An Innovative Transport Model Architecture Aiming at Forecasting a Passenger Railway's Future

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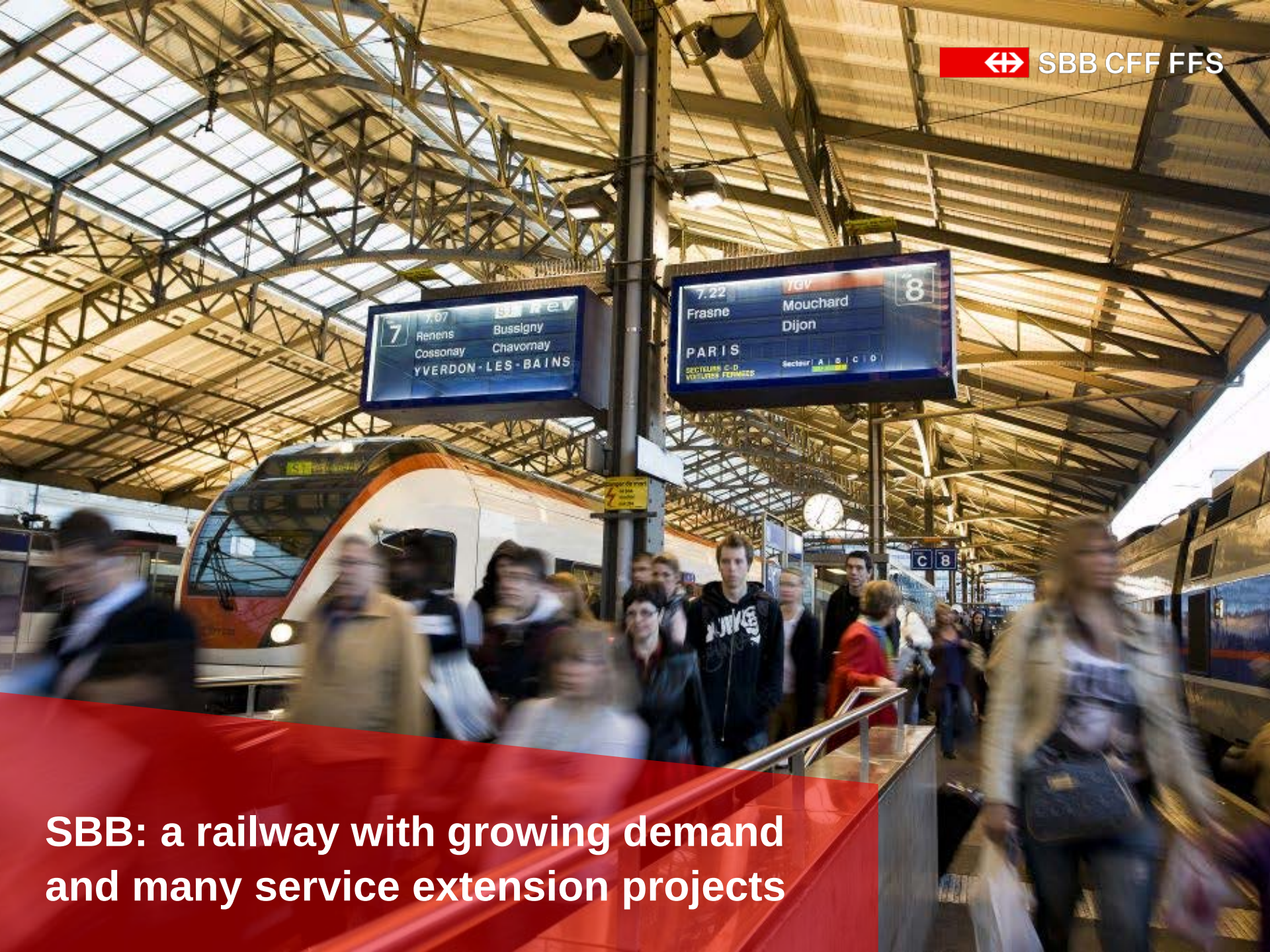
What type of innovation do we pursue:

