



Vista - Market forces trade-offs impacting European ATM performance

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Madrid 7th of March 2017

Vista Objectives

Vista aims at studying the main market forces which will shape the future of ATM in Europe at the 2035 and 2050 horizons

More specifically, Vista aims at studying the following points:

- The trade-off between, and impacts of, primary regulatory and business (market) forces;
- the horizontal metric trade-offs within any given period;
- the vertical trade-offs between periods, particularly as many targets are not currently mapped from year to year, are discontinuous with other targets, or even entirely missing for given periods (such as, vitally, passenger performance targets);
- whether alignment may be expected to improve or deteriorate as we move closer to Flightpath 2050's time-frame?

Strong focus on **five stakeholders**: airlines, ANSPs, airports, passengers, and **environment**.

Building Steps

Vista's results will be ultimately be produced by a multi-layered model. The model will run over several future scenarios as well as the current one. Building steps:

- Consider an extensive list of **business** and **regulatory** factors likely to impact the ATM system in the future.
- **Classify the factors**: short-term/long-term, likeliness to happen, importance of their impact on the ATM system, etc.
- Building model requirements:
 - to take into account as many (**important**) factors as possible in a flexible way.
 - To produce the level of detail **required and achievable** to capture the relevant metrics
- Produce results with model and iteratively modify the model to have the minimal working product.

Industrial partners (ANSPs, 'Airport', Airlines) are **closely involved** in every steps.

Markets forces

In Vista market forces are called 'factors' and are subdivided in two main categories:

- **Business factors:** cost of commodities, services and technologies, volume of traffic, etc => **Demand and Supply**
- **Regulatory factors:** coming from EC or other bodies like ICAO, etc. => **Rules of the game**

Some factors are defined to be in the **background** because:

- They are likely to have a **small** impact on the system.
- **OR** they are **very consensual** and thus are likely to happen in any case.

All the other factors are defined to be in the **foreground**. They represent the factors whose impact are to be studied in more detail.

Business factors

A wide range of factors are considered, including:

- 'SESAR factors': all the operational changes envisioned by SESAR 1 and SESAR2020 for the different time-frames, including:
 - Free-routing and 4D trajectories,
 - Traffic synchronisation,
 - Demand and capacity balancing, etc.
- Airport processes and accessibility:
 - Multimodality,
 - Self-processing, etc.
- Demand evolution:
 - Global demand,
 - Competition with high-speed trains,
 - Societal changes (environmental-friendly passengers, remote meetings), etc.
- Other factors:
 - Smart ticketing
 - Fuel price, etc.

