Functional Design of the Cooperative Maneuver Planner

Webinar "The German LL in the PoDIUM Project: Preliminary Results from the Use Case "Cooperative Corridor Management in the City of Ulm involving Multi-connectivity"'

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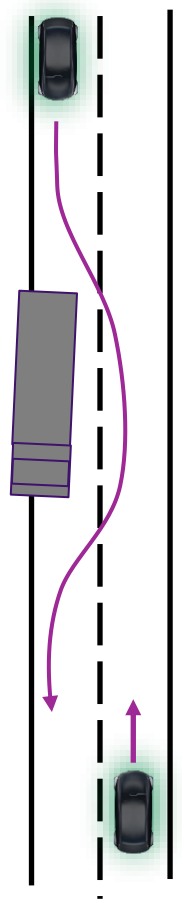
PoDiUM

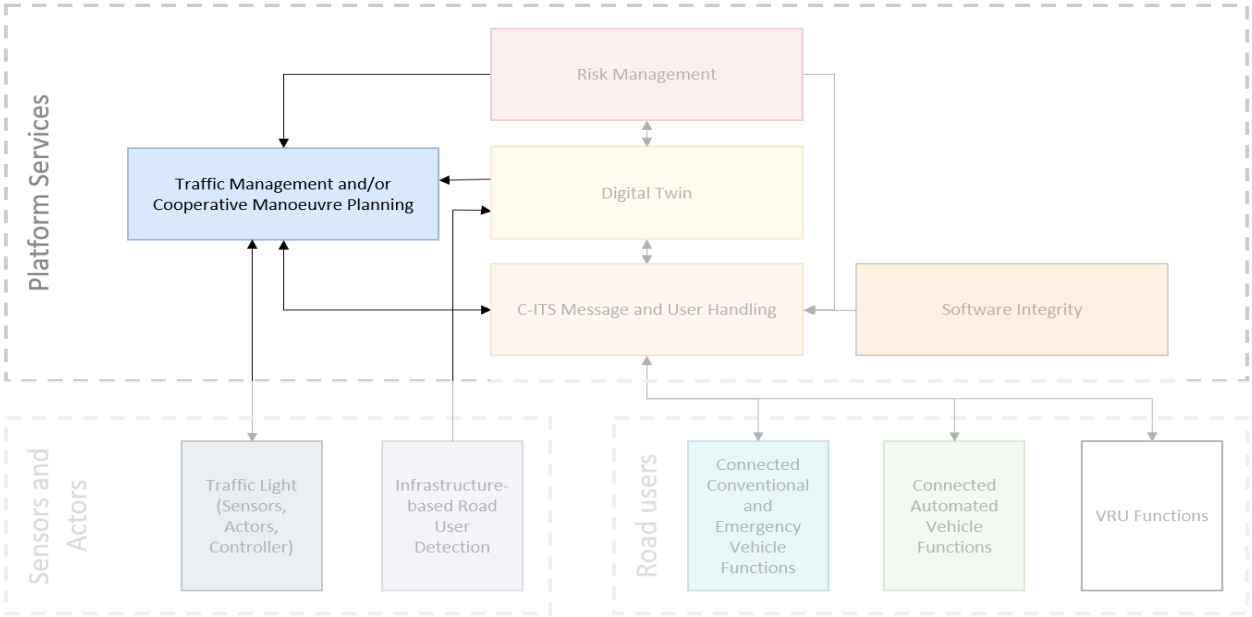
Cooperative Maneuver Planner

Goal: Cooperative maneuver planning service for ad-hoc corridor management

- A real-time CCAM service for managing corridors encountered in complex urban traffic scenarios
- Utilizing reliable, collective environmental perception (digital twin)
- Running on MEC for low latency communication
- Built upon the PoDIUM platform architecture



Platform View:



