COG/TPB GEN3 TRAVEL MODEL

Status report

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Travel Forecasting Subcommittee
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Agenda Item #3b

Overview

- Status of Gen3 Model, Phase 3, development, which is led by TPB staff with on-call support from RSG and Baseline Mobility Group (BMG):
  - Beta release of the Gen3 Travel Model
    - Gen3/Version 1.0.5 Model transmittal package for beta testing
    - Request for the beta release model transmittal package
  - Post-beta model enhancements and bugfixes
    - Recalibrated transit pass subsidy model and free parking model to local data;
    - Updated the transit skimming process to consider PNR parking cost;
    - Recalibrating tour/trip mode choice models following the above model updates;
    - Tested new software/features.
- Next Steps

Beta Release: Model Transmittal Package

- On November 7, Mark announced a beta release of the Gen3/Ver. 1.0.5 Model to the TFS.
- TPB staff prepared a model transmittal package for the beta release, which contains:
  - **Model files** that are necessary to run the model;
  - **Input files** for three analysis years:
    - 2018, representing the model base year;
    - 2025 and 2050, representing the current and horizon years of Visualize 2050, with network inputs from Visualize 2050 (with the Southside Express Lane Project included) and LU inputs from Round 10.0 Cooperative Forecasts.
  - **Model documentation**:
    - Gen3/Version 1.0.5 Model User's Guide
    - Gen3/Version 1.0.4 Model Calibration and Validation Report
    - Highway and Transit Networks Developed for the Gen3 Model

Beta Release: Request for the Beta Model

- The beta model can be requested for testing via TPB's data request portal.
- Upon request, TPB staff will provide a download link for the zipped model transmittal package: It takes about two minutes to download it and about **two hours** to extract it!
- To run the Gen3 Model, please make sure that you have:
  - **A Bentley Cube license** for either Cube CE 6.5.1 or OpenPaths Cube 2025,
  - A Microsoft Windows workstation or server with **recommended specifications** of 32-core CPU, 256 GB of RAM, and 1200 GB of free disk space (or **minimum specifications** of 16 CPU cores, 206 GB of RAM, and 500 GB of free space).
- Before running the model, you are strongly recommended to read the model documentation, especially the model transmittal memo and Chapters 2-4 of the model user's guide.
- Subject to staff availability, TPB **may** be able to provide some helpdesk assistance to testers on how to set up and execute the model.
- Your feedback would be much appreciated!

Post Beta: Transit Subsidy/Free Parking Calibration

- During model development, the transit pass subsidy model and free parking model were transferred from the SEMCOG Travel Model without being calibrated to local data.
- During the model usability testing, TPB staff found that the two models significantly underestimated the availability of employer provided transit and parking benefits in our region as compared to COG's State of the Commute (SOC) Survey data.
- TPB staff addressed this discrepancy through the following actions:
  - Developed local calibration targets from the 2019 SOC Survey data.
  - Developed two Python-based programs that automate calibration for the two models.
  - Re-calibrated the two models to the local data.
- Staff will conduct a sensitivity test to verify the reasonableness of model sensitivities related to transit subsidy or free parking.

Post Beta: Fixes to PNR-access Transit Skimming

- During the model usability testing, TPB staff found that the transmit skimming process for PNR-access transit trips did not properly account for the PNR parking cost at transit stations.
- TPB staff instituted a fix in transit skimming (specifically, in the development of PNR-access Non-Transit legs and their generalized travel costs) to consider the PNR parking cost.
- TPB staff will conduct a sensitivity test related to the parking cost at PNR transit stations to verify this fix.

Post Beta: Tour/Trip Mode Choice Model Calibration

- Updates to transit subsidy, free parking and PNR-access transit skimming warranted a re-calibration of the tour and trip mode choice models.
- Calibrating mode choice models is especially challenging because:
  - Model specifications are convoluted with multiple layers of segmentation.
  - Calibration involves so many coefficients that it is impossible to match every target.
  - Iterating between mode choice calibration and transit validation is often needed to achieve a satisfactory calibration and validation performance.
- TPB staff are conducting the calibration with on-call support from RSG.
  - Staff updated two Jupyter Notebook scripts developed by RSG.
  - Staff conducted first-round calibration and validation, finding that although modeled % shares of tours/trips by purpose/mode closely matched with the targets in calibration, transit ridership was overestimated in validation.
  - Staff are re-visiting mode choice calibration to improve transit validation.

Post Beta: Software Testing

- Staff successfully tested ActivitySim 1.5 in the Gen3 Model and found marginal changes to model results due to the upgrade to Pandas 2.x.
- Staff successfully tested Sharrow in the Gen3 Model but found limited runtime benefits associated with the software.
- Staff tested pre-installing model required R libraries in the Python environment, instead of bundling them with the Gen3 Model files.
- Per request from the ActivitySim consortium, staff tested the new PopulationSim software (v0.10.0) and confirmed that it resolved an issue that COG staff noticed before.
- Staff will evaluate whether to include these new software/features in the official release of the Gen3 Model.

Next Steps

- COG staff will continue to distribute the beta version of the Gen3 Model per request.
- Staff will complete post-beta model updates, conduct additional sensitivity tests to confirm the reasonableness of model response, and incorporate these updates into a new model version.
- The current Gen3 Model development contract with RSG and BMG will expire in December; Staff are reviewing proposals regarding a new contract for consultant assistance on COG's travel forecasting methods.
- Depending on the success of the beta release, staff will prepare an official release of the Gen3 Model in the next few months.

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  - RSG/BMG: Ali Etezady, Joel Freedman, and Mushtaq Rahman.

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