37 factors in total

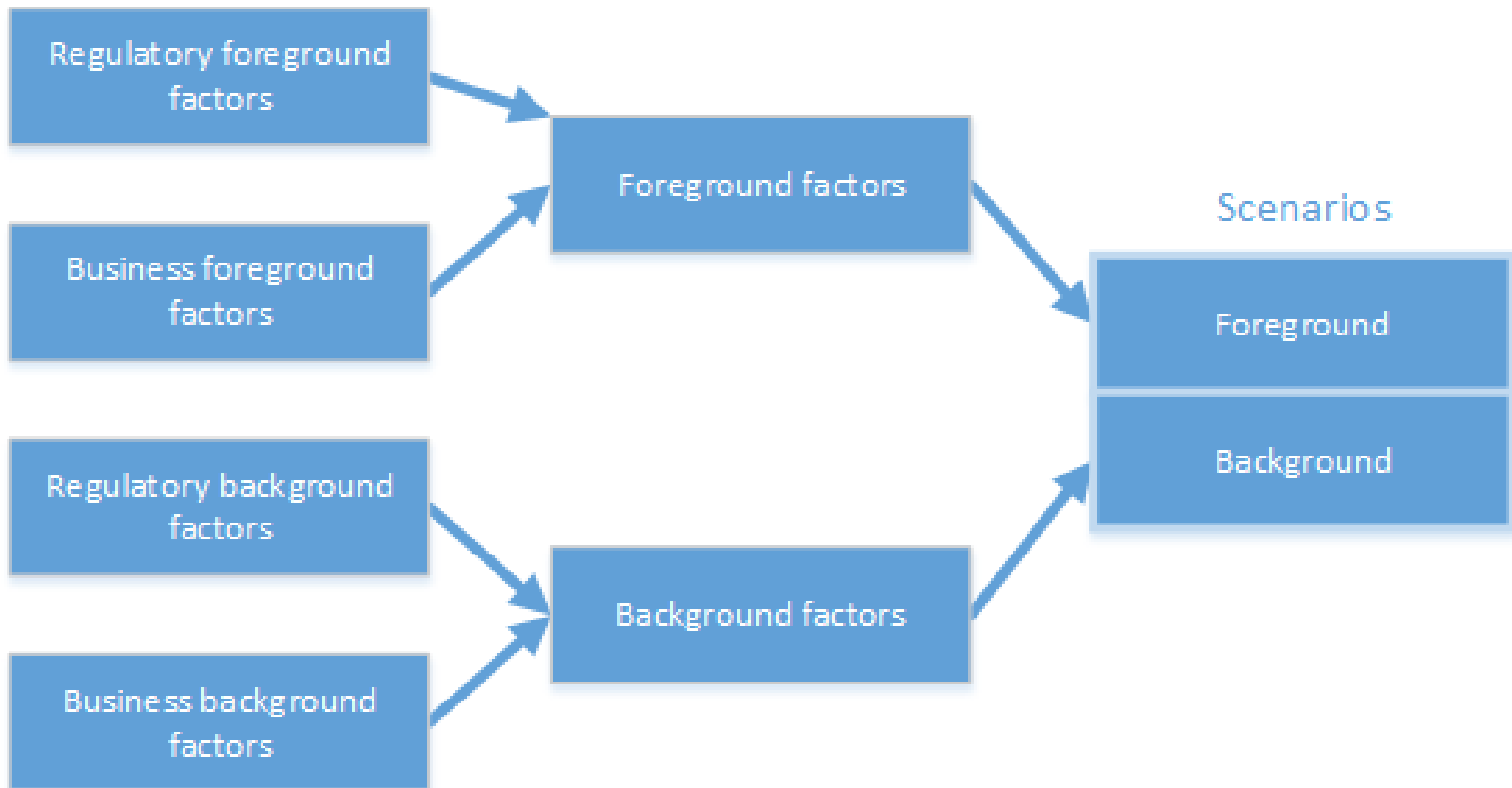
Regulatory factors

Large review of existing and potential regulations affecting directly the ATM system

- Regulations affecting gate-to-gate:
 - SES development and integration (SES, Common projects...),
 - Performance-based regulations (PRB...),
 - ANSP requirements.
- Regulations affecting airports:
 - Airport Demand (slots, charges...)
 - Airport processes (Ground handling market...),
 - Airport access / egress.
- Other regulations:
 - Drones,
 - Passenger provision schemes,
 - Emission Schemes
 - Safety, etc.

