



Designing cooperative interaction of automated vehicles with other road users

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Agenda



Topic	Presenter
interACT project & interACT scenarios	Anna Schieben , interACT Project Coordinator Marc Wilbrink , WP 1 leader Department of Automotive, German Aerospace Center (DLR)
First results of observational studies: Driver- Pedestrian interaction	André Dietrich , WP 2 leader Chair of Ergonomics, Department of Mechanical Engineering, Technical University of Munich (TUM)
First results of observational studies: Driver- Driver interaction	Evangelia Portouli , WP 3 leader Institute of Communication and Computer Systems (ICCS)
Questions & Answers	



The EU project interACT

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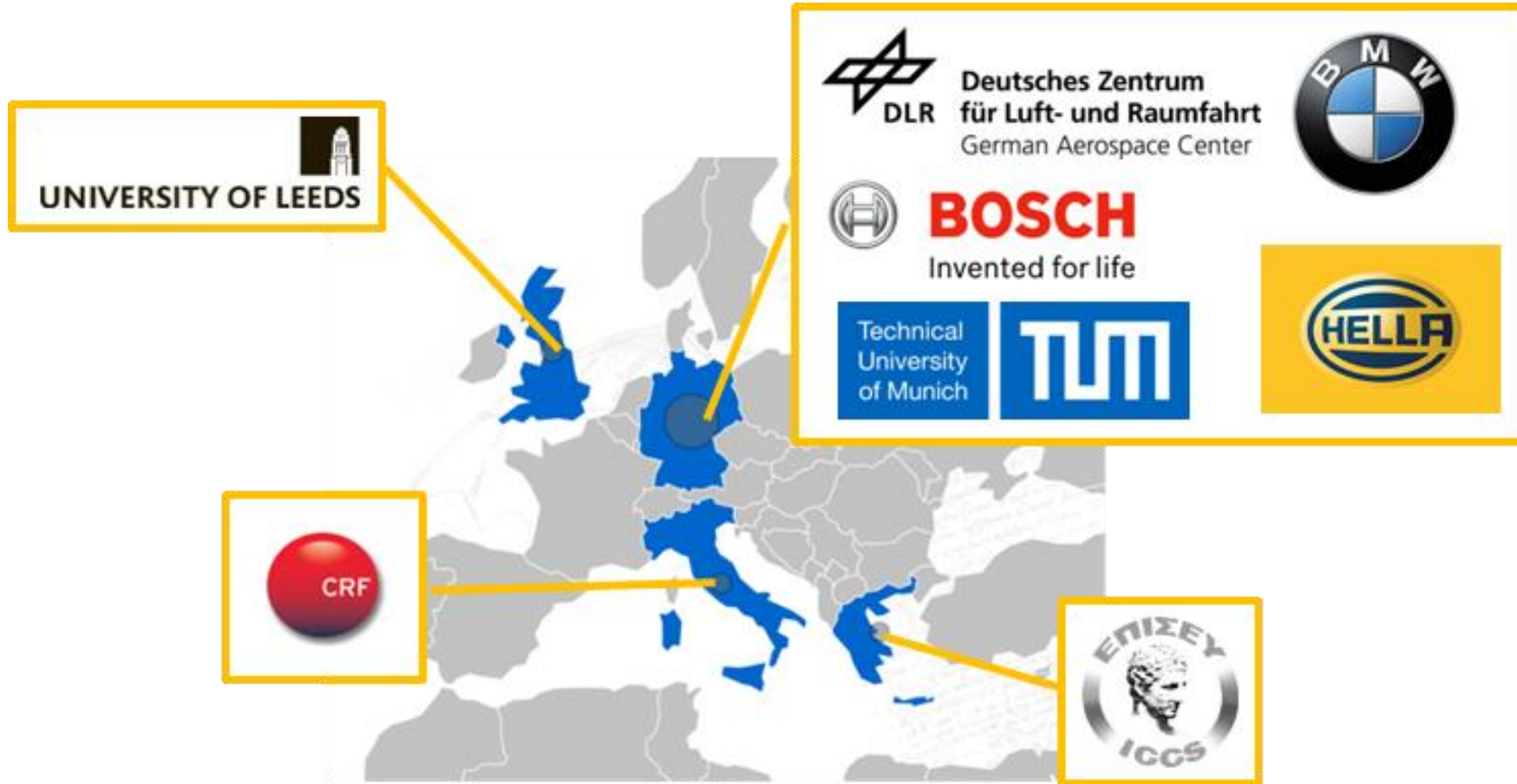
interACT Project Facts



