



Multiagent Coordination In On-demand Transport with Connected Autonomous Vehicles A decentralized resource allocation approach

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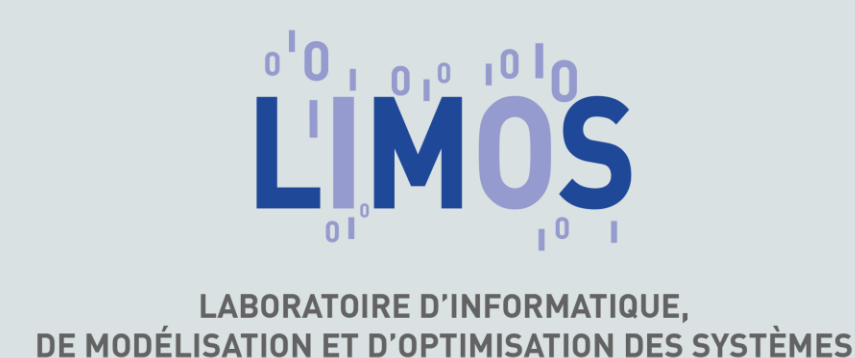
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Multiagent Coordination In On-demand Transport with Connected Autonomous Vehicles

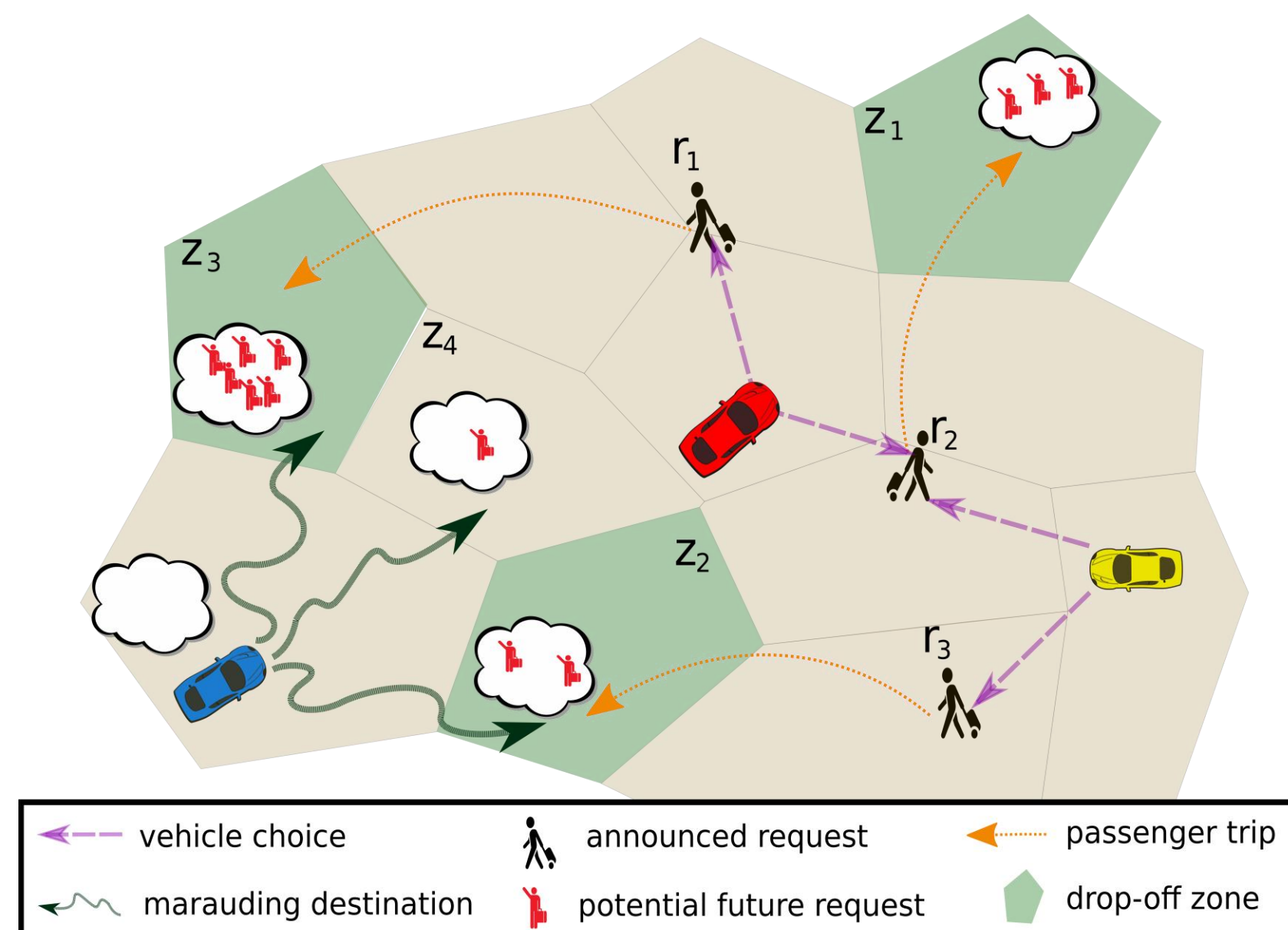
A decentralized resource allocation approach

