

# Challenges in ATO for mainline railways

**Prof. Dr. Rob Goverde**





Department of Transport and Planning  
Delft University of Technology



# Goal of Automatic Train Operation

- Automation of train driving tasks towards supervisory or autonomous train control, enabling improved
  - Capacity
  - Flexibility
  - Quality of Service
  - Safety
  - Energy efficiency
  - Cost effectiveness

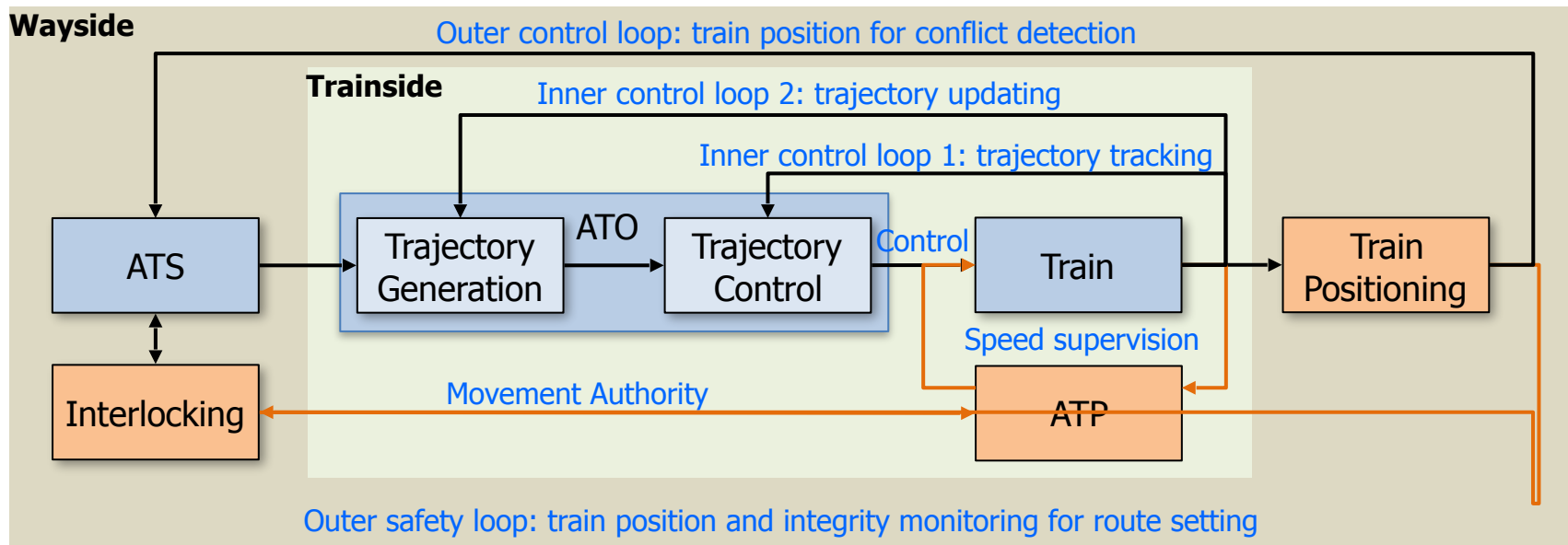
# Grades of Automation

Grade of Automation	Train operation	Setting train in motion	Driving and stopping	Door closure	Operation during disruption
GoA 1 	ATP with driver	Driver	Driver	Driver	Driver
GoA 2 	ATP and ATO with driver	Driver/ Automatic	Automatic	Driver	Driver
GoA 3 	Driverless (DTO)	Automatic	Automatic	Attendant/ Automatic	Attendant
GoA 4 	Unattended (UTO)	Automatic	Automatic	Automatic	Automatic

Note: without ATP the Grade of Automation is GoA 0 (on-sight train operation like tram)

