Université Gustave Eiffel

Final event

May 13th 2024

Agenda - morning

10:00 - Introduction

10:10 - Crash course:

Machine learning for planning and decision making

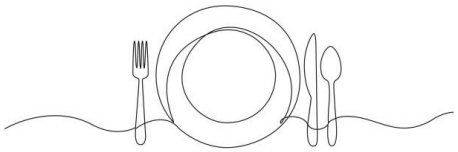
11:10 

11:30 - Crash course:

Collective intelligence for decision support

12:15 - SORTEDmobility

Paving the way to self-organizing traffic management

12:30 

Agenda - afternoon

SORTEDmobility RESULTS

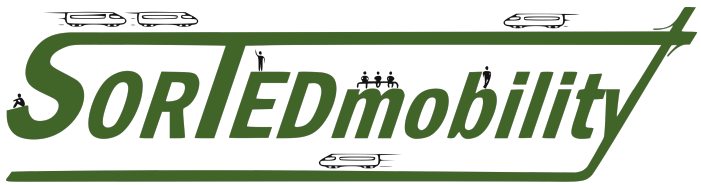
13:50 - Train self-organization for traffic management decisions
14:10 - Dynamic demand requirements for traffic management
14:30 - Evaluation of self-organizing traffic management
- Joint simulation of rail passenger and operations
- Analysis of different case studies
- Industrial interpretation

15:10 - Recommendations

15:30 

16:00 - Round table
17:00 - Conclusions

Paving the way to self-organizing traffic management



Self-Organized Rail Traffic for the Evolution of Decentralized MOBILITY

European project H2020 **ERA*-NET** Cofund

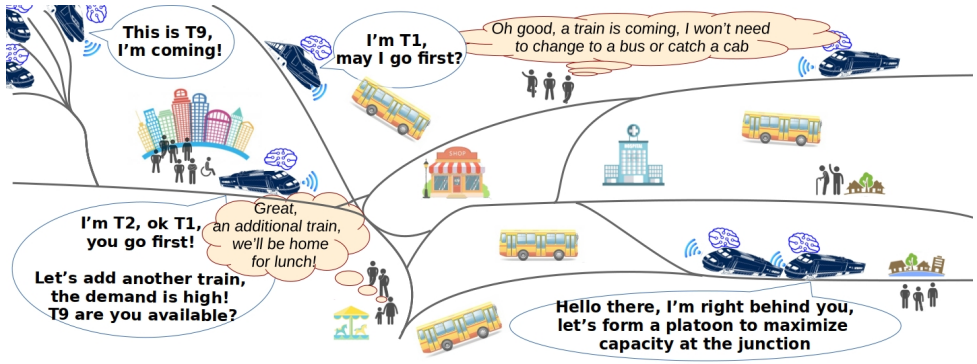
Period : June 2021 - May 2024

Budget: 1 841 776 €

* European Research Area

Concept

Self-organizing management of public transport
→ focus on railways



Self-organization may have several benefits:

- improved **system reactivity**
- preservation of **private information**
- possibility to make **RU-proper decisions**

SORTEDmobility principles

Self-organizing principles for **everyday operations**,

- **traffic perturbations** 
- **disruptions** 

Traffic management works in a **fully automatic** way

The definition of the **overall TMS process** is out of the scope of SORTEDMOBOLITY

Implementation

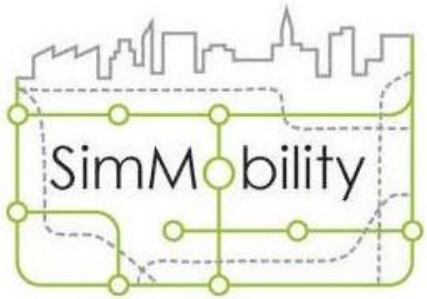
- Trains seek **consensus**
- Possible decisions:
  1. retiming
  2. reordering
  3. local rerouting
     - use alternative platforms or itineraries at stations
     - use of alternative tracks
     - use of track portions typically used for the opposite direction but equipped for both
  4. preserve passenger transfers
- If no consensus, **the last accepted plan** is kept
  - the one decided at a previous iteration
  - the original timetable routes and orders