Authors

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Plateforme Territoire



Application domain : On-demand Transport (ODT)

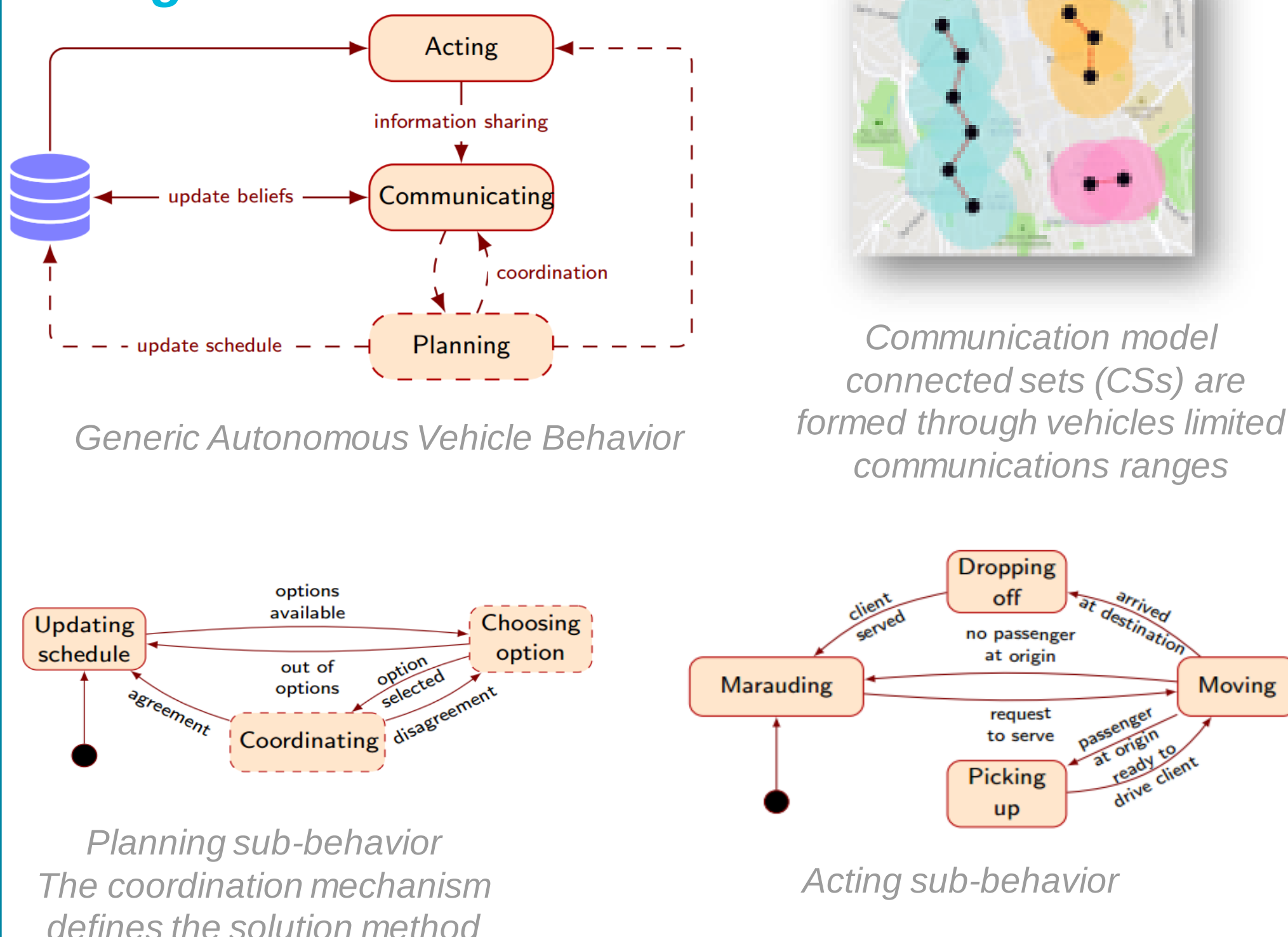
AV-OLRA

An extension to a more generic model (OLRA) adapted to ODT with AVs and their communication constraints

(R, V, G, T)

- R – a dynamic set of requests (ressources)
- V – a set of connected autonomous vehicles (consumers with communication constraints)
- G – a graph defining the road network
- T – the problem's time horizon (discretization of time dimension)