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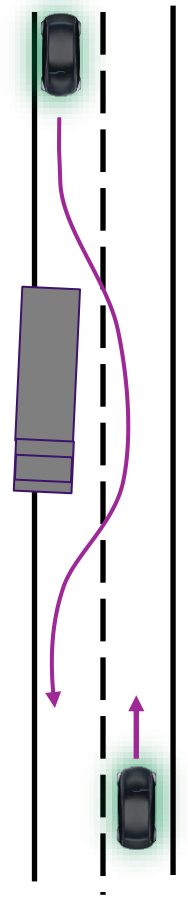
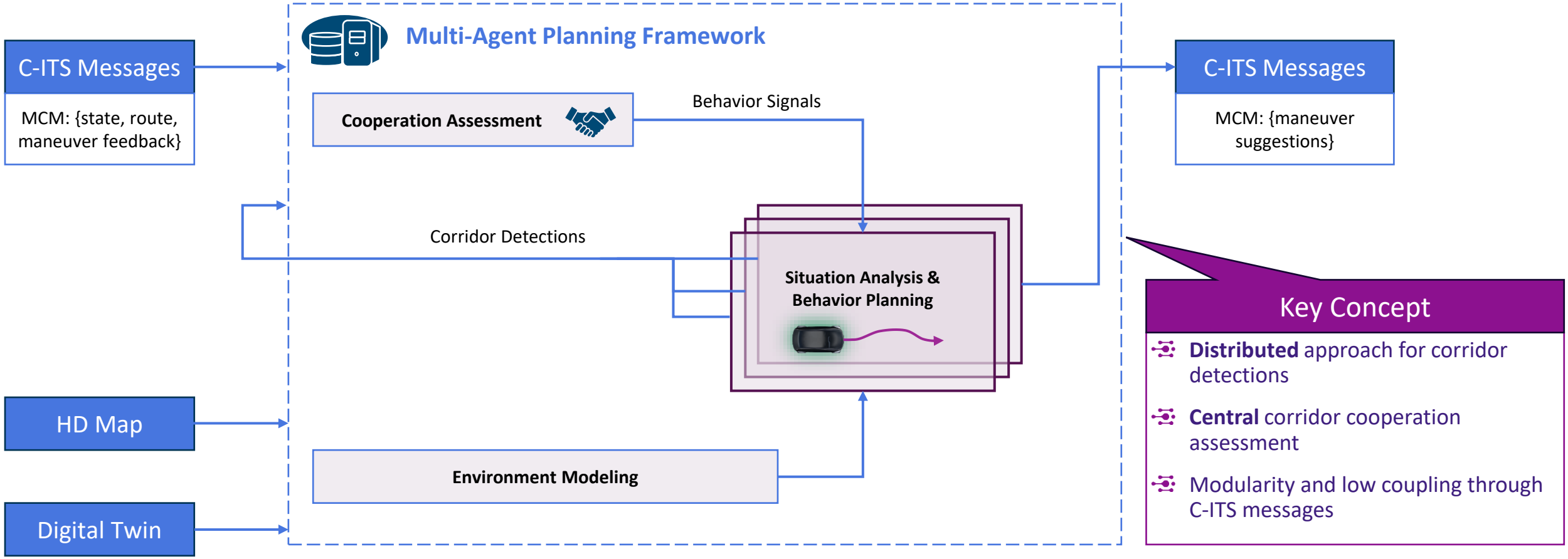


High-level Functional Description:

- Connected road users signal their willingness for cooperation by periodically sending MCMs [1]
- The cooperative maneuver planner continuously analyzes the scene for each road user
- When a corridor is detected, the planner 1) assesses the cooperation capability, 2) determines a passing sequence and 3) computes maneuver suggestions

[1] Mertens et al. (2021). “An Extended Maneuver Coordination Protocol with Support for Urban Scenarios and Mixed Traffic”.