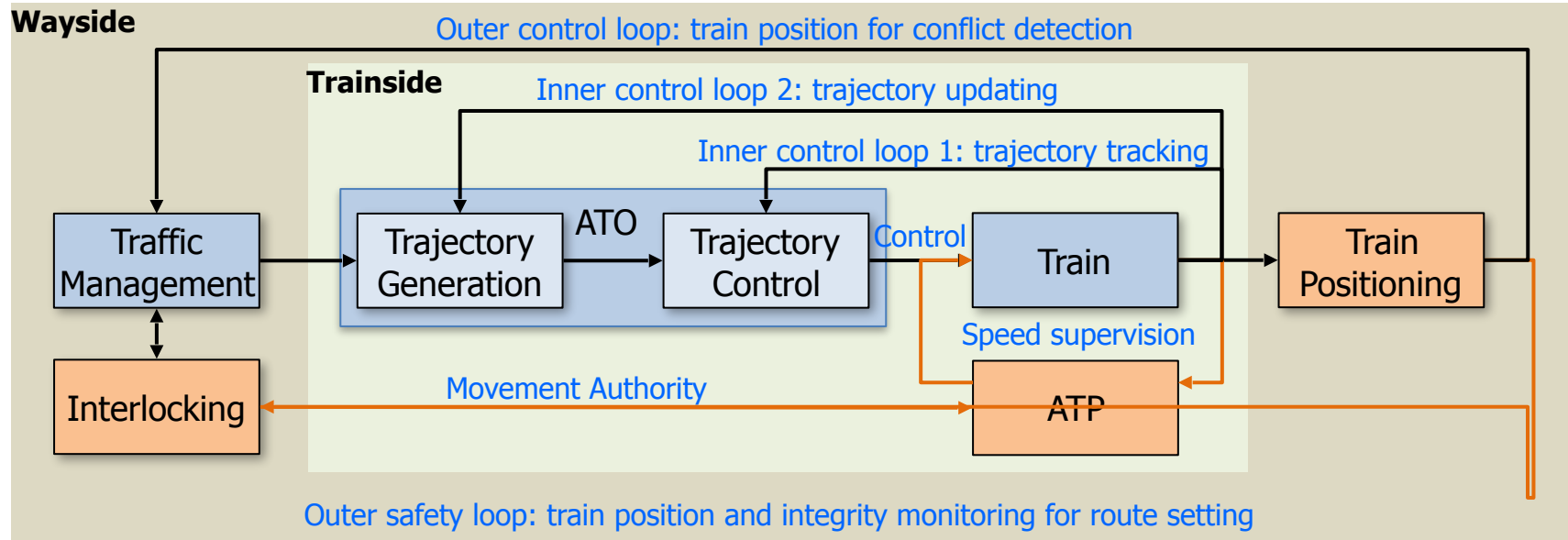


# ATO architecture for mainlines

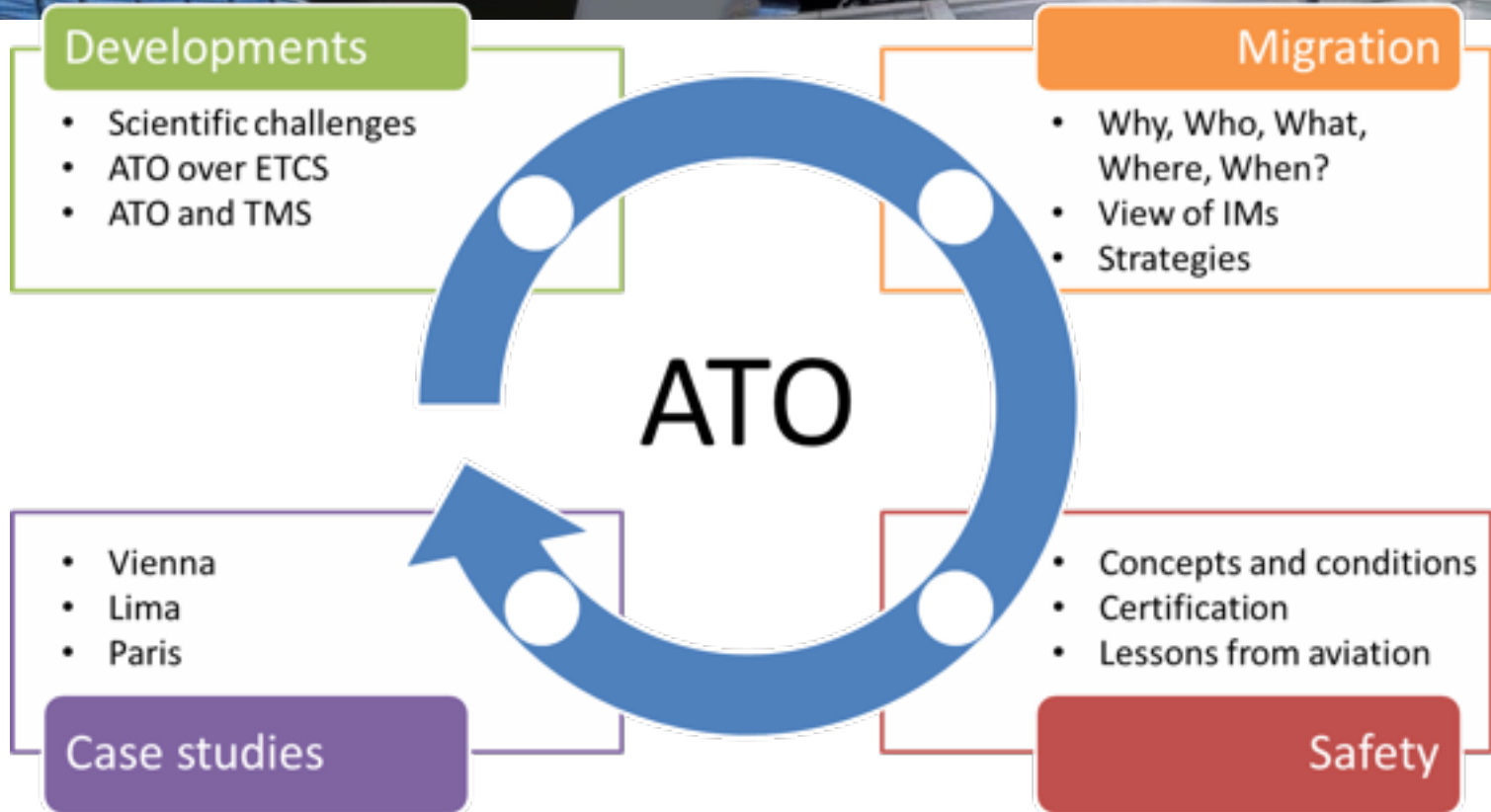




# ATO architecture for mainlines



# ATO conference topics







# Schedule Day 1: Automatic Train Operation

## Automatic Train Operation & Cyber Security

28 -30 November 2017, Vienna, Austria

9:15-9:35 Opening

### Session 1: New developments

09:35-10:30 Presentations

10:30-10:50 Q&A

10:50-11:20 Coffee break

### Session 2: Migration strategies

11:20-12:20 Presentations

12:20-12:40 Q&A

12:40-14:00 Lunch & Network break

### Session 3: Safety

14:00-15:00 Presentations

15:00-15:20 Q&A

15:20-15:50 Coffee break

### Session 4: Case studies

15:50-16:50 Presentations

16:50-17:10 Q&A

17:10-17:15 Closing