22 factors in total

Scenario definition - guessing the future



Background scenarios

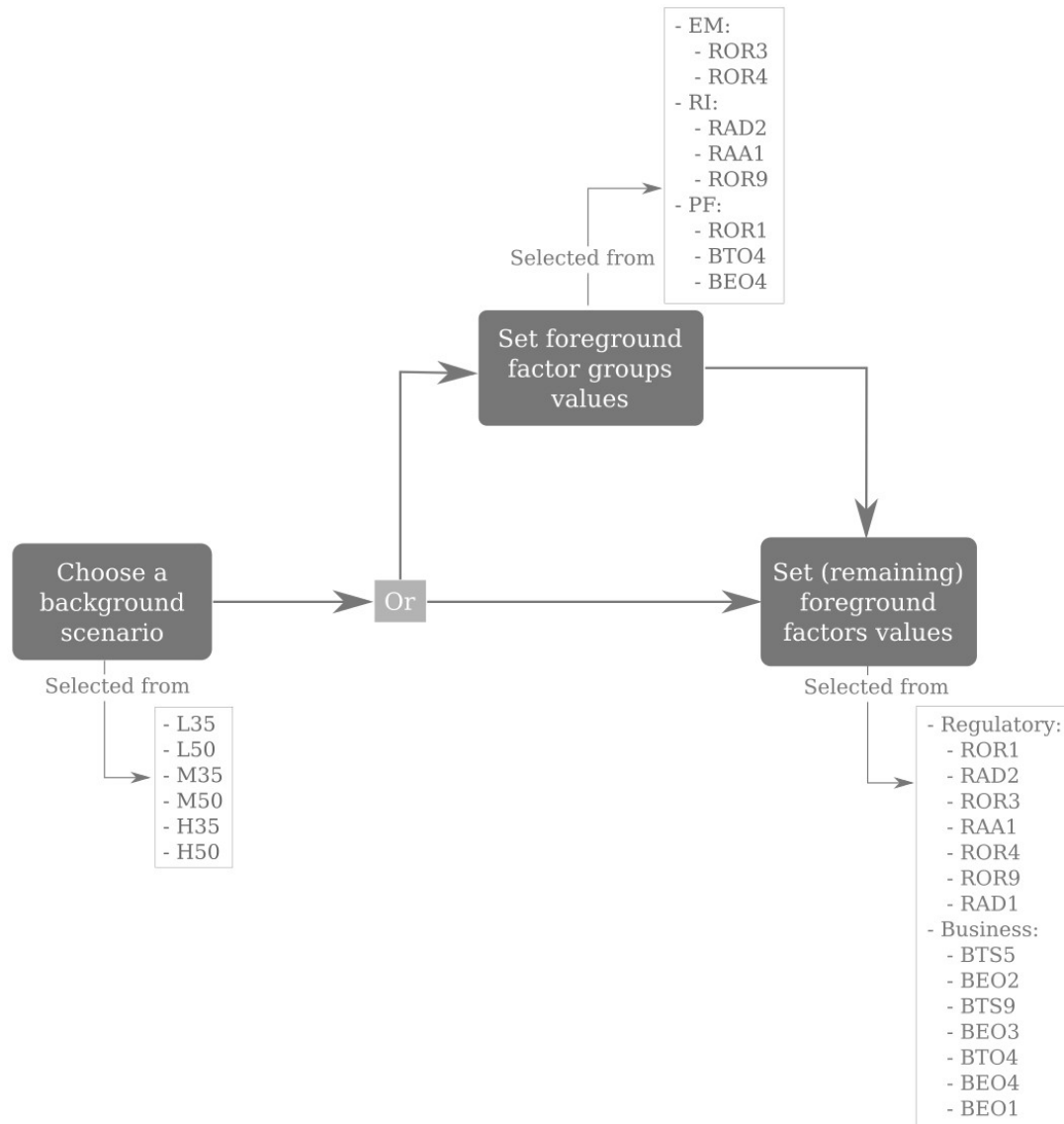
Period	Name	Description
Current	Current	Default
2035	L35: Low economic, Low Techno	Economic growth is slow in Europe , technological and operational changes are not supported .
	M35: High economic, Low Techno	Economic growth is high in Europe , but technological and operational changes are not supported .
	H35: High economic, High Techno	Economic growth is high in Europe and technological and operational changes are supported .
2050	L50: Low economic, Low Techno	Idem L35
	M50: High economic, Low Techno	Idem M35
	H50: High economic, High Techno	Idem H35

