



HARMONY

SPATIAL & TRANSPORT PLANNING FOR A NEW MOBILITY ERA

HARMONY

Operational Simulator

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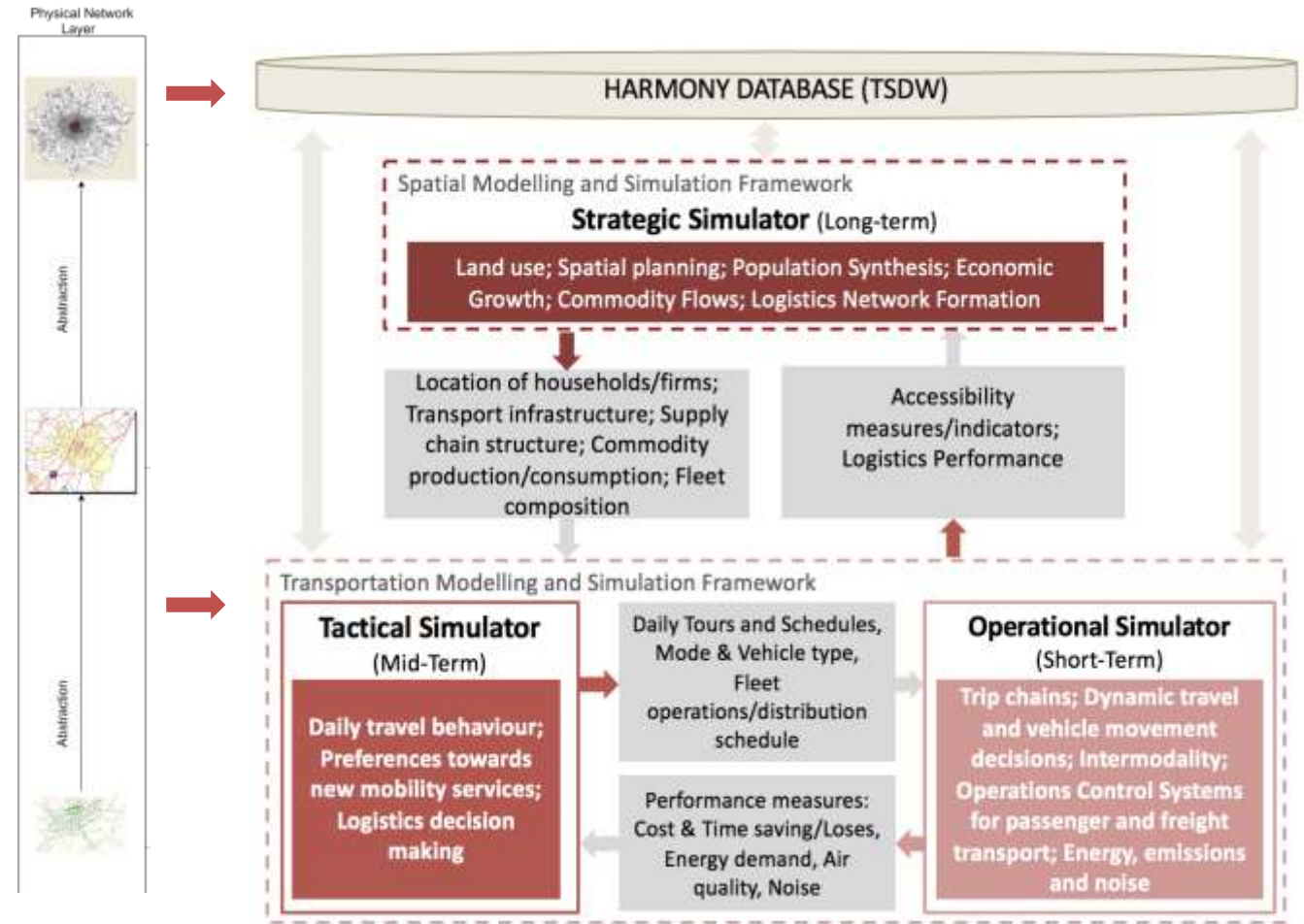


