



FLORIDA TRANSPORTATION FORECASTING FORUM

UNITED FEDERATION OF MODELING

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Sawgrass Marriott | Ponte Vedra Beach, FL

Systems Forecasting
& Trends Office



FLORIDA TRANSPORTATION FORECASTING FORUM

Context Class Capacity Integration into Travel Demand Models

Govardhan Muthyalagari, PE, PTOE

Overview

Need for travel demand
model updates

Objective

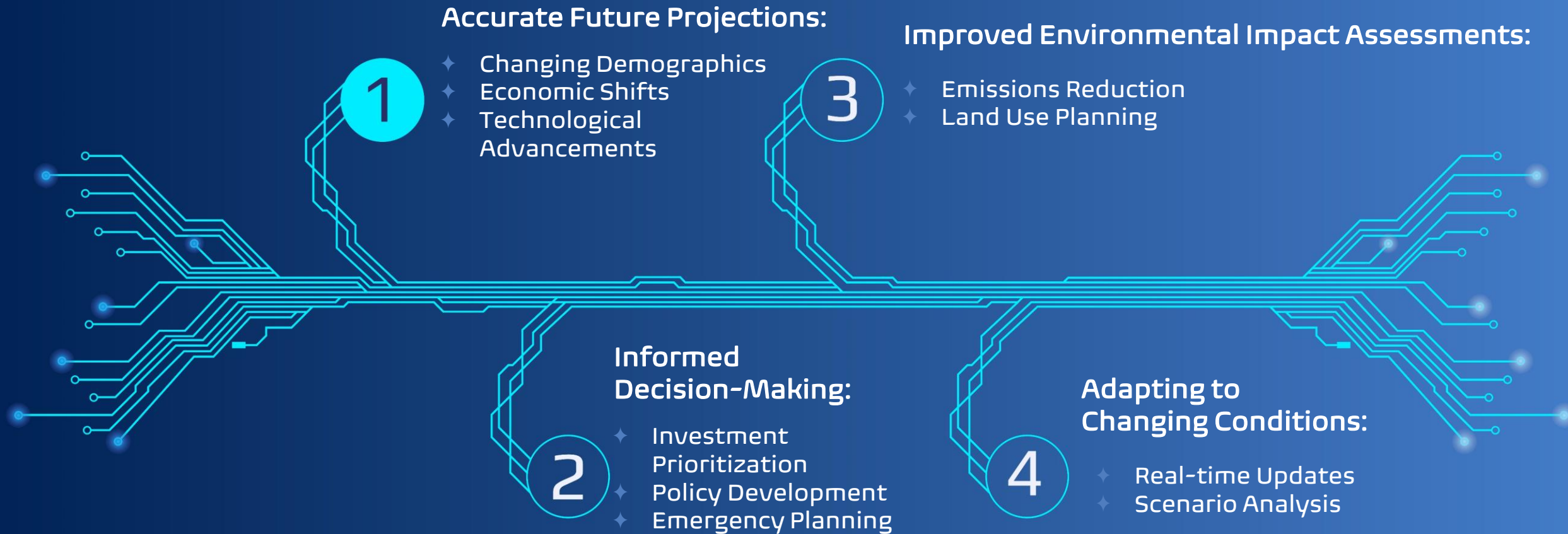
Findings

Next Steps

Methodology

Complete Streets 360°
(FDOT Context Classification Framework)

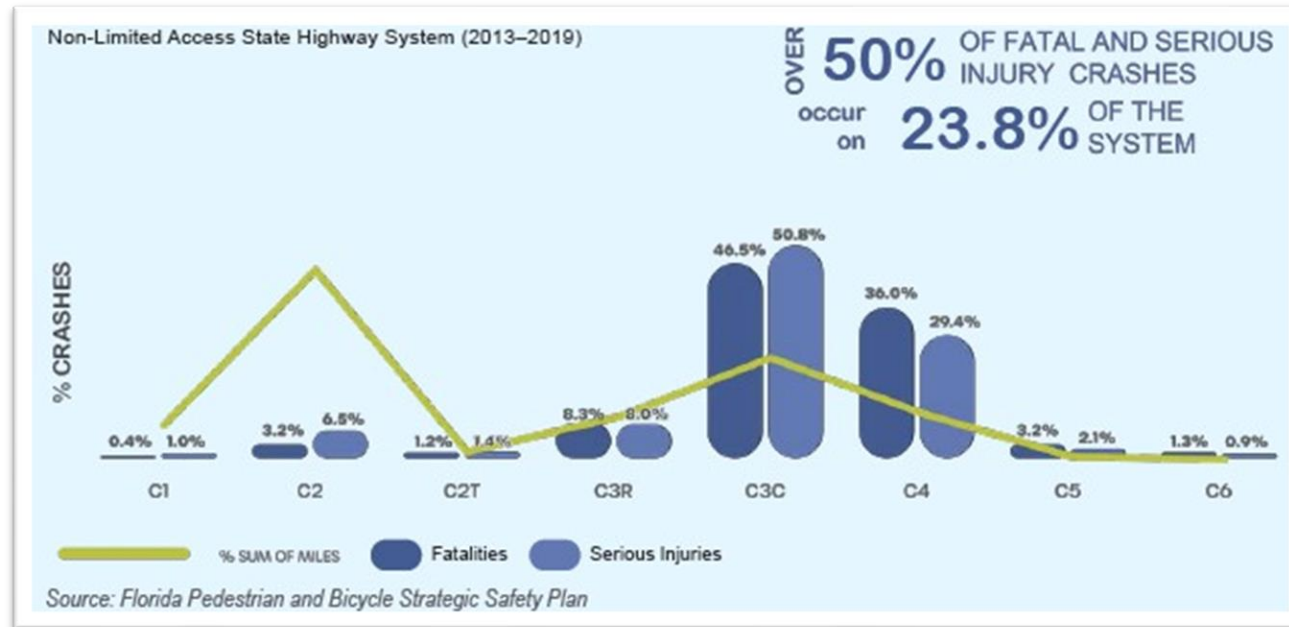
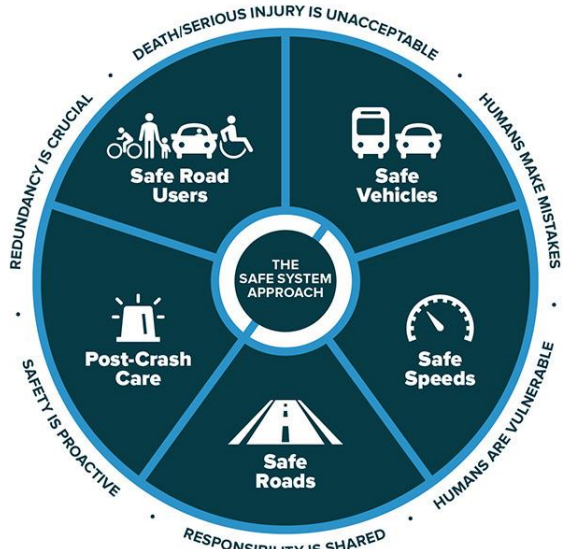
Value in Updating Travel Demand Modeling



