



Gen3 Model Development Project

Travel Forecasting Subcommittee Meeting

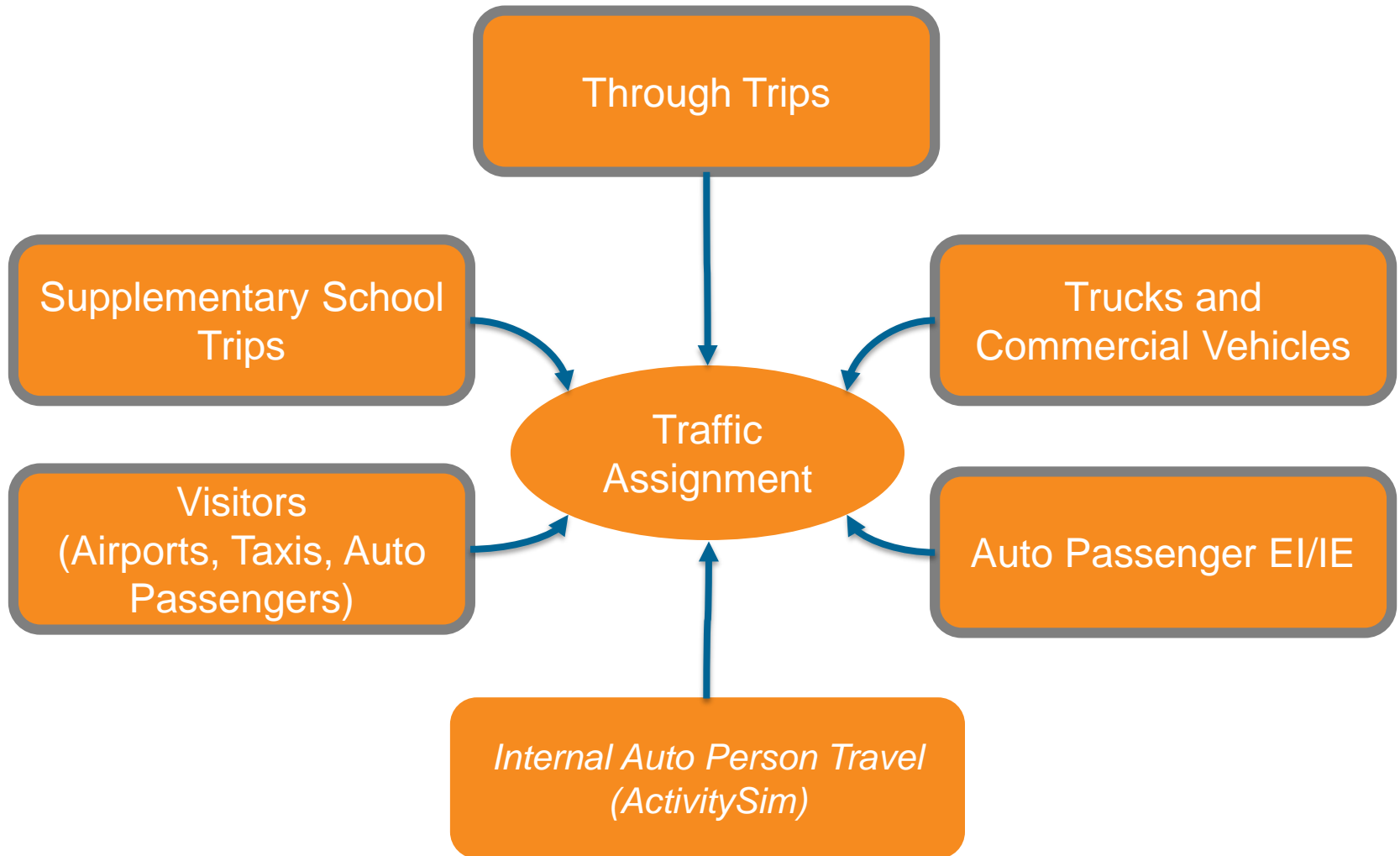
May 20, 2022

IN PARTNERSHIP WITH

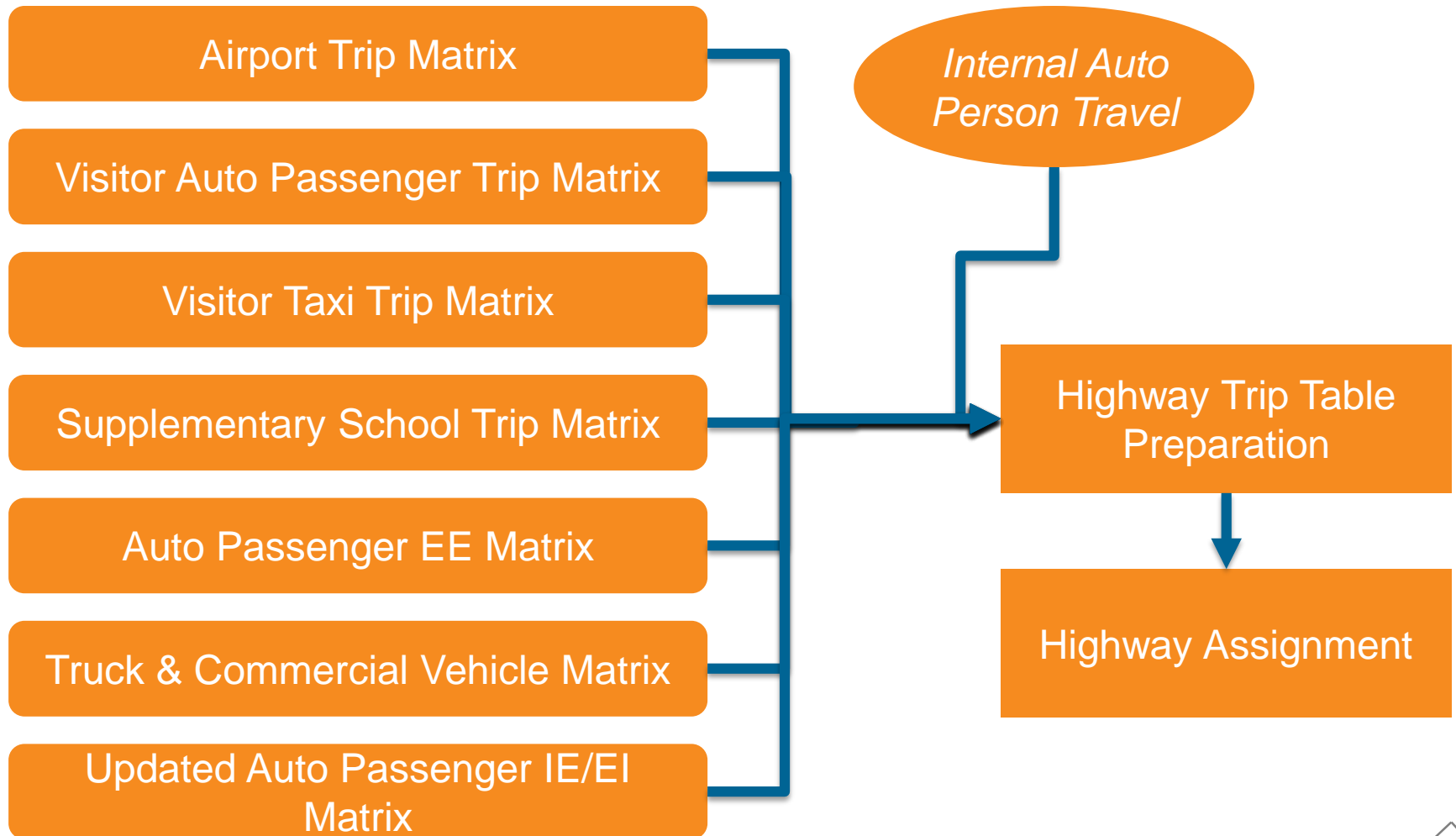


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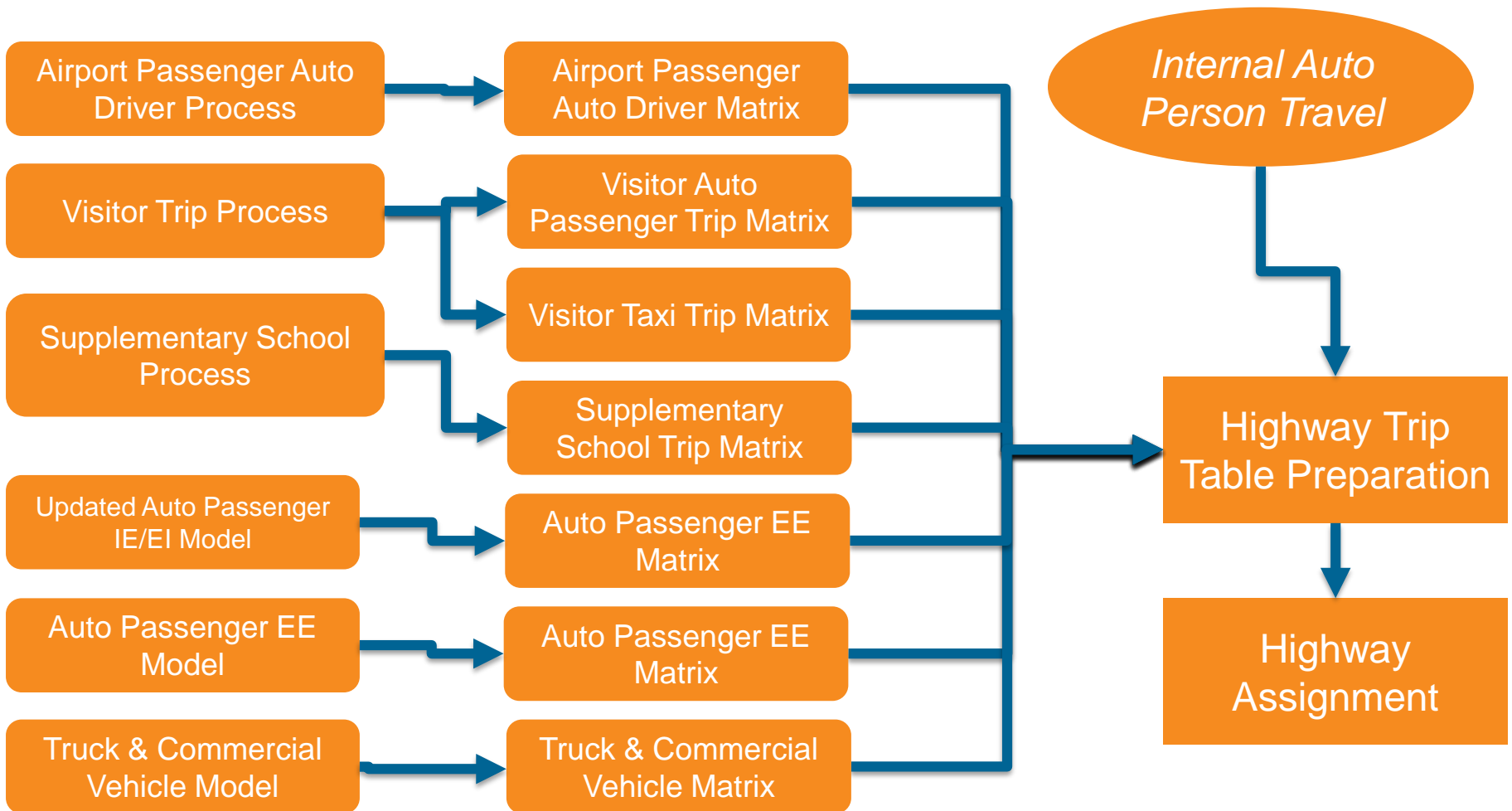
Auxiliary Models Proposed for Gen 3 Model



Gen3 Phase 1 Auxiliary Model Process



Gen3 Phase 2 Auxiliary Model Process



Definitions

- *External-internal trip:* A trip made by a non-resident of the MWCOCG region with one end in the region and one end at an external station.