Evaluation via microscopic simulation

traffic modeling

OPEN TRACK

demand modeling



Evaluation via microscopic simulation

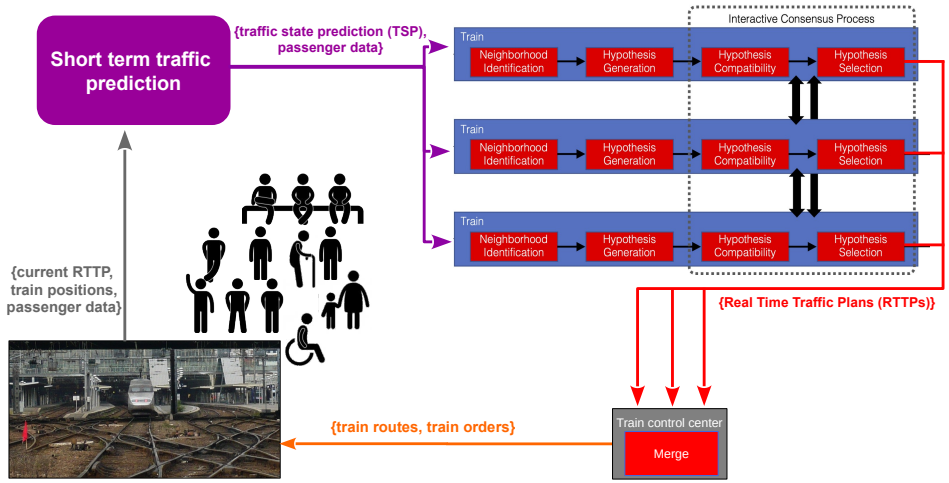
traffic modeling

demand modeling

EGTrain

OPEN TRACK

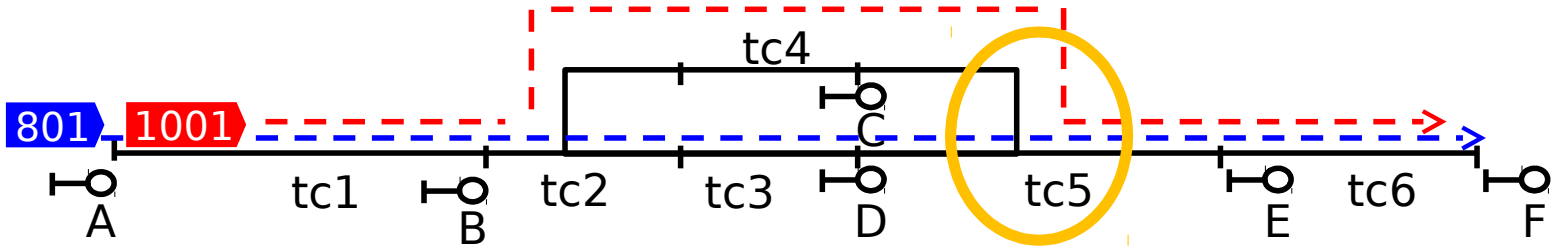
SimMobility



Decision format: Real Time Traffic Plan

The RTTP describes microscopically how the traffic shall be executed:

- Train view: which routes will the trains take
- Infrastructure view: in which order will trains pass over sections



Train view

1001		801	
A-B	tc1	A-B	tc1
B-C	tc2	B-D	tc2
	tc4		tc3
C-E	tc5	D-E	tc5
E-F	tc6	E-F	tc6

Infrastructure view

tc1	tc2	tc3	tc4	tc5	tc6
1001	1001	801	1001	801	801
801	801			1001	1001

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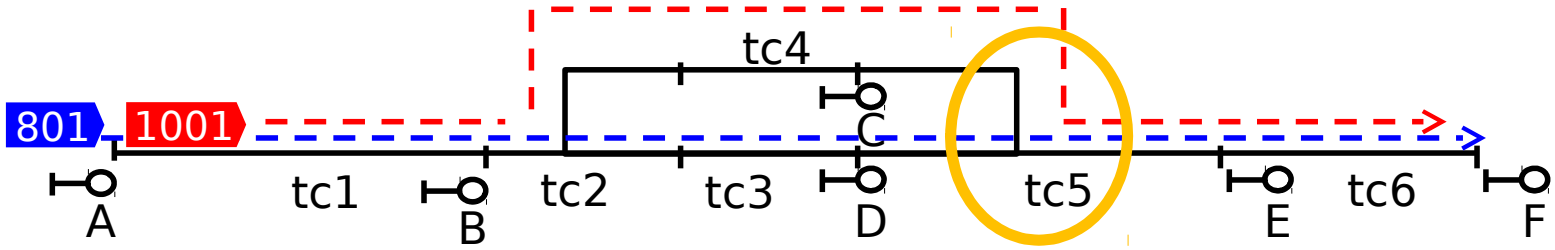

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Infrastructure view

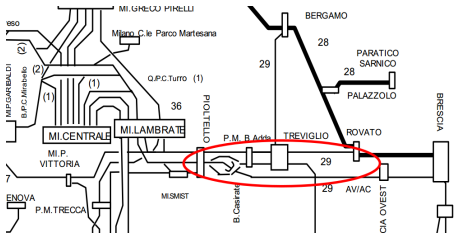
tc1	tc2	tc3	tc4	tc5	tc6
1001	1001	801	1001	1001	1001
801	801			801	801

Assessment

- Benchmark with **centralized management**
- Case studies in **France, Italy and Denmark**
  $\Rightarrow$ Recommendations