COMPLETE STREETS 360°: FDOT CONTEXT CLASSIFICATION FRAMEWORK)

APPROACH

Safe System Approach



- “Putting the right street in the right place”
- Target Zero
- Safe Systems Approach

FDOT Context Classification Framework



- ◆ Roadway characteristics,
- ◆ Traffic Patterns, and
- ◆ Development Densities within Spatial Context

Objective

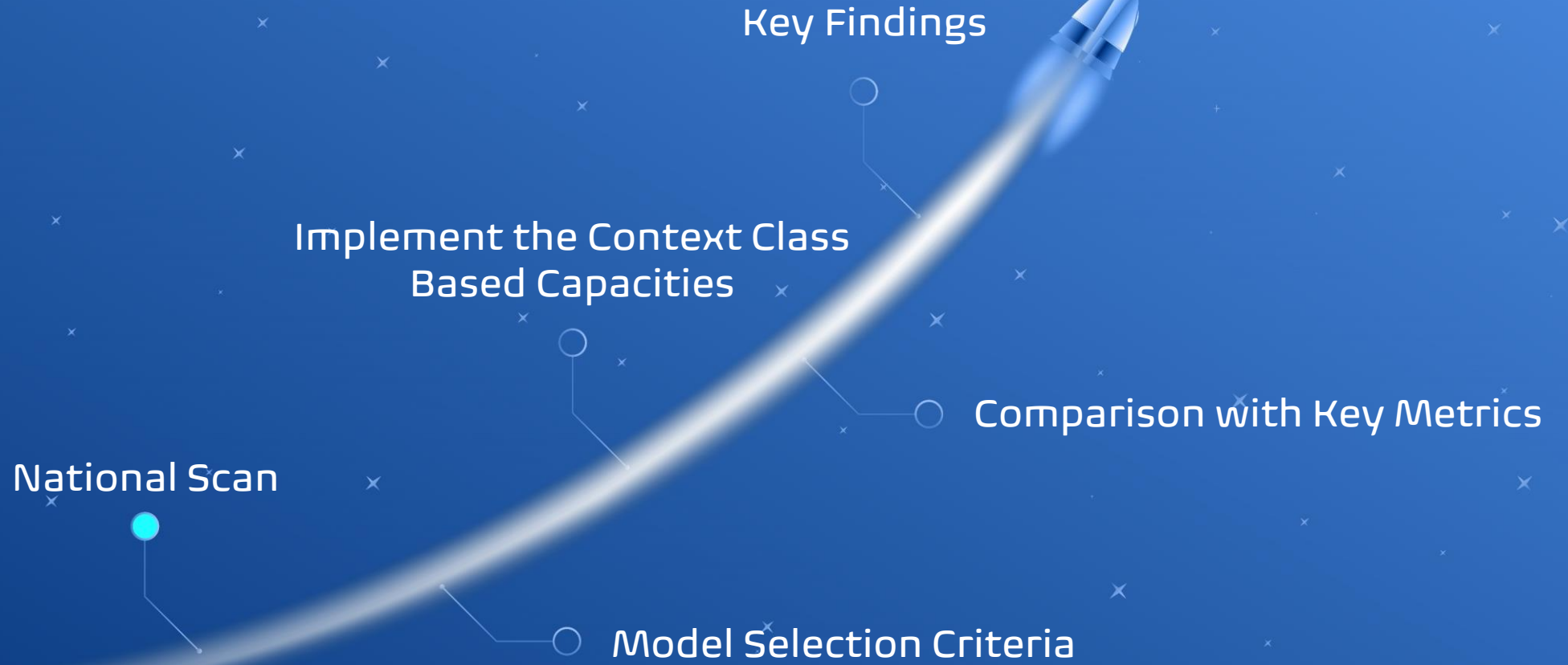
Establish a framework for incorporating FDOT's latest Context Class capacity guidelines into travel demand models to improve the accuracy and reliability of future transportation planning and decision-making.

Current Practice

- ◆ Area Type (Core Urbanized, Urbanized, Transitioning, Rural)
- ◆ Facility Type (Limited Access, Arterial)
- ◆ UROAD factor (accounting for roadway geometry)
- ◆ CONFAC factor (similar to K factor, accounting for development density)
- ◆ Bureau of Public Roads (BPR) Coefficient and Exponent (used in speed-flow relationships)

