New York Best Practice Model Update

Summary Presentation

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Presentation Outline

- What is an Activity-Based Model (ABM) and why is it useful?
- Overview of the New York Best Practice Model (NYBPM) , the NY metropolitan region's ABM
- Improvements in the latest NYBPM update
- Validation of the updated model
- Uses of NYBPM
- Moving forward

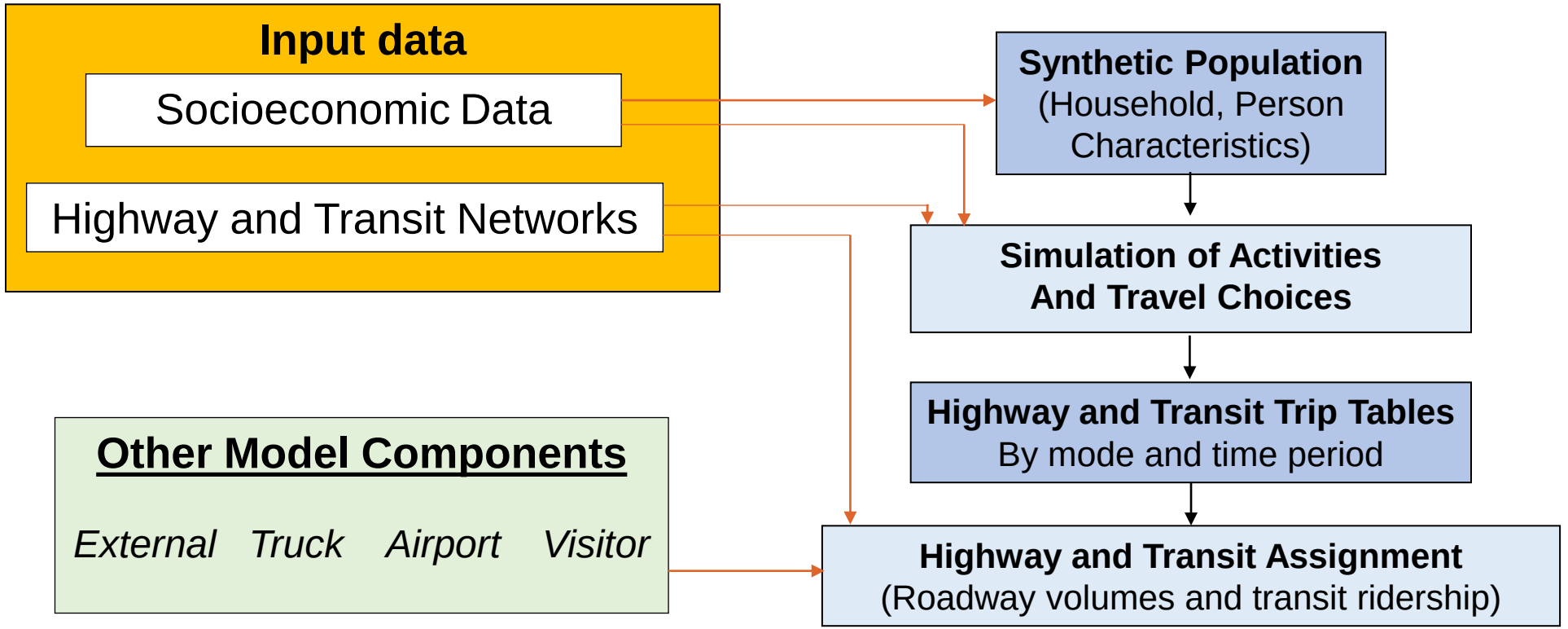
What a Model Is…and Is Not

- A model is…
  - An analytical tool to provide important information to planners
  - A means to quantitatively estimate the effects of transportation planning, policy, or investment decisions—or external factors—on transportation demand
- A model is not…
  - A crystal ball—it does not predict the future
  - A way to get “the answer” on a planning decision

A Travel Demand Model …

- … takes a set of available *input data* …
- … and converts it to a set of *output data*, needed for planning analyses …
- … using a set of *mathematical formulations*…
- … which use *parameters* to perform the conversions