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HARMONY Y model

- **suite** Any major change in mobility landscape, either from supply or demand side, has a potential impact on transport models.
- Decision support systems that reproduce emerging mobility concepts
- An integration is a straightforward way to model mobility



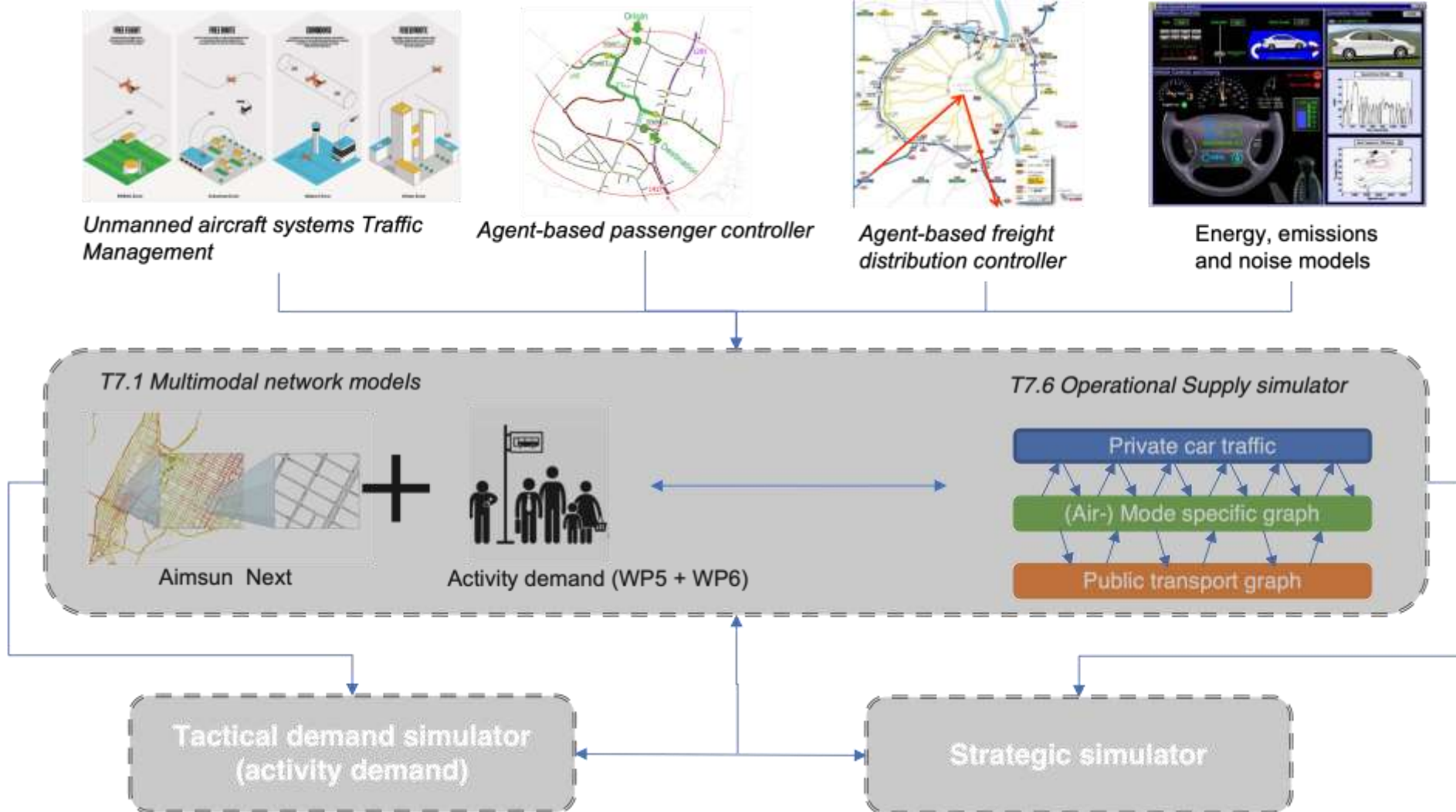


Operational simulator: main components