- **Programme:** EU/H2020-ART04 - *Safety and end-user acceptance aspects of road automation in the transition period*
- **Duration:** 36 months
- **Period:** May 2017 – April 2020
- **EU Funding:** 5.527.581 €
- **Coordinator:** Anna Schieben, DLR
- **Partners:** 8 industrial and academic partners from 4 European countries (Germany, Italy, Greece, UK)
- **Project Officer:** Begoña Munoz (INEA)
- **US - EU twinning project:** AVIntent (NHTSA)



Project consortium

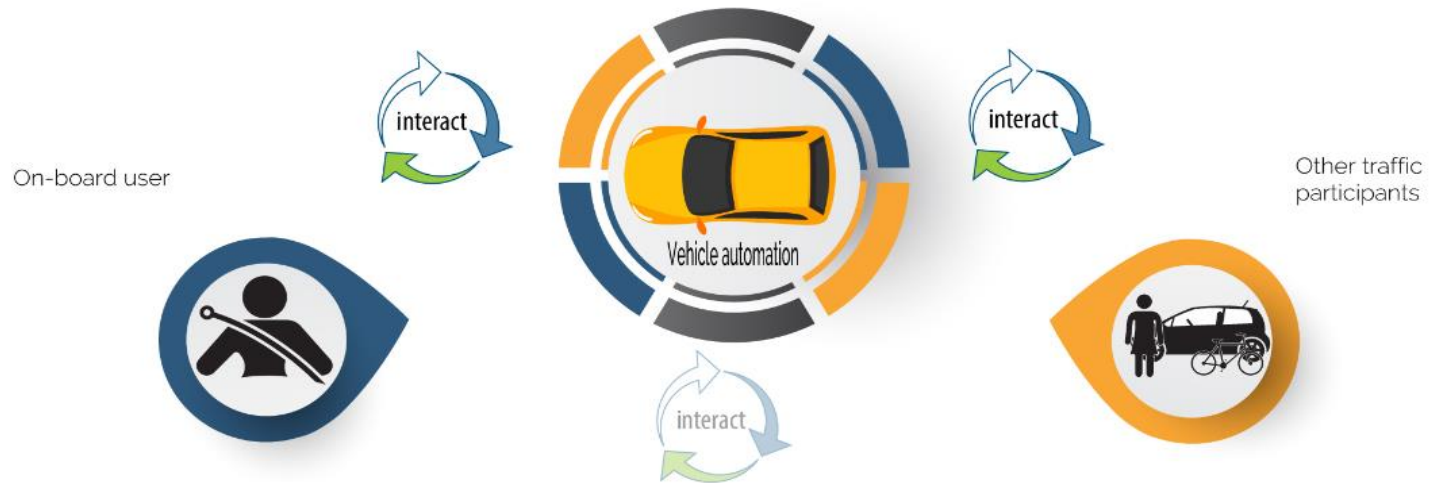


Integrating automated vehicles in mixed traffic

Situation Today



Future situation: Automated vehicles in mixed traffic environments



5th Enabler
Methodology for assessing the quality of interaction

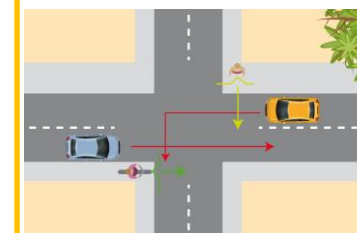
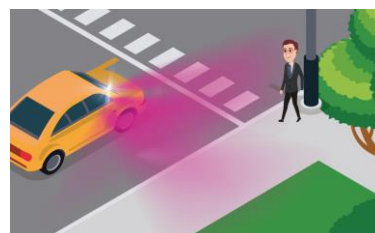


The challenge

1st Enabler
Psychological models



4th Enabler
Novel HMI elements



3rd Enabler
CCPU & safety layer



2nd Enabler
Intention recognition & behavioural predictions

5th Enabler
Methodology for assessing the quality of interaction

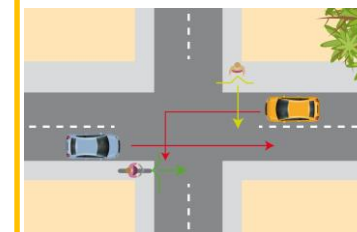
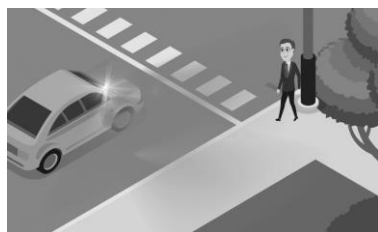