How an Activity-Based Model Works



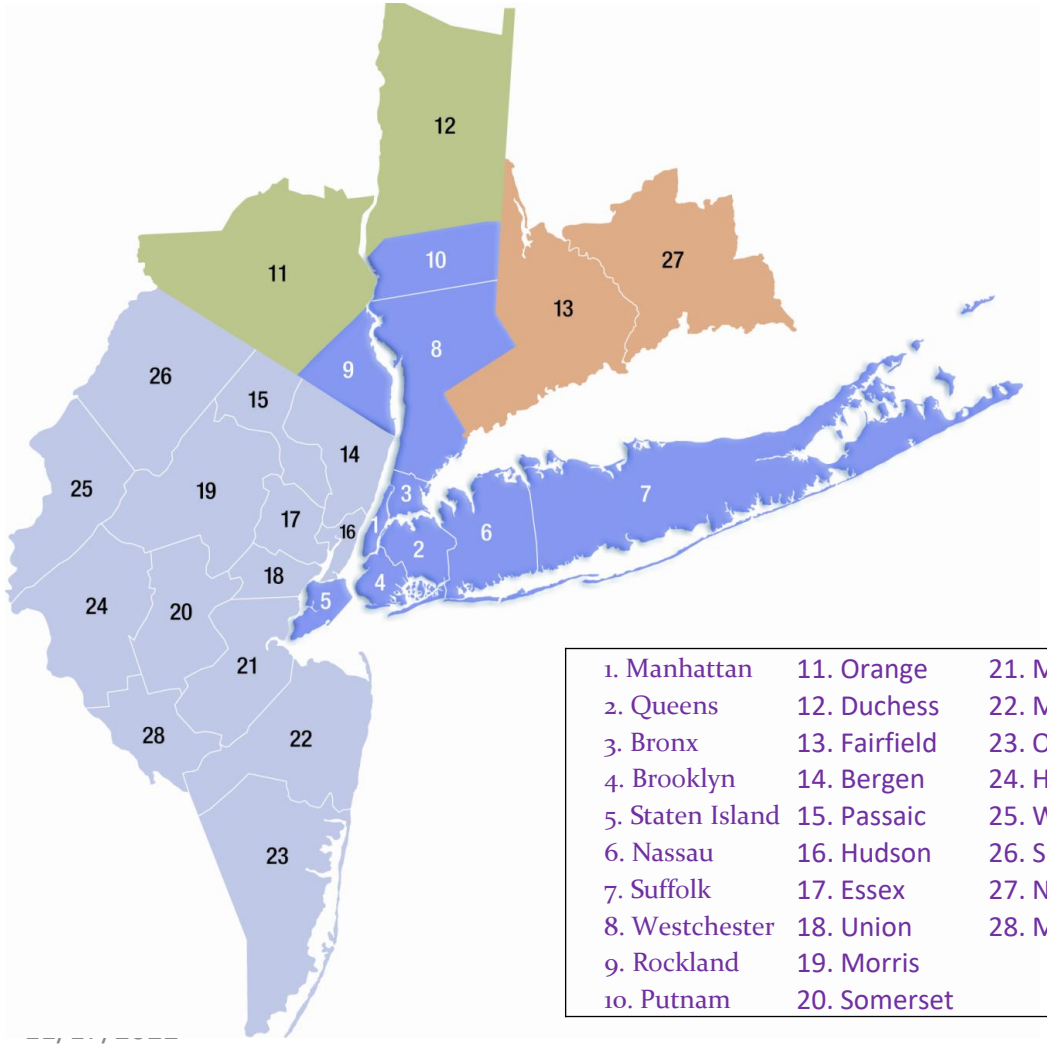
Advantages of an Activity-Based Model

- Better representation of small but important travel segments
- Considers the role of travel *not as a goal in itself*, but *as a means to perform activities* of different types in different places
- Explicitly considers *coordination of travel across the day*, including trip chaining, and within each household
- Results can be summed to estimate *impacts on population segments* (e.g., equity analysis)

