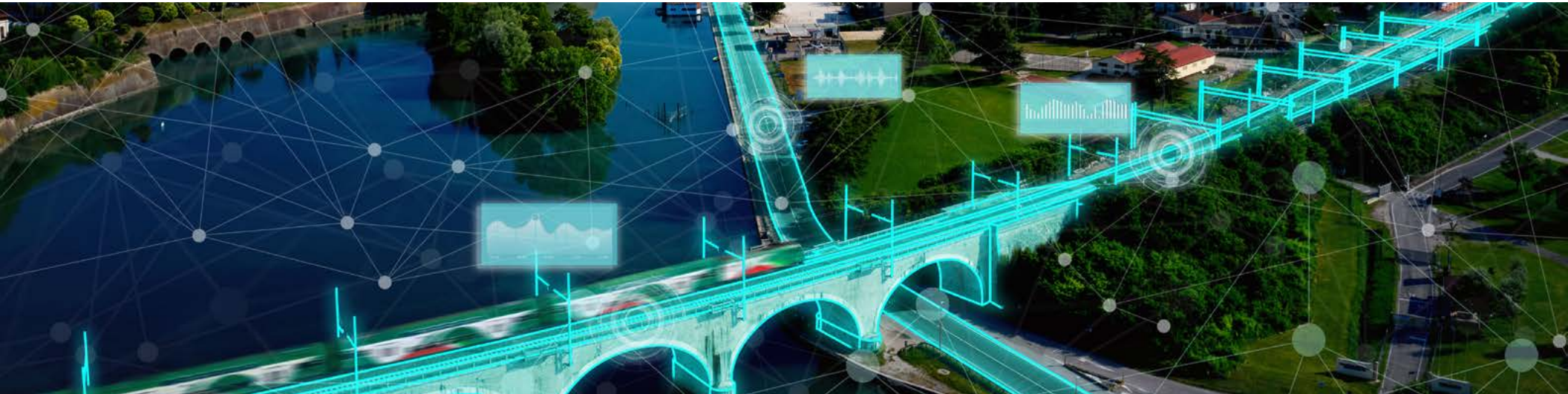
Can Your Travel Demand Modeling Software Keep up with Changing Travel Patterns?

Mobility is Constantly Evolving...

Transport agencies around the world rely on travel demand models to evaluate mobility infrastructure, policy, and multimodal transport systems. Travel models provide decision support for effectively planning a region's accessibility, economic growth, and quality of environment.

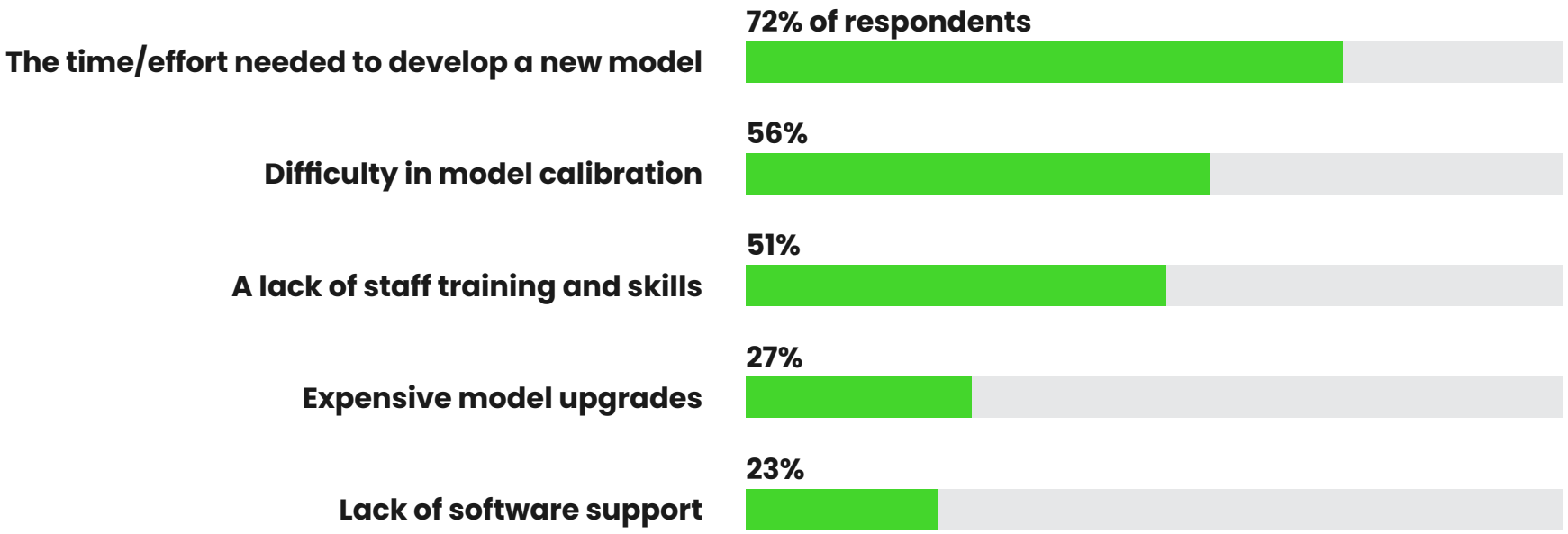
Today, cities are experiencing generational changes to travel behavior and mobility patterns. As a result, **transport modelers are facing new challenges**, including:

