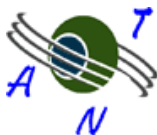


# Towards an Agent-based Model for Demand-Responsive Transport Serving Thin Flows

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# Overview

- 1 Introduction
- 2 Concepts
- 3 SARL
- 4 Conclusion and Future Work

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# Introduction: Problem Context

- 1 Thin flows are expensive for public transport providers
  - Movements of
    - people living in low-density areas
    - mobility impaired people
    - elderly people
  - = Low demand
- 2 Are there any alternatives?

# Introduction: Goal

- 1 Develop a micro-simulation of
  - Demand (=people who want to travel)
  - Supply (=companies who offer a kind of transport)
- 2 Transfer thin flow people to high demand areas
- 3 Check the viability of the suppliers over a long term period
  - Do they need any subsidies to survive?

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# Concepts: Demand Responsive Transport

## ① Demand-Responsive Transport

- Handled by a company (by cars, vans, small buses)
- Customers can book trips from an origin to a destination
- Vehicles do not serve a fixed route (although possible on peak times)
- Possibility to pick up multiple customers on a trip

# Concepts: Booking a trip

## ① Trip Request

- Contains trivial things such as
  - Origin-destination
  - Time windows
  - ...
- Labels
  - *Physical* labels → mobility impairment
  - *Personal* labels → affect the fares
  - *Preference* labels → person specific preferences
  - *Financial* labels → the mode choice

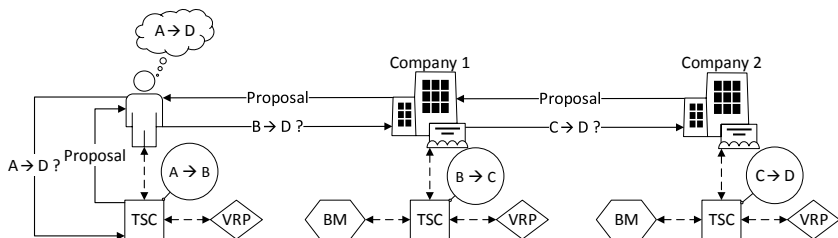
## ② Label matching



# Concepts: Trip Sequence Composer

- 1 Owned by every autonomous agent, e.g.:
  - The brain of a traveler
  - Help desk support of a provider
  - A website of a public transport provider (route planner)
  - A navigation app of a smartphone
  - The personal coach of a mentally disabled person
- 2 Every TSC → limited knowledge of the “World”
- 3 Arrangments of trips
  - Own TSC
  - Contacting other TSCs

# Concepts: Trip Sequence Composer



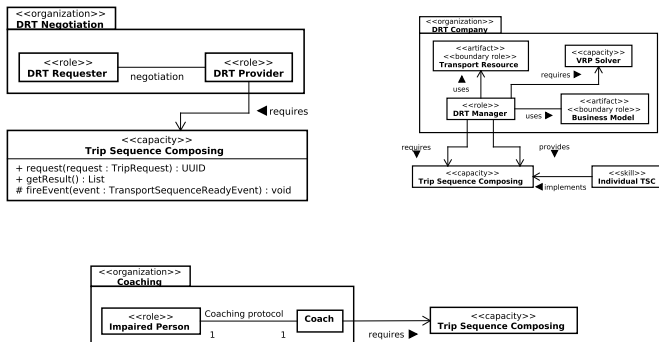
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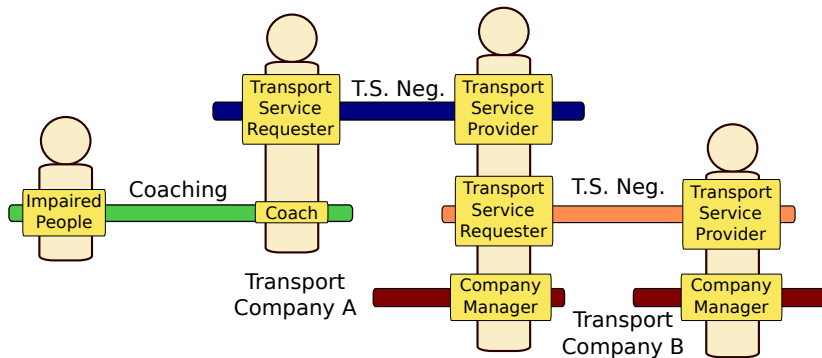
# SARL: Introduction

- 1 Agent-based framework
- 2 Every agent is autonomous
- 3 Organizational model
- 4 Agent-based is needed because we need negotiations

# SARL: Examples of Organizations



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## Conclusion and Future Work:

- 1 Model for simulating thin flows
- 2 Currently being developed
- 3 Behaviors coded as state machines
  - States are triggered by events
  - States are able to fire events
- 4 Scientific problem:
  - **Time management** in a fully distributed system
  - “Real time” needs to be simulated



# Questions?



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