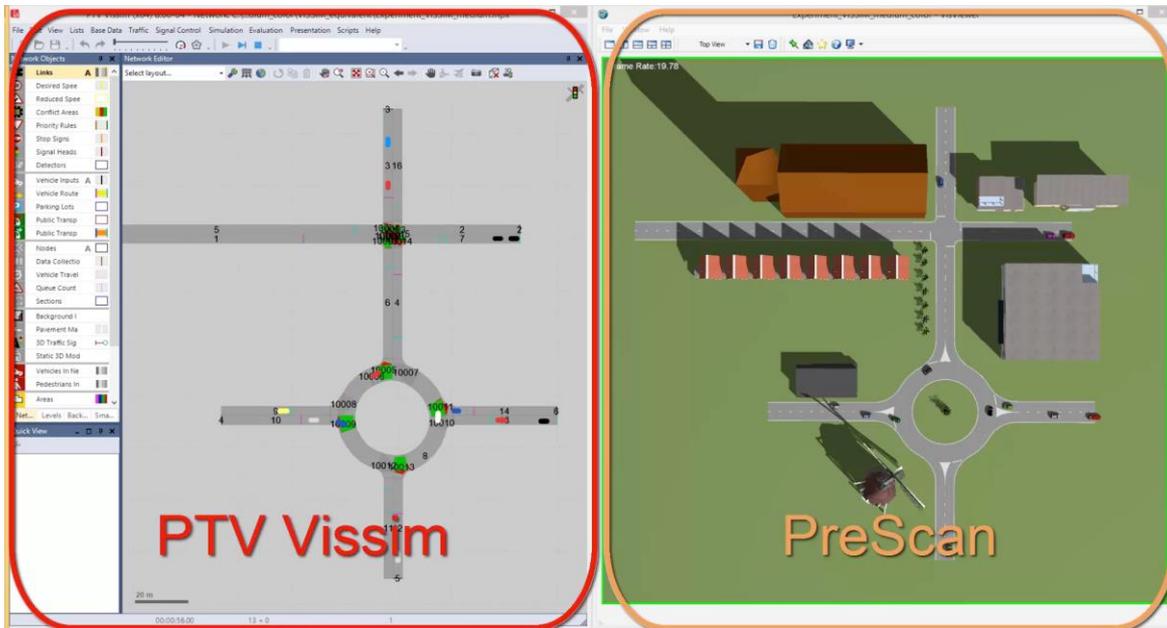


**Maneuver planning:**  
driver accelerates  
during lane changing

**Cooperation:**



# Connecting CAV control logic, sensor simulator and traffic simulator



**RENAULT**



INSTITUT  
**VEDECOM**  
DU VÉHICULE DÉCARBONÉ ET  
COMMUNICANT ET DE SA MOBILITÉ



# Default CAV-behavioural parameters sets

| SAE level   | Name                          | Narrative Definition   | Execution of Steering and Acceleration/Deceleration | Monitoring of Driving Environment | Fallback Performance of Dynamic Driving Task | System Capability (Driving Modes) |
|---|-------------------------------|--|---|-----------------------------------|--|-----------------------------------|
| <b>Human driver monitors the driving environment</b>                        |                               |  |   |                                   |  |                                   |
| <b>0</b>  | <b>No Automation</b>          | the full-time performance by the <i>human driver</i> of all aspects of the <i>dynamic driving task</i> , even when enhanced by warning or intervention systems   | Human driver  | Human driver                      | Human driver                                 | n/a                               |
| <b>1</b>  | <b>Driver Assistance</b>      | the <i>driving mode</i> -specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>           | Human driver and system                             | Human driver                      | Human driver                                 | Some driving modes                |
| <b>2</b>  | <b>Partial Automation</b>     | the <i>driving mode</i> -specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i> | <b>System</b>                                       | Human driver                      | Human driver                                 | Some driving modes                |
| <b>Automated driving system ("system") monitors the driving environment</b> |                               |  |   |                                   |  |                                   |
| <b>3</b>  | <b>Conditional Automation</b> | the <i>driving mode</i> -specific performance by an <i>automated driving system</i> of all aspects of the dynamic driving task with the expectation that the <i>human driver</i> will respond appropriately to a <i>request to intervene</i>   | System  | <b>System</b>                     | Human driver                                 | Some driving modes                |
| <b>4</b>  | <b>High Automation</b>        | the <i>driving mode</i> -specific performance by an automated driving system of all aspects of the <i>dynamic driving task</i> , even if a <i>human driver</i> does not respond appropriately to a <i>request to intervene</i>   | System  | System                            | <b>System</b>                                | Some driving modes                |
| <b>5</b>  | <b>Full Automation</b>        | the full-time performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> under all roadway and environmental conditions that can be managed by a <i>human driver</i>  | System  | System                            | System                                       | <b>All driving modes</b>          |

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Default CAV-behavioural parameter sets