- How to adapt, upgrade, or recalibrate existing travel models, many of which have not been updated since the pandemic.
- How to leverage new mobility data sources including big data.
- How to ensure modeling staff get the right skills and training.



...Leading to New Challenges for Transport Modelers

In a recent global survey*, transport modelers ranked the **top five challenges** faced in maintaining or advancing their travel demand model(s), which are:



Based on a survey conducted by the mobility simulation team at Bentley Systems. Transport modelers were asked about the challenges they faced in maintaining or advancing their travel demand model in today's environment.

Can Your Travel Modeling Software Keep up with New Challenges?
Ask These Five Questions

1 Which travel demand model structures are supported?

Does the model need to change frequently? Can you avoid risky and costly “big bang” model development initiatives?

2 How can you leverage data in model calibration?

Does the platform offer automated calibration?

What kind of data sources can be leveraged for calibration? Will you use HHTS, O-D, traffic counts, or transit count?

3 How long will model development take?

Does the platform have a library of modifiable templates that allows easy user adjustment to model steps? Is your project funding modeling work, or platform implementation?

4 How easy will it be to maintain?

Does the platform offer a user interface for easy modification and management?

How effectively can the models be updated over time?

5 What about technical support and updates?

Is there a dedicated technical support team?

Does the platform also include integrated network modeling capabilities?

Bentley OpenPaths™ Helps You Keep up with Changing Travel Patterns...

Bentley OpenPaths includes AGENT®, a platform for assembling, calibrating, and applying travel demand models for improved forecasting. It has everything needed for modern travel demand modeling, including a population synthesizer, choice modeling, automated calibration and scenario management.