Foreground factors

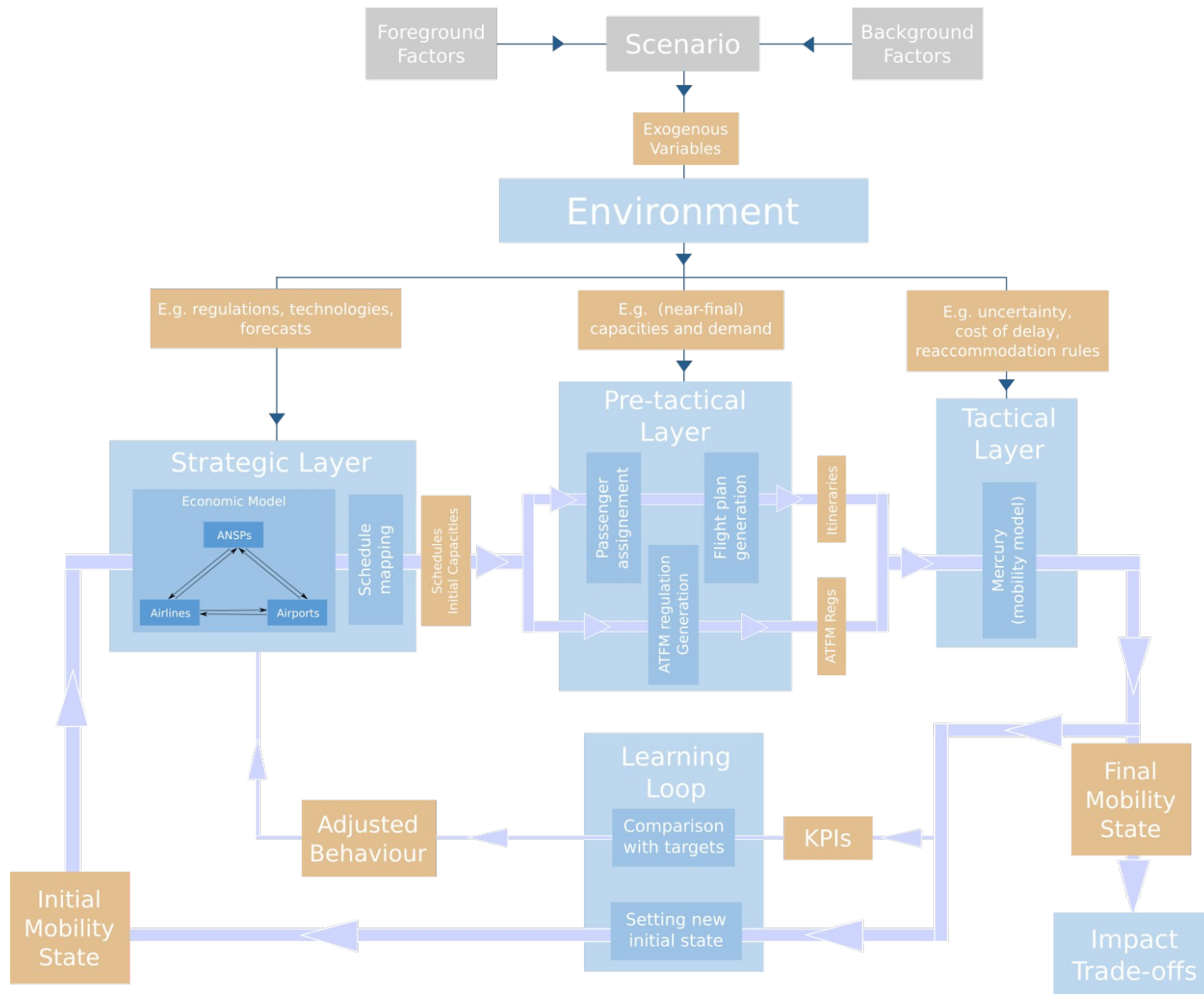
ID	Factor
BTS5	4D Trajectory Management
BTS9	Traffic Synchronisation
BTO4	Passenger reaccommodation tools
BEO1	Fuel prices
BEO2	Airspace charges
BEO3	Airline business models
BEO4	Smart, integrated ticketing

