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N°6.5

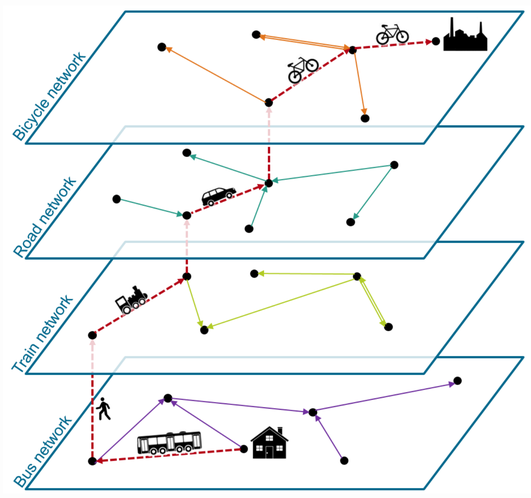
Modeling - Interoperability - Communication

Transportation is quickly developing worldwide underlying new technologies. To support such evolution, it is necessary to develop interoperable solutions while ensuring overall consistency and performance control. Modeling - Interoperability - Communication (MIC) project is an enabler to the sizing, the positioning and the control of multimodal mobility.

1. Context

Multimodal systems are **complex:**

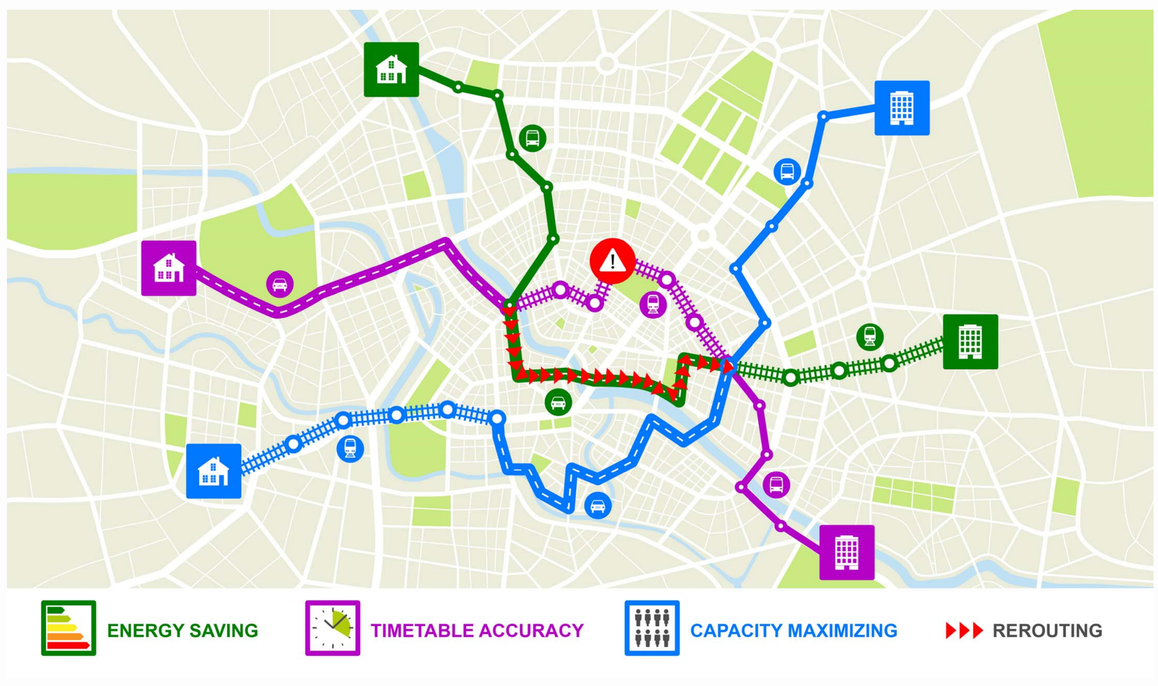
- Numerous **public** transportation
- Growing number of **individual** cars
- New **technologies** (e.g. geo-location)
- Thirst for individual **mobility**
- Undermined **limits** of capacity, performance and accessibility



2. Challenges

Proving concepts of multimodal development and operation lies in:

- Appropriate **Modeling**
- **Optimizing** upon selected parameters
- Getting **data** intensive **simulation** to converge



Several **use cases** shall be addressed:

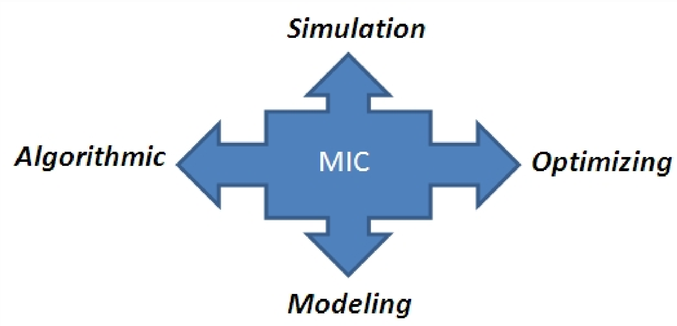
- Manage **new profiles** (e.g. energy saving, capacity maximizing)
- Provide **impact analysis** (e.g. timetable accuracy)
- Static optimization (e.g. **car-sharing** positioning)
- Dynamic optimization (e.g. smart **routing**)

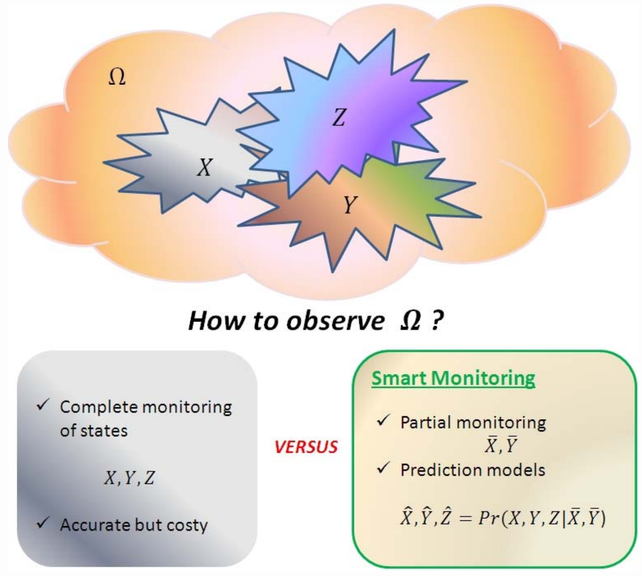
Additional **stakeholders** increase complexity beyond technology. **Legal** and **Economics** shall also be integrated to fully assess the **business** soundness of multimodality.

3. Innovation

Casting multimodality within a single traffic model is a **breakthrough**:

- **Combining** approaches (e.g. Nash, equilibrium, fluid mechanics analogy, stochastic approach, Min-Max theory, multi-agent simulation…)
- Handling **time-dependent** characteristics essential to real-time prediction





- **Smart** routing simulating the influence of a central regulator over a discreet set of passengers in case of incident (e.g. mean field type game)
- **Scalable** approximation with certified performance guarantee
- Observability with **limited** numbers of sensors

4. Expected results

The project shall deliver technical **demonstrators** providing tools for:

- Simulating new patterns and behaviors
- Improving traffic prediction
- Deploying interoperability

It is expected that re-routing scenarios will contradict current natural choices in the absence of a global model.

Also, the **multimodal supervision** may break the traditional pattern complying with deterministic time table and fixed frequency turnaround.

Results may foster reflections about public transportation, long term investments, choices of modes and business involvement of new actors.

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