The challenge

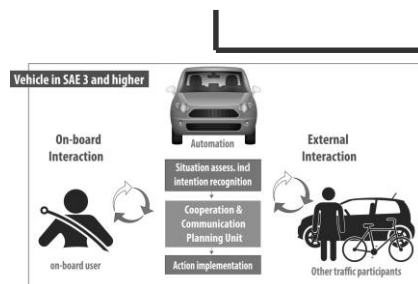
1st Enabler
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Intention recognition & behavioural predictions

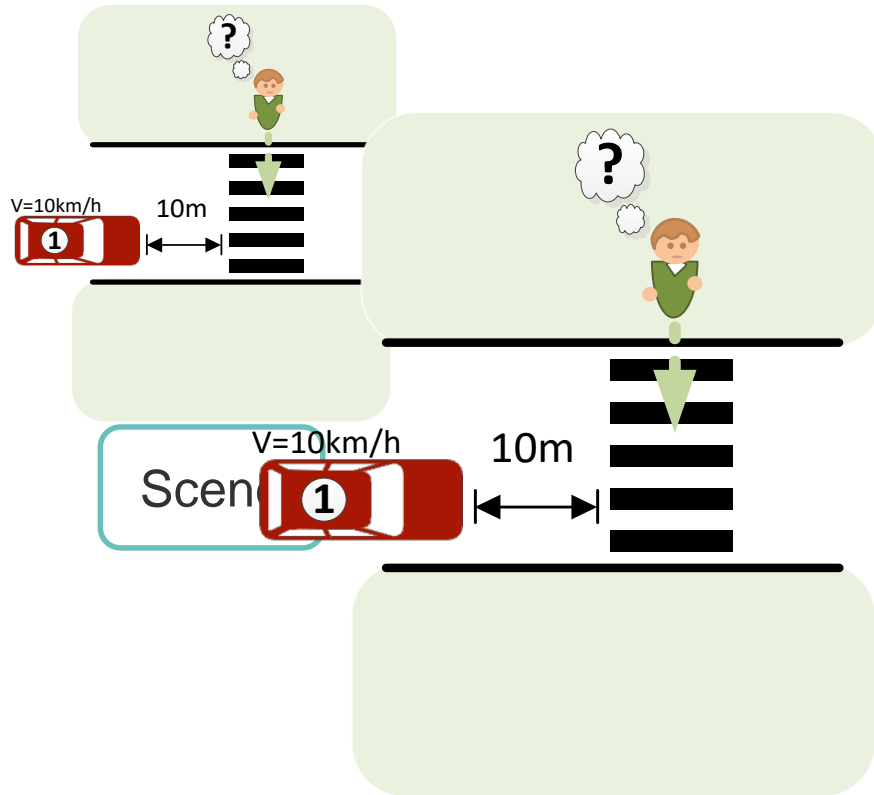
Use cases and Scenarios

interACT

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Use Case – Scenario – Scene

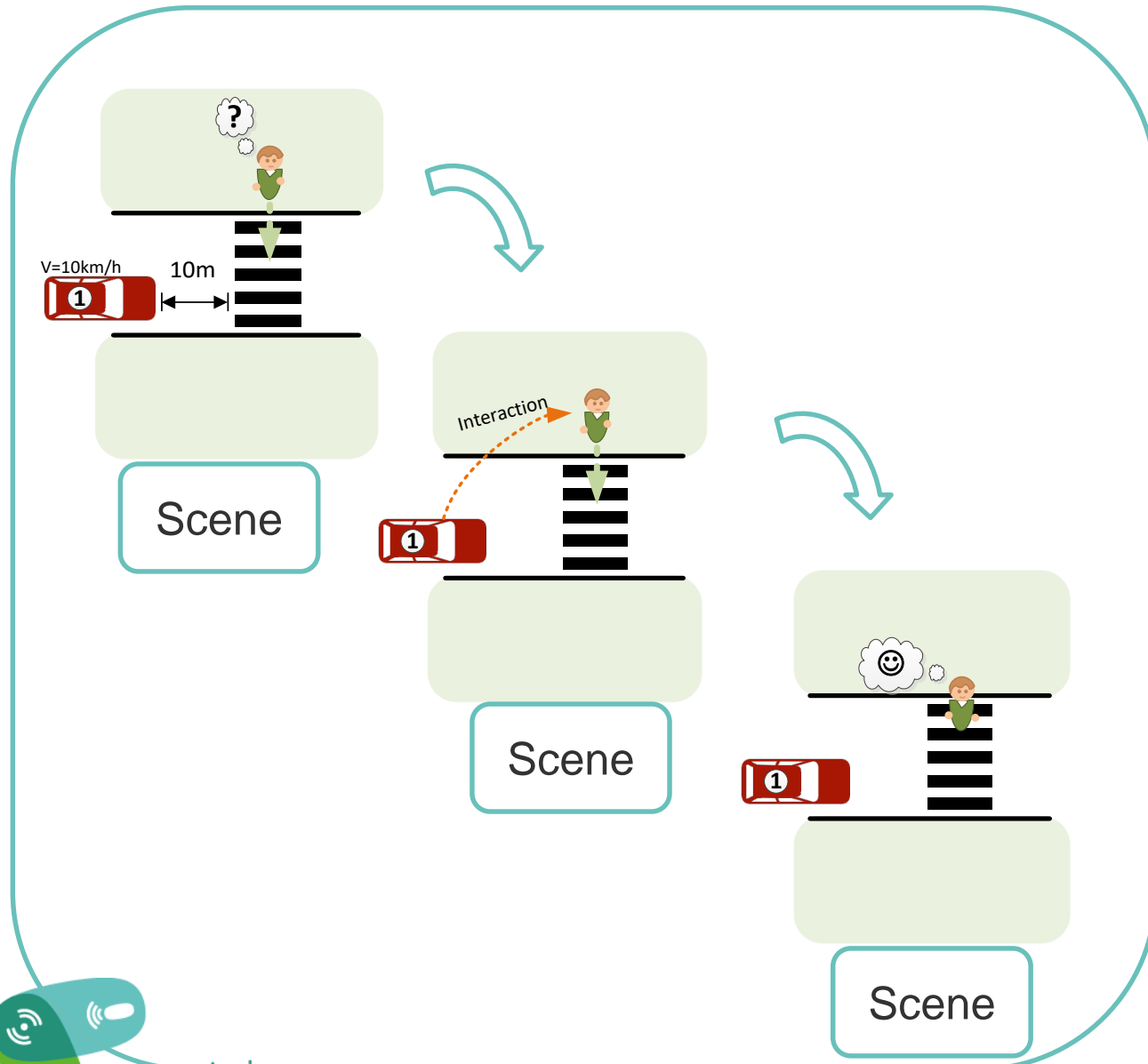


- Persists only several **seconds**
- **Snapshot** of the environment including
 - Scenery (Lane network, stationary elements, traffic lights, obstacles)
 - Dynamic elements (cars, road users)
 - All including agents

Ulbrich, S., Menzel, T., Reschka, A., Schuldt, F., Maurer, M. (2015): Defining and Substantiating the Terms Scene, Situation and Scenario for Automated Driving. IEEE International Annual Conference on Intelligent Transportation Systems (ITSC), Las Palmas, Spanien, pp. 982-988