...and Helps You Address the Top Five Travel Demand Model Challenges

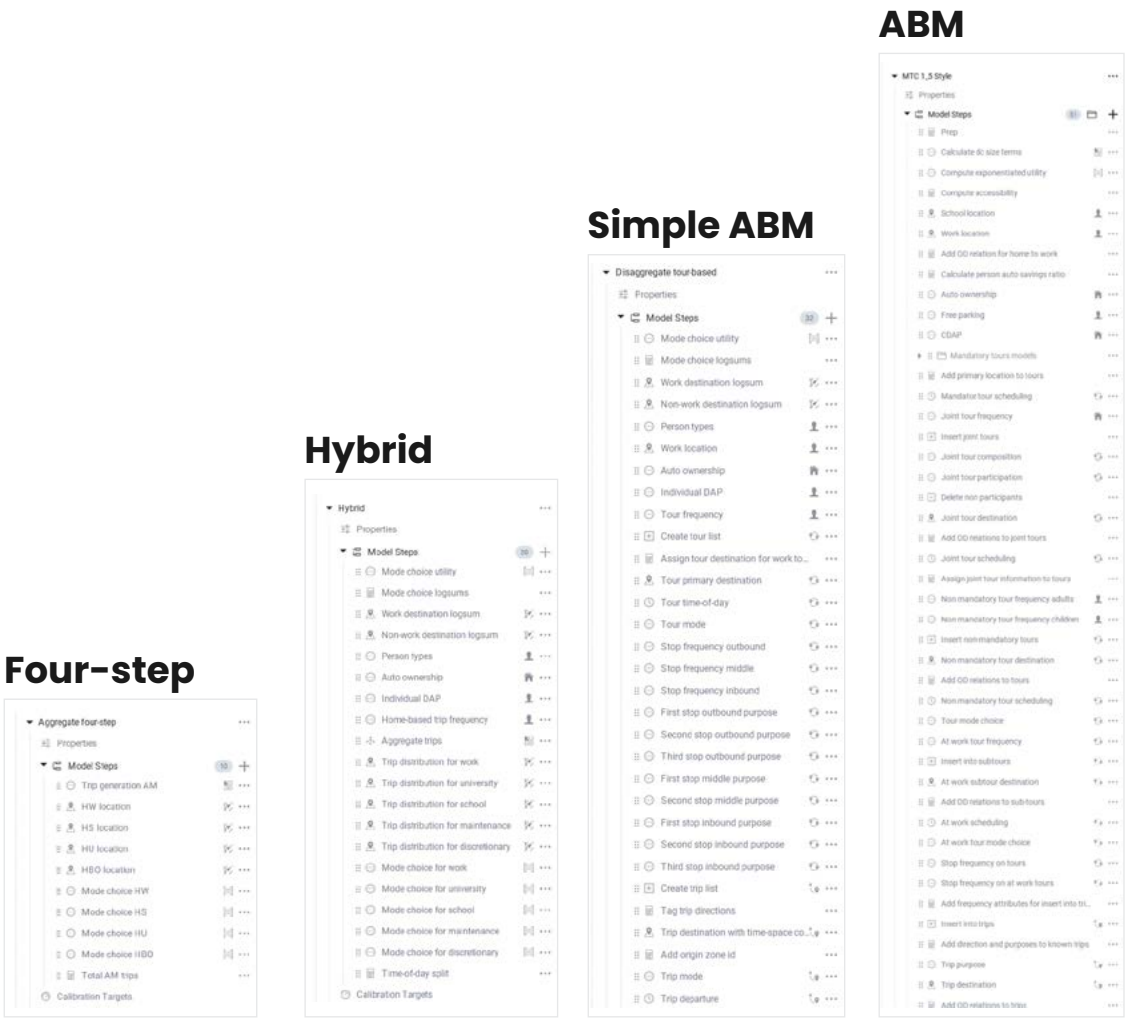
Top Five Travel Demand Model Challenges

1 What Travel Demand Model Structures are Supported?

Bentley OpenPaths AGENT includes out-of-the-box support for **virtually any travel demand model** structure, including trip-based, hybrid, tour-based, and activity-based (ABM) models. You can even mix elements of each as needed.

Now, you can **advance your travel model roadmap** and handle production needs in one platform without the high cost of switching software.