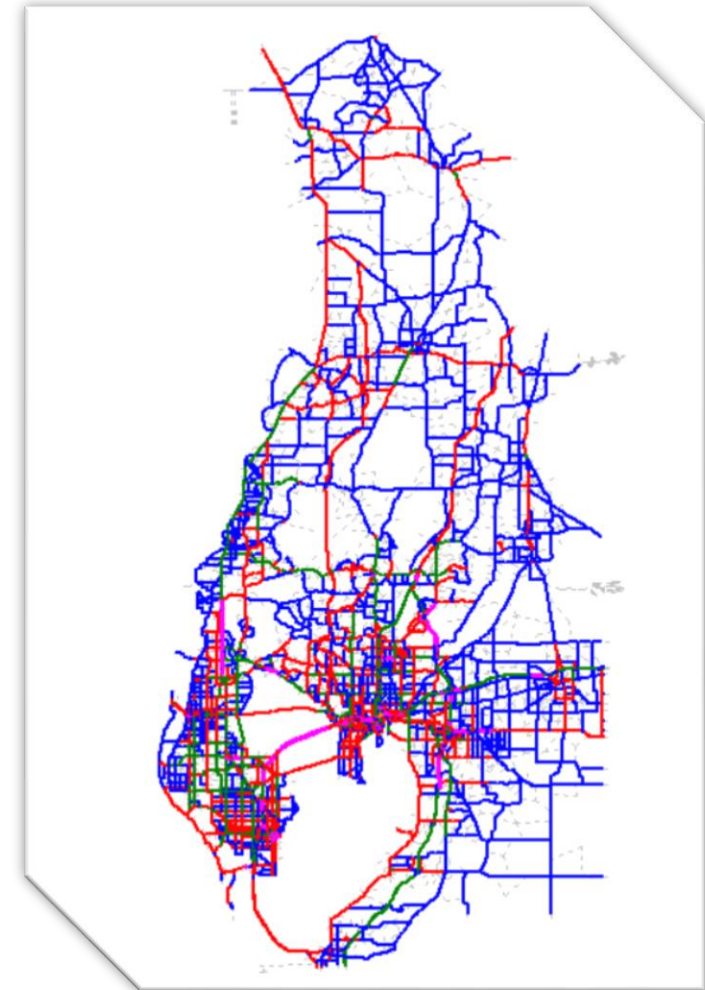


Methodology



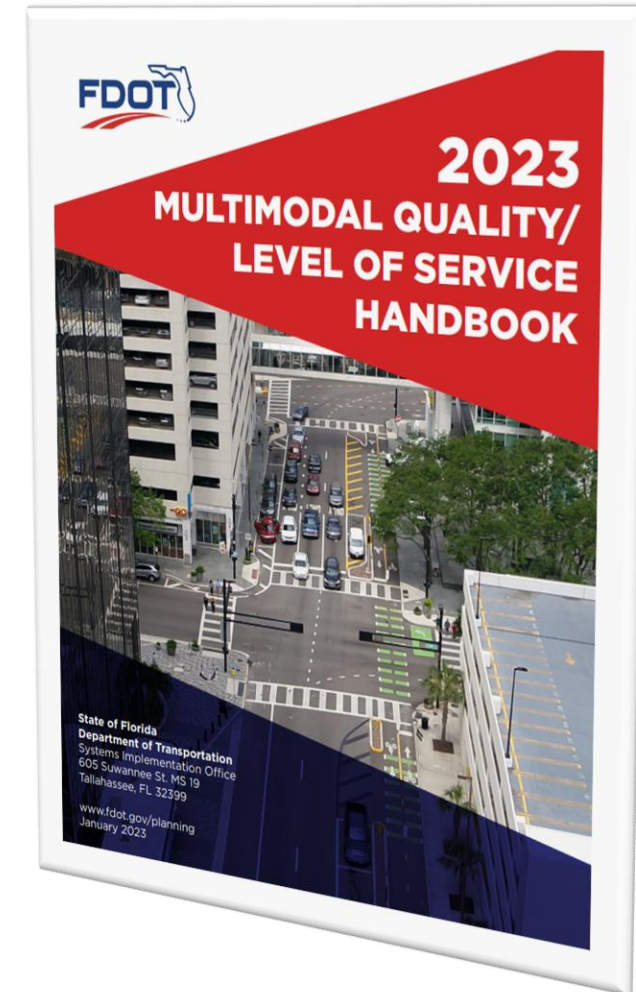
Model Selection Criteria

- ♦ Tampa Bay Regional Planning Model (TBRPM) was selected
 - ❖ Accommodates Time-of-day (TOD) and daily volume within the model.
 - ❖ Coverage of all context classes within the model area's roadway network.
 - ❖ Requires minimal data and effort for integration of context-based capacities.
 - ❖ Offers balance between model size and computational efficiency.



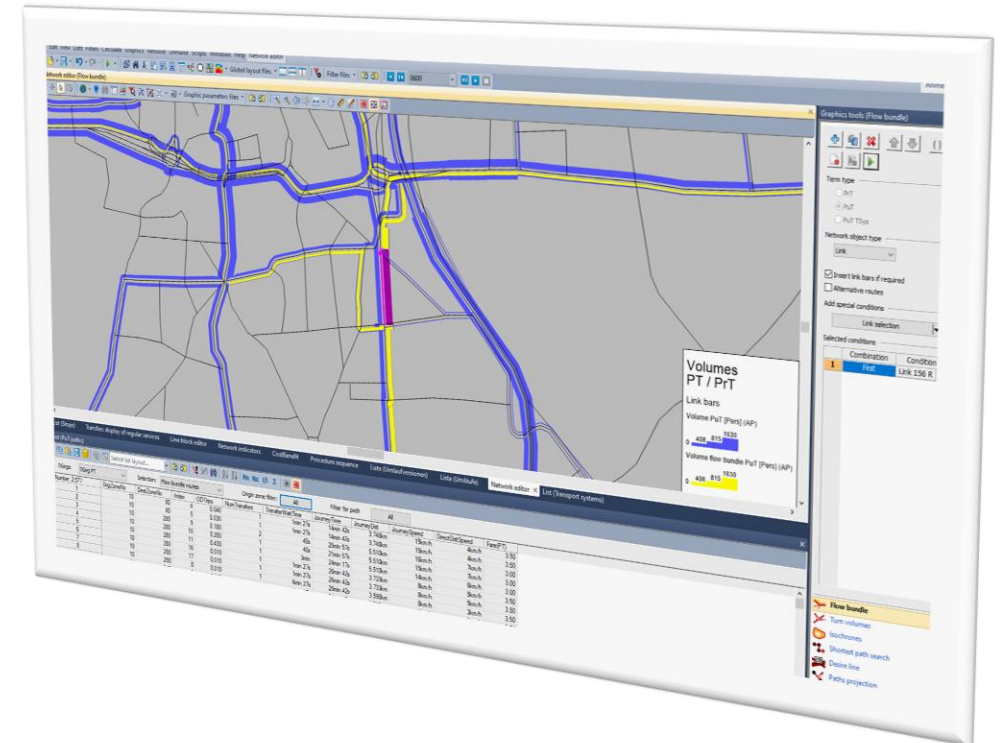
Implementation of Context Class Capacities

- ◆ Utilize 2023 FDOT Multimodal Quality/LOS Handbook
- ◆ No capacity changes to the limited access facilities
- ◆ Updated capacities for State Roadways (C1, C2, C3R, C3C, C4, C5, and C6)
- ◆ No capacity changes to the local roadway



Implementation of Context Class Capacities

- Updated speed and capacities based on Context Class - Procedure 15 within Visum model (Python Script File: 2_update_speed_capacity.py)
- 5,004 (20%) out of 24,780 links were updated for the 2015 Base Year TBRPM
- Quality check performed for speed and capacity using context classification



Findings

- ◆ Compared to 2013 FDOT Q/LOS handbook, the 2023 FDOT Q/LOS handbook shows:
 - ◆ Reduction in capacities for most of the state roadway context classes
 - ◆ Increase in capacities for limited access facilities for Urban Core, Urban, Transitioning and Rural Area Types
- ◆ Trip lengths during peak period all Trip purposes are increased by approx. 1.3%
- ◆ Higher changes approx. 3.7% increase is observed for the off-peak period for all Trip purposes