- → not so much:
  - invention of new algorithms or new methods

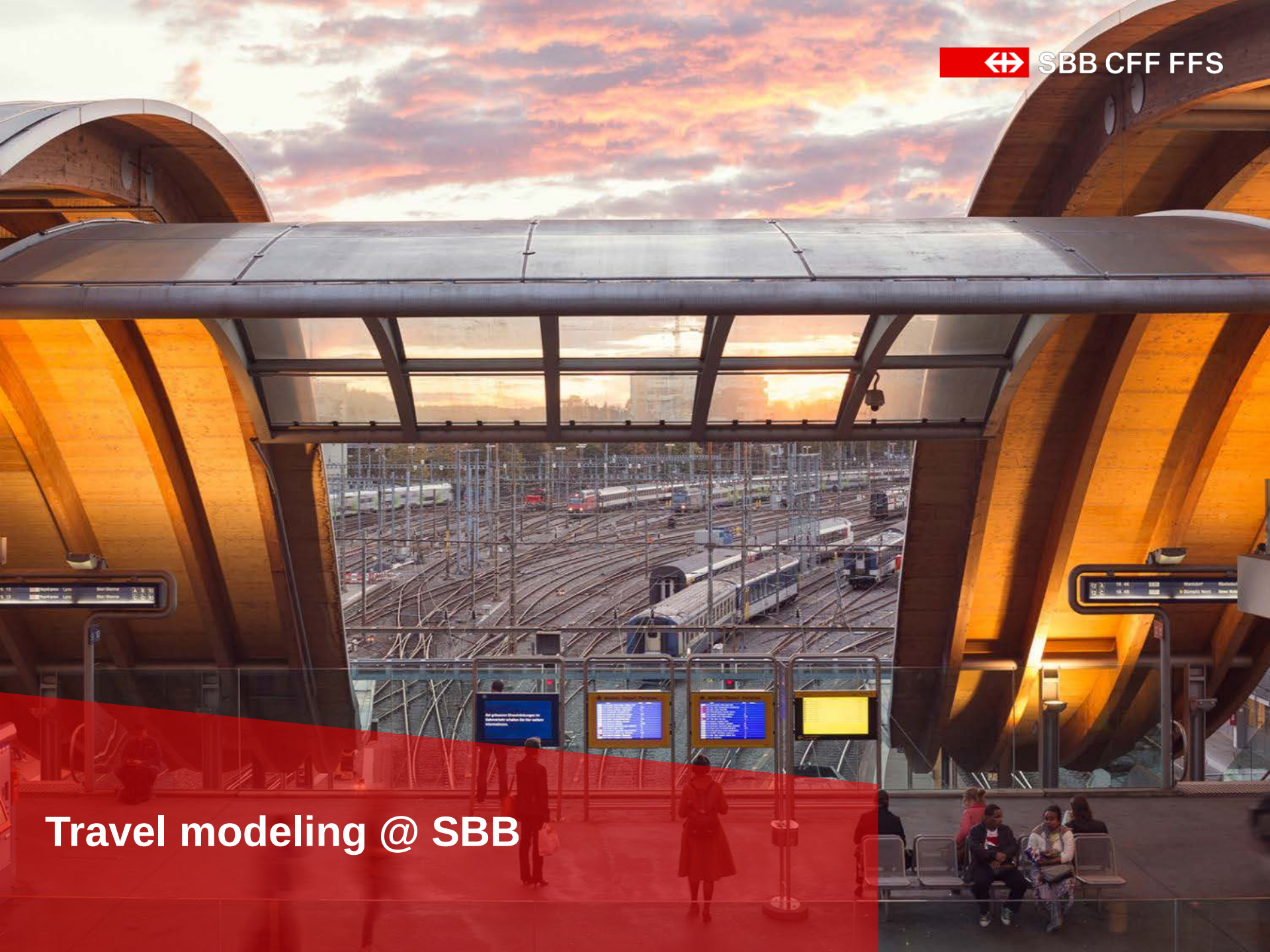
- → but rather:
  - application of better solutions to meet new requirements



SBB: a railway with growing demand and many service extension projects

Swiss Federal Railways (SBB) in numbers 2017

- Leading railway in Switzerland (population 8.4 million)
- 1.3 million passenger trips ADT
  - over the past 15 years: +3.5% in average p.a.
- 3’200 km network length (standard gauge)
  - most densely used rail network in the world
- 33’000 employees
- Punctuality
  - 89% of passengers arrived with less than 3 minutes delay
- Renewable energy
  - > 90% of all electricity used in rail transport