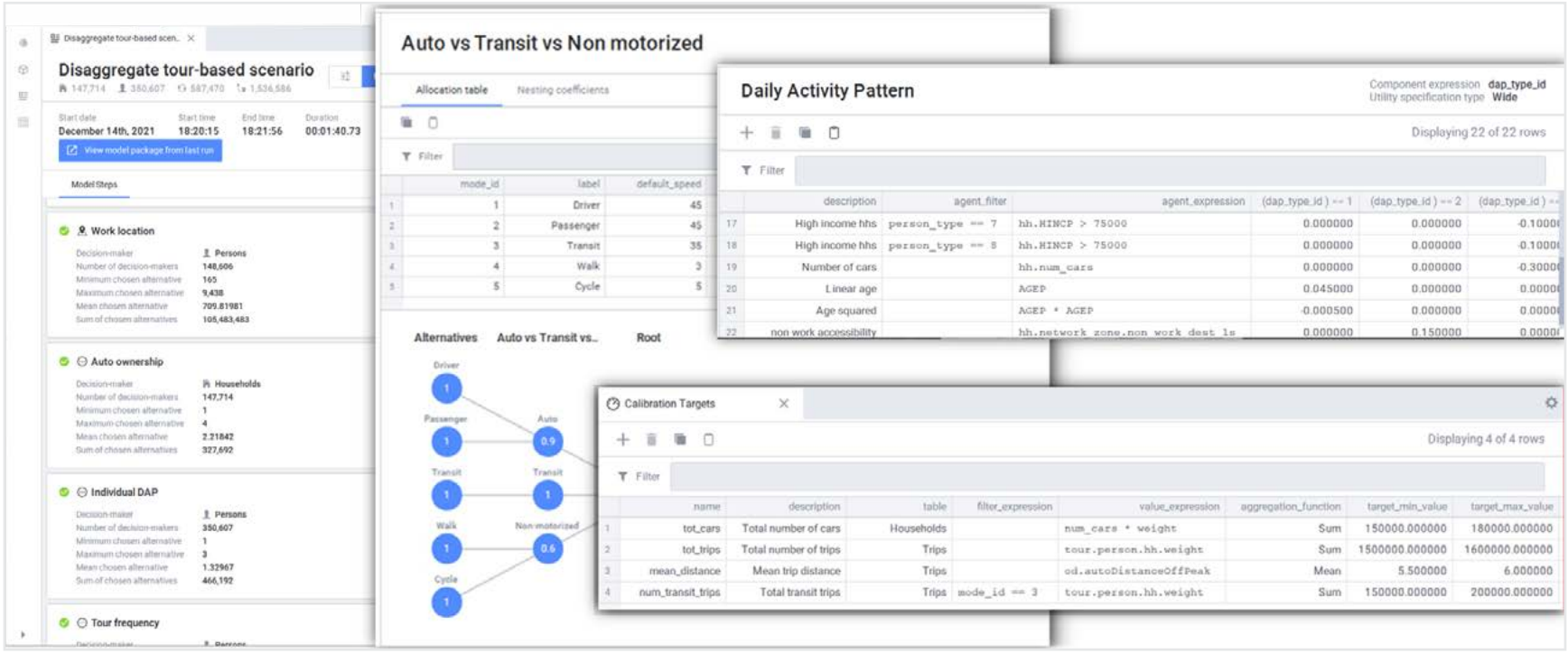
Every travel model is different, but your travel model platform does not need to be.



From left to right, examples of trip-based, hybrid, tour-based, and activity-based model packages, assembled from configurable components.

2 How Long Will Model Development Take?

Bentley OpenPaths AGENT helps you **assemble travel demand models faster** than you thought possible, whether you are replatforming your existing model or starting a new model. Get started quickly with out-of-the-box model templates for your chosen travel demand models, then leverage an intuitive UI, a powerful expression system, and live model validation to save time.