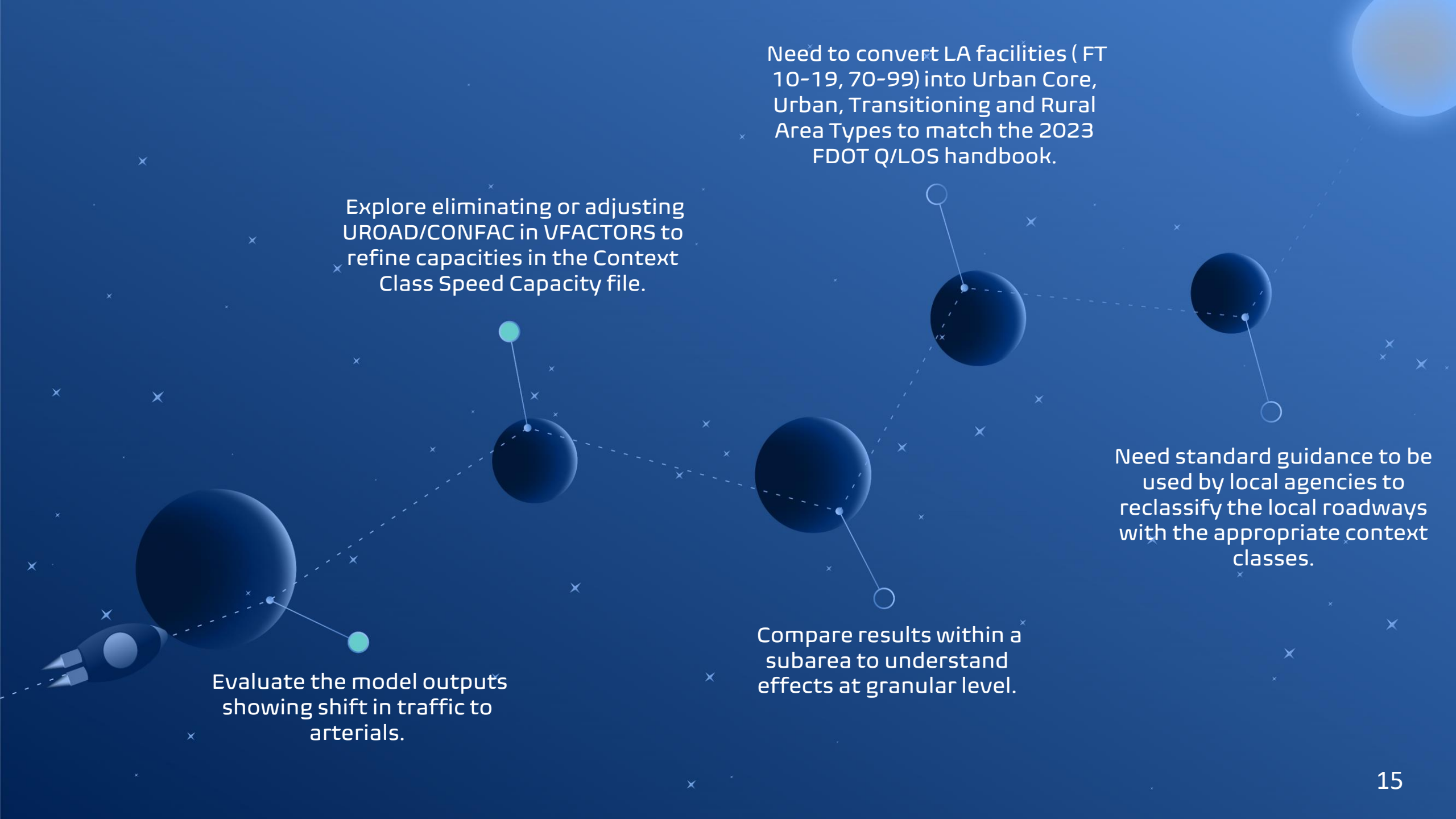
TRIP PURPOSE	PEAK - Total Trip Length (Miles)	OFF-PEAK - Total Trip Length (Miles)
HBW	-1.24%	-4.77%
HBSH	-1.54%	-3.38%
HBSR	-1.81%	-2.75%
HBSC	-1.26%	-4.76%
HBO	-1.39%	-2.47%
NHBW	-1.59%	-8.01%
NHBO	-1.61%	-8.28%
LTRK	-1.68%	-6.95%
HTRK	-0.59%	-0.90%
TAXI	-1.95%	-7.15%
EI	0.64%	3.54%
AIRP	-0.14%	0.52%
COL	-0.94%	-4.46%
Overall	-1.28%	-3.67%
Person	-1.39%	-4.32%
Vehicle	-0.05%	0.99%

Findings

- ♦ Overall deviation of around 4% based on the Volume/Count ratio
- ♦ Traffic volumes have decreased along:
 - ♦ Freeway/limited access facilities,
 - ♦ Toll facilities, and
 - ♦ Collectors
- ♦ Traffic volumes have increased along:
 - ♦ Undivided arterials,
 - ♦ Divided arterials, and
 - ♦ One Way facilities

Highway Validation by Facility Type

Facility Type	Count	Volume	Volume/Count
Freeway	0.00%	4.18%	3.96%
Divided Arterial	0.00%	-6.82%	-7.00%
Undivided Arterial	0.00%	-20.00%	-19.59%
Collector	0.00%	1.99%	1.20%
One Way Facility	0.00%	-13.04%	-13.28%
Ramps	0.00%	5.32%	5.71%
Toll Facilities	0.00%	4.38%	4.65%
Overall	0.00%	-3.76%	-4.08%



Need to convert LA facilities (FT
10-19, 70-99) into Urban Core,
Urban, Transitioning and Rural
Area Types to match the 2023
FDOT Q/LOS handbook.

Explore eliminating or adjusting
UROAD/CONFAC in VFACTORS to
refine capacities in the Context
Class Speed Capacity file.

Evaluate the model outputs
showing shift in traffic to
arterials.

Compare results within a
subarea to understand
effects at granular level.

Need standard guidance to be
used by local agencies to
reclassify the local roadways
with the appropriate context
classes.

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High-Resolution Statewide Socio-demographic, Land Use and Economic Development Framework for Transportation Planning

Naveen Eluru

*Professor in Civil, Environmental and Construction Engineering
University of Central Florida*

BOLDLY GOING: TRIPS IN CONTEXT, TFF 2024

Presentation Outline

Project Vision and Approach

Project Findings

Data products and Use cases

Takeaways

Background

The project focuses on developing a standardized high resolution state-wide sociodemographic, land use and economic development model

The project will generate a universal template of variables that will be useful for the statewide framework

For the universal template built, the research team will generate socio-economic, land use and economic development variables

Objectives

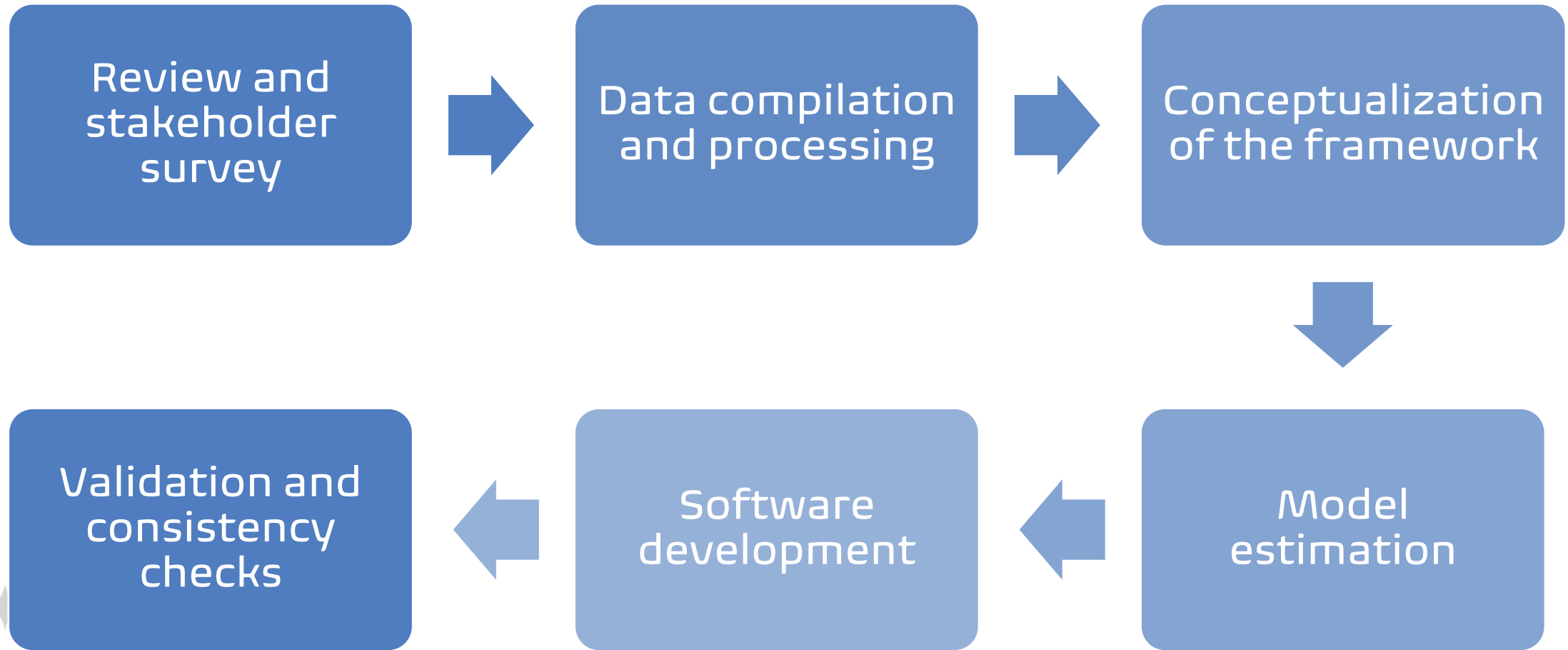
To establish a universal template of socio-demographic, land use and economic indicators

