Ohio Statewide Model Applications

Information Forward

Tell Me a Story by Copilot

Once upon a time, in the bustling city of Metropolis, travel demand models played a pivotal role in shaping the city's transportation infrastructure. These models, like mystical crystal balls, attempted to predict how people would move about the city. Let me take you on a journey through the four-step travel demand modeling process:

1. **Trip Generation**: The first step was akin to summoning spirits from thin air. Planners conjured data on households, jobs, and other land uses. They asked questions like, "How many trips will the factory workers make?" or "Will the wizards living in the enchanted forest travel to the city center?" The answers materialized as trip rates, revealing the number of trips each land use generated.
2. **Trip Distribution**: Next, the city's sages pondered the great question: "Where shall these travelers roam?" They consulted ancient scrolls (okay, maybe just spreadsheets) to determine the likelihood of trips between different zones. Would the sorcerers prefer teleporting to the market square or riding their broomsticks to the library? The distribution matrix revealed their mystical preferences.
3. **Mode Choice**: The third step involved unraveling the secrets of transportation modes. Would the knights ride their trusty steeds, or opt for the magical teleportation network? The model considered factors like travel time, cost, and the allure of dragon sightings along the way. The result? A glimpse into the future—how many travelers would choose each mode.
4. **Trip Assignment**: Finally, the city's cartographers mapped out the actual routes. They assigned travelers to roads, bridges, and secret tunnels. The highways hummed with carriages, while the bike lanes sparkled with fairy dust. The model revealed congestion spots, guiding the construction of new roads and enchanting bike paths.

And so, Metropolis flourished. Its citizens moved harmoniously, thanks to the wisdom of travel demand models. But remember, dear reader, even the most powerful models had their limitations—like predicting sudden unicorn parades or rogue spell-casting traffic jams. Yet, they remained essential tools, weaving the fabric of urban mobility.

Would you rather…

- Utility associated with the Attributes of the Alternative:

$$V(X_i) = \gamma_1 \times X_{i1} + \gamma_2 \times X_{i2} + \cdots + \gamma_k \times X_{iK} \quad 3.4$$

where γ_k is the parameter which defines the direction and importance of the effect of attribute k on the utility of an alternative and

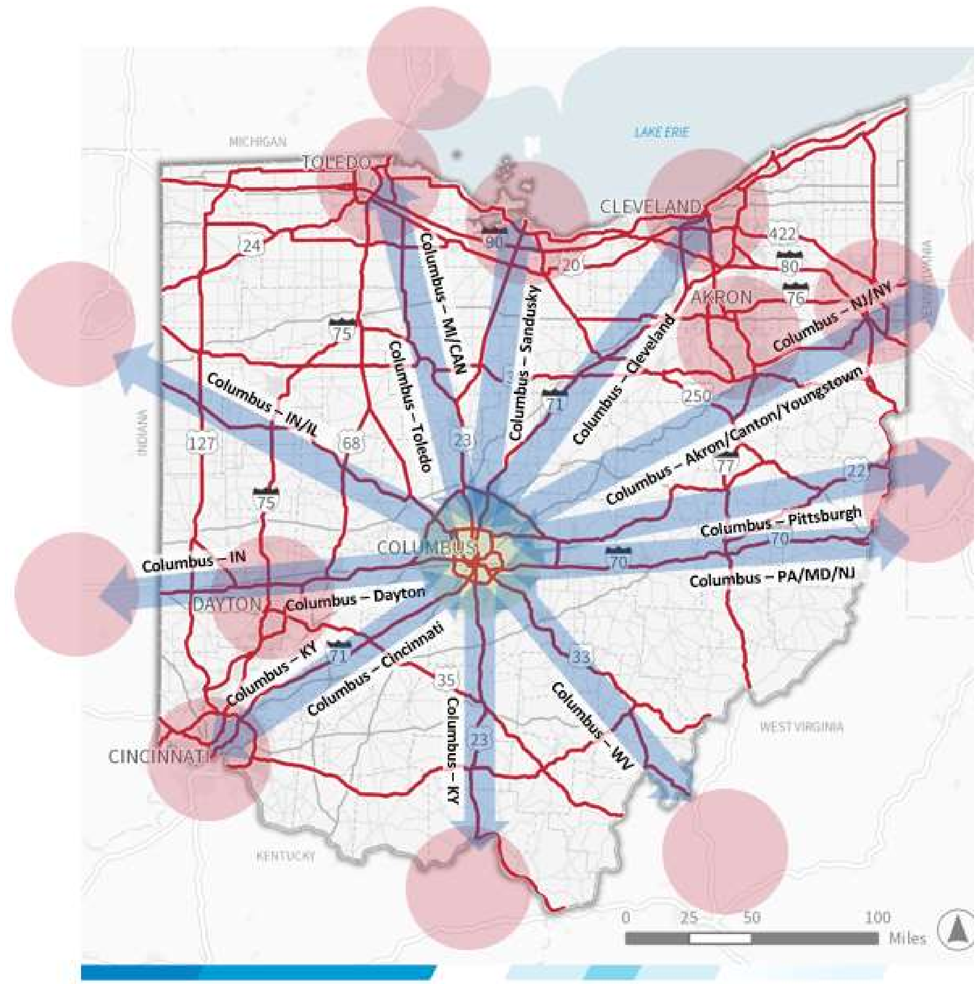
X_{ik} is the value of attribute k for alternative i.

- An example for three different travel modes (Drive Alone (DA), Shared Ride (SR) and Transit (TR) alternatives is:

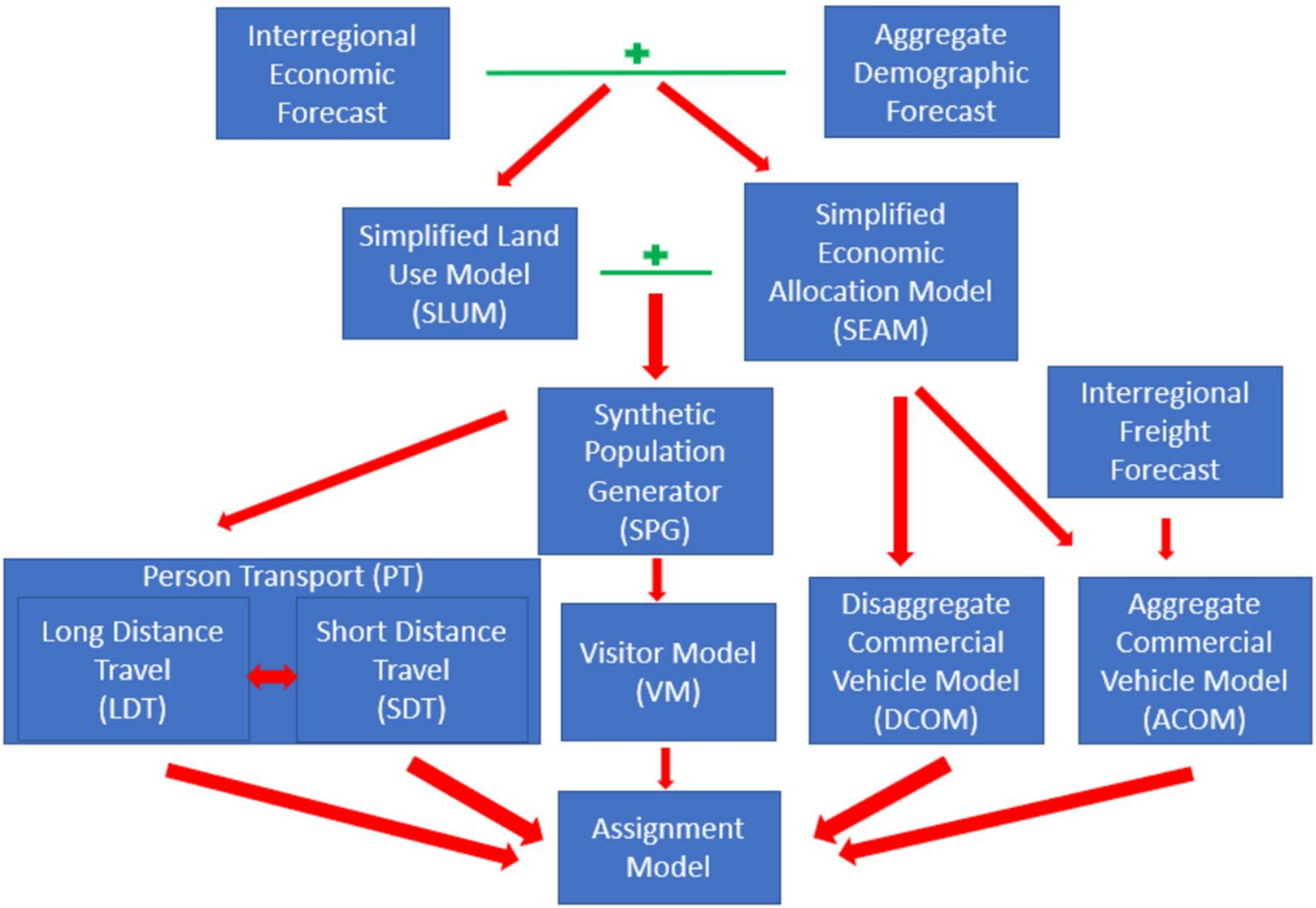
$$V(X_{DA}) = \gamma_1 \times TT_{DA} + \gamma_2 \times TC_{DA}$$
$$V(X_{SR}) = \gamma_1 \times TT_{SR} + \gamma_2 \times TC_{SR}$$
$$V(X_{TR}) = \gamma_1 \times TT_{TR} + \gamma_2 \times TC_{TR} + \gamma_3 \times FREQ_{TR}$$

- The Utility associated to the characteristics of the Decision Maker, in the specific example above would be:

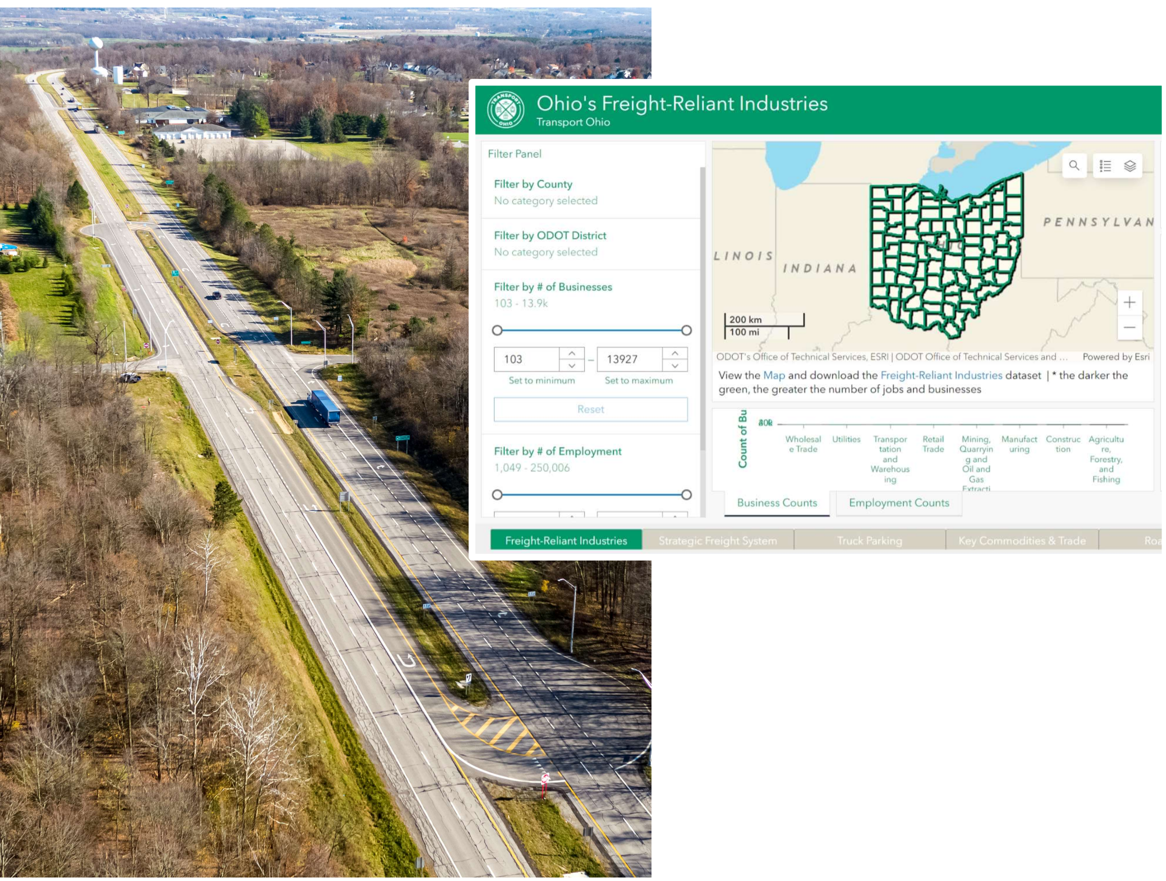
$$V(S_{DA}) = \beta_{DA,0} \times 1 + \beta_{DA,1} \times Inc_t + \beta_{DA,2} \times NCar_t$$
$$V(S_{SR}) = \beta_{SR,0} \times 1 + \beta_{SR,1} \times Inc_t + \beta_{SR,2} \times NCar_t$$
$$V(S_{TR}) = \beta_{TR,0} \times 1 + \beta_{TR,1} \times Inc_t + \beta_{TR,2} \times NCar_t$$



Ohio Statewide Model (OSWM)

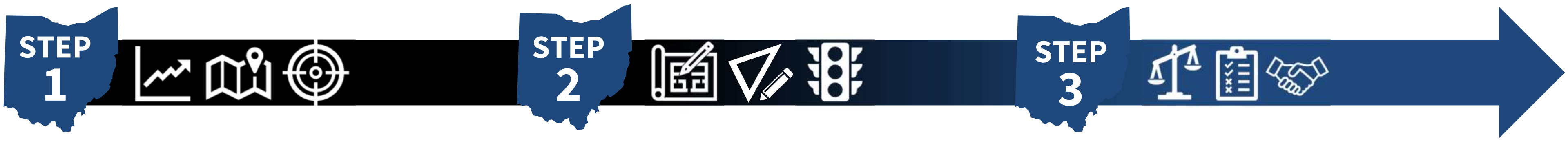


Strategic Transportation & Development Analysis



- Outcomes
  - Investment Opportunities: Identify investment opportunities that will enhance Ohio's economy and support communities
  - Decision Making Tools: Leverage dynamic data and insights for informed decisions with private sector partners
  - Partnerships & Collaboration: Prepare ODOT and partners to secure funding and efficiently deliver the right investments

Technical Approach



Existing Conditions & Stress Test

- Assess existing and future congestion, reliability, safety, asset condition, resilience
- Compile current development trends, opportunities, and risks
- Identify hotspots for assessment in Step 2

Identify Improvements

- Identify concepts to address existing and potential system hotspots
- Determine triggers that initiate concept implementation
- Screen concept feasibility, assess costs, consider impacts

Analyze Benefits & Prepare to Implement

- Monetize potential benefits and refine costs
- Determine funding eligibility and potential
- Advance partnerships, confirm project readiness

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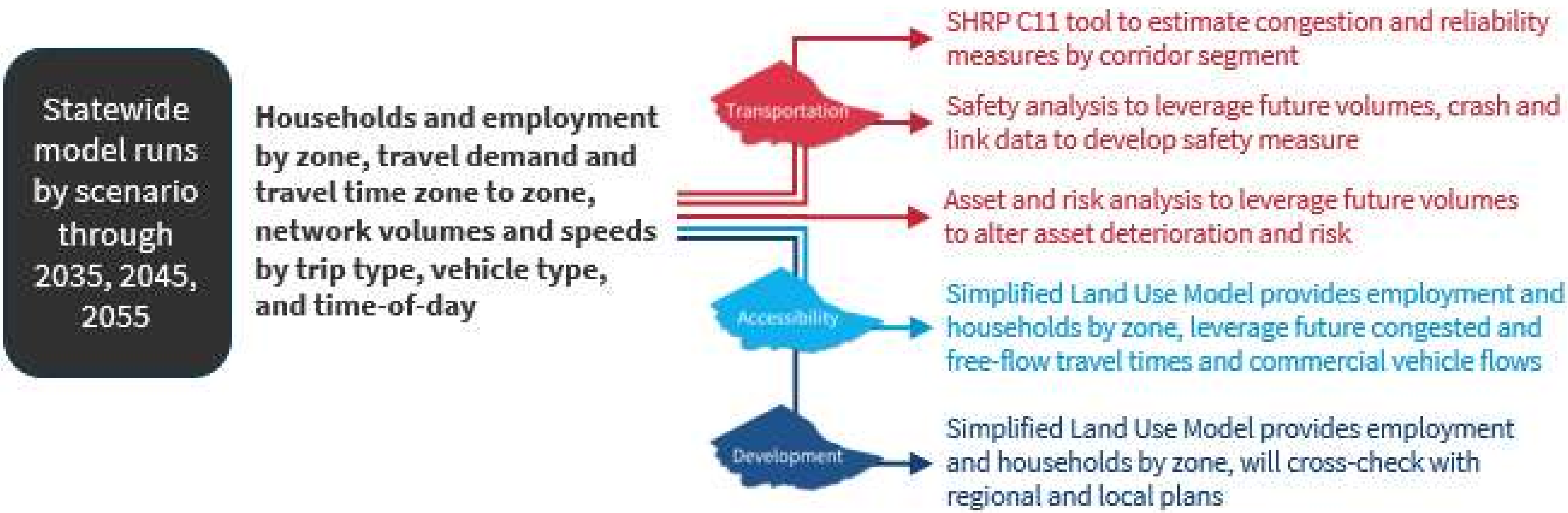
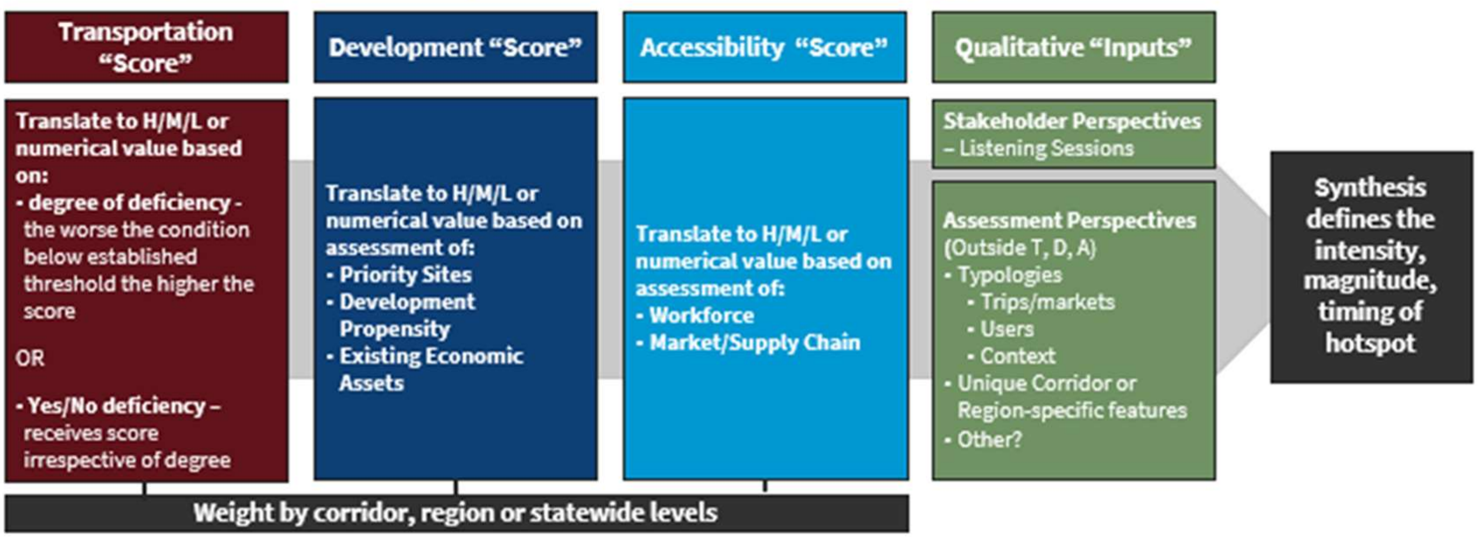
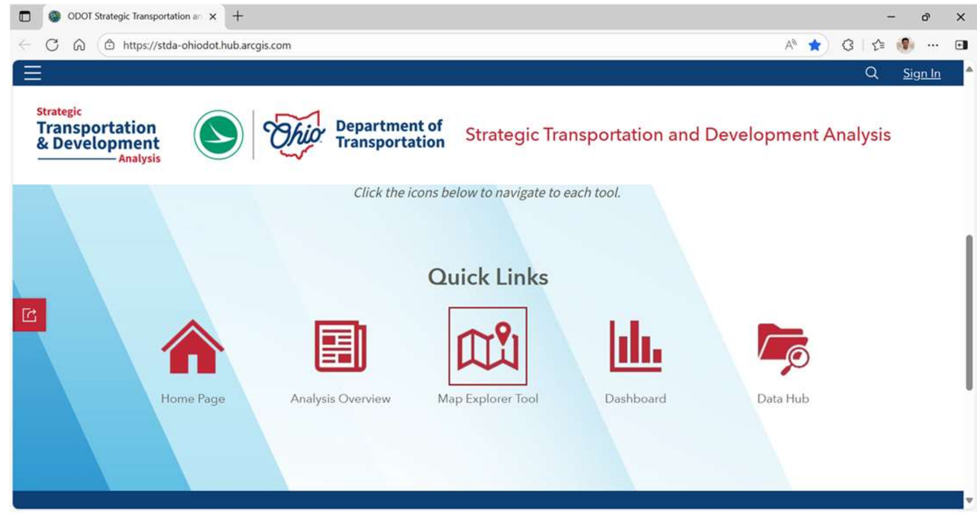
OSWM to Assess Future Risk