NYMTC Region Has Had an ABM for Nearly 30 Years

- One of the first major metropolitan areas to develop an Activity-Based Model (ABM)
- Activity-based approach allows for better analysis of emerging demographics, mobility, and technology

New York Best Practice Model (NYBPM)

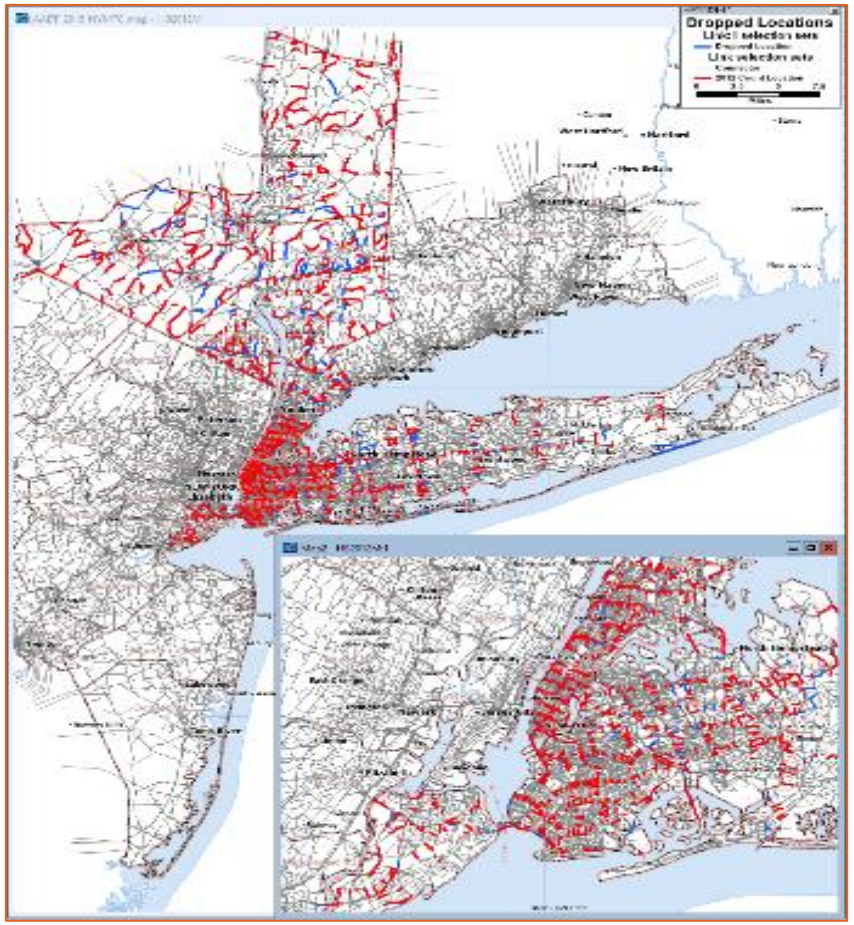


1. Manhattan	11. Orange	21. Middlesex
2. Queens	12. Duchess	22. Monmouth
3. Bronx	13. Fairfield	23. Ocean
4. Brooklyn	14. Bergen	24. Hunterdon
5. Staten Island	15. Passaic	25. Warren
6. Nassau	16. Hudson	26. Sussex
7. Suffolk	17. Essex	27. New Haven
8. Westchester	18. Union	28. Mercer
9. Rockland	19. Morris	
10. Putnam	20. Somerset	

- Portions of 3 States: NY, NJ, and CT
- 28 Counties
- 5,418 Traffic Analysis Zones (TAZs)
- ~ 22,500,000 Population
- Almost 60 Million Daily Trips

NYBPM 2019 Enhancements

- NYBPM updates
  - Base Year 2012 (released in 2020)
    - More robust modeling procedures, newly available data sources, increased collaboration, improved data for model validation
  - Base Year 2019 (to be released in December 2022)
    - Improved, simplified model structure and new features
    - Introduced location-based service data (LOCUS) for model validation
- New features
  - Incorporation/validation of TNC travel
  - Open road tolling