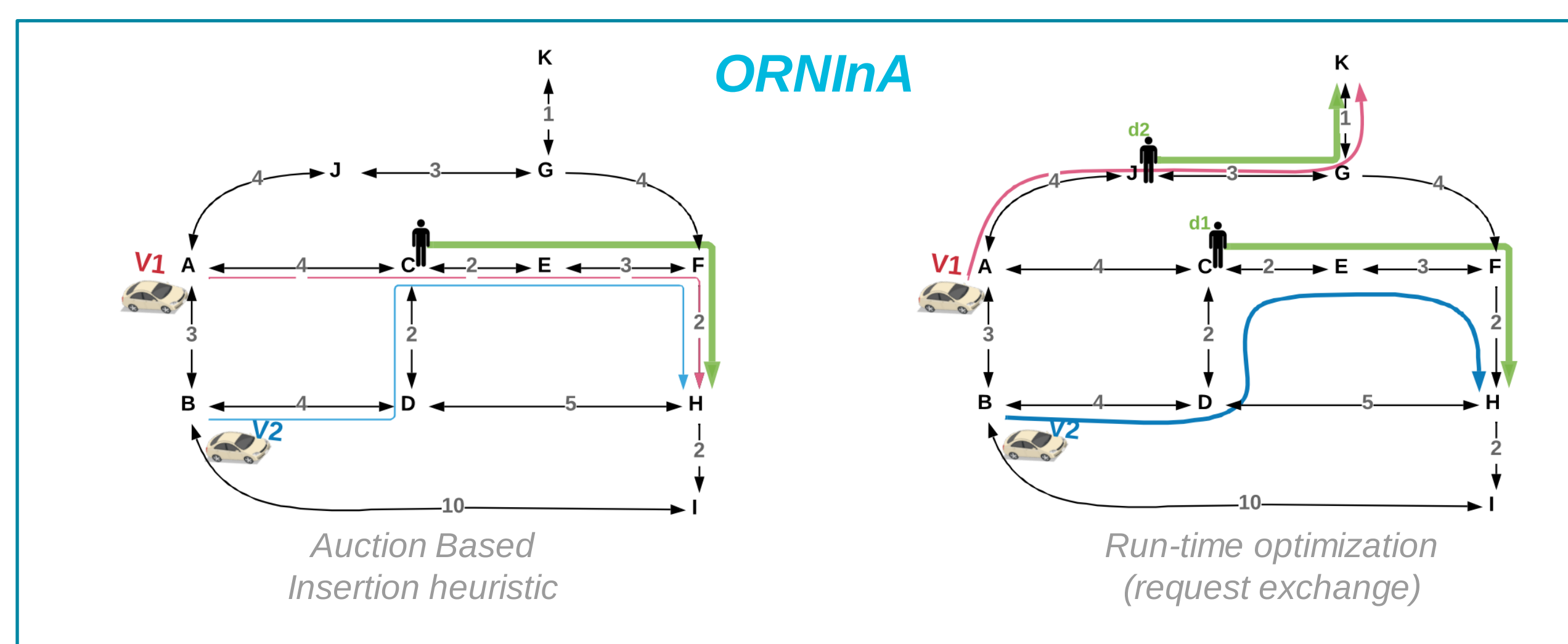
AV Agent



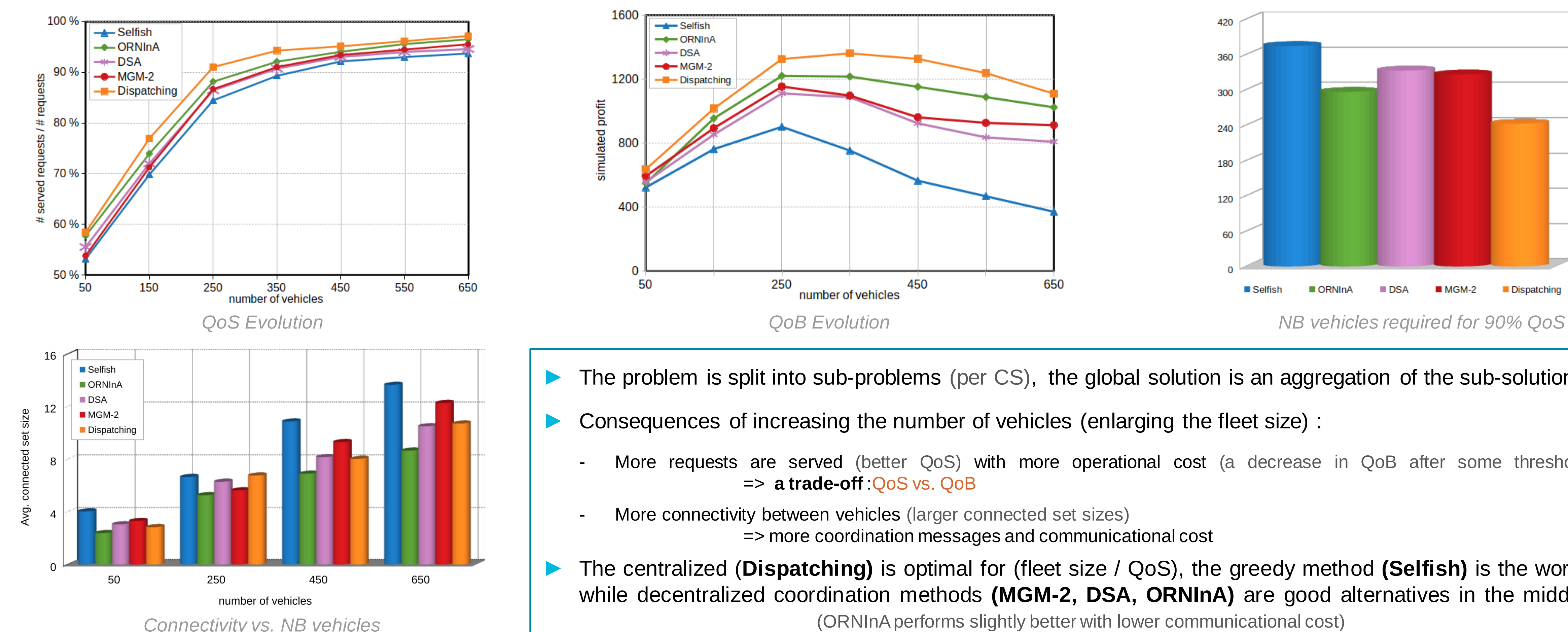
Deploying autonomous vehicle fleets, with limited communication ranges, in order to provide ODT service requires a careful choice and evaluation of solution methods for resource allocation problems.

Our Multiagent Approach

- **Generic Modeling (AV-OLRA)** – Autonomous Vehicles Online Localized Resource Allocation: A generic model to ODT's dynamic resource allocation problem in connected autonomous vehicle fleets, taking into account the limited connectivity and communication constraints
- **Behavior Abstraction (AV Agent)** – Each Autonomous vehicle is an agent whose behavior consists of 3 sub-behaviors: (Acting, Communicating and Planning)
- **Solution Abstraction (CM)** – A coordination mechanism defines the characteristics of a solution methods and requirements to implement the corresponding planning sub-behavior
- **Evaluation Testbed (AV-SIM)** – A multiagent simulator based on "Plateforme Territoire" with a set of evaluation criteria (QoB, QoS, Communication load, Connectivity)
- **A new solution method (ORNInA)** – A Decentralized, Auction-based, coordination approach with run-time optimization



Experimental evaluation with AV-SIM on real-world data (NYC-TLC trip records)



References

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