Visualization of Information

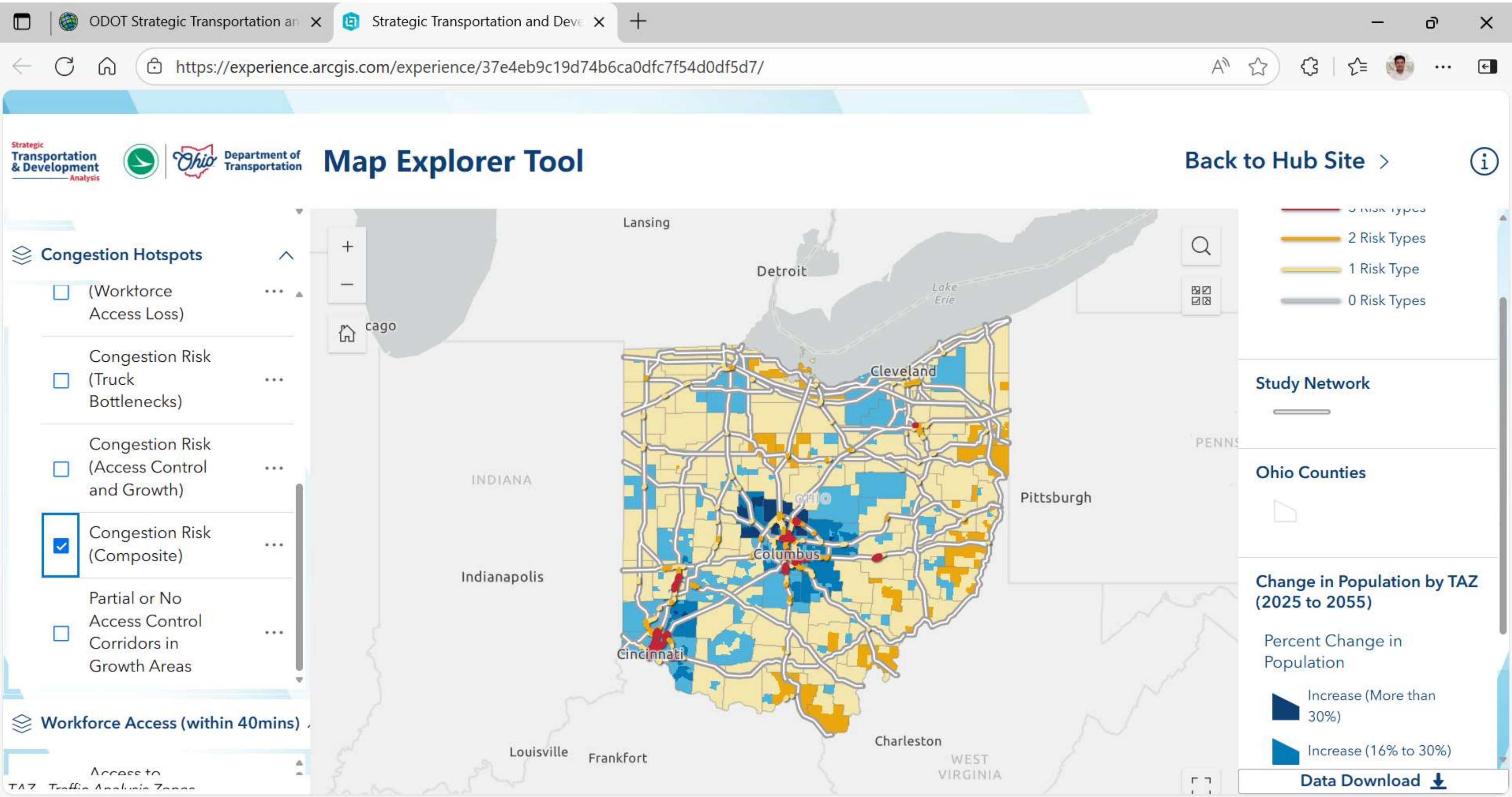
- Finding effective way to communicate information is the biggest challenge
- Requirements
  - User Specific
  - Easy to Navigate
  - Informational
  - Support Decision Making



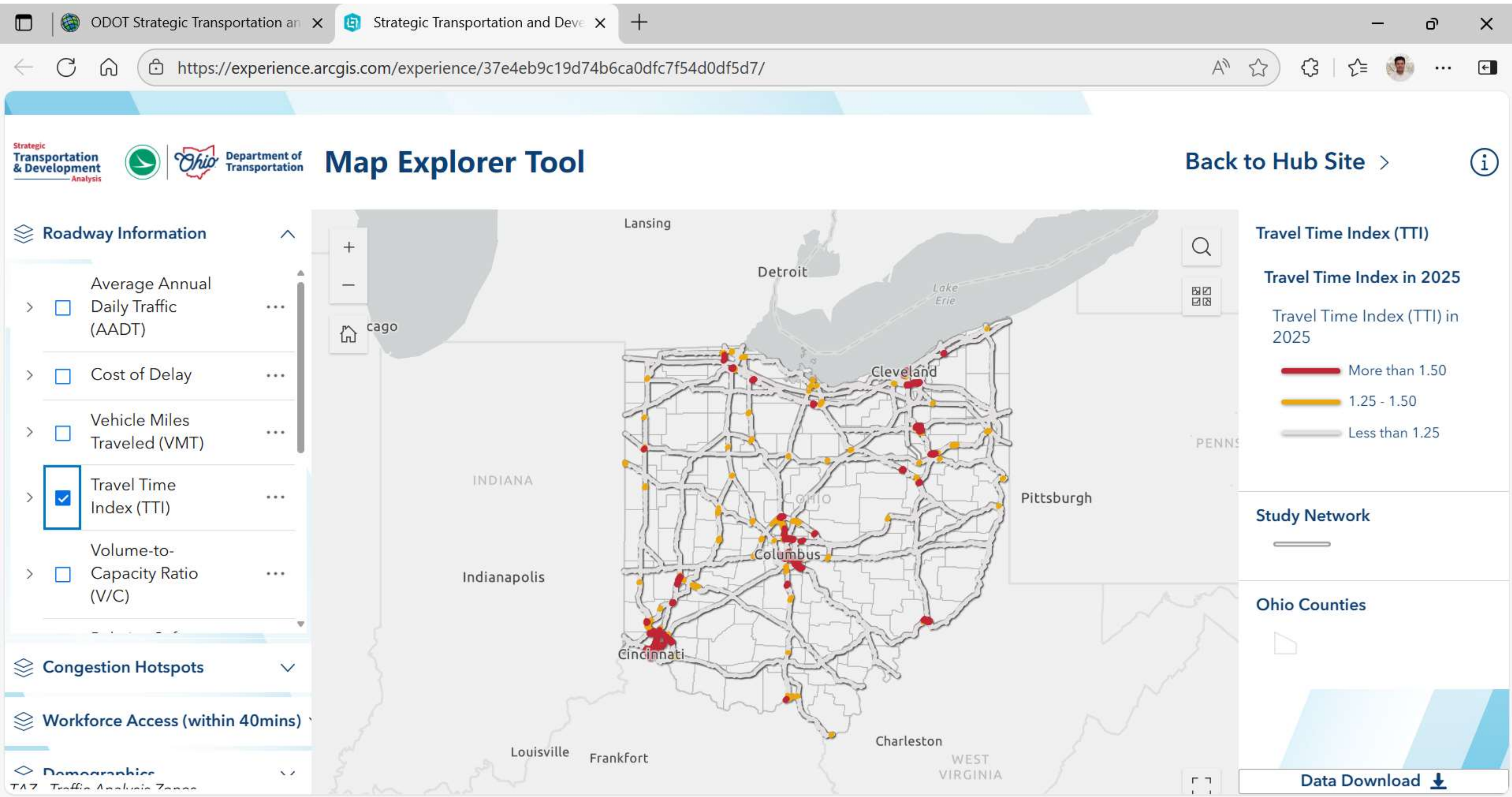
  - AGOL: Sarah Windmiller, Jack Glodek
  - Metric Development: Navnit Sourirajan, Dan Tempesta, Rich Margiotta

