SPATIAL PLANNING & URBAN DESIGN

URBANISM NEXT EUROPE 2021

Innovation Framework for New Developments

A case study

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Walking the talk…
Our journey to redefine modelling

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MIMAS : Modelling Infrastructure & Mobility as a Service

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Our Modelling Track Record

Background

The existing Oxfordshire Strategic Model (OSM) was developed in 2013. In line with our drive to be at the forefront of Local Authority innovation, the OSM was one of the first models to exploit Mobile Network Data (MND). Whilst this was considered cutting edge in 2013 and has been used to great effect over the last four years, the data within the model is now reaching the end of its useable life.

We needed a new approach designed around Local Authority needs…

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User first Design

Understanding our challenges & ambitions

Commercial

- UK first innovation procurement partnership
- Collaborative model
- Turn key – inhouse operation
- Recurring revenue – mobility providers, developers
- Recurring revenue – other local authorities

+

Functionality

- Robust, evidence based decision making
- Input agnostic & dynamic – future proofing
- Persistent, real time capability
- Historical, current & predictive – ‘what if’
- Test schemes digitally with zero risk
- Easy to use for non-specialist users

forty two.

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Broad Needs

Easy to use

- Select Link Analysis- junctions
- Developers – simple transport assessments
- O/D routes for journey planners
- Support different levels of access depending on needs

Robust

- UTMC
- Data agnostic
- Future traffic year projections
- Behaviourally sound mechanisms for route selection
- Cover the County
- Granularity – O/D journey purpose
- Incorporate freight / Delivery data
- Model all time periods not just peak

Flexible

- Micro / Macro Simulations – new sources
- Ingest other models
- Real time updates – future proof new data
- Assess housing & employment needs – local growth

Broad Needs

Forecast

- Multi- modal modelling – all modes
- What-if?
- Assess network wide impact on congestion, infrastructure changes, policy changes.
- Isolate first/last mile in multi-modal environment
- Model vehicle ownership and usage
- Correlate relationship between car use and available parking

Business Case

- Support business case for transport, land use, environmental measures,
- Assess proposed road improvements, transport schemes, major local events and their impact
- Cost of congestion caused by accidents, roadworks vs potential savings from interventions
- Evidence projected effect of of changes to overall road capacity
- Provide clear outputs for stakeholders – pictorial, dashboard etc

Revenue Generating

- Commercially viable
- Replicable
- Licensable to others
- Income generating for OCC

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Inside MIMAS

- MIMAS is a bespoke platform combining
  - Immense's agent-based model,
  - Alchera's secure data integration,
  - GeoSpock's data store and
  - Zipabout's journey support with
  - Oxford Computer Consultants' visualisations.

What can we do with MIMAS

Some use-cases:

- Model the impacts on traffic network of new housing/employment development sites;
- Model the impacts of new road schemes;
- Model the impacts on congestion of modal share changes (e.g. active modes uptake);
- Model PT improvements (e.g. new bus routes);
- Model the impact of new P&R sites, on-street parking spaces;
- Etc.

What can MIMAS do?