- *Internal-external trip:* A trip made by a resident of the MWCOCG region with one end in the region and one end at an external station.



Auto Passenger IE/EI Models



- Trip generation based on synthesized HH & population, accessibility
- Trip destination choice based on distance, spatial factors, accessibility

Cube IE/EI Destination Choice

$$\text{InternalExternal_Trips}_{ij} = \text{Attractions}_i * \frac{\exp(c_{time} * \text{Time}_{ij} + c_{cost} * c_{operatingCost} * \text{Distance}_{ij} + \ln(\text{households}_j))}{\sum \exp(c_{time} * \text{Time}_{ij} + c_{cost} * c_{operatingCost} * \text{Distance}_{ij} + \ln(\text{households}_j))}$$

$$\text{ExternalInternal_Trips}_{ij} = \text{Productions}_i *$$

$$\frac{\exp(c_{time} * \text{Time}_{ij} + c_{cost} * c_{operatingCost} * \text{Distance}_{ij} + \ln(\text{employment}_j))}{\sum \exp(c_{time} * \text{Time}_{ij} + c_{cost} * c_{operatingCost} * \text{Distance}_{ij} + \ln(\text{employment}_j))}$$

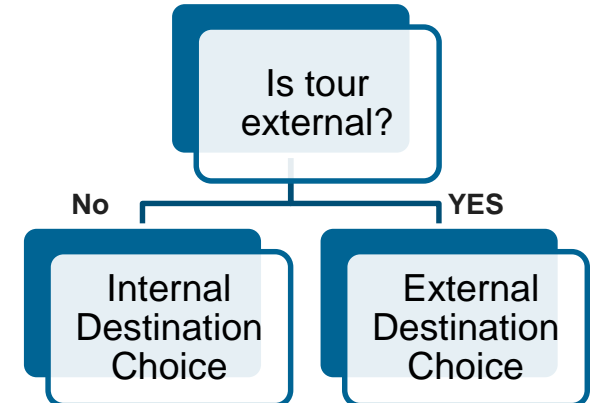
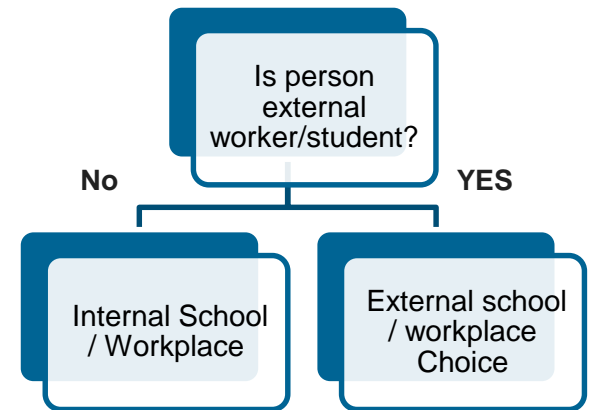
Potential Spatial Factors:

- Potomac Crossing
- Beltway (I-495) Crossing
- DC Boundary Crossing



ActivitySim Internal-External Model

- A model would be run before mandatory location choice for each worker and student to predict whether they work/go to school inside or outside region
 - If outside region, an external destination choice model would be run to predict which external station is the primary destination
 - These workers/students would not be considered in shadow pricing
- Similar model run before non-mandatory tour location choice
- External tour identifier can be used as explanatory variable in time-of-day, mode choice, stop frequency, etc.
- Stop frequency on external tours will be modeled as internal stops only
- *No double counting of travel, no extra code base, no competition in shadow pricing*

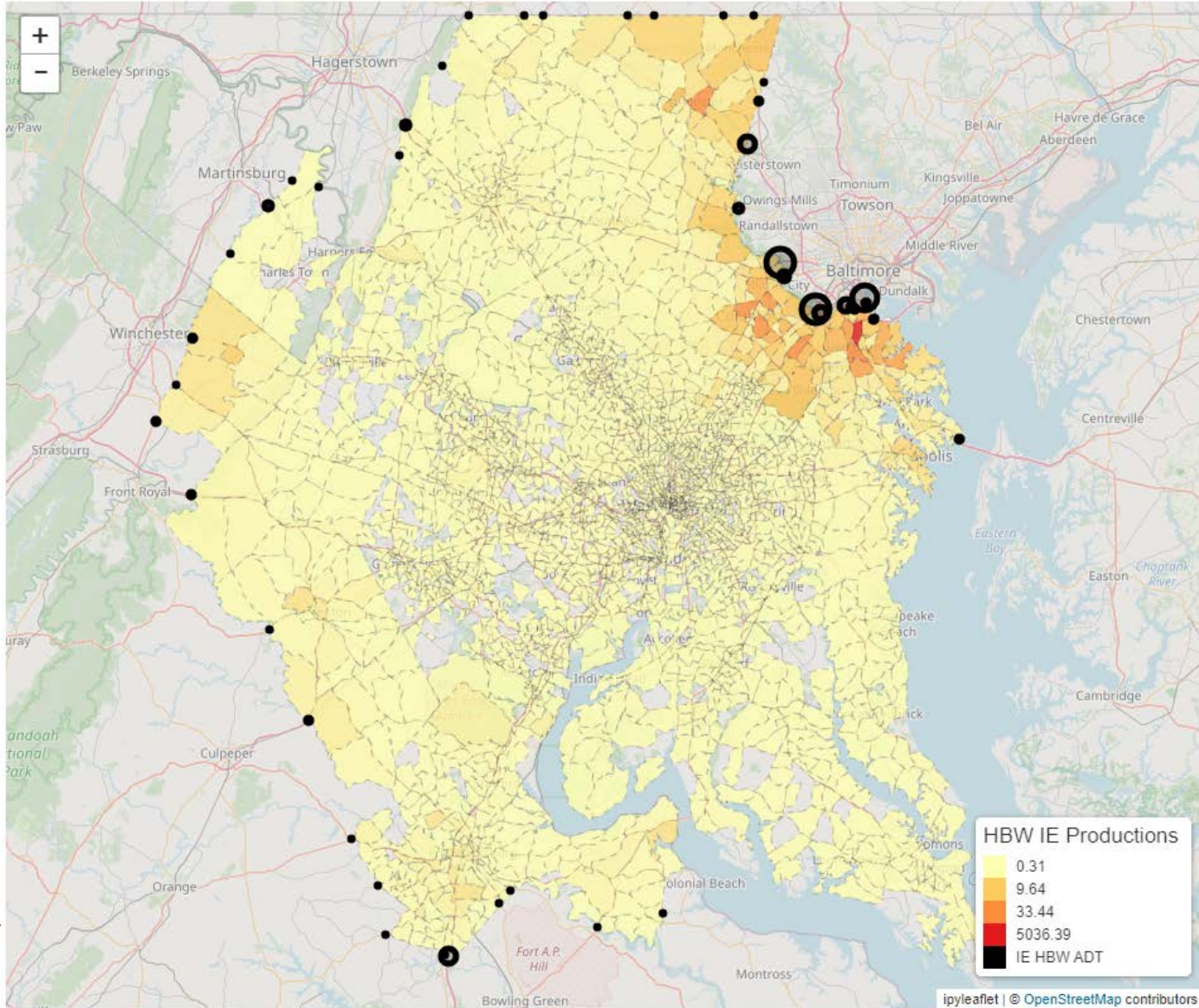


Data Inputs

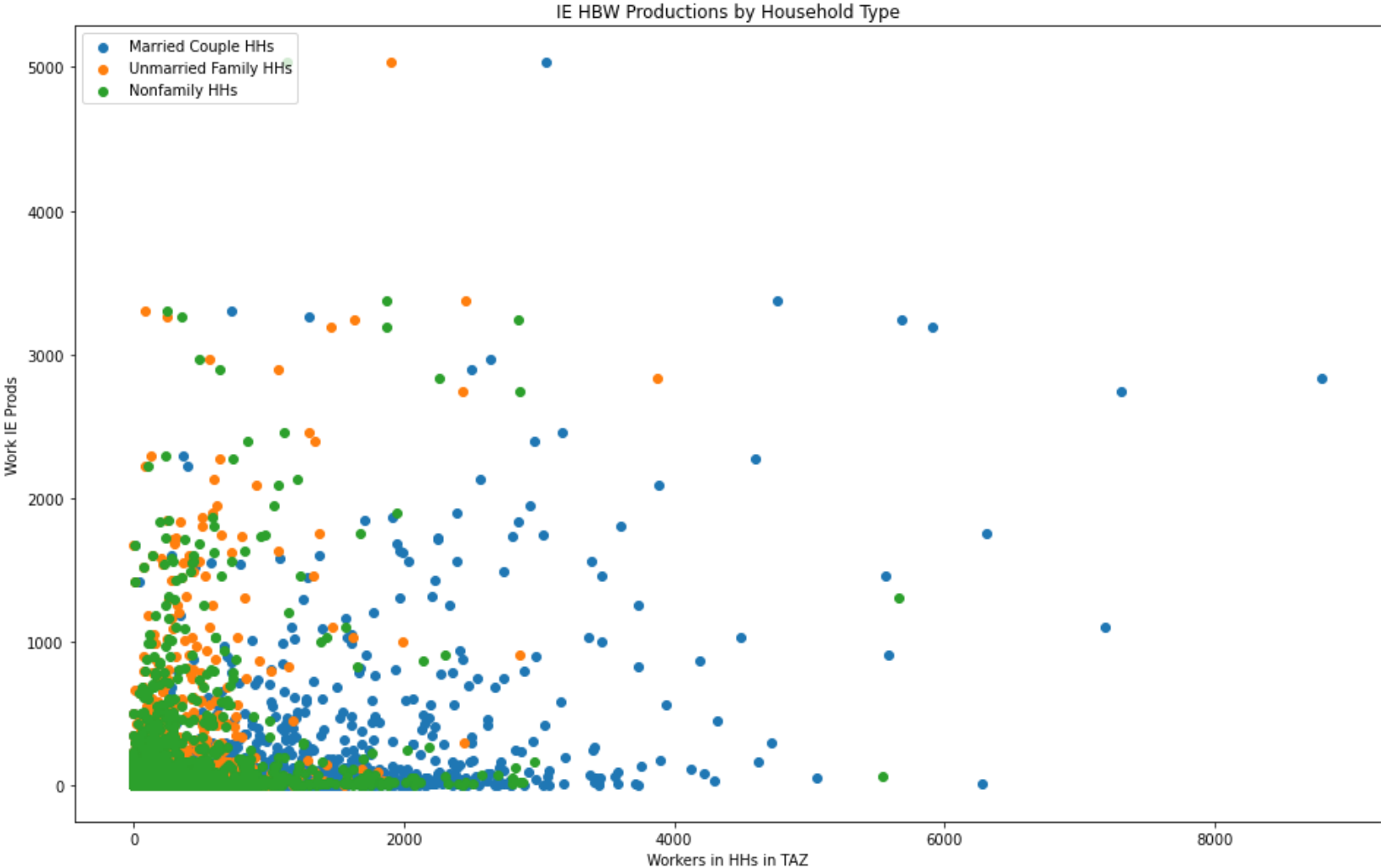
- Synthesized persons and households
- Model inputs (zonal, GIS data, and external PA)
- Model distance skims
- AirSage 2014 Data from MWCOCG