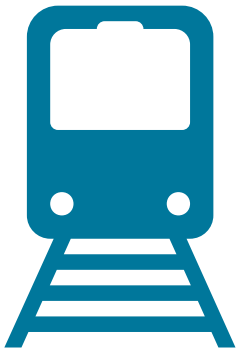


Extensive member agency involvement and training, improved functionality and user interface

Data Updates for 2019

- Latest official 2019 population/employment data
- Updated data for model validation
  - Traffic counts
    - Updated to 2019
    - Use only “real” counts (eliminated synthesized counts)
  - Transit ridership and surveys
    - Updated to 2019
    - Comprehensively recompiled and processed data from different sources to minimize inconsistencies
  - Introduced location-based service data (LOCUS) for model validation
    - Origin-destination patterns
    - Time of day by tour purpose
    - Visitor model

Highlights of NYBPM



Regional activity-based model

- 28 counties in three states
- ~67,000 roadway segments
- All major highway and transit modes included
- Built from Household Travel Surveys and other data

For each forecast year, the NYBPM predicts travel demand for **9 trip purposes** by **4 time periods** for **7 modes**

All codable projects in the fiscally-constrained *Regional Transportation Plan (RTP)* and *Transportation Improvement Program (TIP)* are coded in the NYBPM networks as a "build" scenario

The Region's Activity-Based Model

- Developed through a true team effort including:
  - NYMTC staff and on-site contractors
  - Consultant team led by CS
  - Model Advisory Committee
- Used the latest data
  - NYMTC's surveys (Regional Household Travel Survey, Regional Establishment Survey)
  - NYMTC official socioeconomic data
  - General Transit Feed Specification information on transit systems
  - Traffic counts from various jurisdictions
  - Transit ridership information and surveys from the region's providers
  - LOCUS
- Efficient user interface and reporting functions

Improvement Goals for 2019 Update

- Maintain goals of 2012 update, which included:
  - Improved transparency/accessibility
  - Robust, modern modeling procedures
  - Improved network representation using newly available data sources and procedures
  - Systematic, comprehensive validation
  - Additional reporting features
- Take advantage of knowledge of NYMTC staff and partner agencies (through the Model Advisory Committee)

Improvement Goals for 2019 Update (cont'd)

- Update results to be based on a more recent timeframe (2019)
- Improve ability to estimate key measures of travel by all modes (with a particular emphasis on transit)
- Improve model operation and user friendliness
  - Streamline model execution
  - Enhance reporting

These goals were achieved, and the model represents travel well at the regional level

Transparency/Accessibility

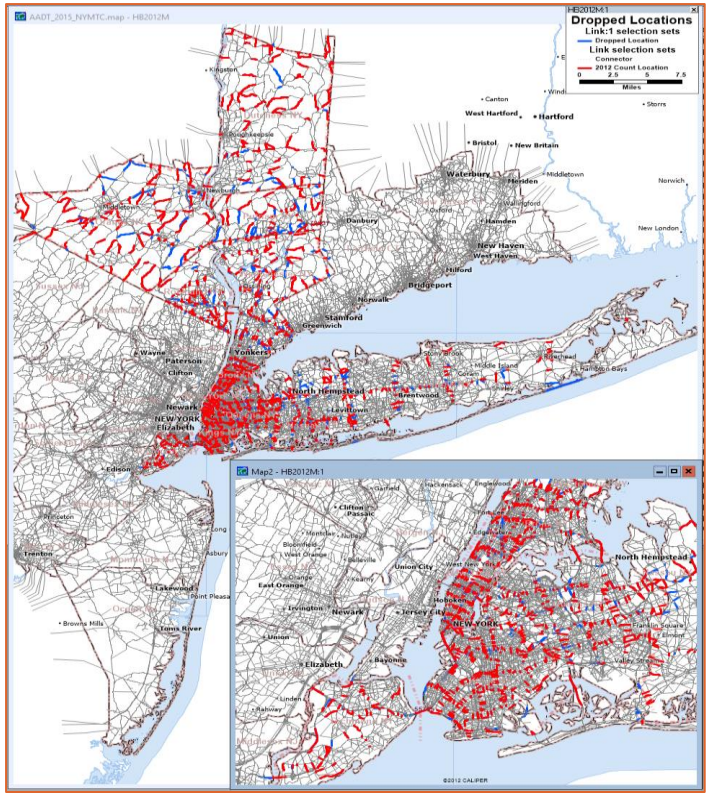
- Not a “black box”
- All code and TransCAD scripts are open source or owned by NYMTC (and therefore can be made available)
- Model results stored in databases for easy access
- Customized reporting