CAMBRIDGE SYSTEMATICS
Think Forward

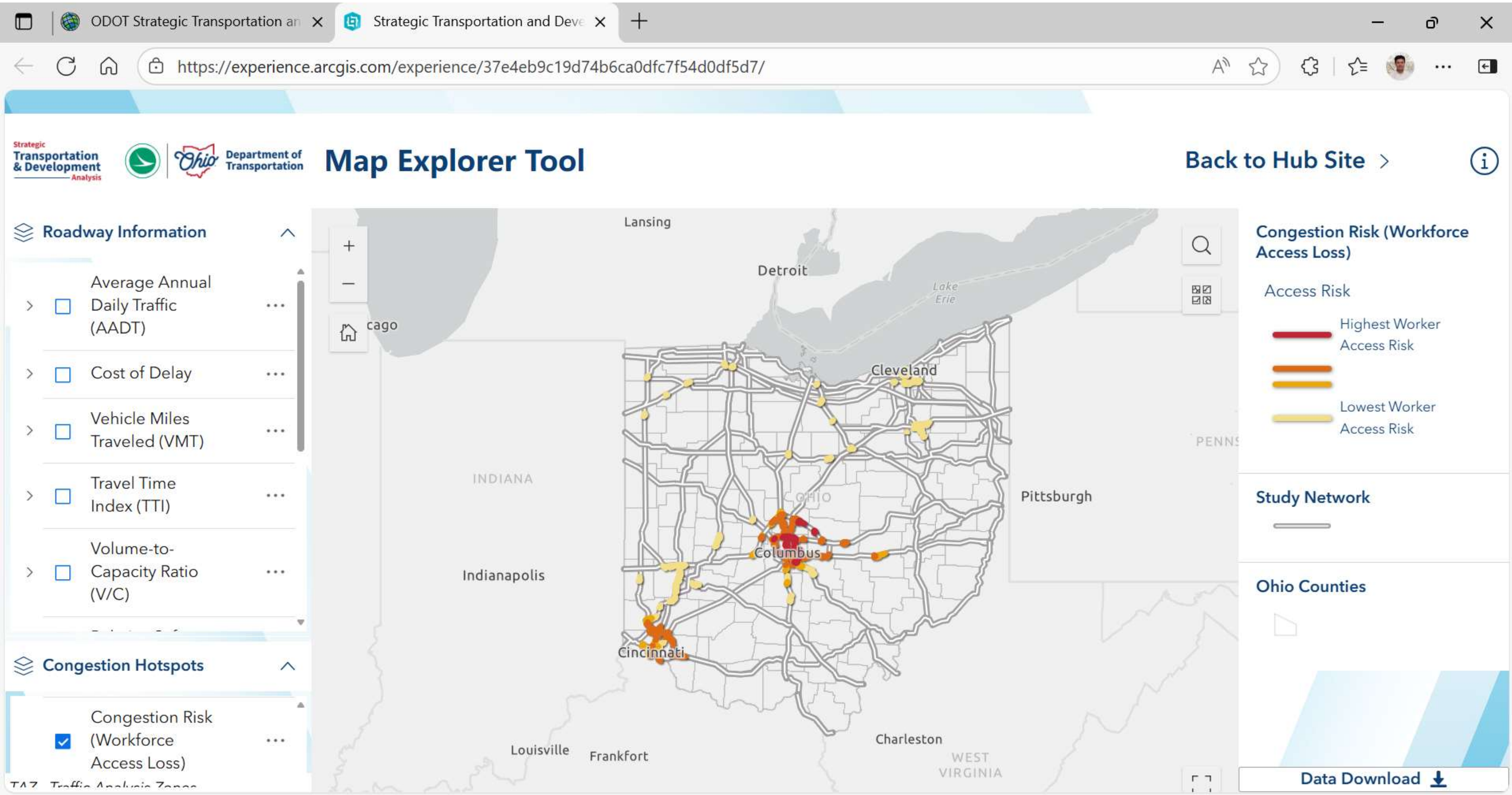
Transportation



Transportation



Accessibility



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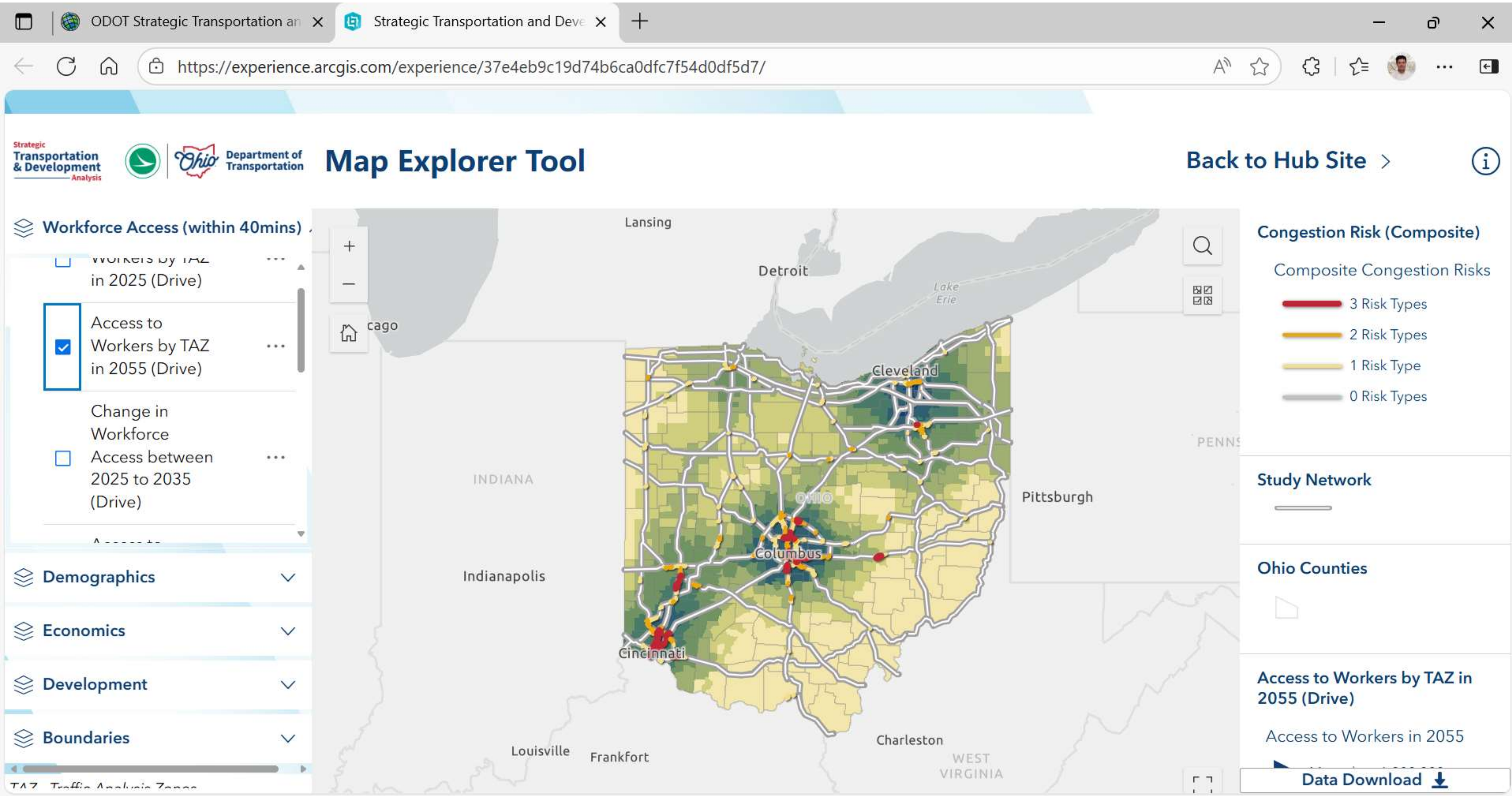
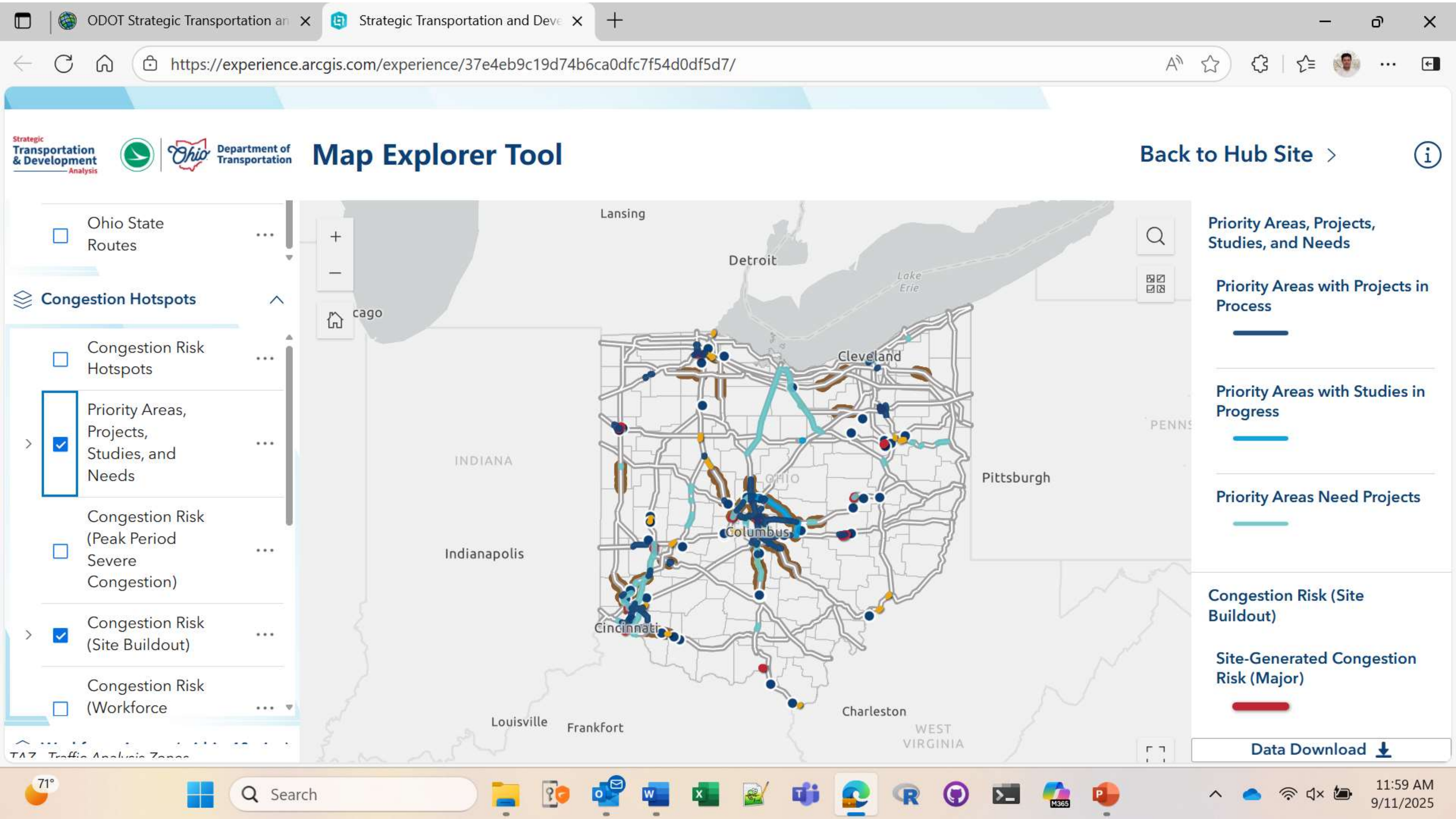