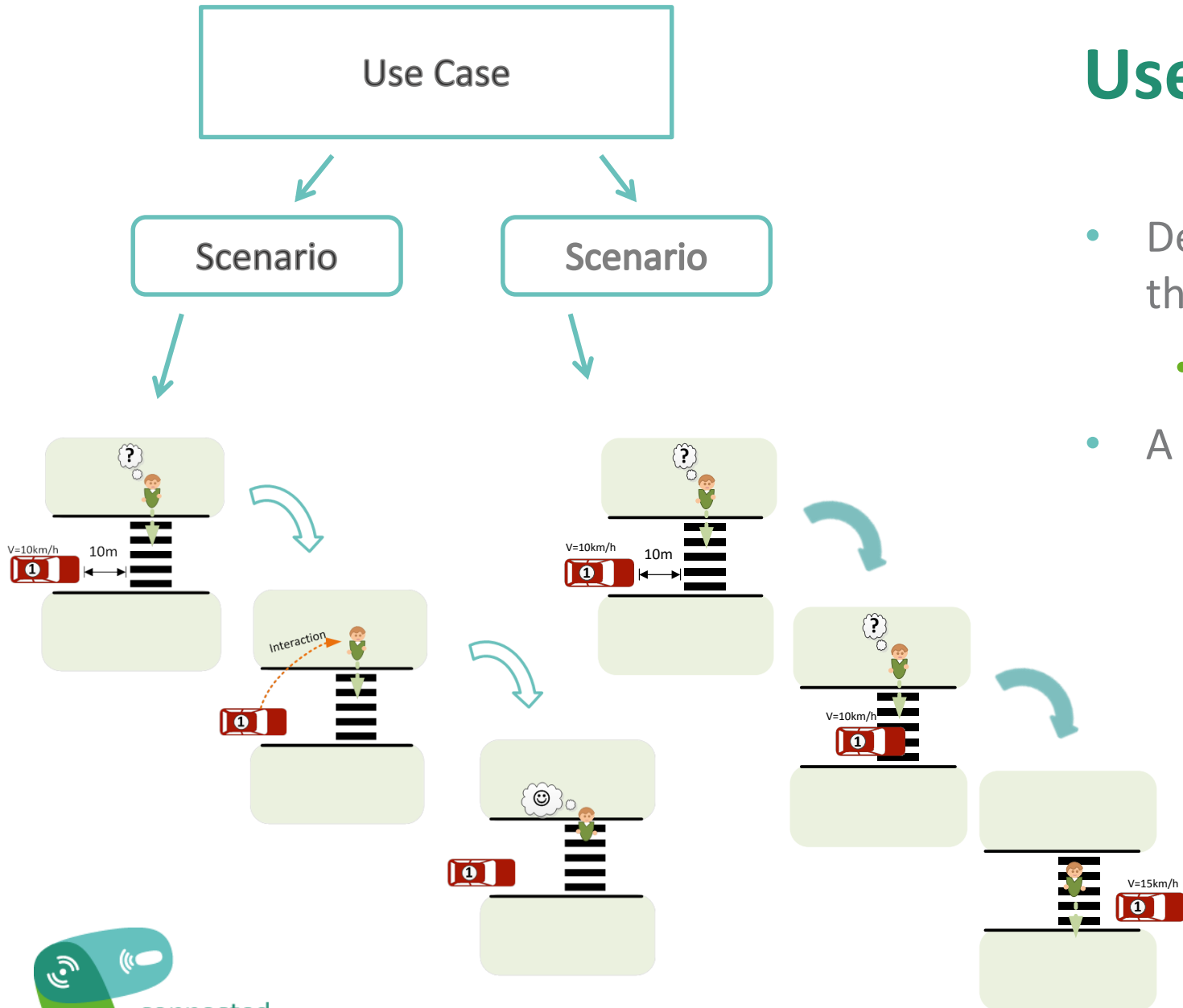
Scenario

- Temporal **development** between several scenes
- A **sequence** of scenes connected by actions & events
- Includes **goals** of the agents
- Spans a certain amount of **time**



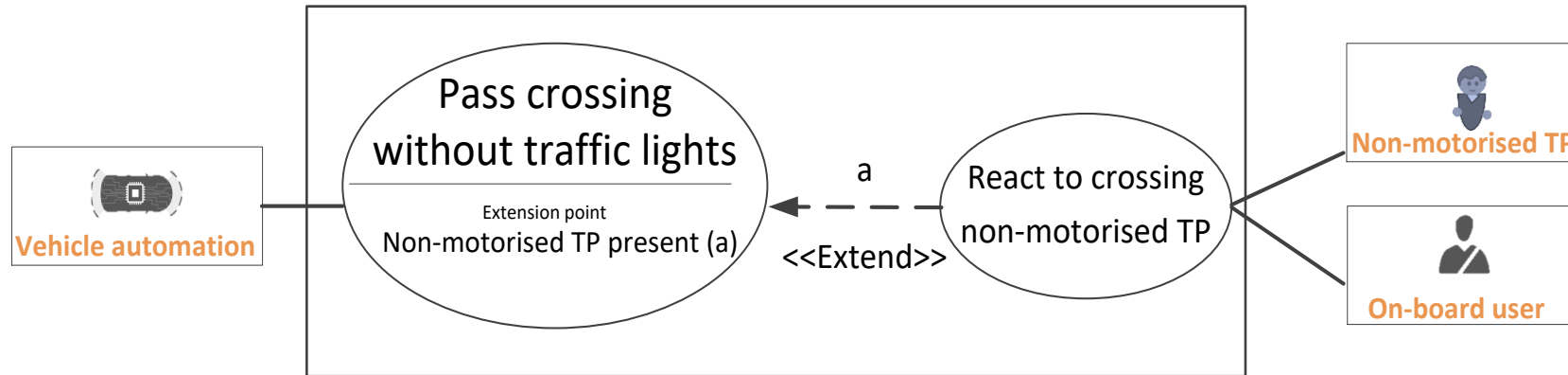
Use Case

- Description of the **functional** range and the **desired behaviour**
 - Specification of system boundaries
- A use case can include **several scenarios**