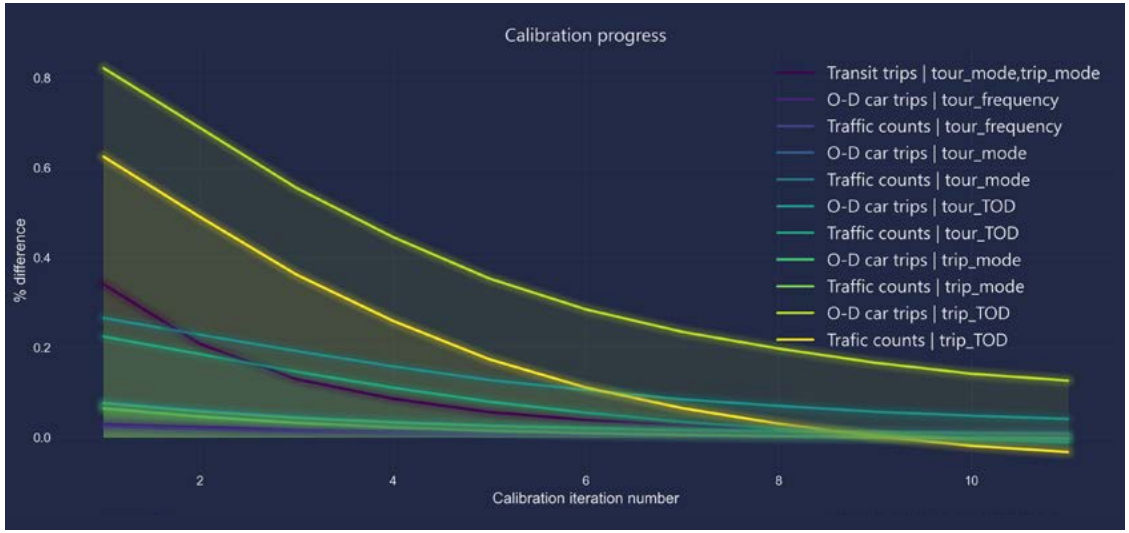


Bentley OpenPaths AGENT provides rapid and composable model configuration with a full demand modeling UI, easing configuration of choice set, statistical model, decision maker, utility expressions, and calibration targets.

3 How Can You Leverage Data within Model Calibration?

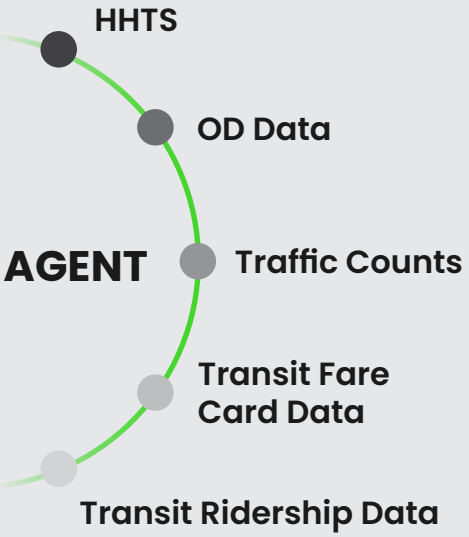
Bentley OpenPaths AGENT includes an automated calibration procedure that allows you to simultaneously calibrate model coefficients against data targets from available mobility data. The procedure helps you to:

- **Eliminate costly trial-and-error** approaches to calibration.
- **Improve** model **calibration** and **validation** results.
- Keep travel demand models **up to date with mobility changes**.
- Leverage new mobility data sources, including **big data**.



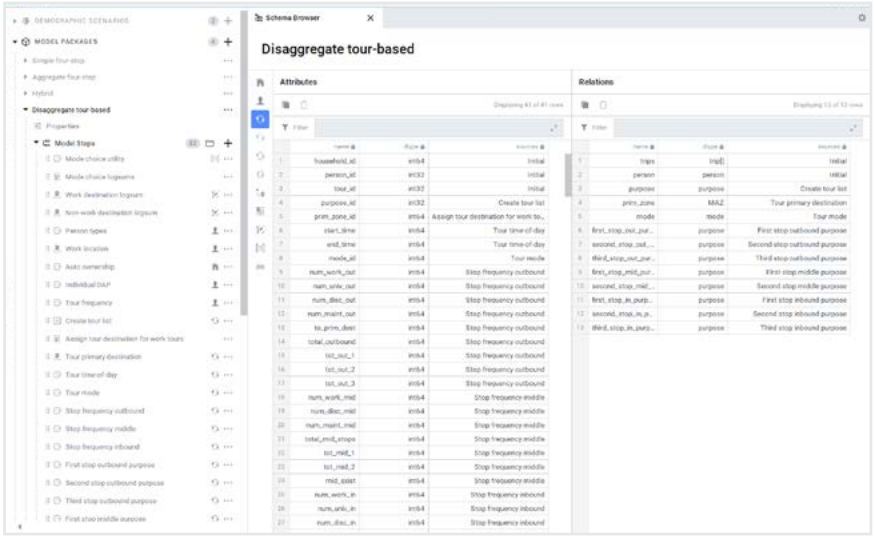
Mobility Data Fusion – a simultaneous calibration procedure using multiple data sources automates the most manual of modeling tasks.