To develop and validate an algorithm to generate socio-demographic, land use and economic indicators

To employ the validated algorithm developed to generate future socio-demographic, land use and economic indicators in 5-year increments from 2025 through 2050

To generate the variables for a spatial resolution that can be directly employed for local jurisdictions and statewide models

Research Overview



Data Resources

Florida
Department of
Revenue

U.S. Census
Bureau

FDOT Roadway
Characteristics
Inventory and
Florida Geographic
Data Library

American
Community
Survey

UF Population
Data

Spatial Resolutions

Parcels

Block Group

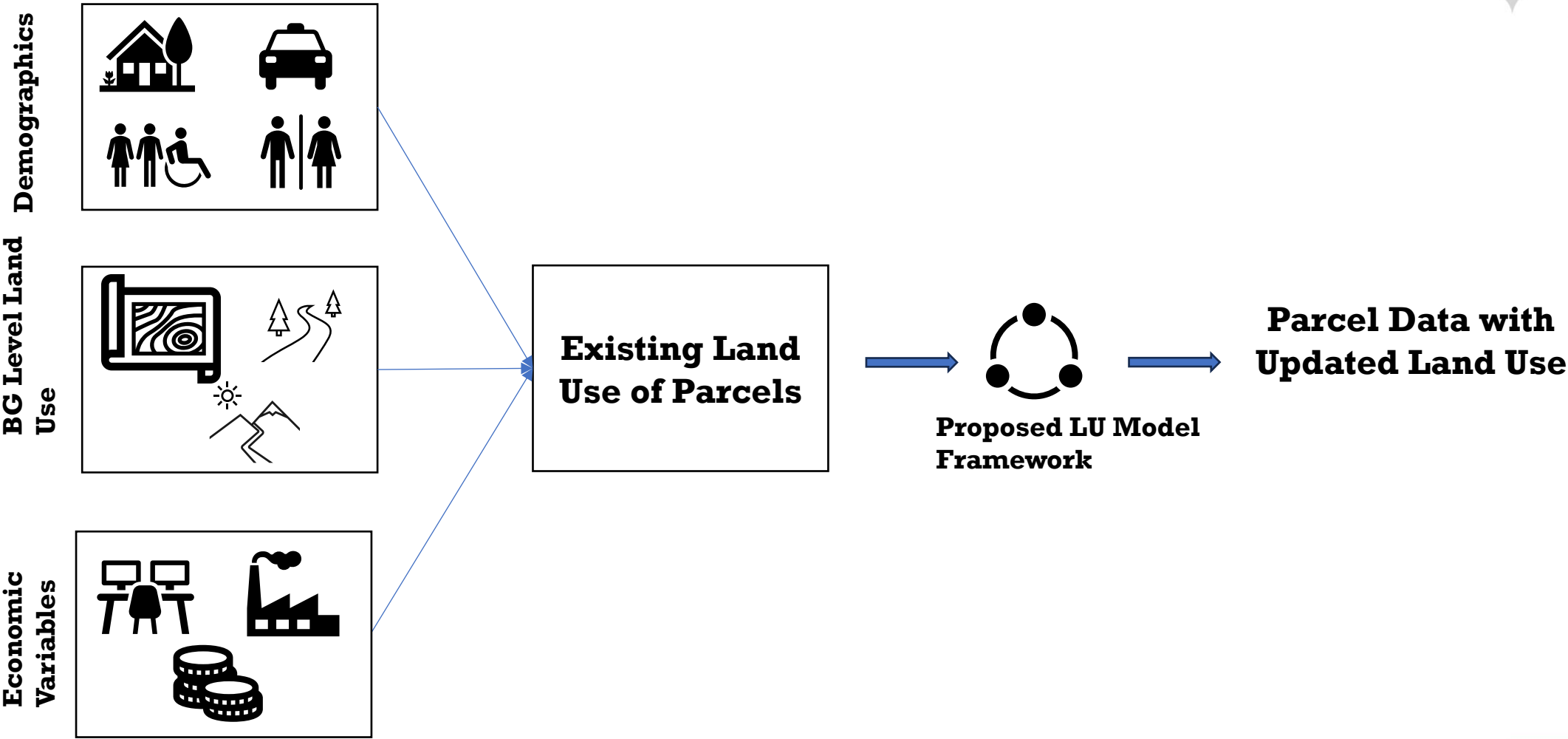
Census Tract

County

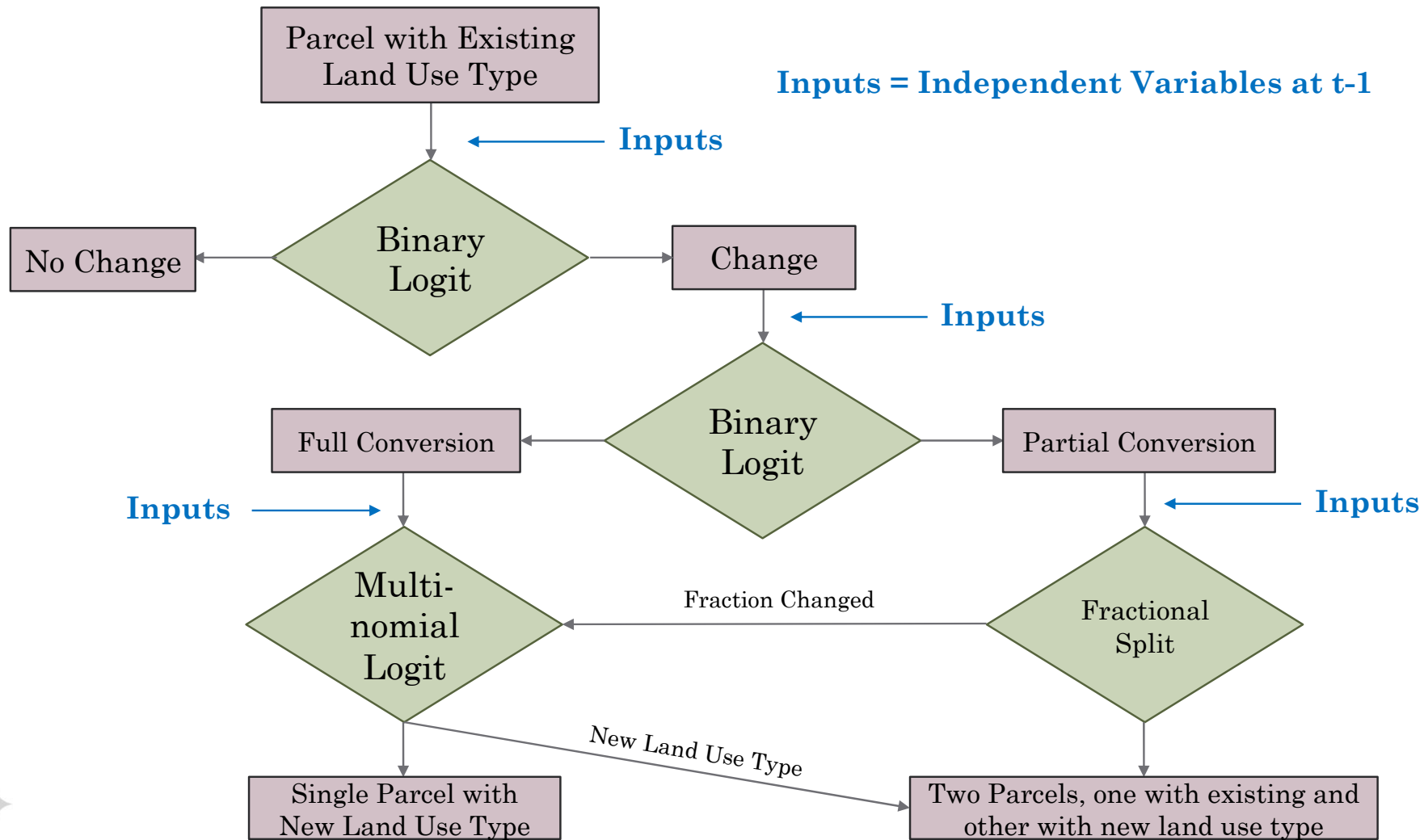
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Conceptual Framework for Land Use Evolution