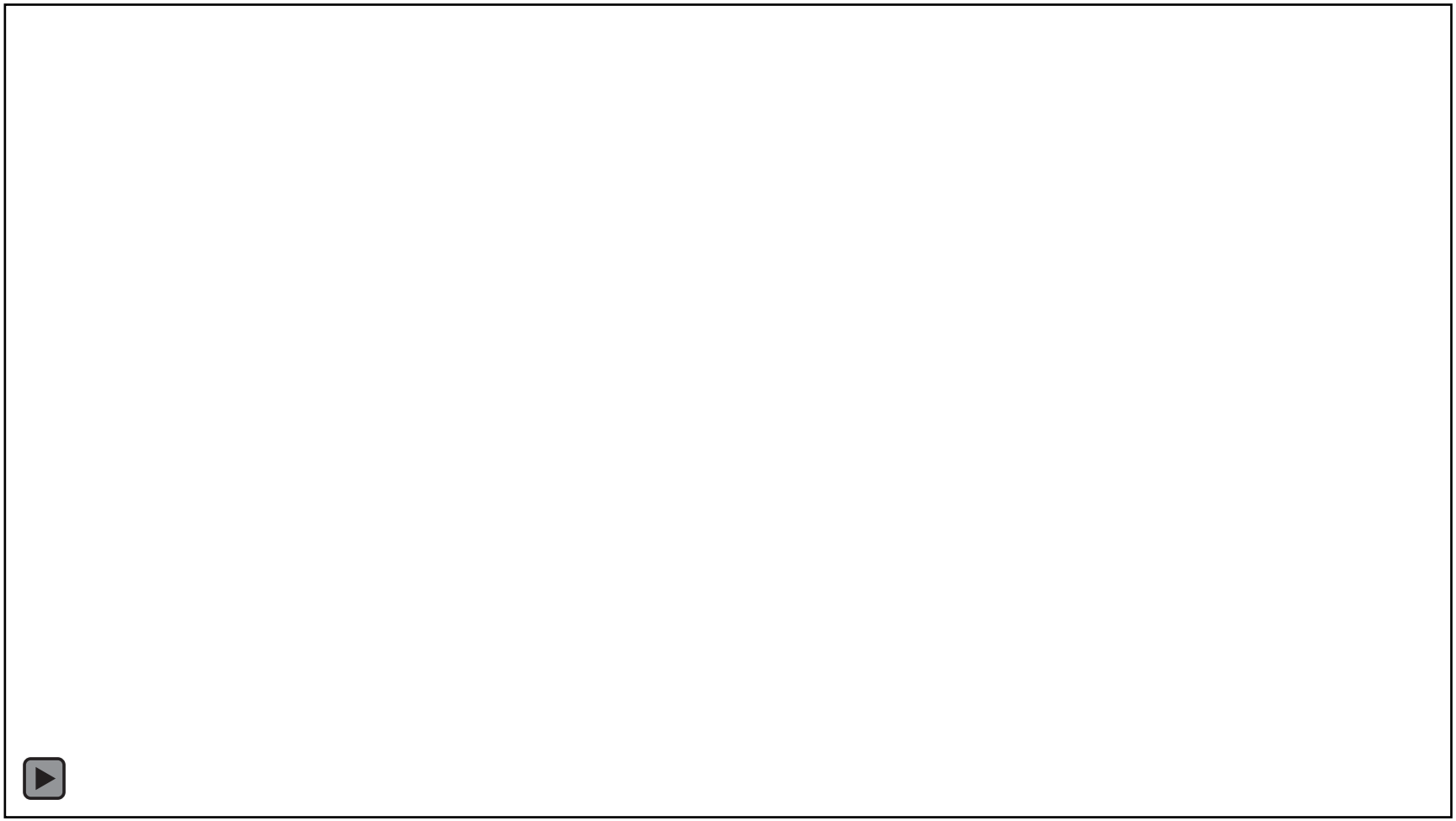
Travel modeling @ SBB

15 years of experience in transport modeling with «SIMBA Rail»: a data-driven macroscopic model

https://www.youtube.com/watch?v=vPfFQWfXcXo&feature=youtu.be

- Dynamic, capacity-constrained 24-H passenger assignment
- Empirical passenger demand, elasticity-based forecasting
- Rail production model (schedule, fleet, operations)