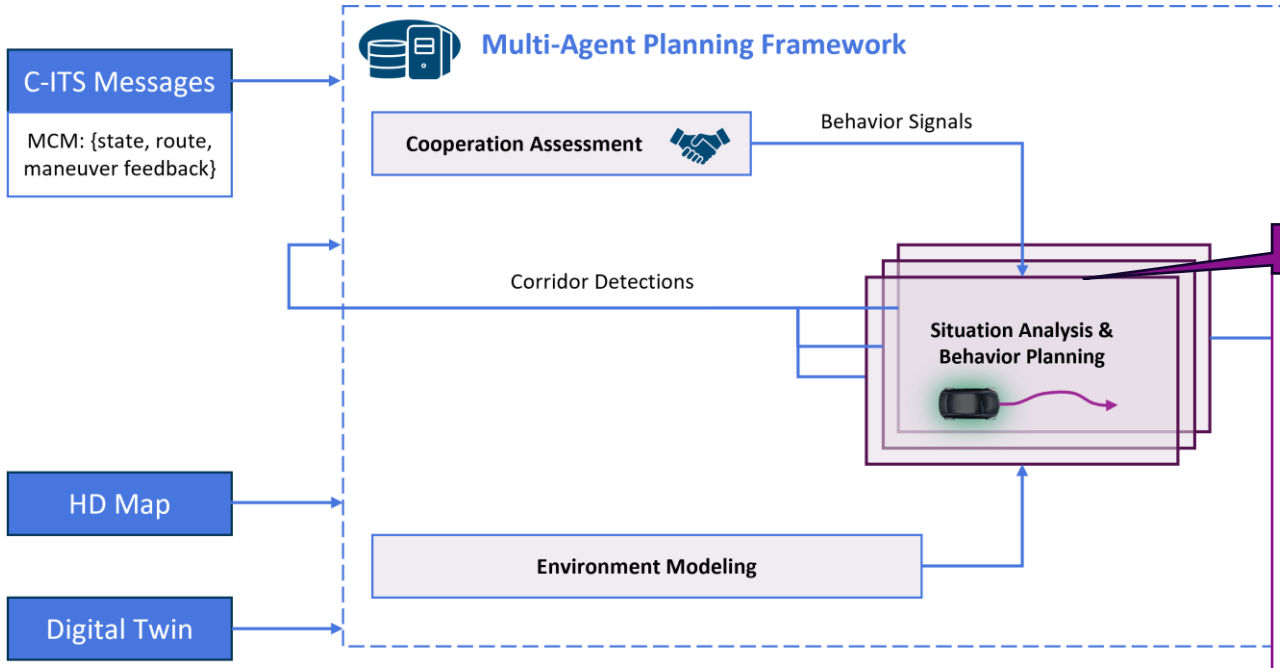
Cooperative Maneuver Planner



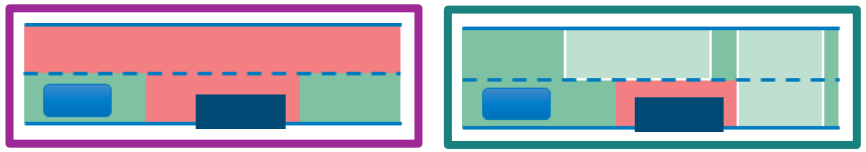
Key Concept

- **Distributed** approach for corridor detections
- **Central** corridor cooperation assessment
- Modularity and low coupling through C-ITS messages