ID	Factor
ROR1	Passenger provision schemes
ROR3	Emission schemes
ROR4	Noise pollution
RAD1	Airport slots
RAD2	Regional airport development
RAA1	Airport access
ROR9	Operation of air services

Building a scenario

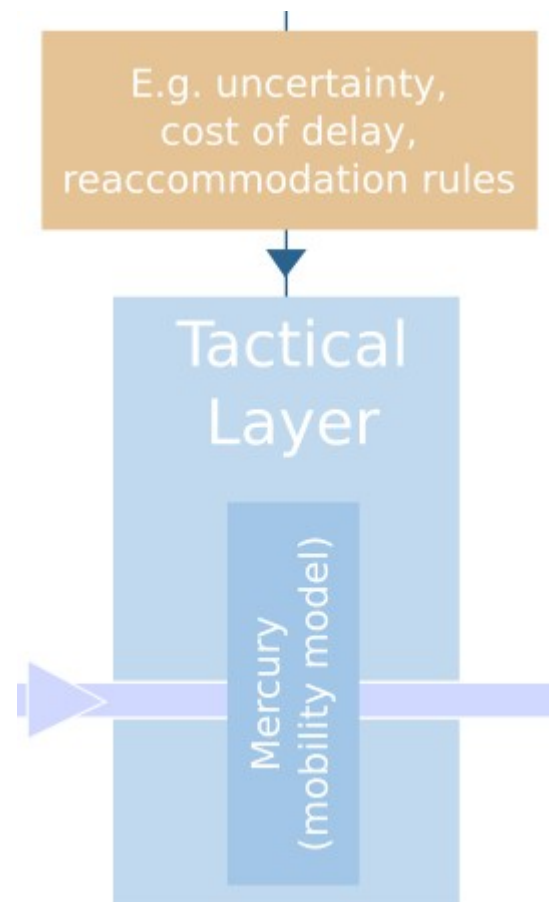


Building the model



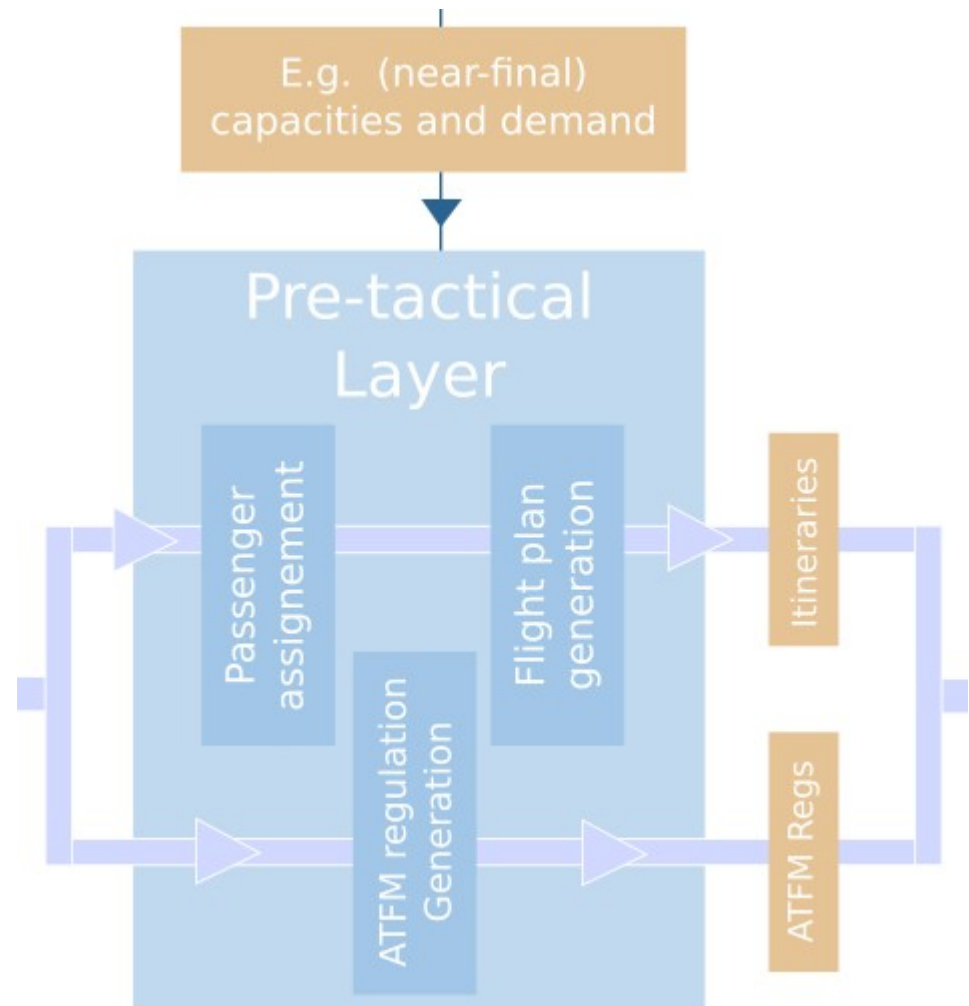
Building the model (backwards)