Robust, Modern Modeling Procedures

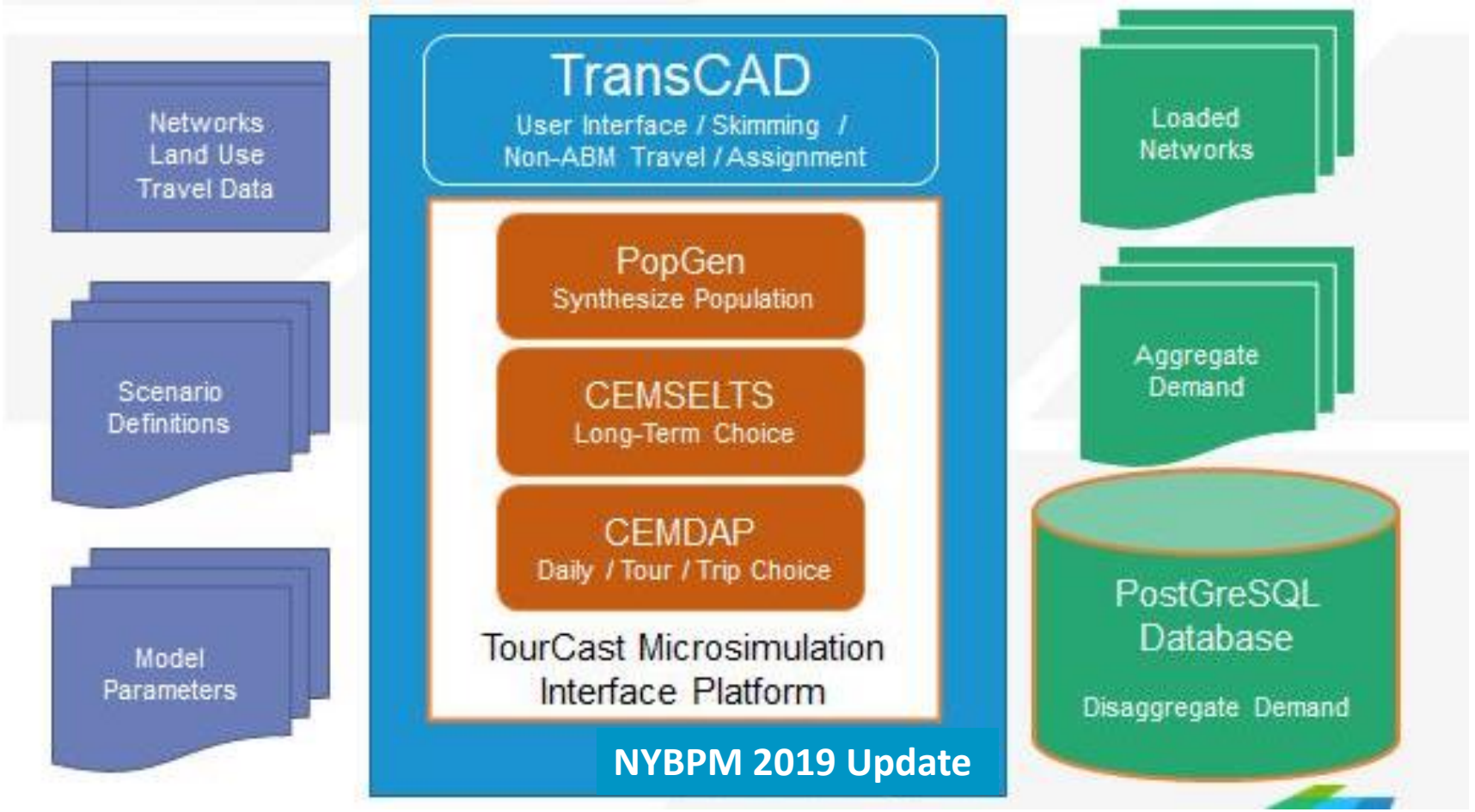
- Overall structure based on modern research and tested in previous settings
- Specifically adapted and revised for the unique New York area environment
- Made optimal use of all available local data for model estimation and validation