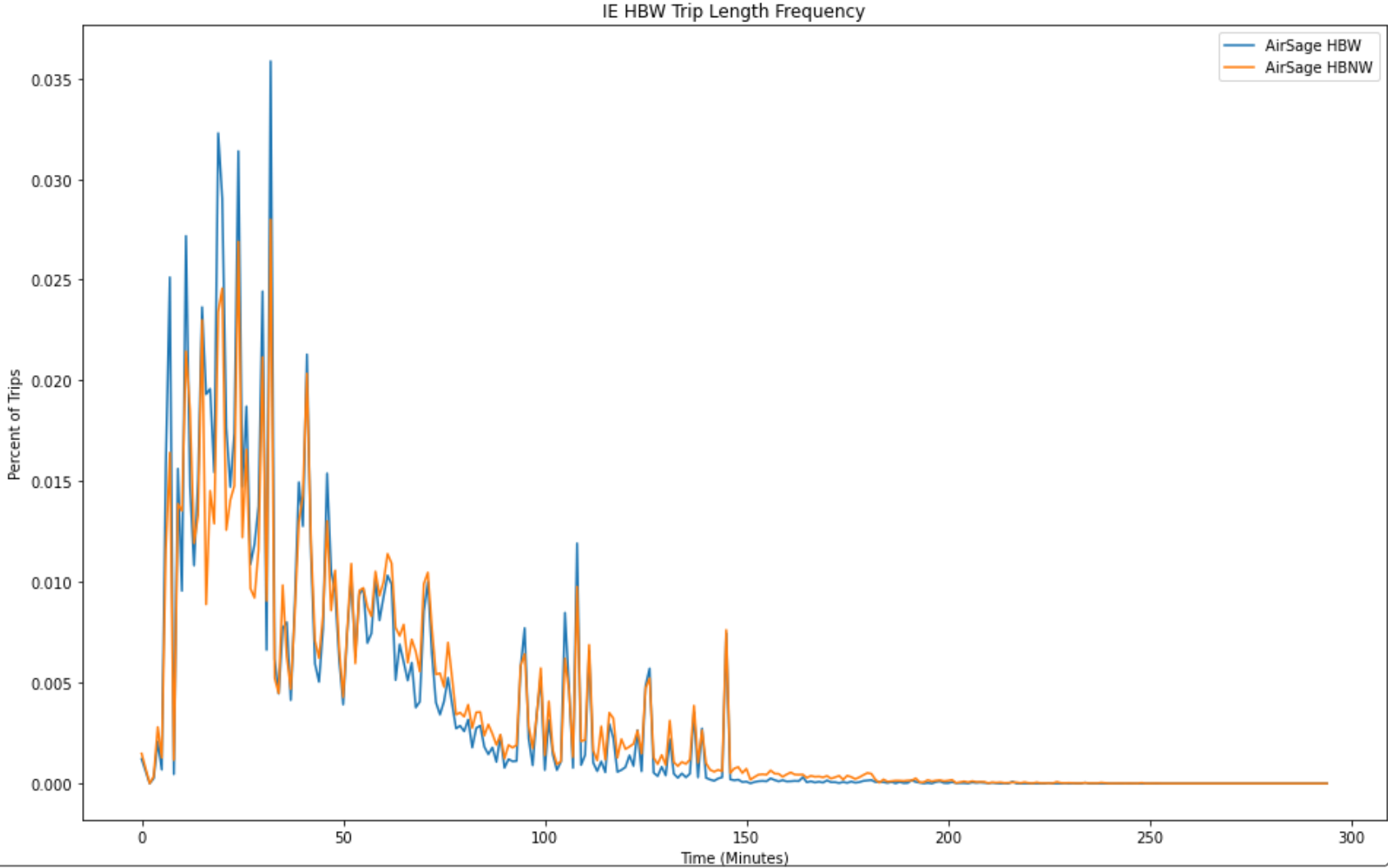
AirSage HBW Internal-External Productions