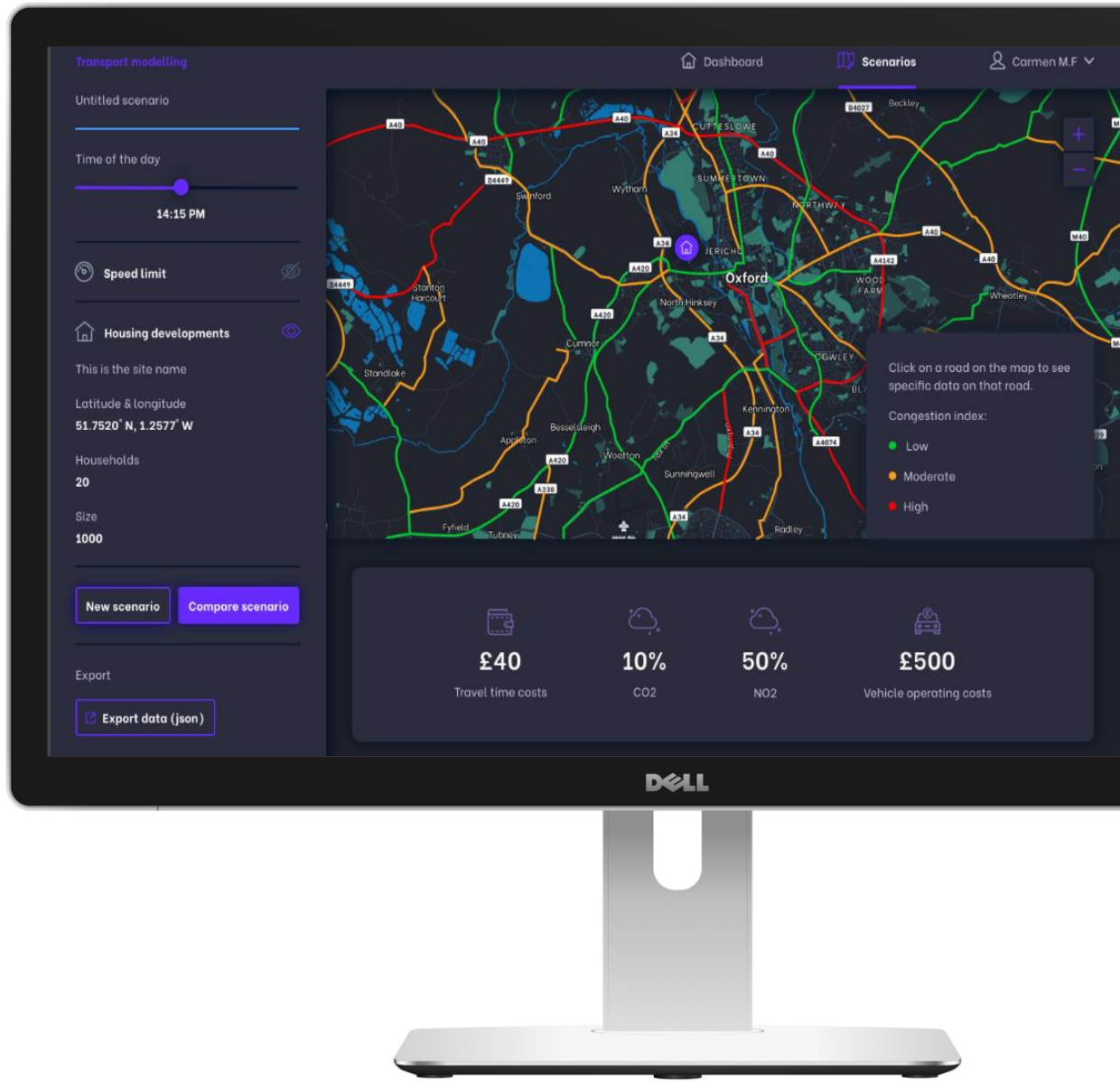
Users can interrogate the OMM results

- Visualise KPIs to understand the impact of new schemes;
- compare base-model outputs with observed data;
- track data and configurations back to its source:

  simulation results ⇨

  (model + scenario) ⇨

  validation data

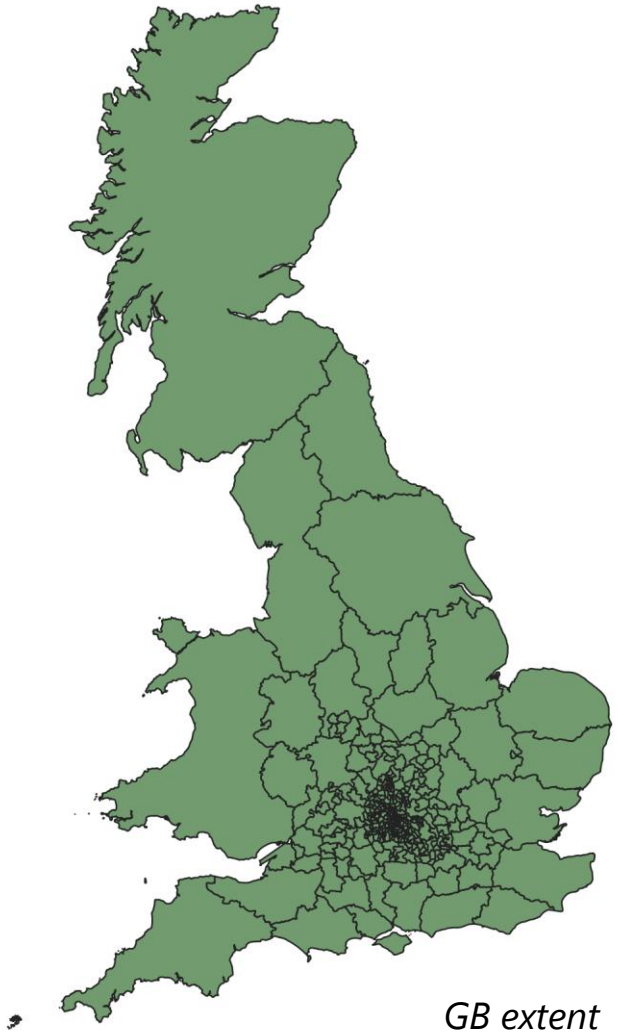


Data used to develop OMM

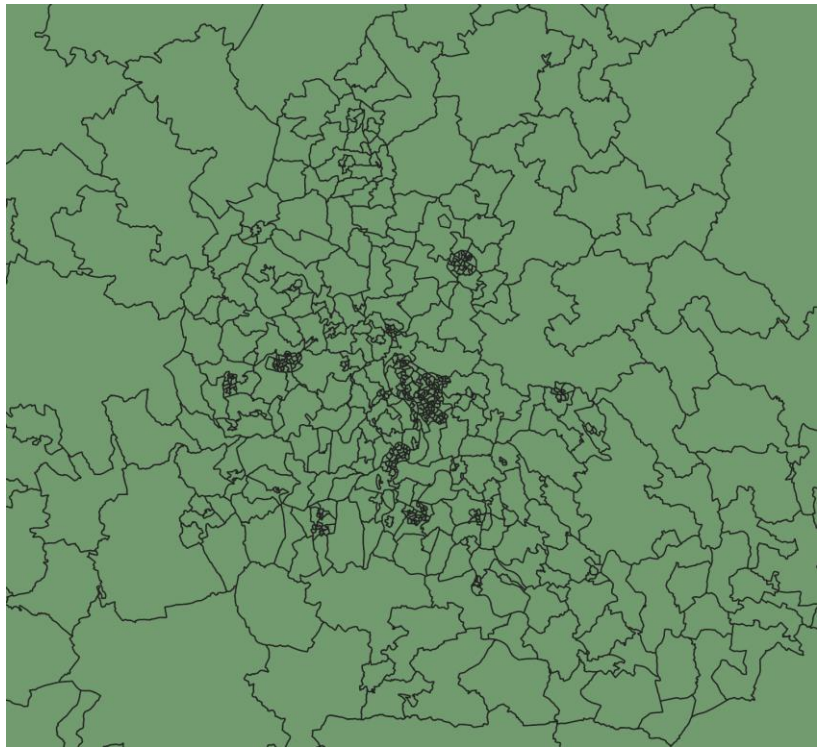
- Travel demand based on 2019 Mobile Network Telefonica data (MND);
- Pedestrian and cyclist data extracted from STRAVA Metro;
- Supply data derived from open source dataset and enriched with premium datasets;
- Public Transport data: timetables provided by Alchera and additional missing information extracted from the existing EMME model;
- Cal/Val data: journey times, traffic counts (MCC), INRIX speed data, provided by Oxfordshire County Council.

Geographic coverage of the model

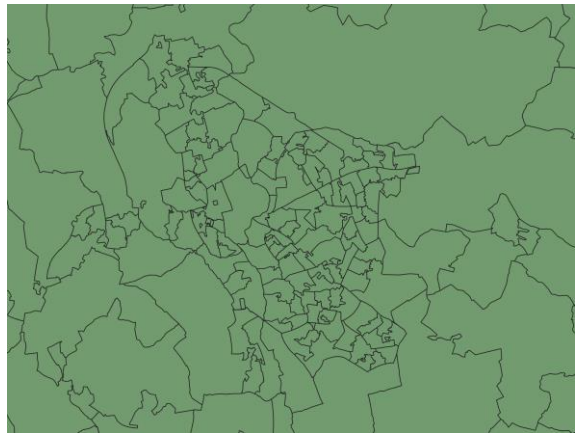
OMM zone system based on Census boundaries