Bentley OpenPaths AGENT lets you fuse your mobility data together for an enriched model calibration, resulting in improved simulation outcomes. Now, you can leverage big data directly within model calibration.

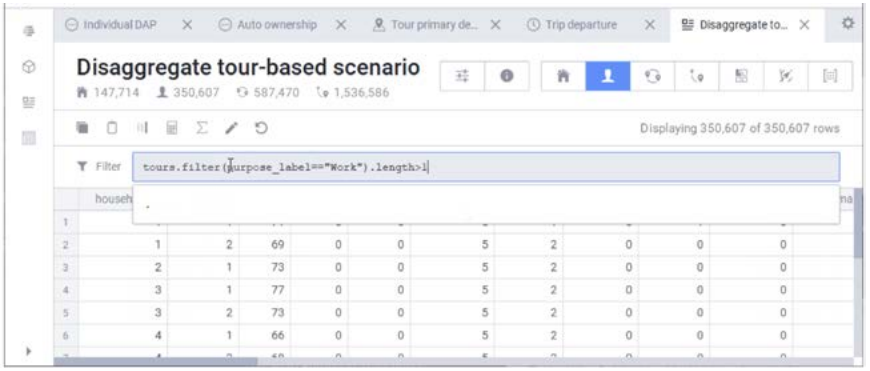


4 How Easy Will it Be to Maintain?

Bentley OpenPaths AGENT makes it simple to define travel demand models and work with simulation results in **a clear and intuitive interface** that everyone on the team can use. Model packages can easily maintain different model structures or versions in parallel, and **can be upgraded over time with advanced features** without the high costs of recoding or changing platforms. A managed system for model validation automatically identifies configuration issues before they occur to avoid time-consuming model run errors and improve model reliability.



A schema browser maintains an up-to-date glossary of configured attributes and relations that make any model transparent.



Bentley OpenPaths AGENT includes expressions with autocomplete. You can navigate a relational travel database of households, persons, tours, trips, and multiple zone systems.

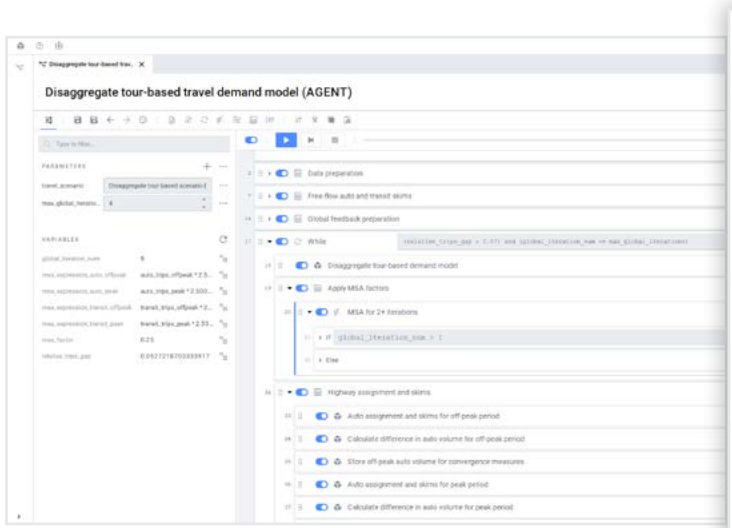
5 What about Technical Support and Updates?