Development



Intraregional / Interregional

ODOT Strategic Transportation an | BI Tool Dashboard

https://experience.arcgis.com/experience/6a91a64b3f1c43879e64b95857cd8e64

Strategic Transportation & Development Analysis

Ohio Department of Transportation

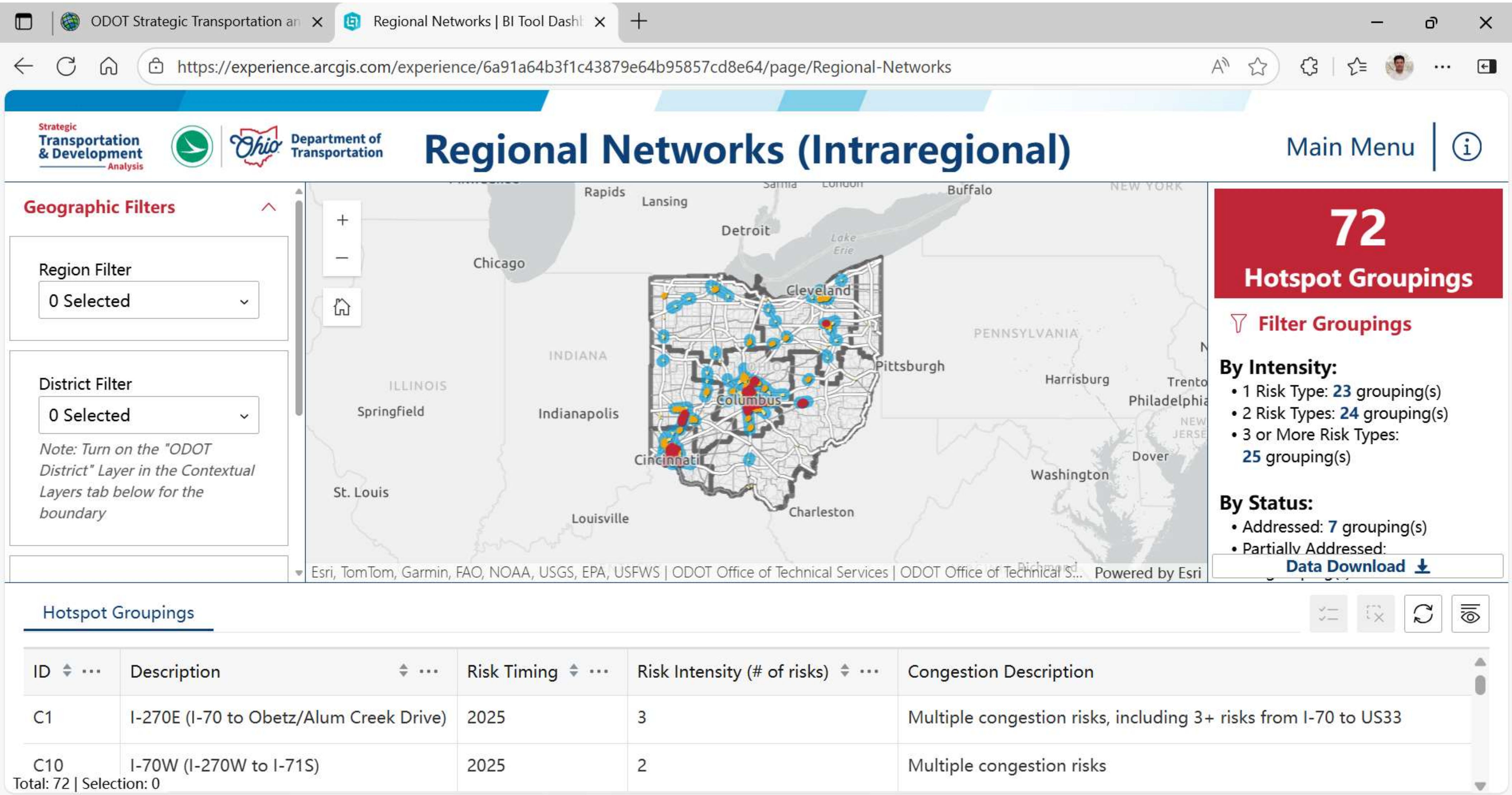
Regional Networks (Intraregional)

Roadways facilitating intraregional connections within markets enable safe and reliable access to job centers for workers and access for logistics and distribution networks for industries, warehousing, and retailers. This dashboard displays the roadway congestion risks, a composite of risks from excessive delays, anticipated development, workforce access, partial access control, and truck delays. These congestion risks are summarized by hotspot groupings, including the grouping's intensity, timing, and status of being addressed by existing, planned projects. Users can filter by JobsOhio region, ODOT district, and MPO/RTPO.

Market Connections (Interregional)

Roadways facilitating interregional connections enable efficient and reliable travel for all vehicles and include capacity and infrastructure to support commercial vehicles. Ohio's regions do not operate in isolation. Trade between regions, including other states and provinces, provides the lifeblood for Ohio's economies. This dashboard displays travel across key roadways and corridors, summarizing said corridor's traffic movement, surrounding development, and risk.

Intraregional



Intraregional

ODOT Strategic Transportation an | Regional Networks | BI Tool Dash

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Regional Networks (Intraregional)

Main Menu

Geographic Filters

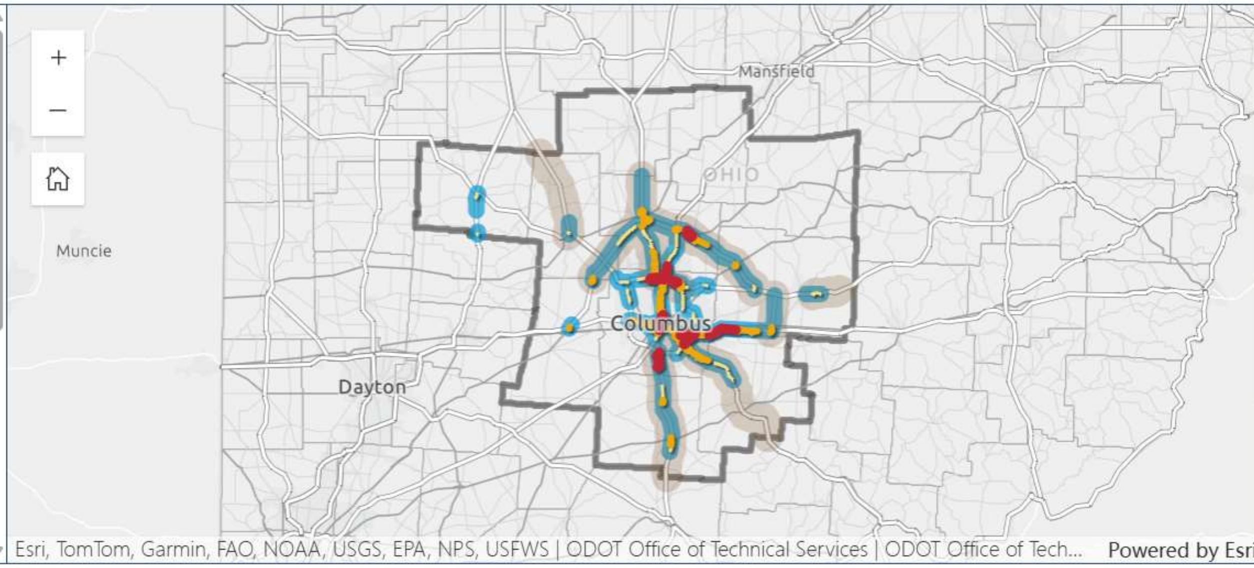
Region Filter

1 Selected

District Filter

0 Selected

Note: Turn on the "ODOT District" Layer in the Contextual Layers tab below for the boundary



By Intensity:

- 1 Risk Type: **7** grouping(s)
- 2 Risk Types: **8** grouping(s)
- 3 or More Risk Types: **12** grouping(s)

By Status:

- Addressed: **2** grouping(s)
- Partially Addressed: **16** grouping(s)
- Planning Ongoing: **4** grouping(s)
- Planning Gap: **5** grouping(s)

By Risk Timing:

- 2025: **20** grouping(s)