Data Updates

- Updated and improved accuracy of highway data
  - Traffic counts updated to 2019 and cleaned up
- LOCUS
  - 2019 data
  - Larger sample size
  - Detailed O-D and time of day patterns
- Improved validation and reporting



Core Model Components
(about 65 components total)



Systematic, Comprehensive Validation

- Based on industry standard procedures
- Validation plan followed closely
- Every component validated and reviewed by NYMTC and Model Advisory Committee members
- Aggregate results examined intensely
- When something didn't work, we explored and made adjustments as appropriate

Purpose of Model Validation

- Confirm that model accurately reflects travel behavior in the region, under existing and potential future conditions
  - Run model for base year, compare to observed data
  - Examine sensitivity of model results to key variables (e.g., travel time, cost, demographic changes)
  - Ensure that results are *reasonable for required types of planning analyses*

Aggregate Model Validation

- Compare volumes to counts
  - % vehicle miles traveled difference by facility type
  - Screenline crossing comparisons
  - Major route/crossing comparisons
  - Comparing volumes on individual links
- Transit comparisons
  - Comparisons at station group, geography, service type levels
  - Not straightforward due to variety of services, transfers, data inconsistencies

	Model VMT	Count VMT	% Diff	Target
Interstate/Freeway/Tollway	21,408,580	21,576,781	-1%	7%
Principal Arterial	3,465,794	3,587,811	-3%	10%
Minor Arterial	2,569,045	2,546,392	1%	10%
Major Collector	669,109	600,967	11%	15%
Minor Collector	135,182	146,440	-8%	15%
Total	**28,306,532**	**28,518,060**	**-0.7%**	**1%**

	% Difference
From/to Manhattan	4.9%
Intra-Manhattan	5.1%
Other Intra-NYC	10.6%
Other Cross-Hudson	14.8%
Other Intra-NYS	12.0%
Other NY-NJ	-10.2%
NY-CT	-11.0%
Regional cordon	0.3%

What does this all mean?

- Transparent, easy-to-use user interface
  - Does require a basic understanding of modeling
- Simulates regional travel well
  - Ideal for transportation conformity
  - Existing and future conditions
  - Geographic coverage
  - Auto+ taxi+ truck+ subway+ commuter rail + bus + ferry
    - Distinguishes between commuter and local buses;
    - Select Bus Service
- Ability to model corridors and subareas

What can we use the NYBPM for?

- Regional planning
  - Long range transportation plans (land use, network, pricing)
  - Transportation conformity (VMT, VHT, Speed)
  - Subarea/corridor analysis (VMT, VHT, Speed)
  - Truck volumes
- Policy analysis
  - Pricing/tolling (mode shifts, diversions)
  - Peak spreading
- Project analysis
  - Scenario and long-range planning
  - Equity analysis (impacts on low-income populations)

Some applications require customization and area-specific details

What can we use the NYBPM for? (continued)

- Transit planning
  - Mode shifts as a result of improved service
  - Impact of Transit Signal Priority
  - Demand for a new ferry service?
- Changing travel behavior
  - Testing work-from-home impacts
  - Active transportation
  - Technology-driven changes (open road tolling, Uber/Lyft, etc.)

Moving Forward…

- The model is operational and validated for the 2019 base year
  - Model Advisory Committee review will be forthcoming
  - Sensitivity testing is underway
  - Documentation is being prepared
  - NYBPM 2019 will be used for upcoming conformity analysis
  - Model will be available from NYMTC for use in 2023
  - Training will be conducted in early 2023