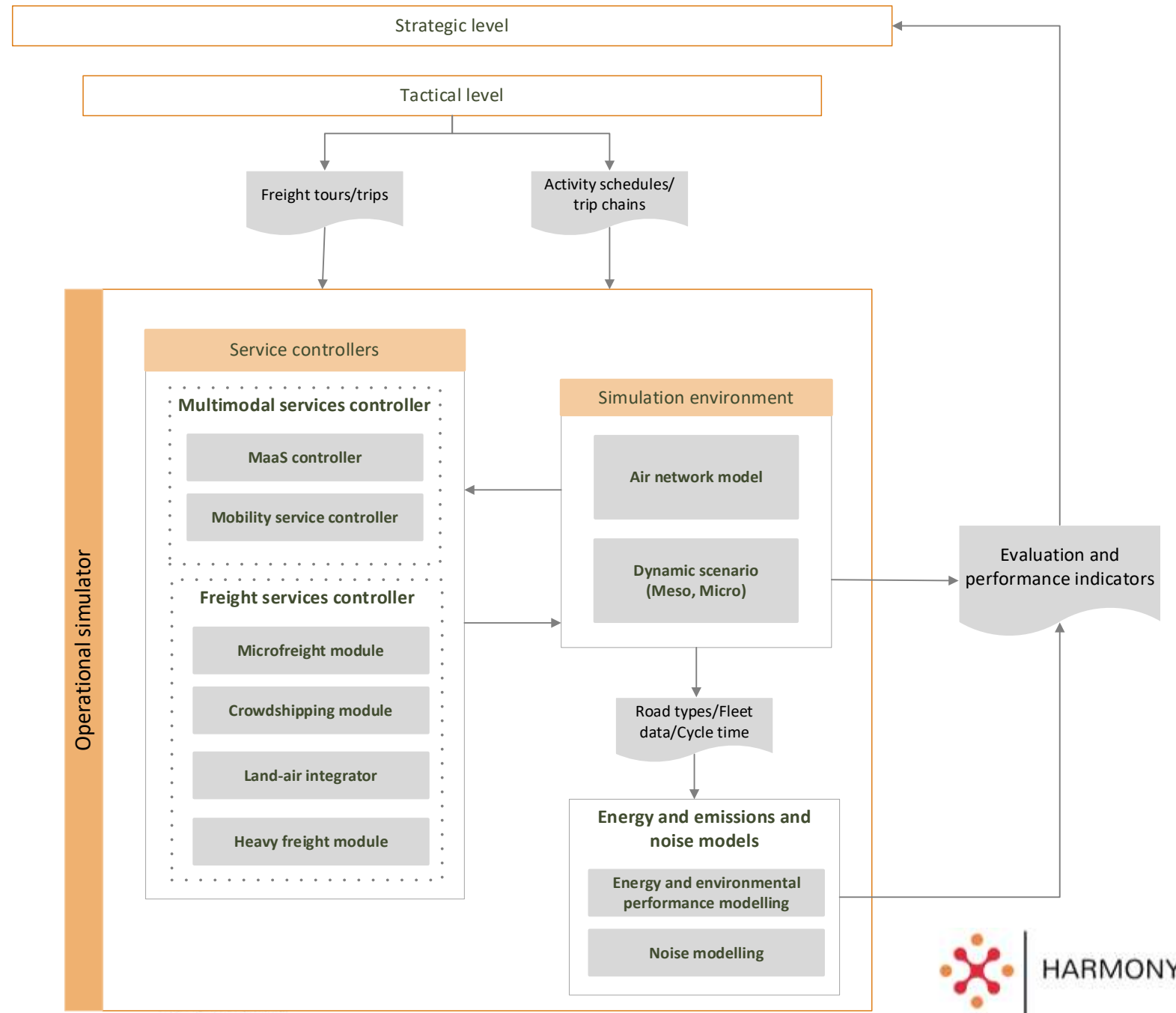
- HARMONY's operational simulator is an integrated dynamic demand and supply simulator, operating on a short-term horizon (with-in day simulations).
- Its main purpose is the evaluation of the transport network's performance, under different loading conditions (demand) and variable infrastructure and mobility services configurations (supply).