Model Framework



Land Use Model Structure



Socio-Demographic Variables

Population

Number of
HHs

Vehicle
Ownership

Ethnicity
Distribution

Economic Development Variables

Number of
Jobs

Jobs by
industry

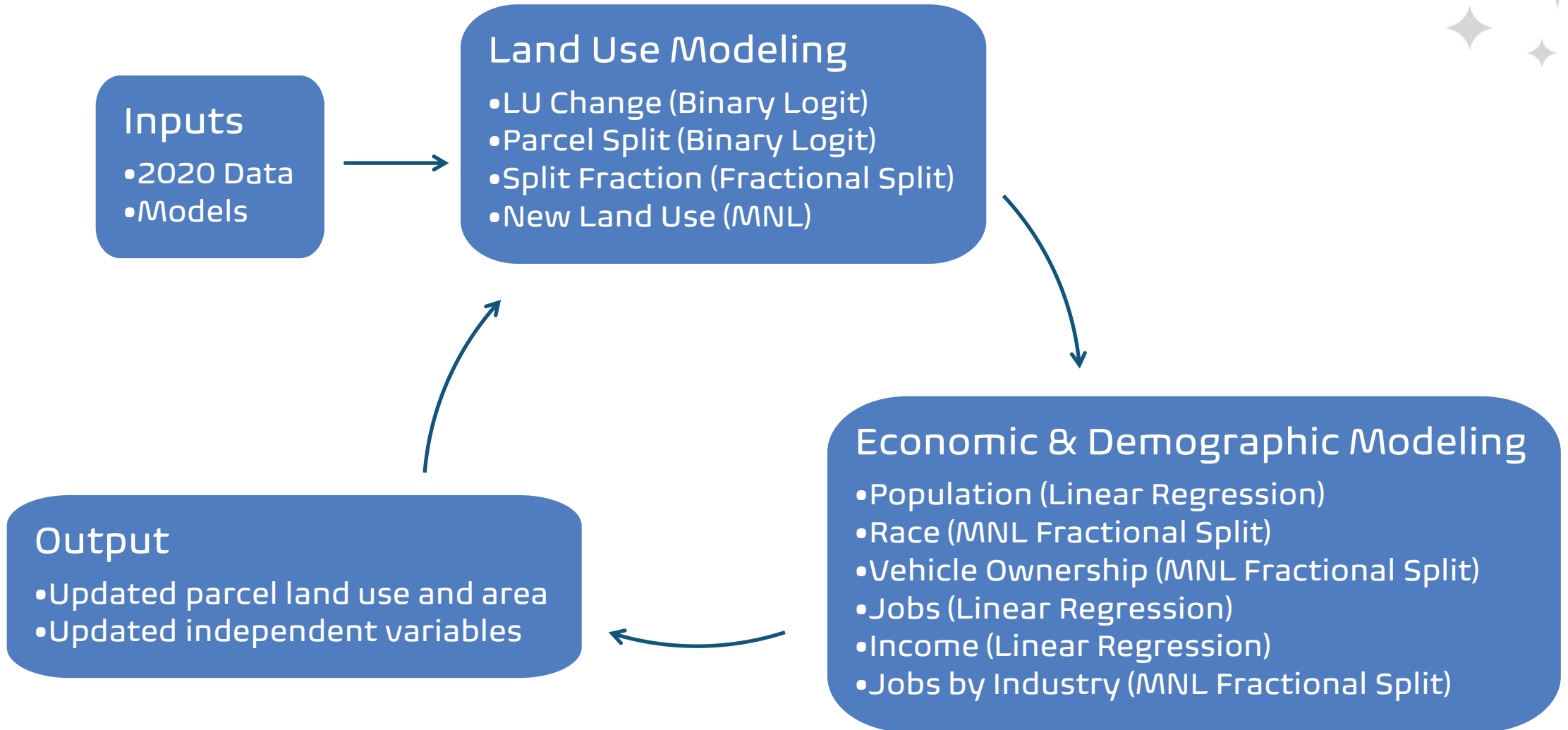
Number of
Businesses

Median
Income

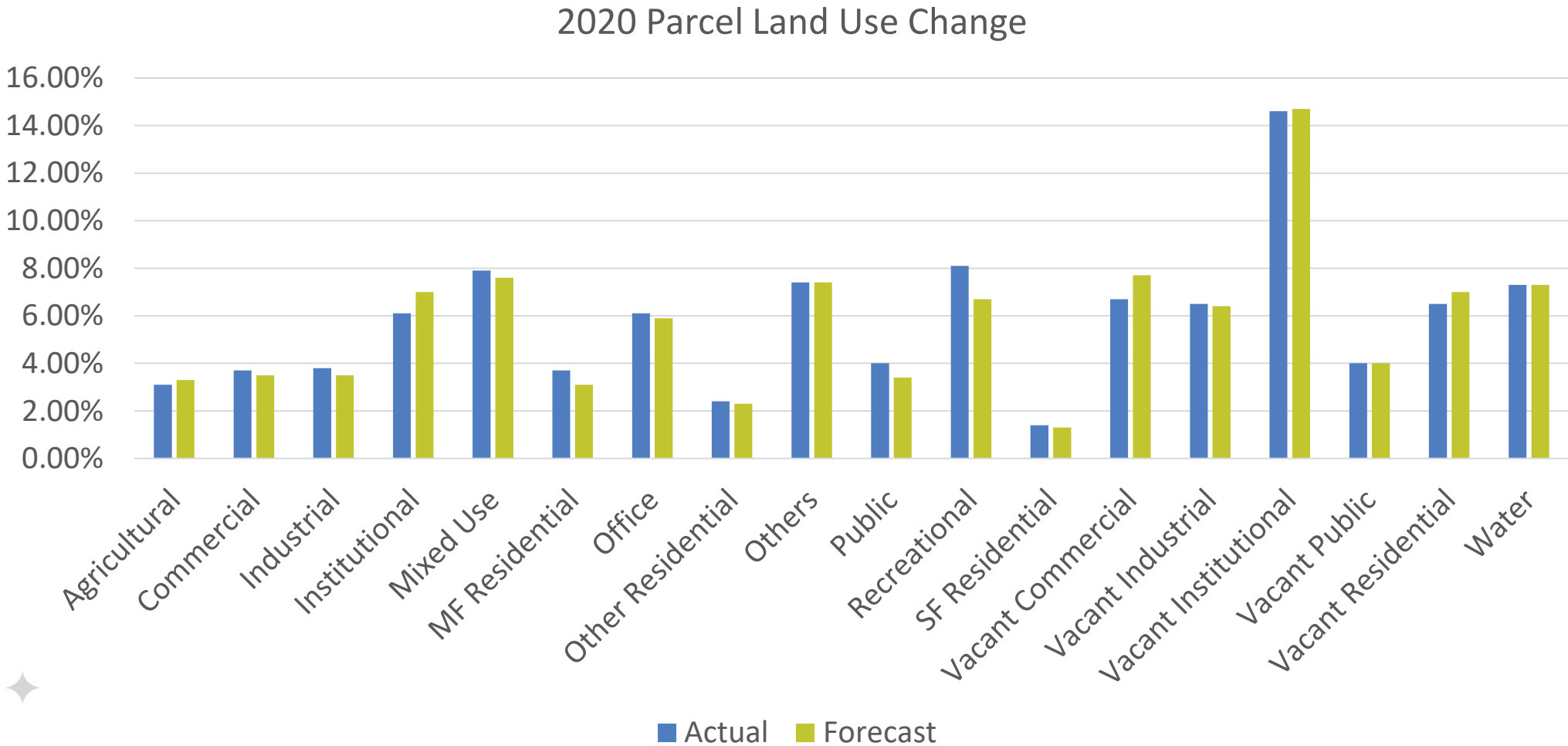
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Simulation Validation and Results