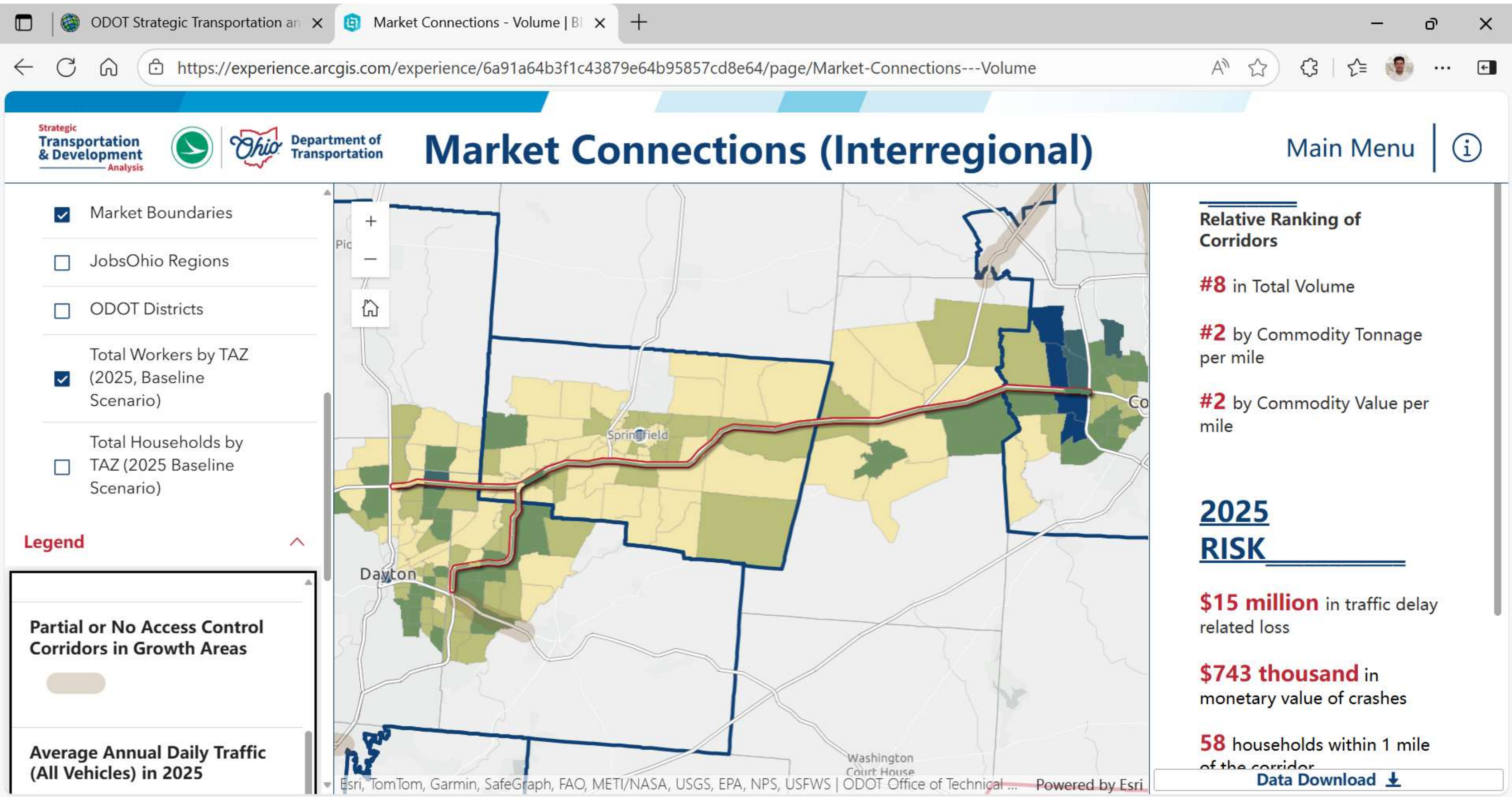
Data Download

Hotspot Groupings

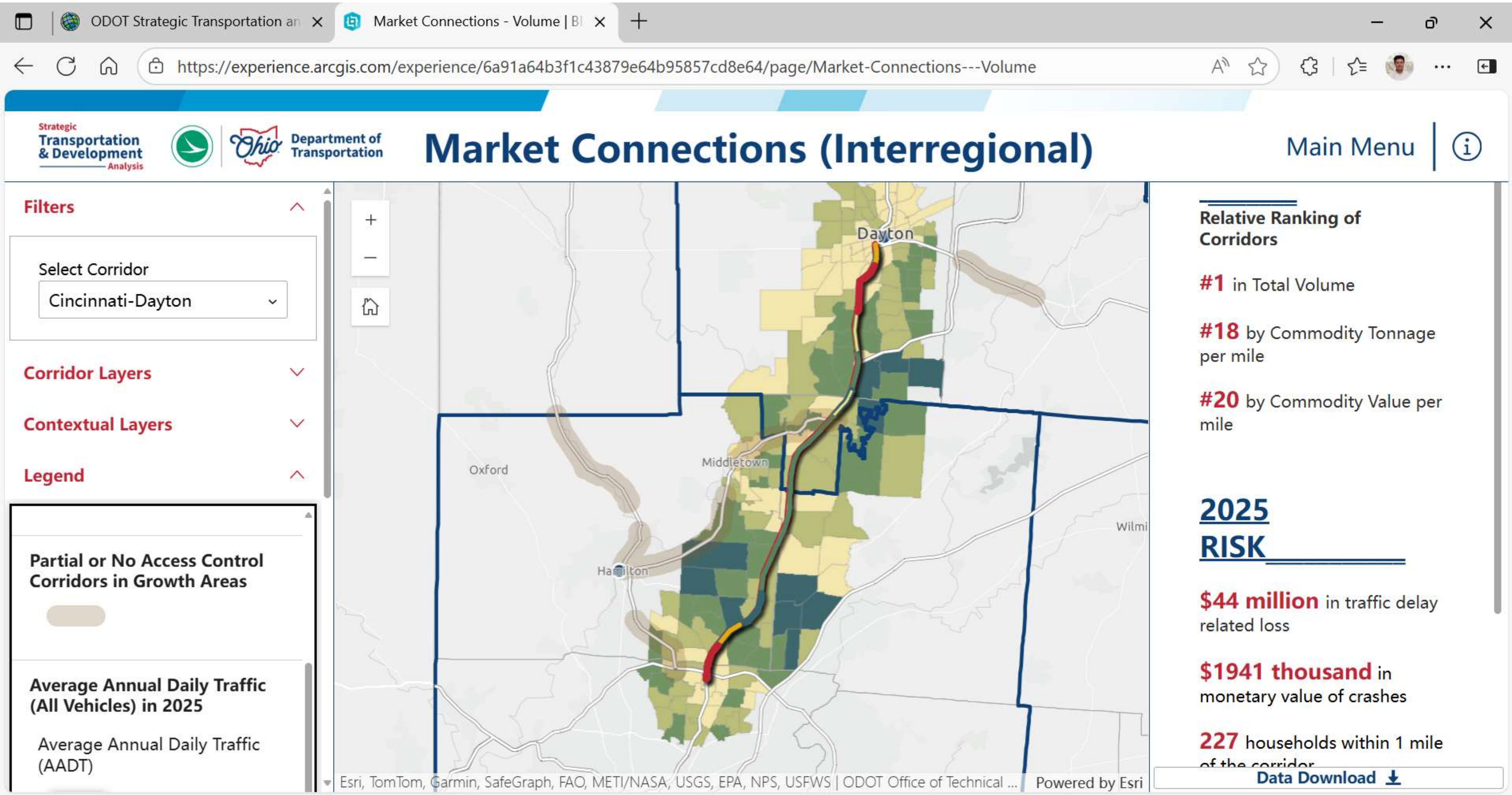
ID	Description	Risk Timing	Risk Intensity (# of risks)	Congestion Description
C1	I-270E (I-70 to Obetz/Alum Creek Drive)	2025	3	Multiple congestion risks, including 3+ risks from I-70 to US33
C10	I-70W (I-270W to I-71S)	2025	2	Multiple congestion risks