- Microscopic model: each passenger is tracked independently
- Passenger make different 'choices' based on their profile (5 profiles of passengers considered in Vista)
- Airlines make different 'choices' based on their types (5 types of airlines considered in Vista)
- Stochastic model
- Engine behind the models in POEM, ComplexityCosts, DATASET2050



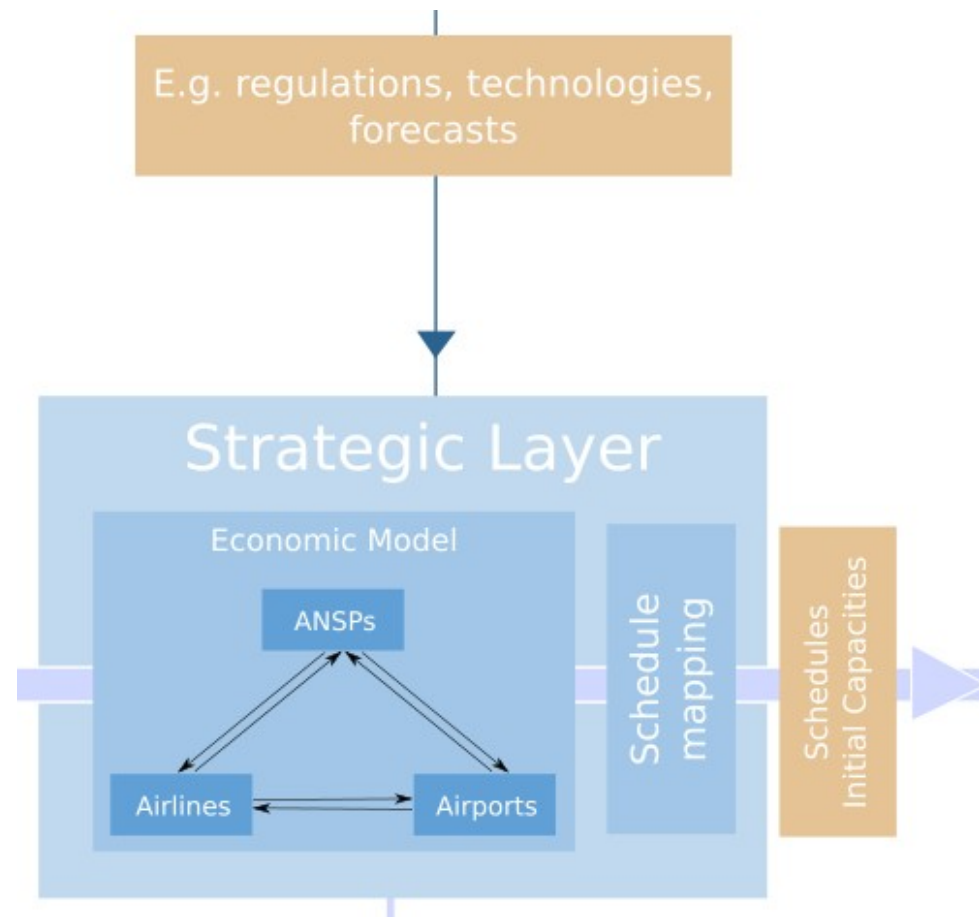
Building the model (backwards)