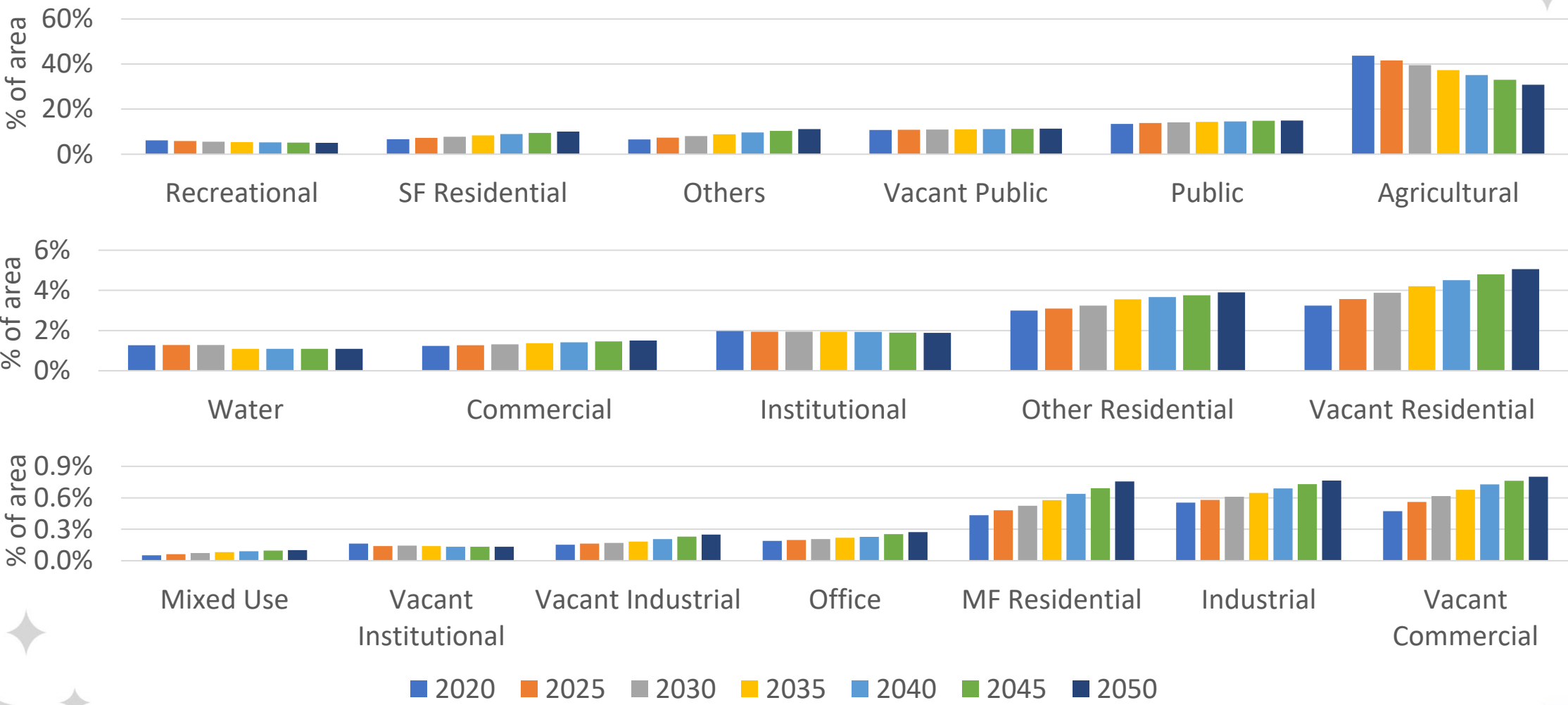
Simulation Engine



Simulation Engine Validation



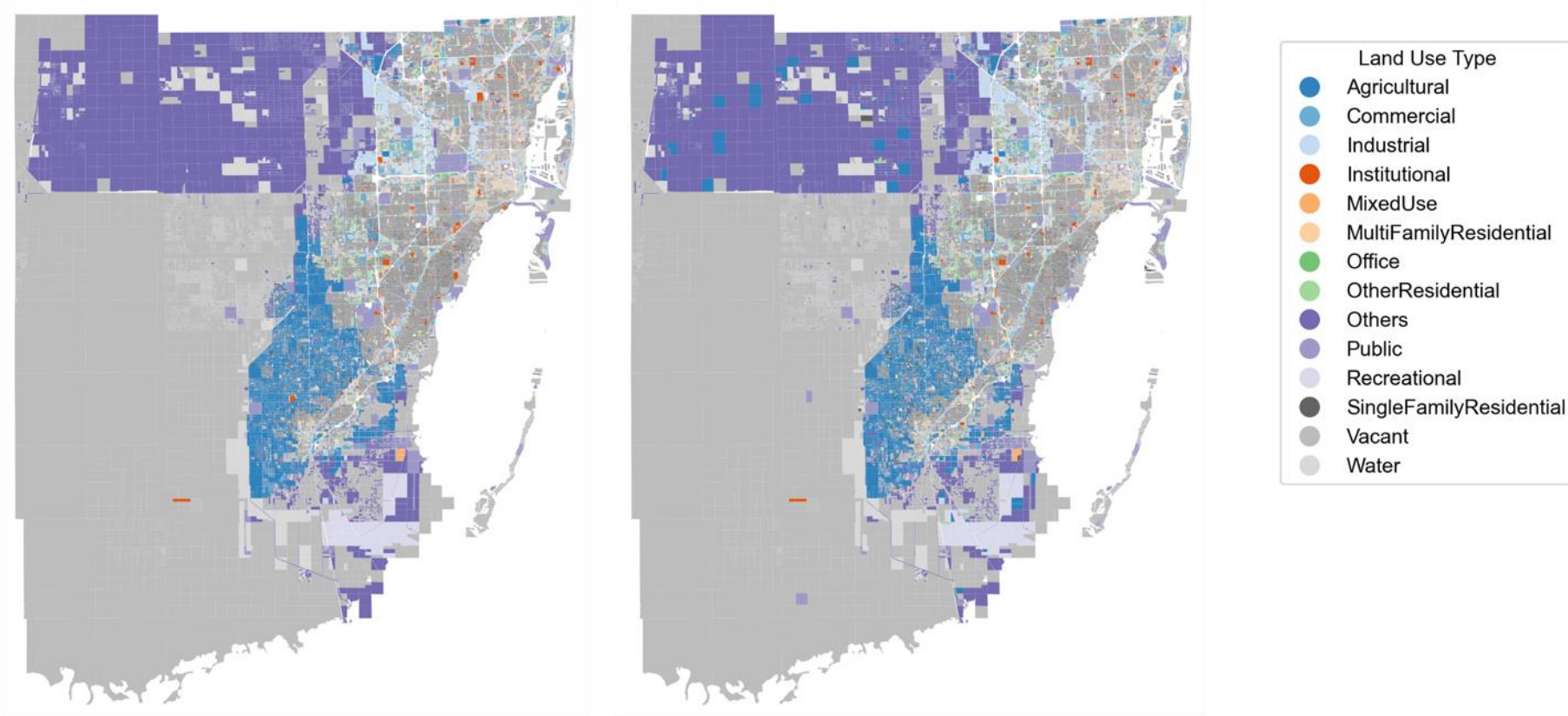
Land Use at the State Level