1 year of experience in agent-based modeling
SIMBA MOBi 1.0



https://www.youtube.com/watch?v=5FQtwcAsSqI&feature=youtu.be

New requirements have led to a new model architecture

SBB CFF FFS

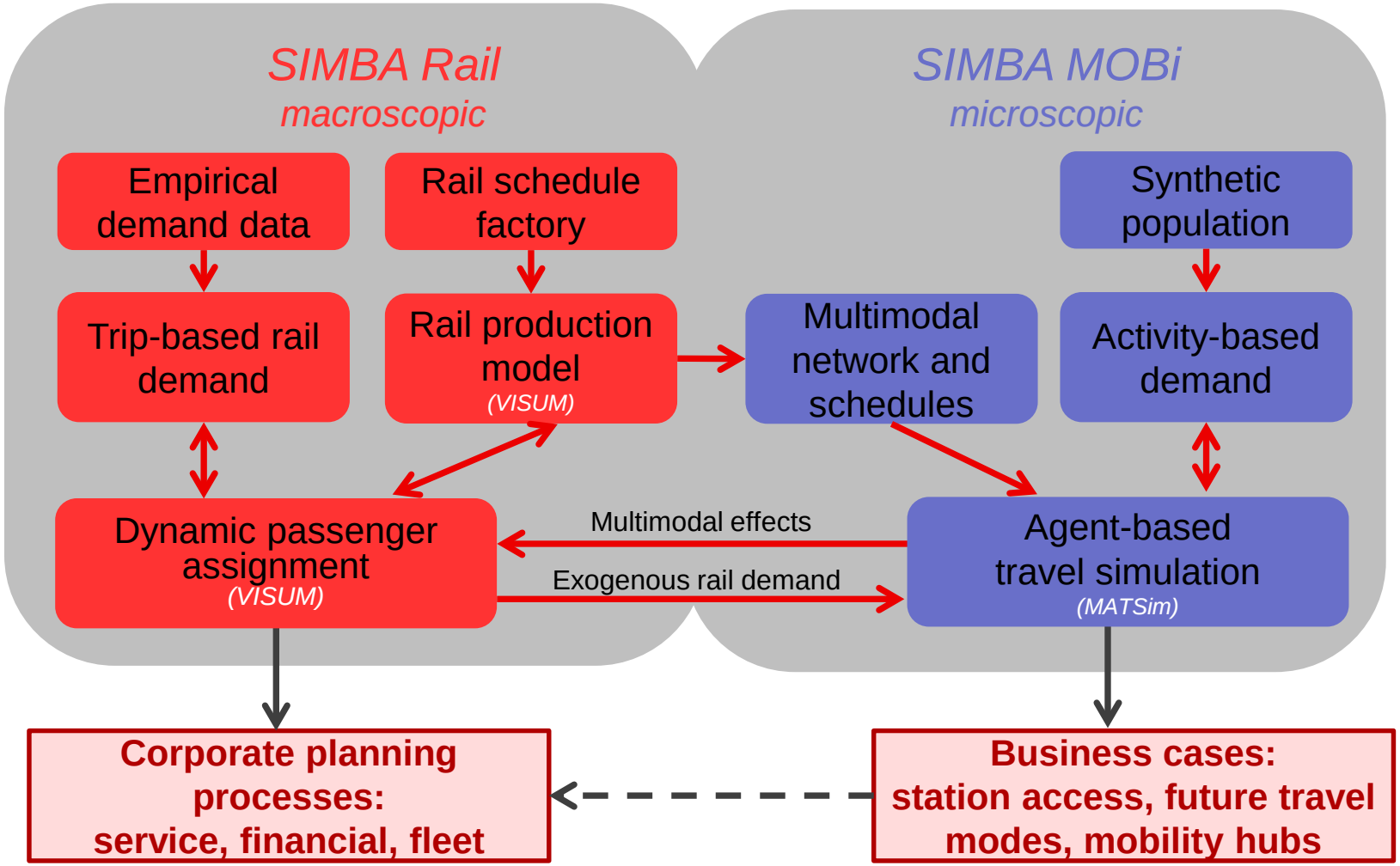
Communication inside of the corporation about model requirements and model properties

Model requirements	SIMBA Rail (macroscopic)	SIMBA MOBi (microscopic)	Integration
Close fit of rail demand in the existing state	☑	☑	☑
Holistic modelling of the rail system (demand and production)	☑	☒	☑
Prediction success (rail demand)	☑	☑	☑
Effective feed into financial planning (demand and operations indicators)	☑	☒	☑
High degree of granularity of passenger flows	☒	☑	☑
Door-to-door description of passenger trips (including station access)	☒	☑	☑
Modelling competing travel modes	☑	☑	☑
Possibility to model future transport modes (e.g. autonomous vehicles, sharing modes)	☑	☑	☑
Complex new pricing schemes	☑	☑	☑
Interaction of land use and travel, based on accessibility	☒	☑	☑

Conclusions for the new architecture

- There is not one model that fits all purposes
- A combination of macroscopic and microscopic will best meet our requirements
- Innovation in new models requires investment in staff, know-how, IT resources

2-pillar architecture for the model landscape SIMBA*



* **S**tandardisierte **I**ntegrierte **M**odellierung und **B**ewertung von **A**ngebotskonzepten

Riding trains in Switzerland is fun ...