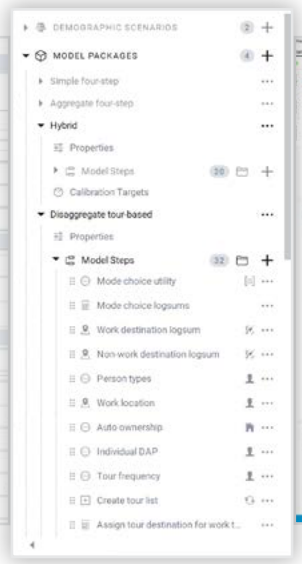
- Bentley OpenPaths AGENT works with Bentley OpenPaths EMME® and Bentley OpenPaths CUBE™ to provide seamless, integrated transport modeling.
- Advance your travel model capabilities over time with new Bentley OpenPaths AGENT application updates, distributed alongside Bentley OpenPaths CUBE and/or Bentley OpenPaths EMME versions.
- Access our industry-recognized technical support team for help with integrated topics covering both demand and network modeling.

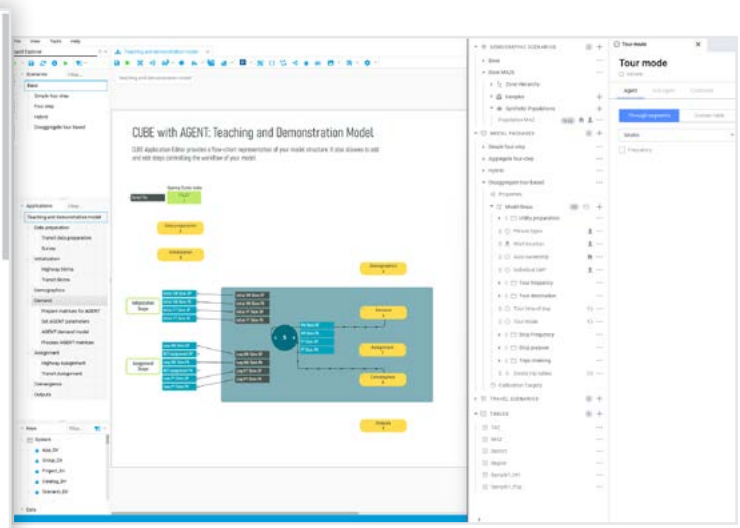
OpenPaths™ EMME®

OpenPaths™ AGENT®

OpenPaths™ CUBE™







Leverage Bentley OpenPaths EMME features like Modeler, APIs, Notebooks, Scenes, and Flow with Bentley OpenPaths AGENT.

Leverage Bentley OpenPaths CUBE features like Application Manager, Scenario Manager, and Voyager with Bentley OpenPaths AGENT.

What Modelers Are Saying about Bentley OpenPaths AGENT

> Bentley OpenPaths AGENT has made transport modeling more accessible to a wider range of users. It has further enhanced our capabilities to forecast travel demand in a more sophisticated manner, and can be more representative of how people actually travel.

LTA Singapore, Transport Modelling and Simulation Division

Land Transport Authority
We Keep Your World Moving

> Bentley OpenPaths AGENT allows me to focus on the actual design and implementation of the demand model itself [...] this saves me time that I can use in calibration and validation to improve the quality of our models.

Kurt Verlinden, Significance NL

significance
quantitative research

> Features we have found very useful [in Bentley OpenPaths AGENT] include tools for analyzing model output and the built-in support for model calibration that saved us a lot of time [...] Our impression so far [of Bentley OpenPaths AGENT] is that we have a model with a low cost of maintenance that can be further developed to address new questions.

Svante Berglund, Trafikverket Sweden

TRAFIKVERKET

What Modelers Are Saying about Bentley OpenPaths AGENT

> Every so often, a profession or industry witnesses a significant event or inflection point that greatly improves efficiency, commissioning, and understanding of current practices while allowing the study and implementation of evolving behavior that was hitherto unexplored or too costly to execute. Bentley's launch of Bentley OpenPaths AGENT [...] is one such inflection point in the travel forecasting and mobility planning space. Its easy-to-use interface, calibration frameworks, multilevel and comprehensive use of big data sources, and pre-built modeling paradigms provide practitioners and users flexibility and access to cutting-edge ideas that were previously out of reach without a significant investment in time and resources.