Must-have use cases in interACT

- 1 React to crossing non-motorised TP at crossings without traffic lights
- 2 React to an ambiguous situation at an unsignalised intersection
- 3 React to non-motorised TP at a parking space
- 4 React to vehicles at a parking space

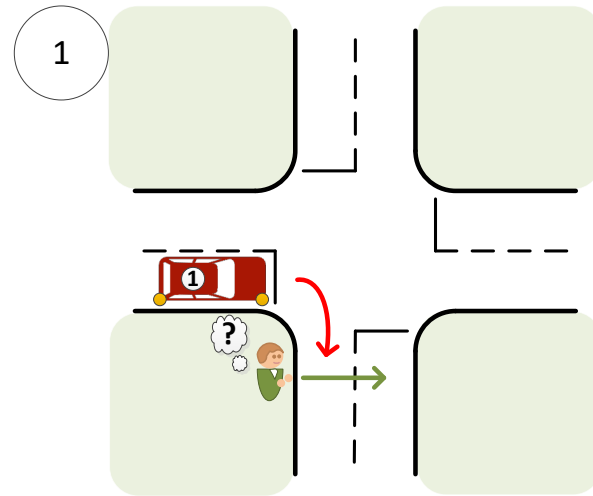


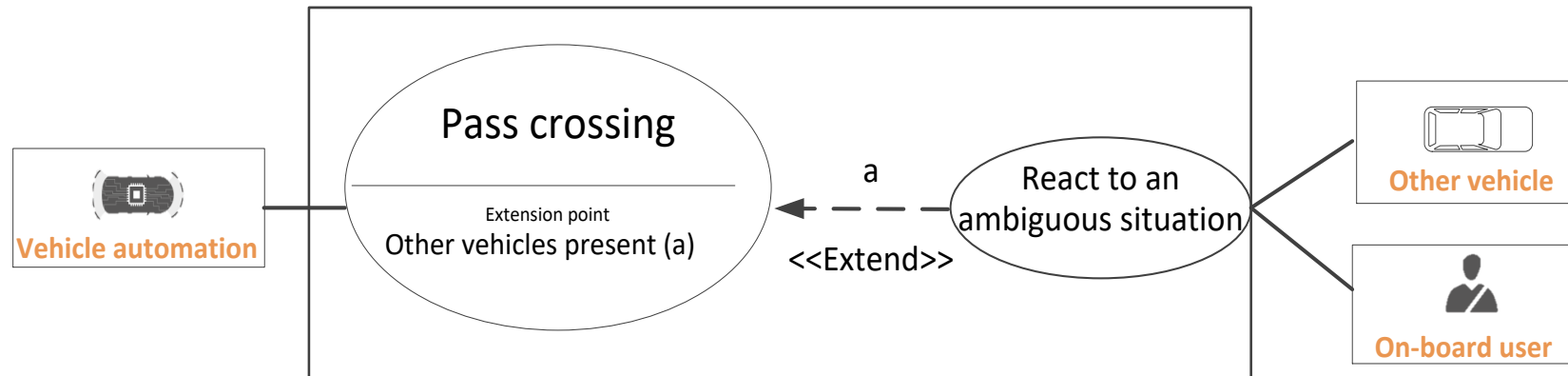
Use case diagram in UML

- Shows **relationship** between actors
- Shows **desired behaviour** of the AV
- **Extension point** if non-motorised TP is present

1

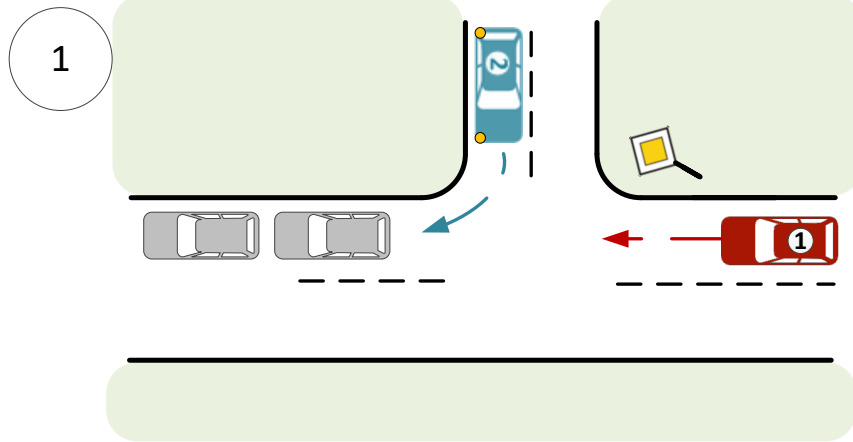
React to crossing non-motorised TP at crossings without traffic lights