GB extent



Oxfordshire extent



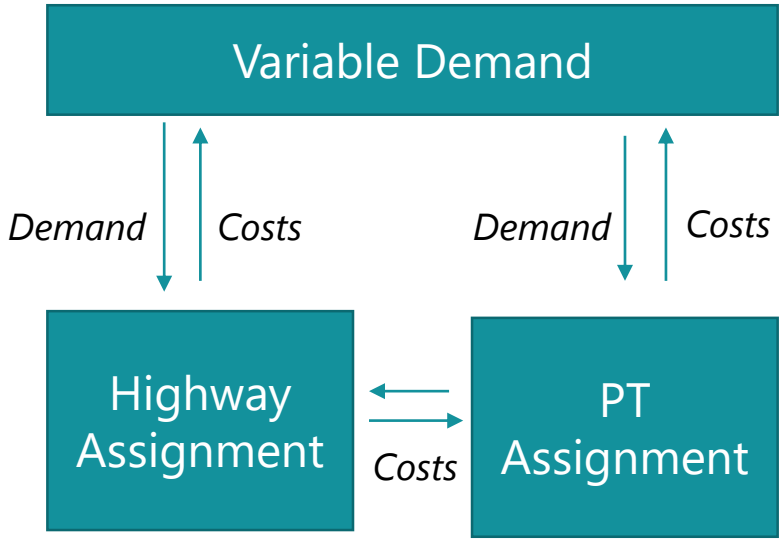
Oxford extent

The modelling approach

From a functional perspective, the core components of a traditional strategic model will be included.

These are:

- An aggregate demand and mode choice model;
- An agent-based highway assignment model;
- An aggregate public transport assignment model.



Model outputs

- Highway model outputs:
  - Traffic flows;
  - Turning flows;
  - Average speed;
  - Congestion metrics (queue lengths, density/jam-density, speed/free-flow-speed);
  - Environmental indicators (CO_2 and NOx) at link level;
  - SLA (Select Link analysis);
  - Parking spaces utilisation.

- PT model outputs:
  - OD bus matrices;
  - Passengers flows on highway links and railway links;
  - Walk flows generated by agents catching the bus at bus stops.

- Demand model outputs:
  - Agent-based demand matrix with agents' attributes (e.g. trip purpose, demographic).

Modes/vehicle types/trip purposes/times of day modelled

- Modes: highway, PT, P&R modes. Active modes in demand model (unused) and not assigned to the network;
- Vehicle types: car, LGV, HGV, buses;
- Trip purposes: HBW, HBO, NHBW, NHBO, Education trips;
- Times of day modelled: 24 hrs.

OMM : facts

- Model being developed according to TAG
- Base year: 2019
- Forecast year: 2035 do-minimum
- Temporal coverage: 24 hrs
- Spatial coverage: Oxfordshire

