Mobility in sparsely populated areas

- Sparsely populated areas with a lack of mobility solutions and public transport
- Inadequate public transport offer with low frequency
- First and last miles problem almost impossible to solve
- Personal car quasi-mandatory to move

Flexy vehicle

- Rail-Road vehicle that can switch mode without stopping
- 6/9 seats for customers
- Lighter and cheaper than heavy regional trains
- Reduced maintenance costs for vehicle and infrastructure

On-demand Transportation

- Facilitate the travel of inhabitants with doo-to-door transportation
- New transport offer designed for sparsely populated areas
- Revive small and unused train lines (~ 9000 km in France)
- Boost railway transportation

Original problem

Hybridisation between the Dial A Ride problem and the single track railway scheduling problem:

- Maximize the number of clients serviced
- Respect the coupling constraints specific to railtrack utilization

Route example with 2 vehicles

Results and perspectives

- Model as a Dial A Ride problem with railway constraints [1]
- Generation of realistic instances based on a small line candidate for the FLEXY
- Generic algorithm adapted to the solution of any vehicle routing problems with resource synchronisation [2, 3]
- Study the impact of the vehicle's rail and road speed on the number of clients serviced
- Evaluate the impact of the new on-demand transport with a multi-agent simulator: MATSim
- Dynamic case: Accept new clients while vehicles are in service
- 3-step system:
  - Acceptance of new clients through a booking phase
  - Optimization with confirmed requests for the service
  - Deal with new clients while the system is running

References