Total: 27 | Selection: 0

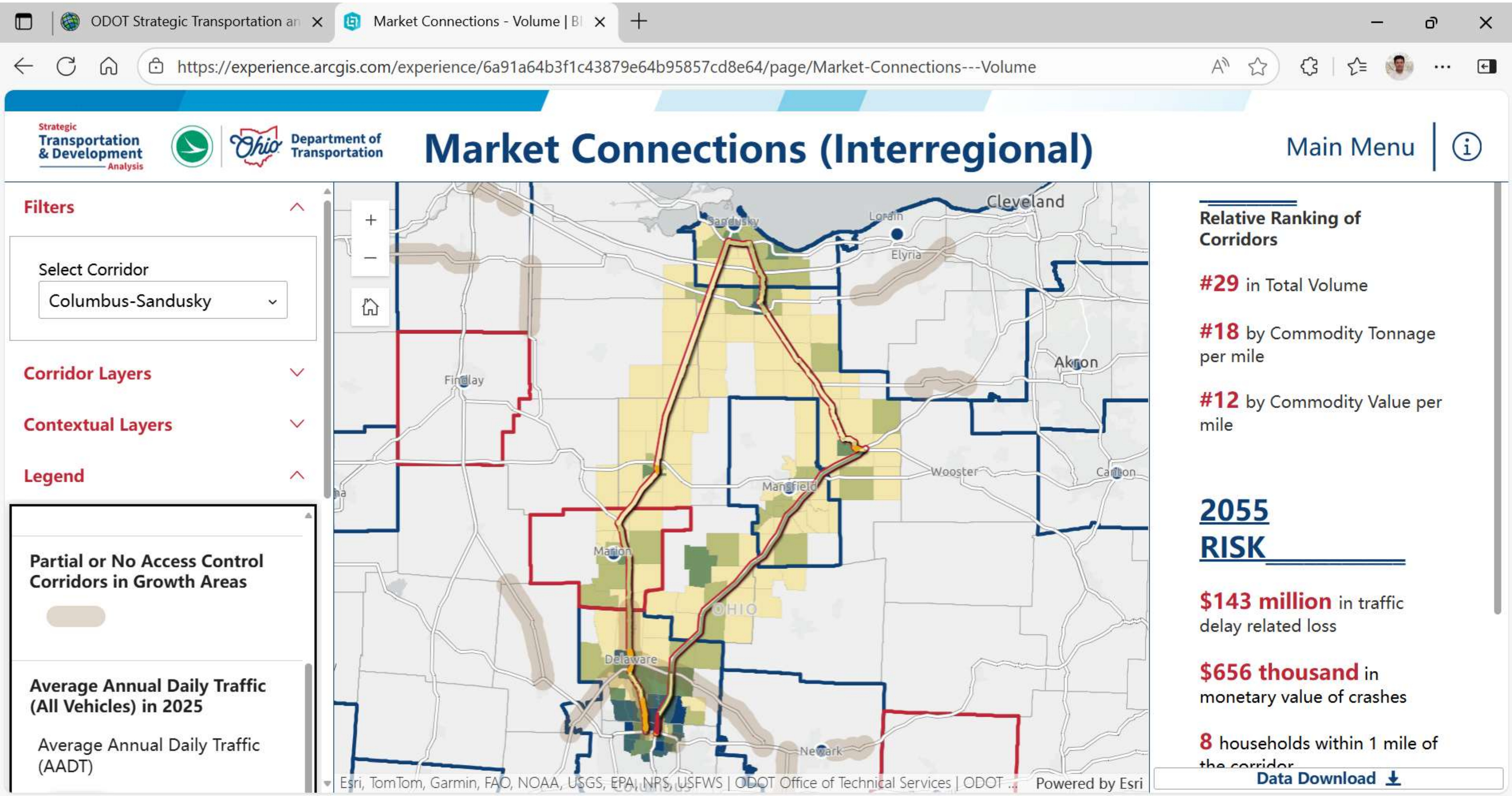
Interregional



Interregional

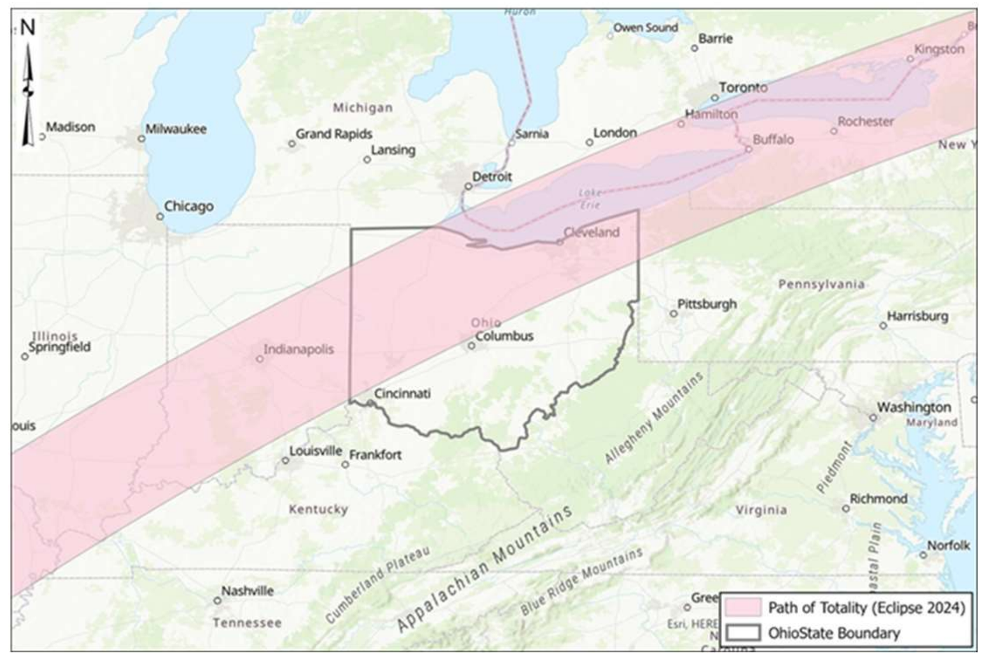


Interregional



Ohio Total Solar Eclipse

- ODOT wanted to be able to be proactive in planning for and positioning resources on eclipse day to facilitate smooth traffic operations.
- Statewide in Scale – Statewide Model
- Goal
  - Create an Eclipse Day event model for Ohio
  - Big Data collected from the 2017 eclipse in Kentucky and Tennessee



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Eclipse Model – Development and Application

Data
- 2017 Regular Day
- 2017 Eclipse Day

Difference
- Visitor Trip Behavior
- Changes to Resident Behavior

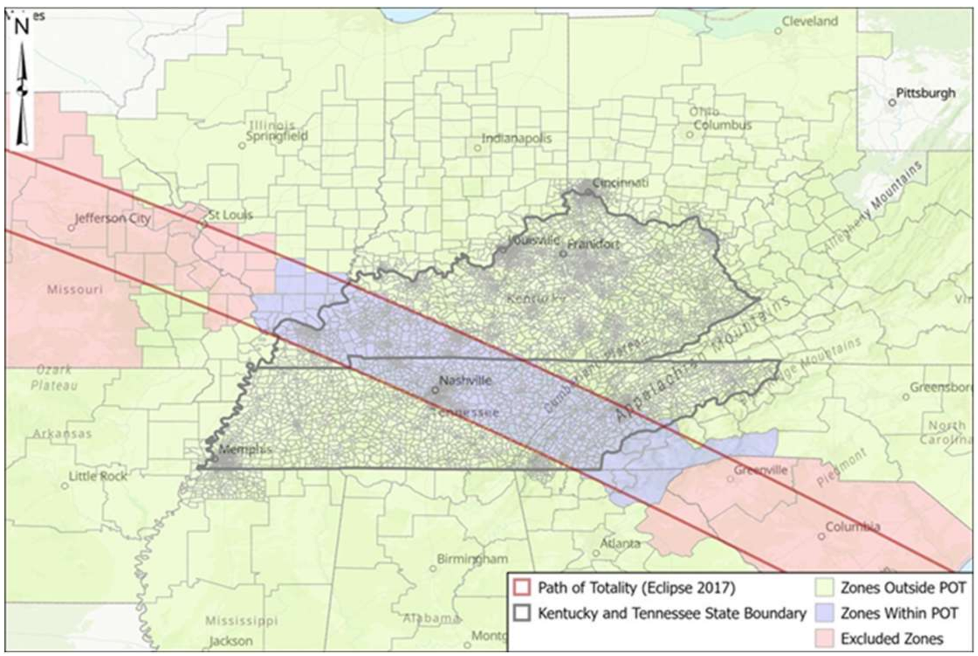
Model
- Apply Changes & Visitation
- Impact

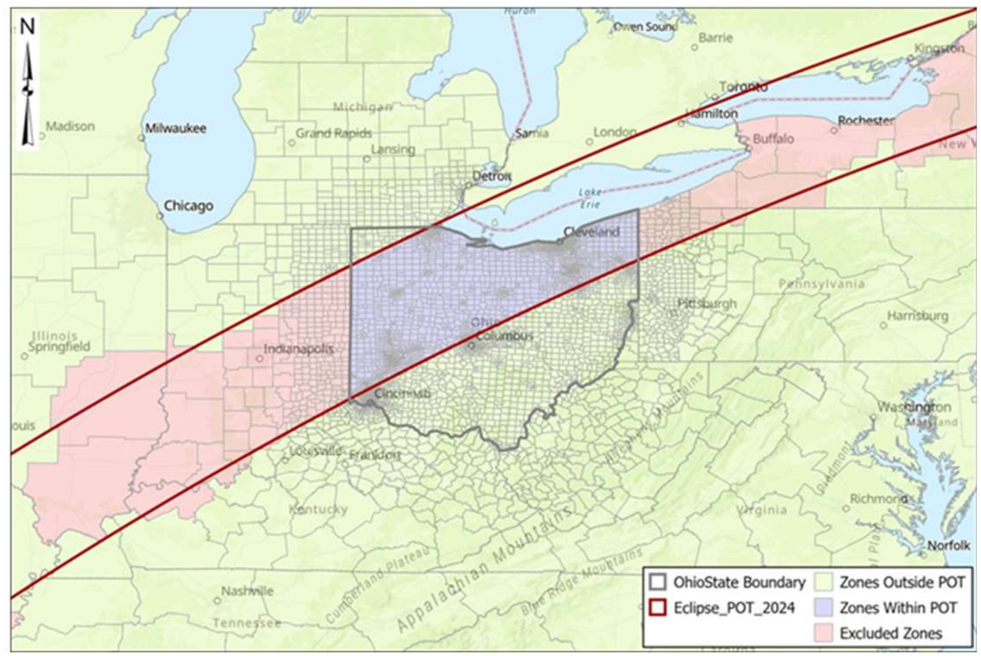
Statewide Event Modeling

- Classification of Trips
- Changes in Travel
  - Trip Length
  - Trip Making
- Diurnal Shifts
- Magnitude of Trips
- Traffic Assignment

Classification of Trips

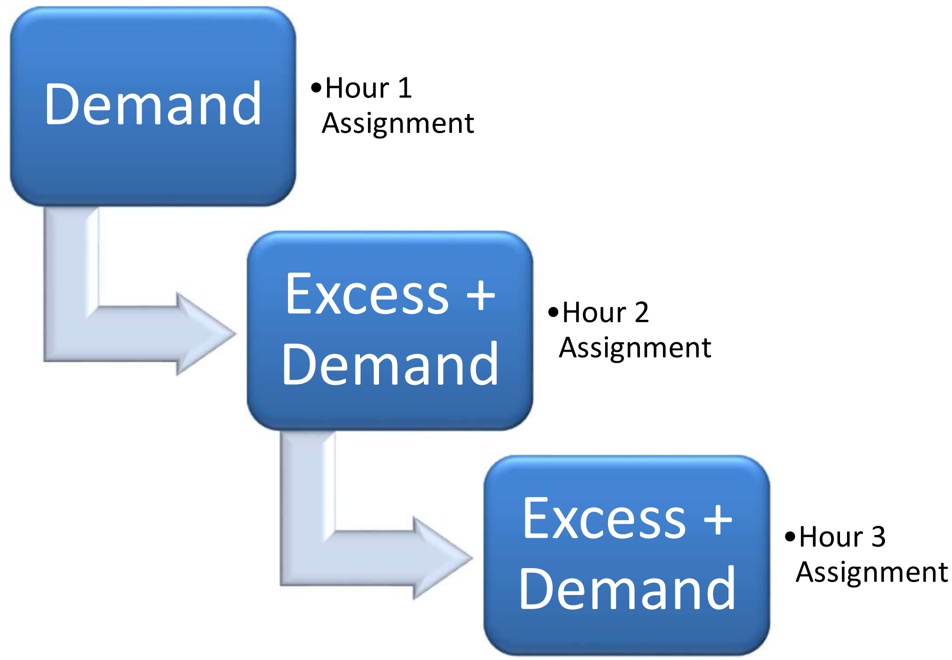
- II trips: Trips beginning and ending in the path of totality
- Visitor Trips
  - IE trips: Trips traveling from the path of totality
  - EI trips: Trips traveling to the path of totality
  - EE trips: Trips traveling through or avoiding the path of totality