- Microscopic layer: passengers are assigned independently, regulations generated based on historical data,
- Passengers profiles are differently assigned to different O/D and different types of airlines,
- Capacity and demand are used based on historical data,
- Stochastic model,
- Part of this layer has been written for Complexity costs.

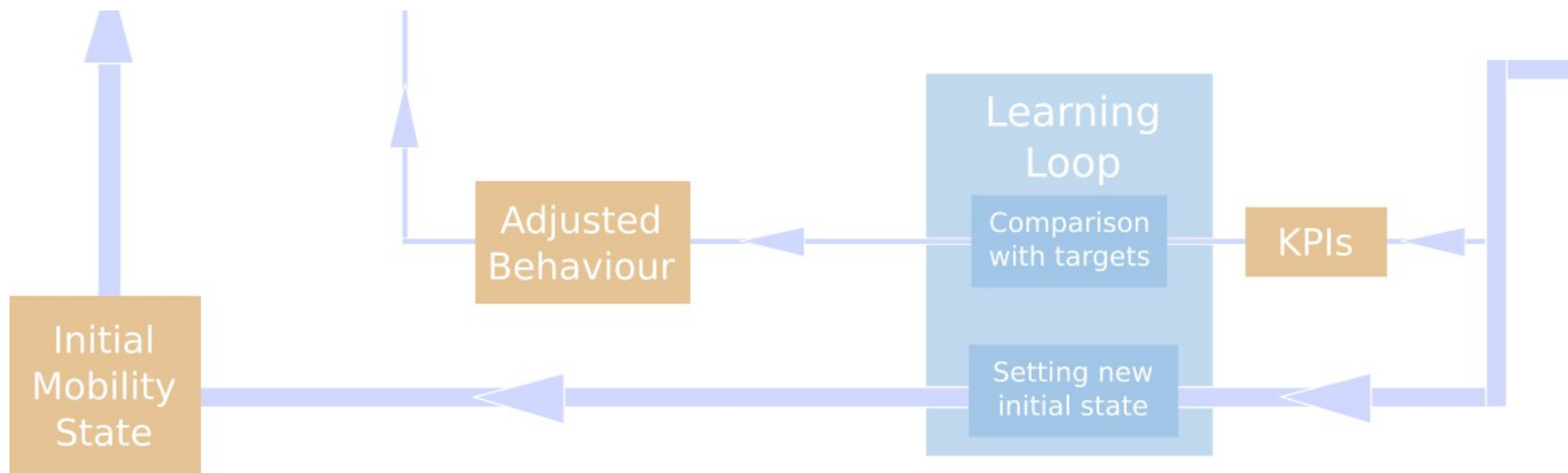


Building the model (backwards)

- Macroscopic to microscopic,
- Simple equilibrium between representative agents,
- Modified equilibrium with respect to baseline is used to modify historical schedules,
- Deterministic equilibrium, stochastic generation of schedules,
- Airline model to be inspired from the project 'Modelling of an Airport Economic model'.