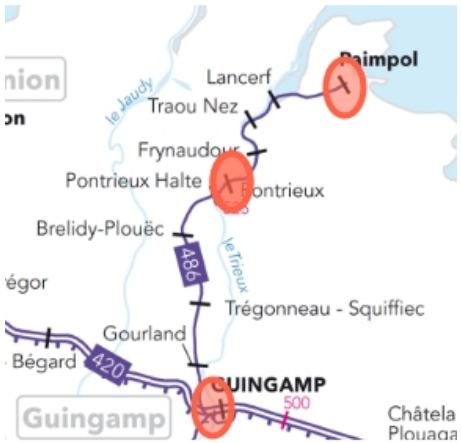
Pioltello - Rovato line (Italy)

54 km



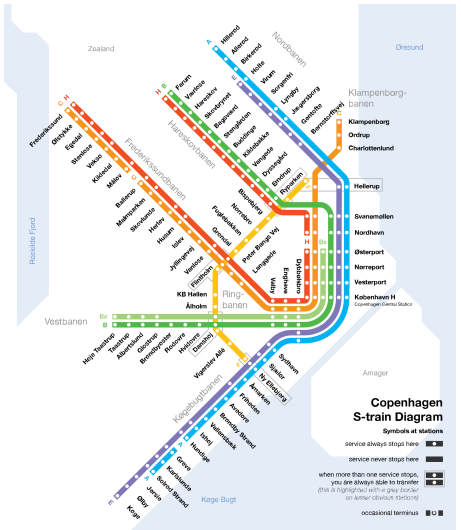
Guingamp - Paimpol line (France)

37 km

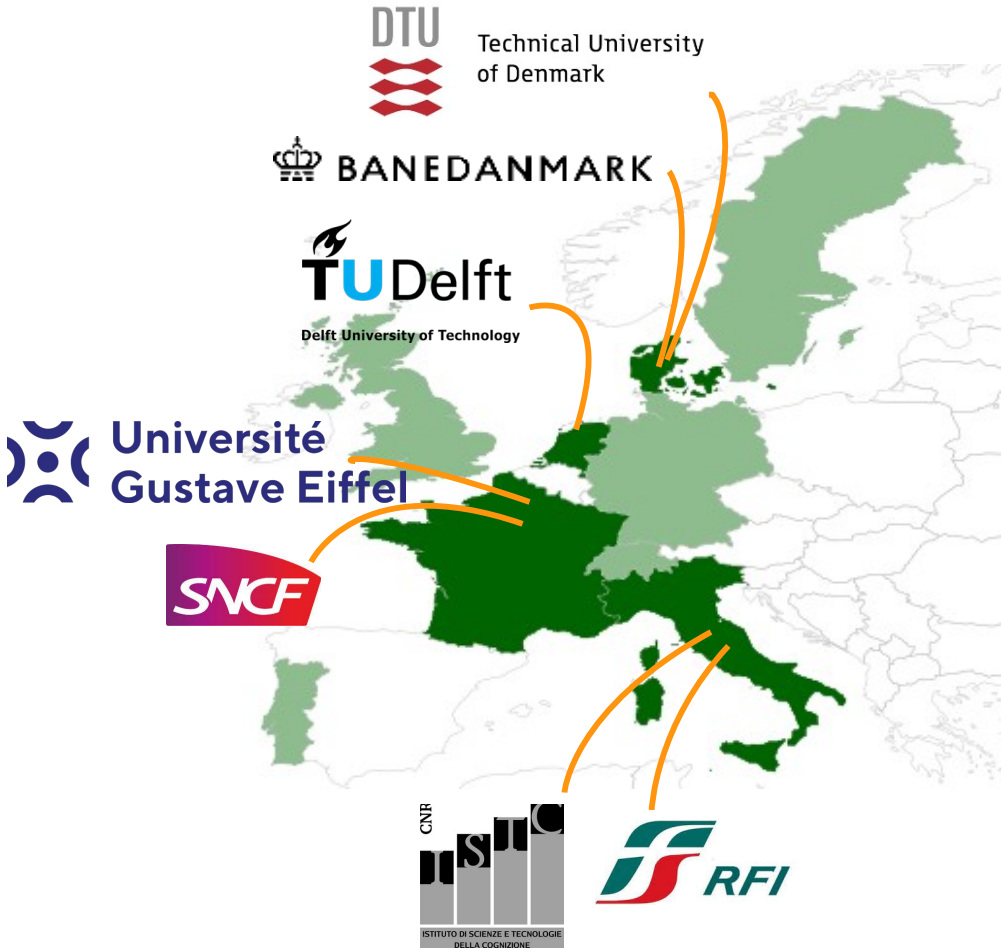


Copenhagen suburban network (Denmark)

170 km



Consortium



Advisory board

BTH – Blekinge Institute of Technology

DB Netze

ETH Zürich

Infrastruturas de Portugal

Network Rail

Università degli Studi di Napoli Federico II

University of Cambridge

Thank you!

For later questions and comments

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