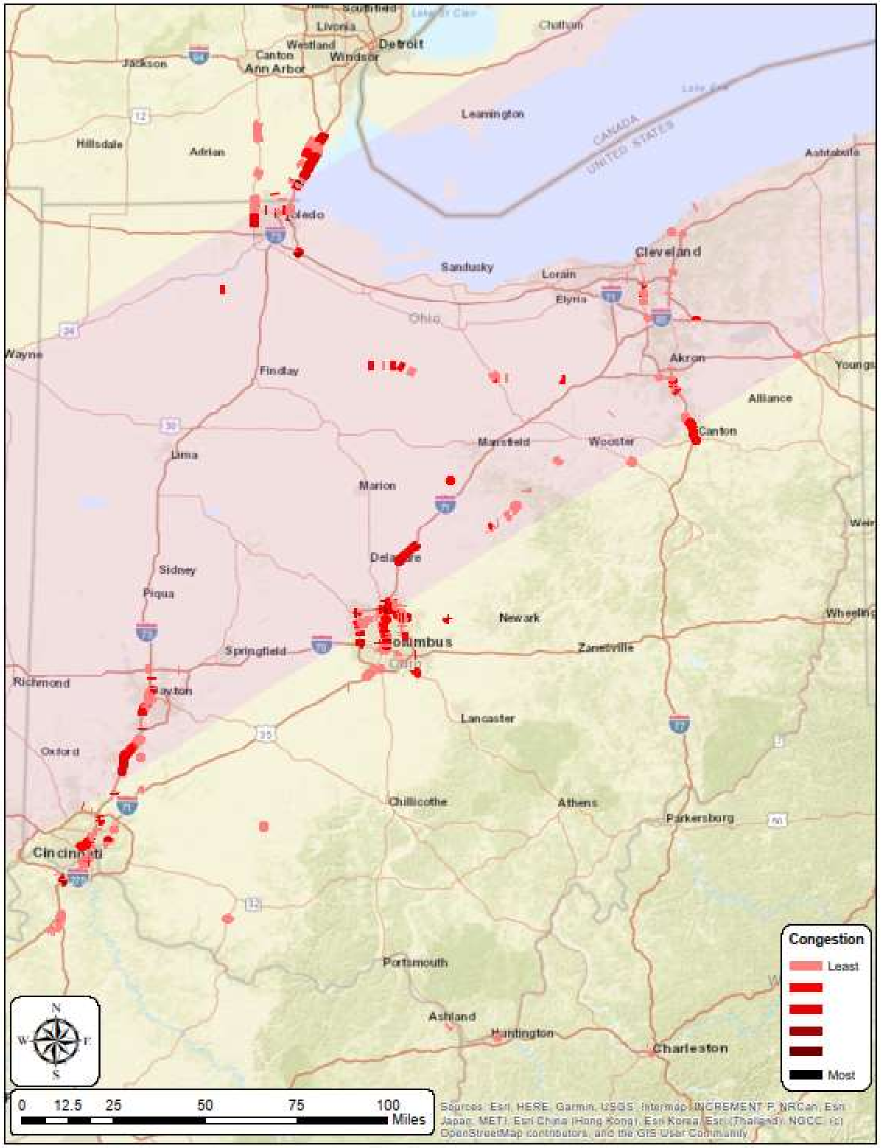


Eclipse Assignment

- Created a sequential static assignment.
  - 24 one-hour assignments
  - Volume in excess of capacity is carried over to the next hour
- Can measure anticipated congestion hot-spots, but cannot address operational elements such as queuing
- Best analyzed by comparing changes to congestion between a “regular” day and the eclipse scenario

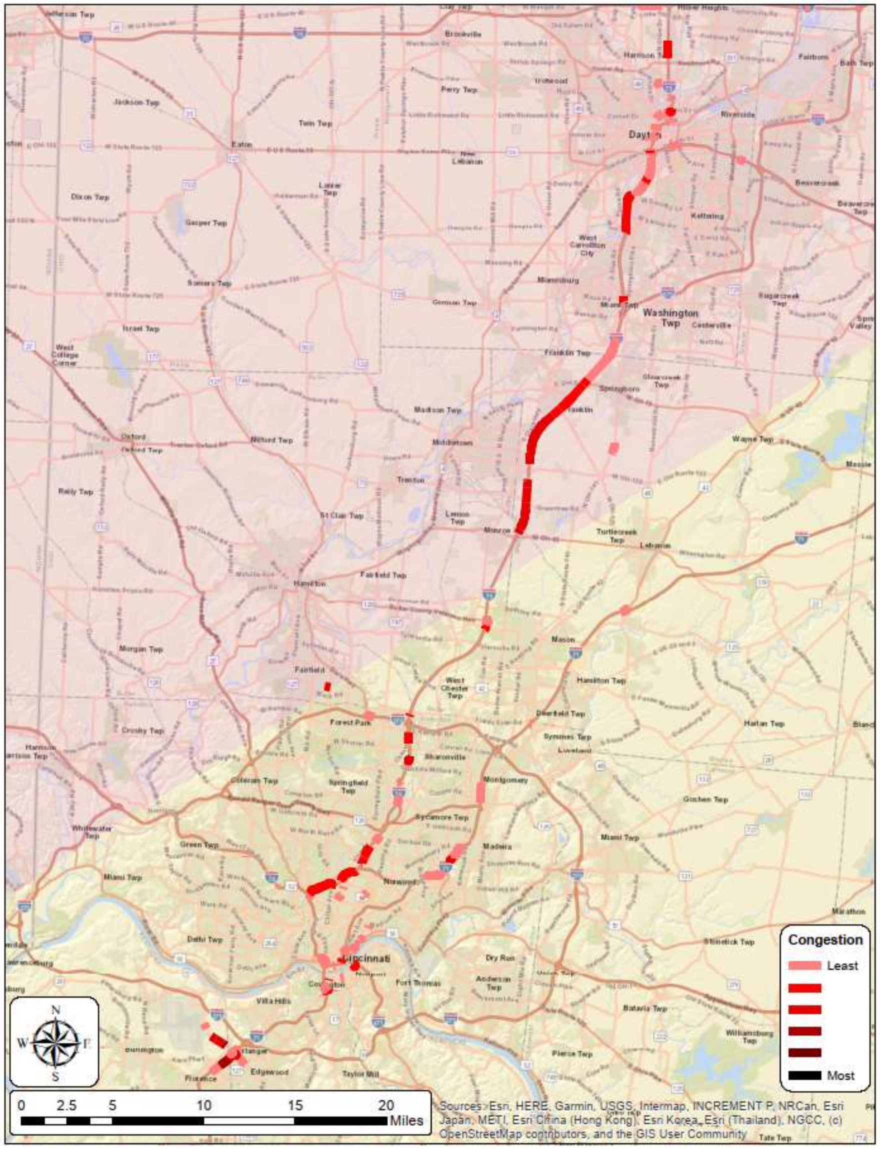


Findings

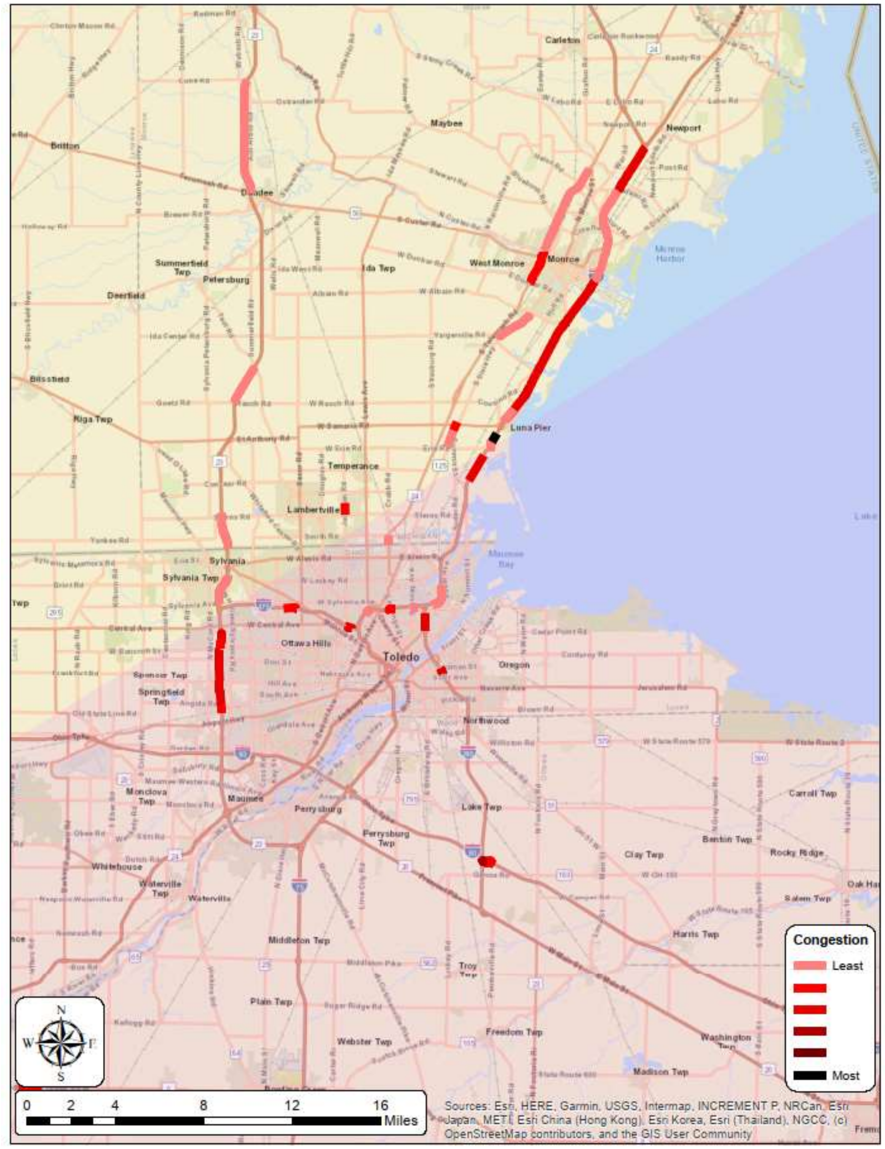


- Planning Mitigation Strategies
- Identification of potential bottlenecks in the system

Findings



Dayton
Washington Twp
Cincinnati
Congestion
Least
Most
0 2.5 5 10 15 20
Miles
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



Monroe
Toledo
Congestion
Least
Most
0 2 4 8 12 16
Miles
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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