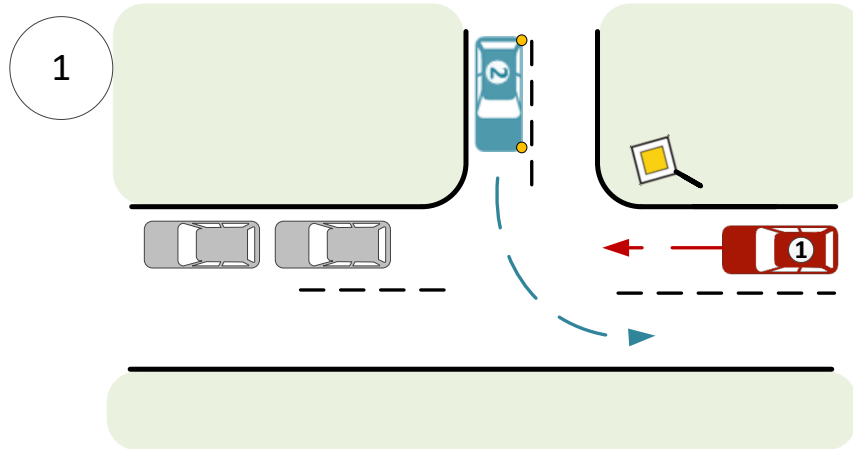
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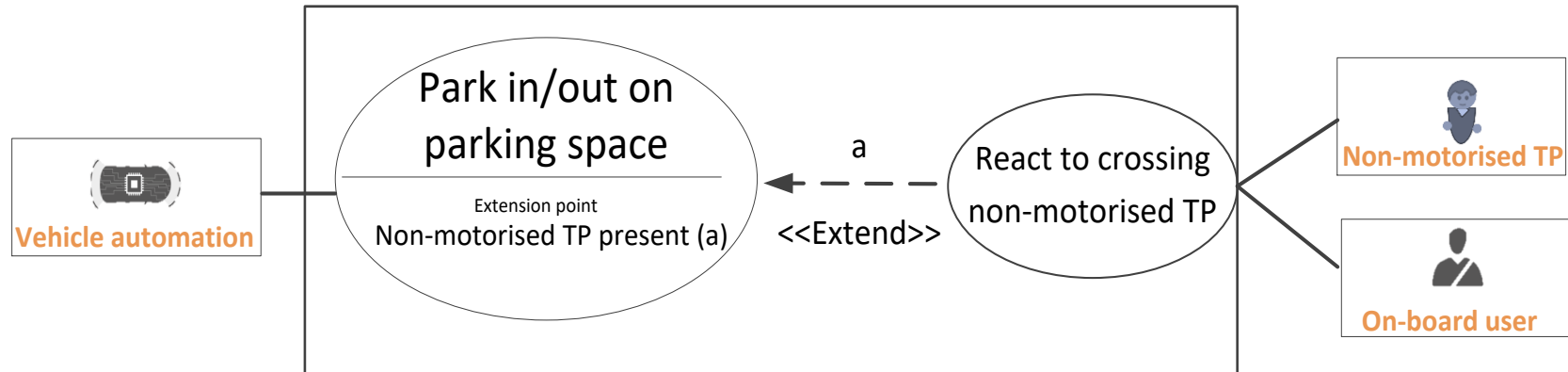
React to an ambiguous situation at an unsignalised intersection