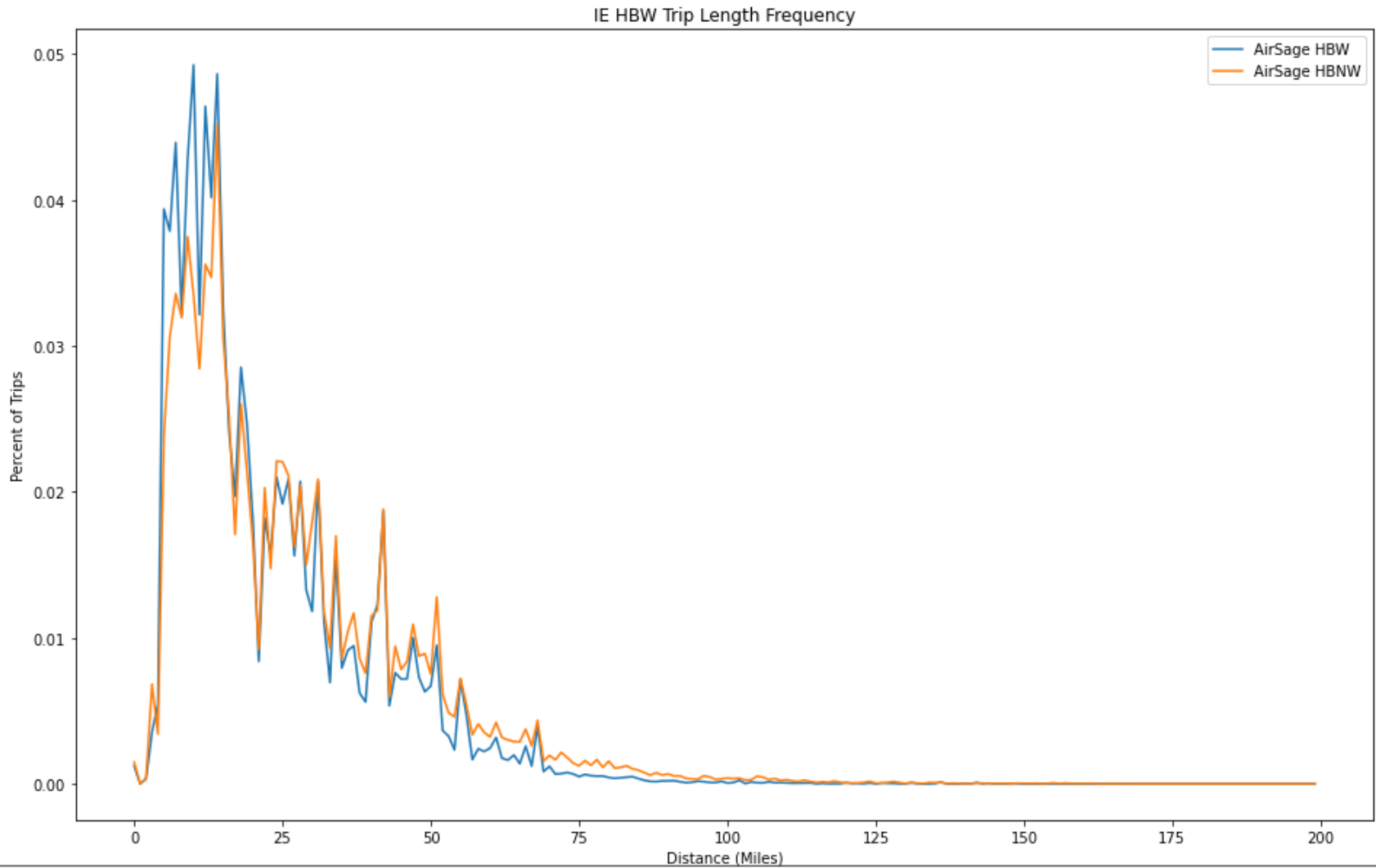
AirSage HBW Internal-External Trips



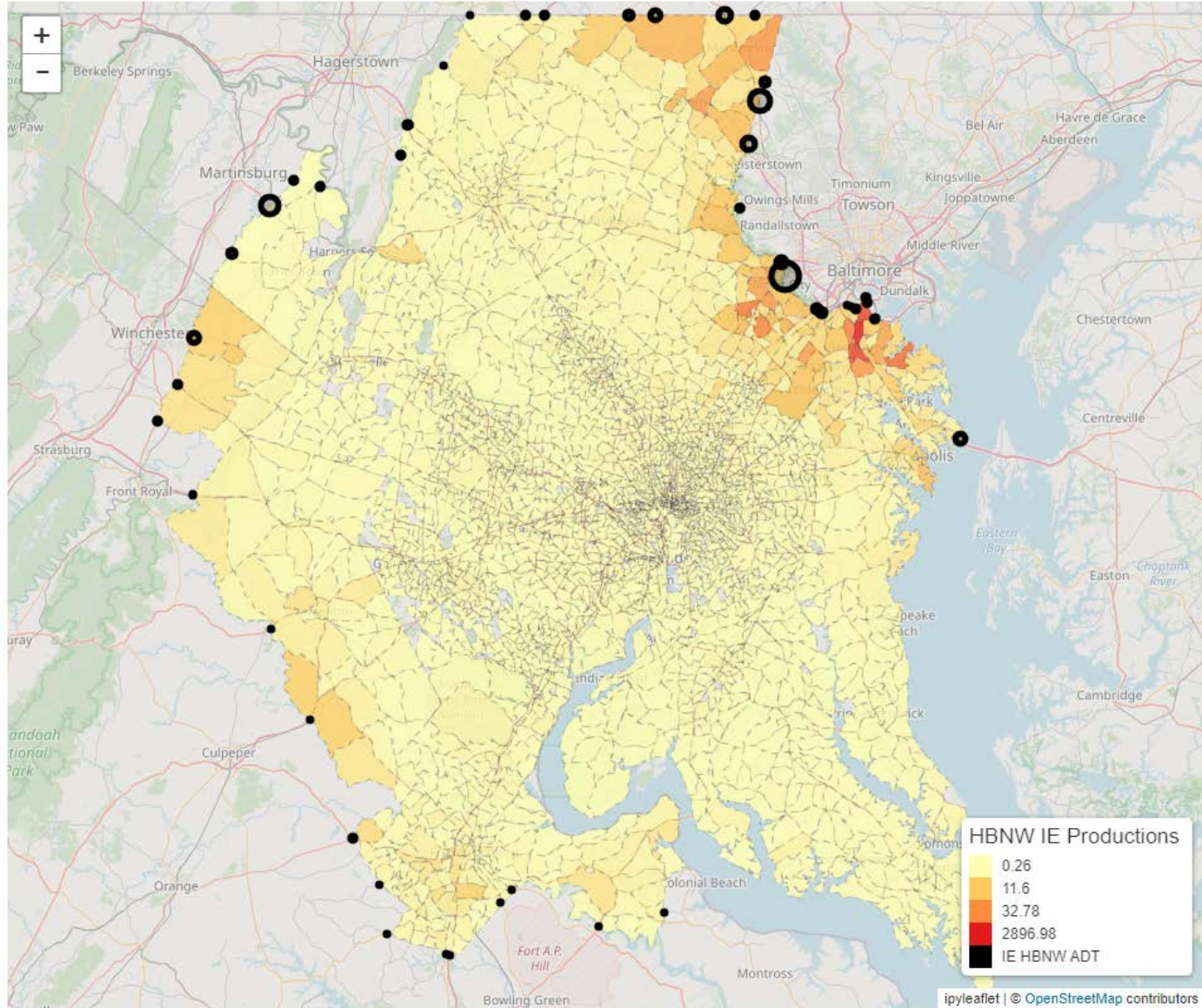
AirSage Trip Length Frequency



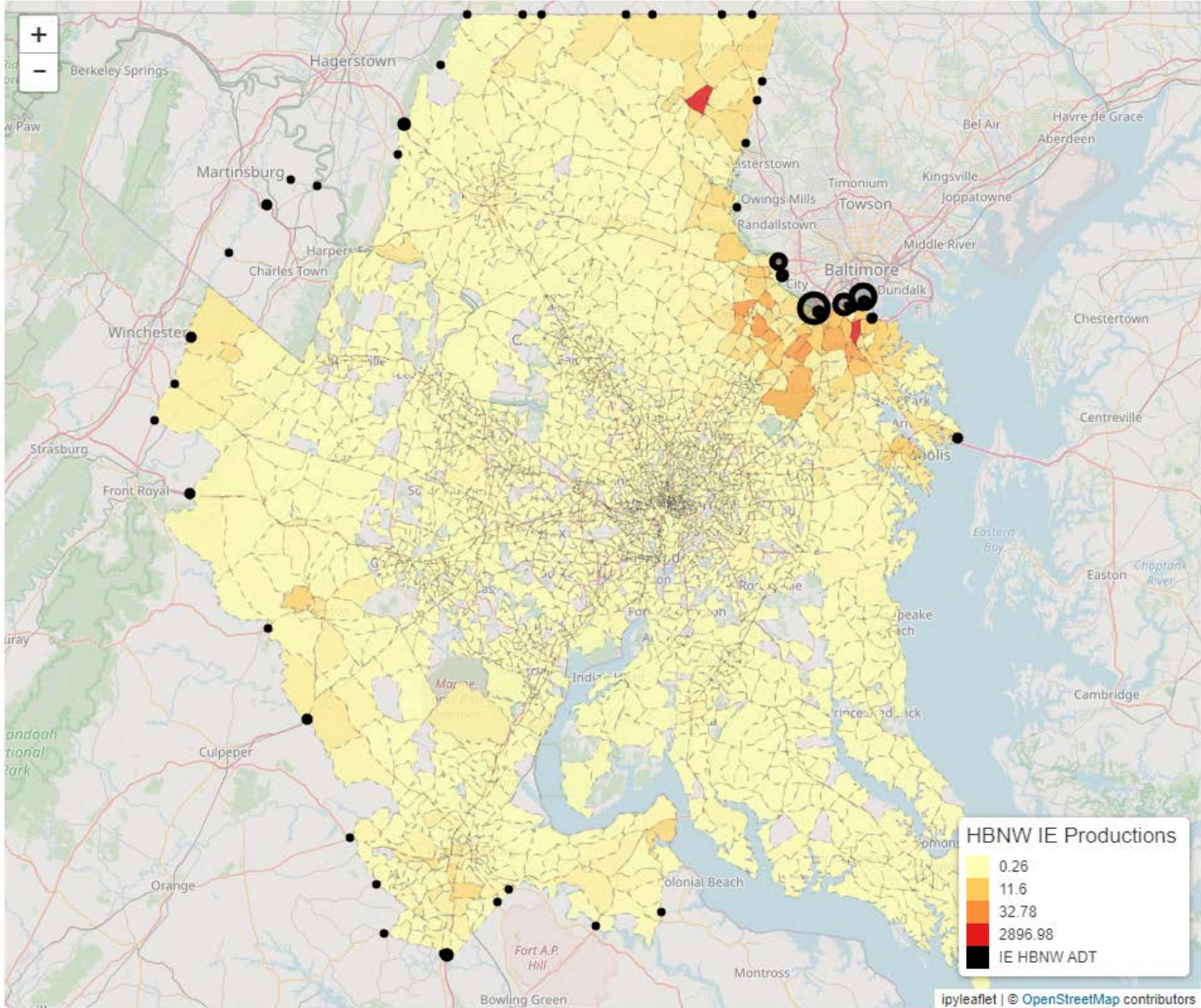
AirSage Trip Length Frequency



AirSage HBNW Internal-External Productions



AirSage NHB Internal-External Productions



Next Steps

- Implement IE and EI Generation models in Cube
 - Based on AirSage 2014 data at TAZ level
 - Controlled to External Station Volumes
- Prepare and implement IE and EI destination choice into Cube
 - Calibrate to match AirSage 2014 TLFs





the science of insight



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