Learning loop

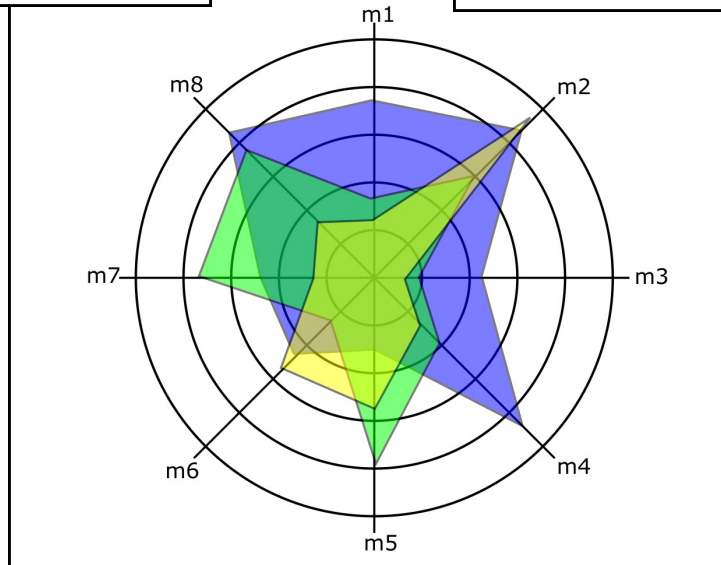
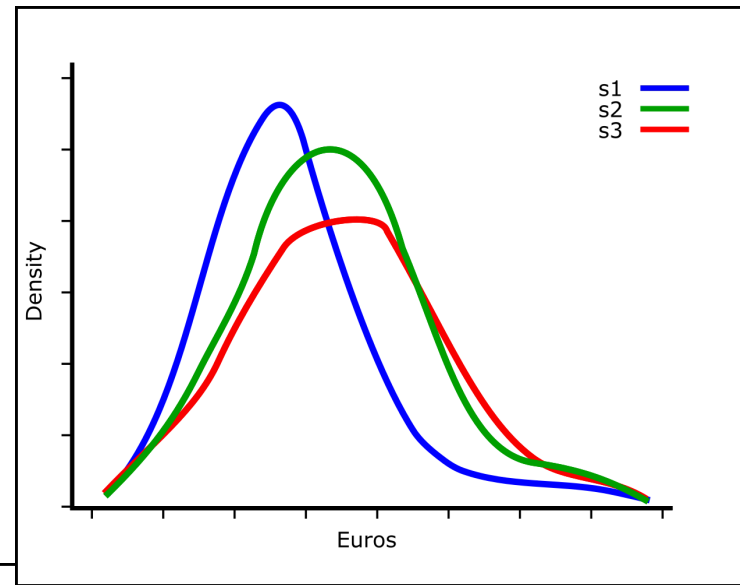
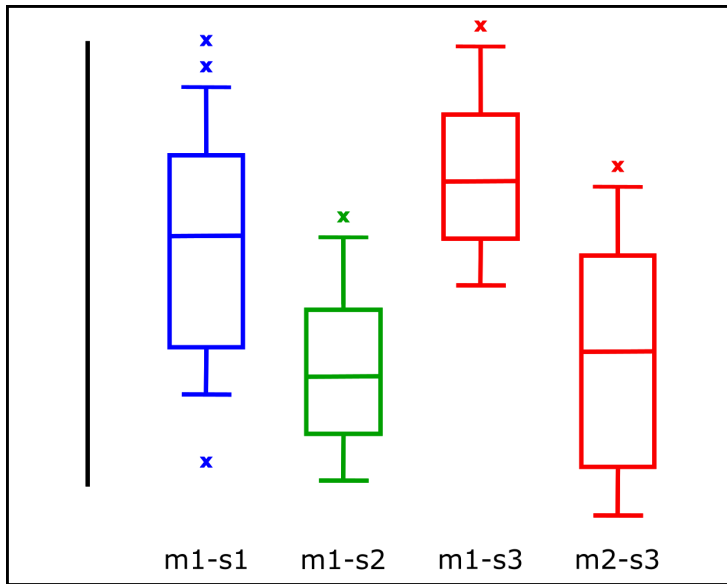


Potentially used for:

- Consistency between economic equilibrium and results of tactical run,
- Convergence to scenario through the slow adaptation agents.

Lowest priority

Analysing trade-offs





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Thanks for listening!



This project has received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 699390.



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