Operational simulator: main components



Operational simulator: High level architecture



DATA – network geometry



Data for operational simulator

In order to create a realistic simulation environment, the operational simulator requires the following inputs:

- **Road and Air network geometry:**
- **Demand:** Zoning system, demand data expressed in trips or tours, activity schedules for passengers.
- **Traffic control:** Data defining the operation of traffic signals and ramp meters.
- **Transit operation:** Data defining the operation of public transport (e.g. transit routes, stop locations, service schedule).
- **Network traffic state and performance:** Data defining the behaviour of road elements (e.g. volumes, speeds, travel times).
- **Traffic monitoring data:** Traffic flow, speed and occupancy data from road detectors.
- **Fleet characteristic:** Vehicle composition for public transport vehicles, freight and drones.
- **Regulations:**



Rotterdam use case

Operational simulator: Scenarios and KPIs

Scenarios	KPIs
<p>(Autonomous) Mobility on demand and MaaS (Electric vehicles, demand responsive services, fleet size, charging and parking infrastructure, pricing, routing and re-balancing strategies) Oxfordshire, Athens</p>	<ul style="list-style-type: none">• Energy and emissions performance• Network travel times• Kilometres travelled per vehicle type• Vehicle occupancy
<p>Integration of new city logistics concepts (Automated delivery vans, e-cargo bikes, drones) Rotterdam</p>	<ul style="list-style-type: none">• Number of deliveries per unit time• Total cost of delivery• Energy and emissions performance
<p>Crowdsipping for parcel delivery Oxfordshire, Rotterdam</p>	<ul style="list-style-type: none">• Kilometres travelled per vehicle type• Total cost of delivery• Energy and emissions performance



Scope of the model proposed by Oxfordshire in the Harmony project



OMNICAV Aimsun Next MACRO Model

Ordnance Survey Geometry

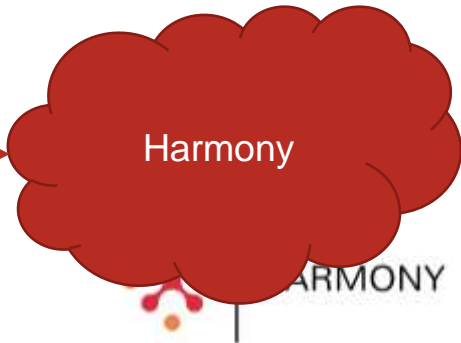
OD MATRIC

OMNICAV Next MICRO Model

Oxfordshire Saturn Model (circa 2013/4)

Oxfordshire Aimsun Next Macro Model
Import and calibrated/ validated
AM / PM and IM (cal&val year unknown)

NEVFMA Aimsun Next Macro Model
NEVFMA Aimsun Next MESO Model
NEVFMA Aimsun LIVE MESO Model



Operational simulator: Oxfordshire example



Conclusions

- **First application** of the operational model will be applied for the assessment of policies in the system related to fleet management for passenger and freight.
- New generation of multi-agent simulation models for urban passenger and freight planning are part of iteration process with operational simulator to improve reliability of the models.
- **Integration of multiresolution supply and fleet controllers with multi-agent demand** allows a better impact prediction of the new emerging concepts faced by stakeholders (e.g. logistic segments), and implementation of scenarios for city logistics and DRT services.
- **Next iterations** of the operational simulators are expected to improve the validity of models.



Thank you!

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