Cooperative Maneuver Planner

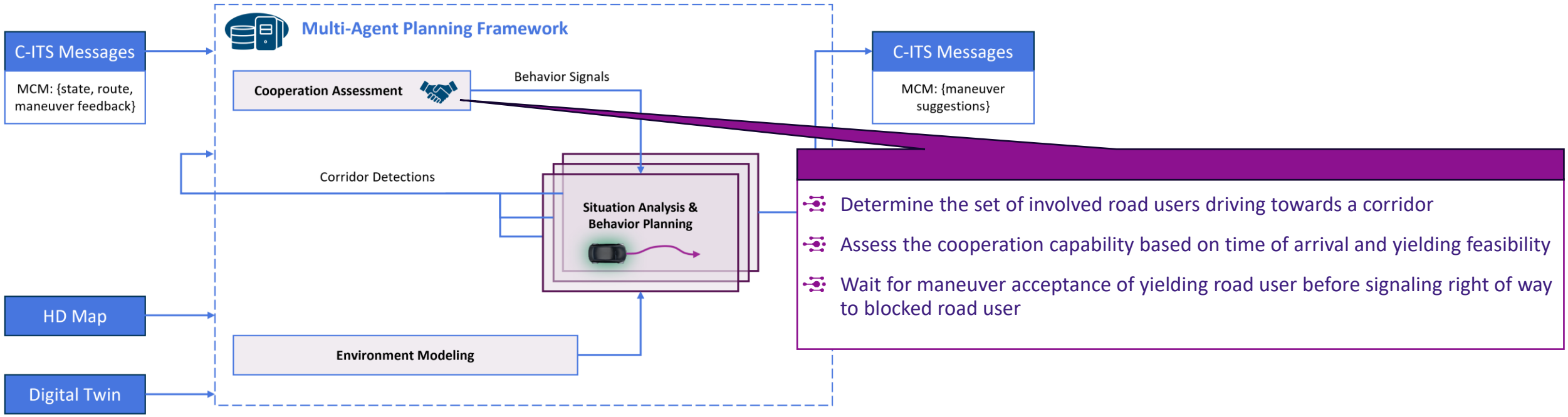


- **Geometric approach** for **situation analysis** based on object tracks, occupancy grids and HD Map to compute behavior plans
- Behavior plans are characterized by sets of conditionally valid, geometric areas along the road
  - Impassable, lane-blocking geometric areas are marked as potential corridors



- Update of priorities and behavior conditions based on signals from cooperation module
- Starting from the highest priority, behaviors are analyzed w.r.t. their feasibility

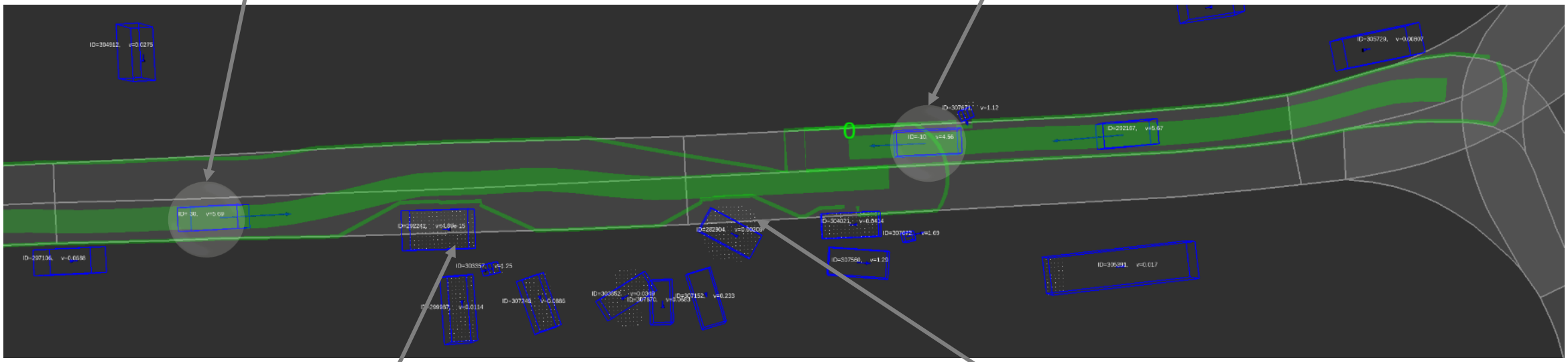
Cooperative Maneuver Planner



- Determine the set of involved road users driving towards a corridor
- Assess the cooperation capability based on time of arrival and yielding feasibility
- Wait for maneuver acceptance of yielding road user before signaling right of way to blocked road user

Cooperative Maneuver Planner

Preliminary Functional Test at Pilot Site Ulm-Lehr



Thank you!

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