# Demonstration of CoEXist tools

**Milton Keynes  
(Uni Cambridge)**

**Gothenburg (VTI)**

**Helmond (TASS)**

**Stuttgart  
(Uni Stuttgart)**



**Microscopic**



**Macroscopic**



# CoEXist Use Cases



 **Gothenburg (VTI)**  
Shared Space

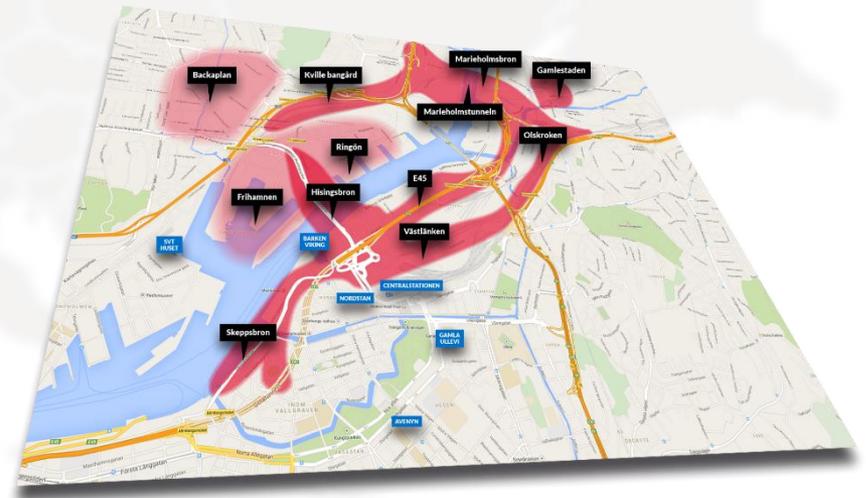
Long term constructions



**Microscopic**



**Macroscopic**



# CoEXist Use Cases

## Impact of CAVs on highway / transition zones



 **Helmond (TASS)**

### Signalized urban traffic junctions

- Mixed traffic
- V2I & V2V



**Microscopic**



**Macroscopic**



# CoEXist Use Cases



Drop off / pick up / self parking

 **Milton Keynes  
(University of Cambridge)**

## Automated Freight Delivery



**Microscopic**

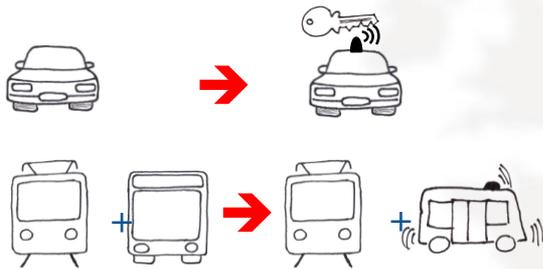
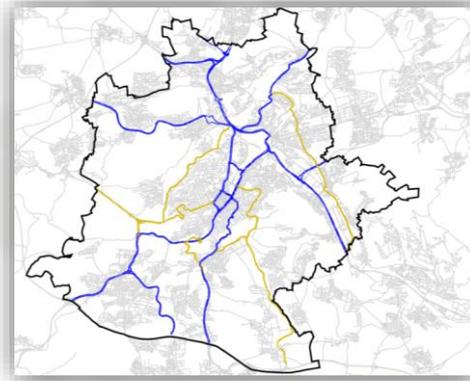


**Macroscopic**



# CoEXist Use Cases

Network categorisation



**Stuttgart**  
**(University of Stuttgart)**

Carsharing / public ridesharing systems



**Microscopic**

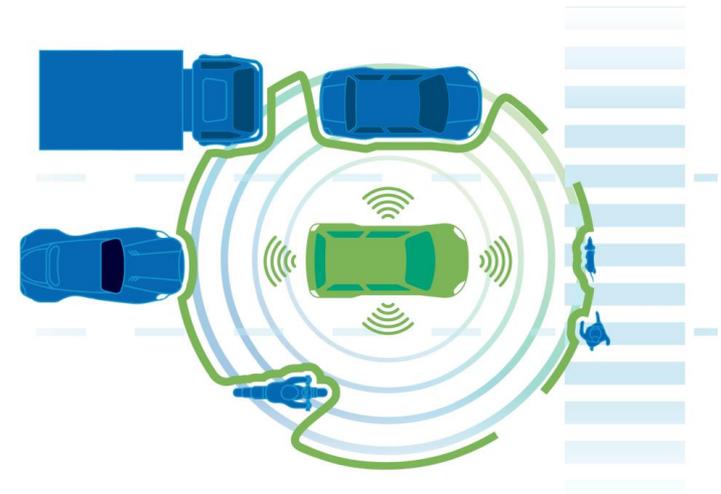


**Macroscopic**



# Automation-Ready Local Authorities

- Automation-ready action plans:
- Stakeholder process – Automation-ready Fora
- Actions: Now, 5 years, 10 years
- Annex to mobility plans (e.g. SUMPs)
  
- CoEXist Automation-Ready framework
  - Guidance on issues like technology, impacts and measures
  - Clear-headed and informed decisions about automation
  - Automation FAQ for cities



# Automation-Ready Local Authorities

- Break-out session:
  - Definition “Automation-Ready“
  - Vision / Mobility Goals for “Automation-Ready“
  - “Automation-Ready“ Measures





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