Mausam Duggal, National Director, Transportation Planning and Science, WSP Canada

> Bentley OpenPaths AGENT is a great step up from conventional modeling software. We were amazed by the fast development time, the ease of incorporating steps, the transparency of the models, and the quick runtime, not to mention the great support from Bentley's team.

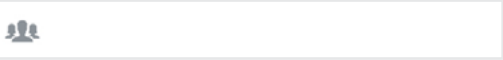
Issa Zananiri, Jerusalem Transportation Master Plan Team

JERUSALEM TRANSPORTATION MASTER PLAN TEAM

Bentley OpenPaths Includes Everything Needed for Modern Travel Demand Modeling in One Place

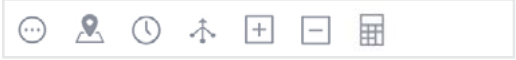
Population Synthesizer

Simultaneous balancing of geographies and zones. Diagnostic warnings. Promotion and sharing for working across geographies with insufficient samples.



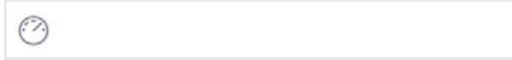
Choice Modeling Tools

Temporal, location, and general choice model components. Stochastic and statistical model options. Time-space constraints. Relational utility expression specifications.



Automated Calibration

Regional, zonal, and O-D calibration targets. Simultaneous and automatic adjustment of model coefficients to mobility data. Diagnostic reports.



Relational Travel Data Schema

Native support for households, persons, vehicles, tours and joint tours, trips, cars, zones, and O-D matrices.

Model Packages

Generalized travel demand model specifications for virtually any travel demand model. Flexible model structure and segmentation. Out-of-the-box templates for trip-based, tour-based, activity-based, and hybrid models. Export/import donor models.

Audit, Diagnostic, and Validation Features

Live validation of utility expressions and model package integrity. Granular error diagnostics. Dependency tracing.

Bentley OpenPaths Includes Everything Needed for Modern Travel Demand Modeling in One Place

Scenario Management

Demographic scenario and travel scenario management. Works with Bentley OpenPaths EMME network scenarios and/or Bentley OpenPaths CUBE scenario manager.

Model Management Frameworks (UI and API)

User interface for interactive travel demand model management. Python APIs for automating data access, data import, and working with model runs.

Visualization and Analysis

Relational expressions for tabular and relational travel scenario analysis. Interactive simulation playback of ABM results.

Addressing the Top Travel Demand Model Challenges Is Easy with Bentley OpenPaths AGENT

Top Five Challenges Faced by Transport Modelers		Bentley OpenPaths AGENT	Current Software
Time/effort to develop a new model	✓	Bentley OpenPaths AGENT reduces the time needed to assemble a travel demand model, no matter your model structure (four step, tour based, activity based).	?
Difficulty in model calibration	✓	Bentley OpenPaths AGENT automates and accelerates the model calibration process.	?
Lack of staff training and skills	✓	Bentley OpenPaths AGENT offers an intuitive UI that provides a general specification for travel modeling.	?
Expensive model upgrades	✓	Bentley OpenPaths AGENT enables you to easily adapt, adjust, or maintain different models in parallel without changing platforms.	?
Lack of software support	✓	Bentley OpenPaths AGENT comes with recognized technical support and platform upgrades over time.	?

AGENT is Now Available as Part of Bentley OpenPaths!

What is Bentley OpenPaths?

Bentley OpenPaths is a harmonized product license for EMME, CUBE, AGENT, DYNAMEQ and CityPhi, providing greater accessibility to both trusted transport modeling software and new technology with generational advances to support strategic and operational transport planning.

OpenPaths is offered in two distinct licensing options.

- OpenPaths Advanced includes OpenPaths EMME®, OpenPaths CUBE™, and OpenPaths CityPhi®.
- OpenPaths Ultimate includes everything in the Advanced Edition plus OpenPaths AGENT® and OpenPaths DYNAMEQ®

Learn More About Bentley OpenPaths