2

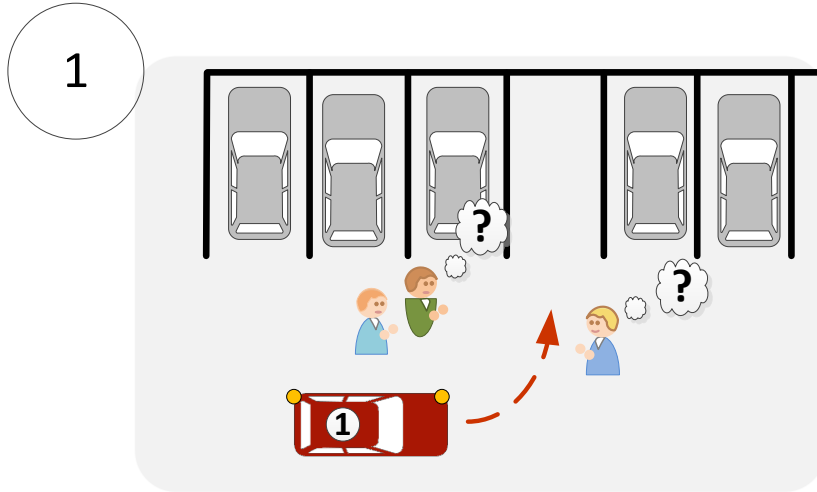
React to an ambiguous situation at an unsignalised intersection

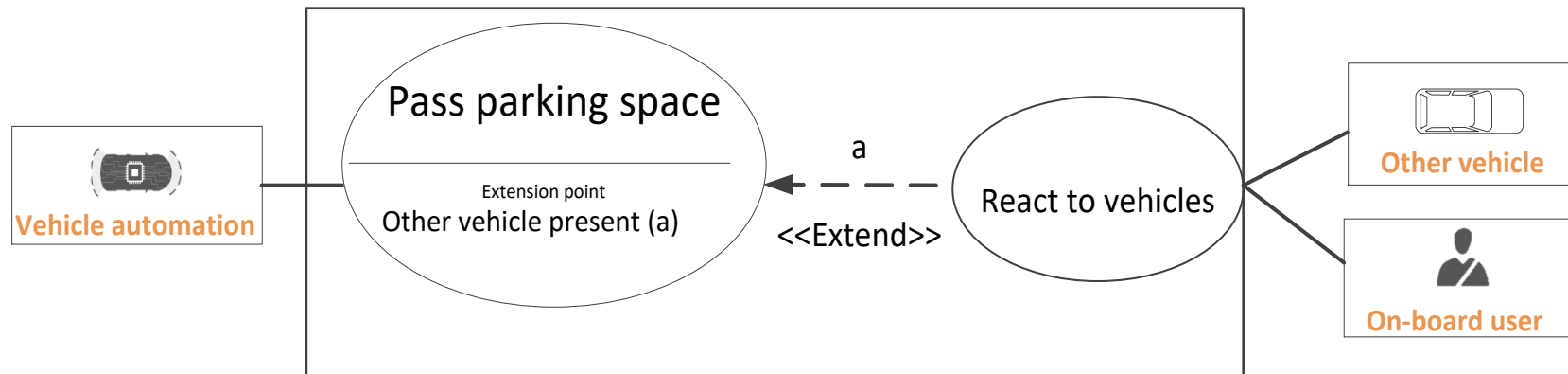




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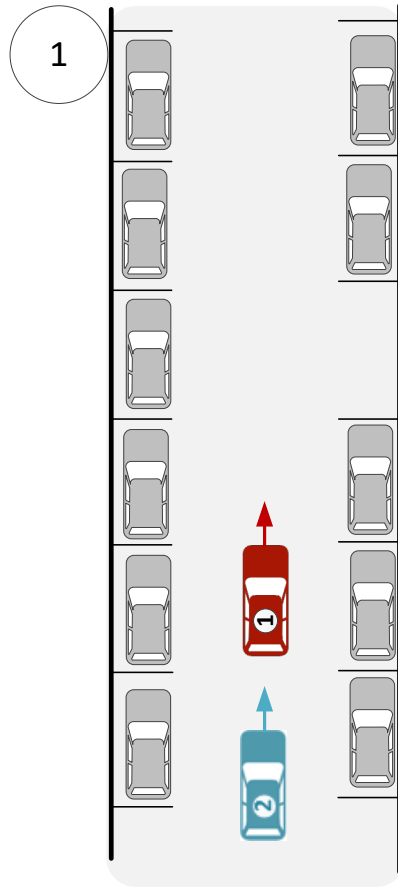
React to non-motorised TP at a parking space





4

React to vehicles at a parking space



Further information



- Deliverable 1.1: Definition of interACT Use Cases and Scenarios

<https://www.interact-roadautomation.eu/projects-deliverables/>





Thank you!



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Further information



<http://interact-roadautomation.eu>

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