Model update

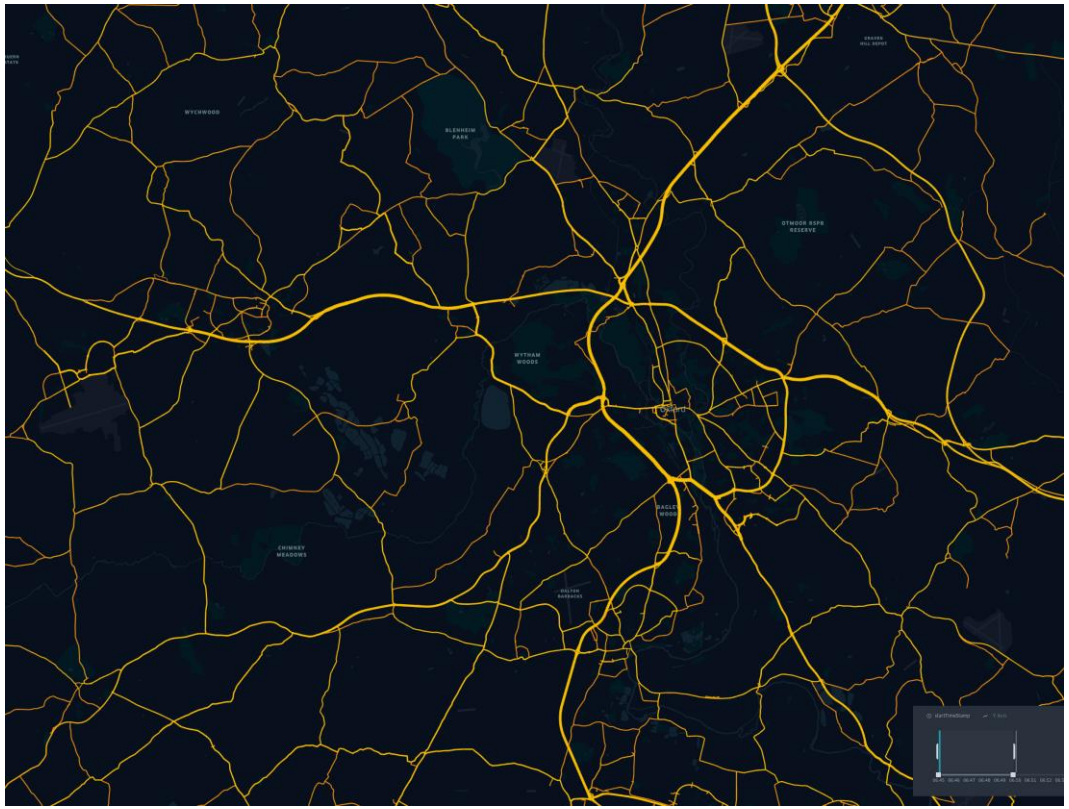


Figure 2: traffic flows – initial network calibration

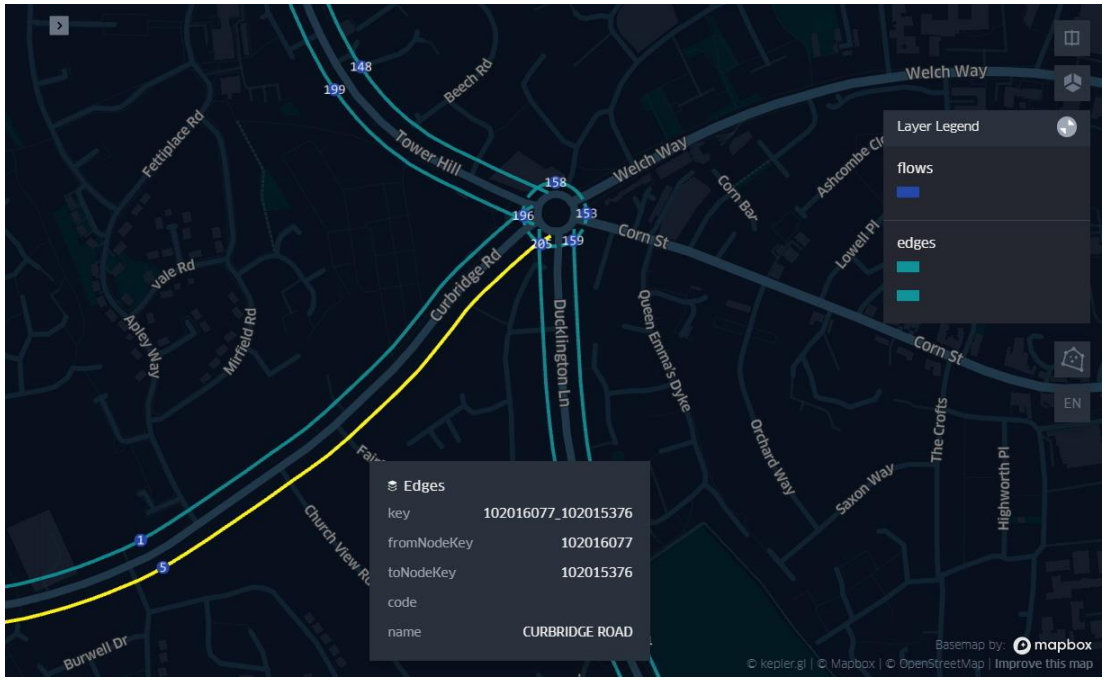


Figure 3: traffic flows – initial network calibration

Model update

- Demand model:
  - Initial demand validation;
  - Highway/demand models interaction.

Figure 4: origin to destination arcs, along with the routes that connect them.

Figure 5: single origin to destinations arcs, along with the routes that connect them.

OMM development timelines

- April 2021:
  - Software development completed;
  - Beta version released at the end of April;
- May-July 2021:
  - Cal/val activities;
- Q4 2021:
  - Calibrated OMM model release.

THANK YOU
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