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Data Products

Parcel Data Sample

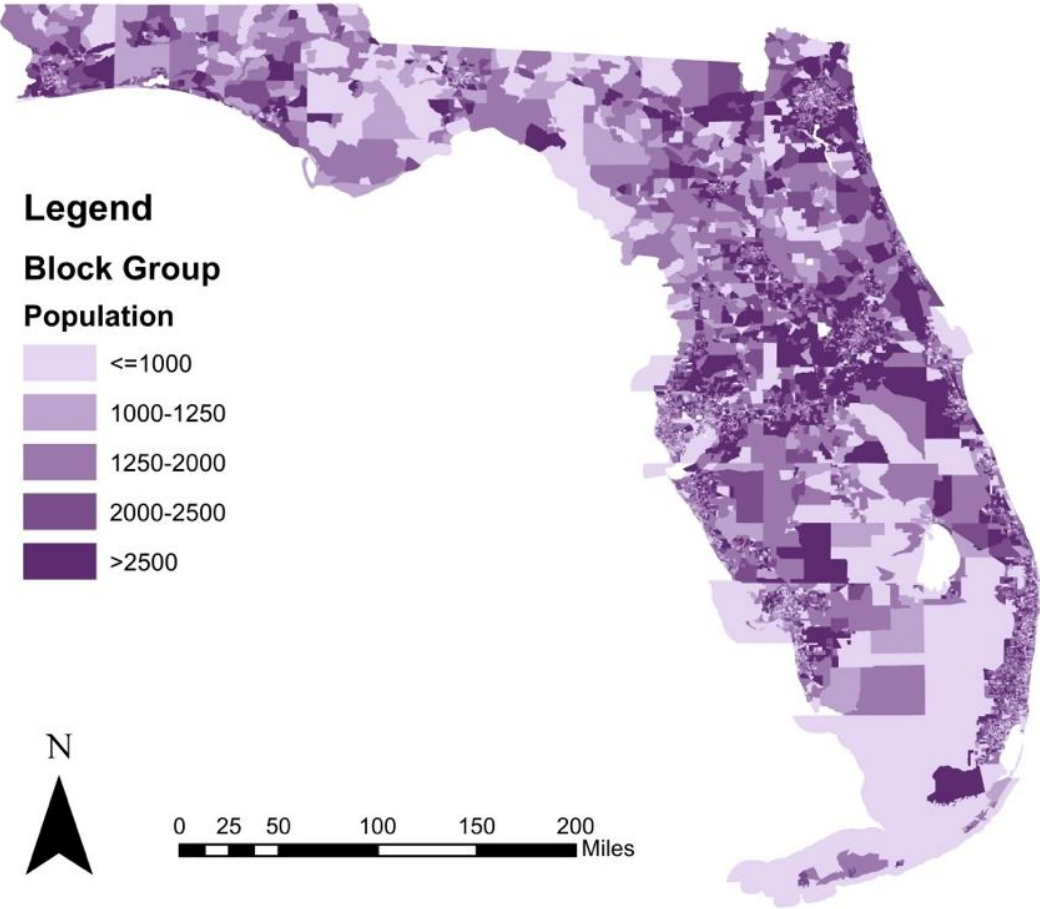


Miami-Dade 2020

Miami-Dade 2025

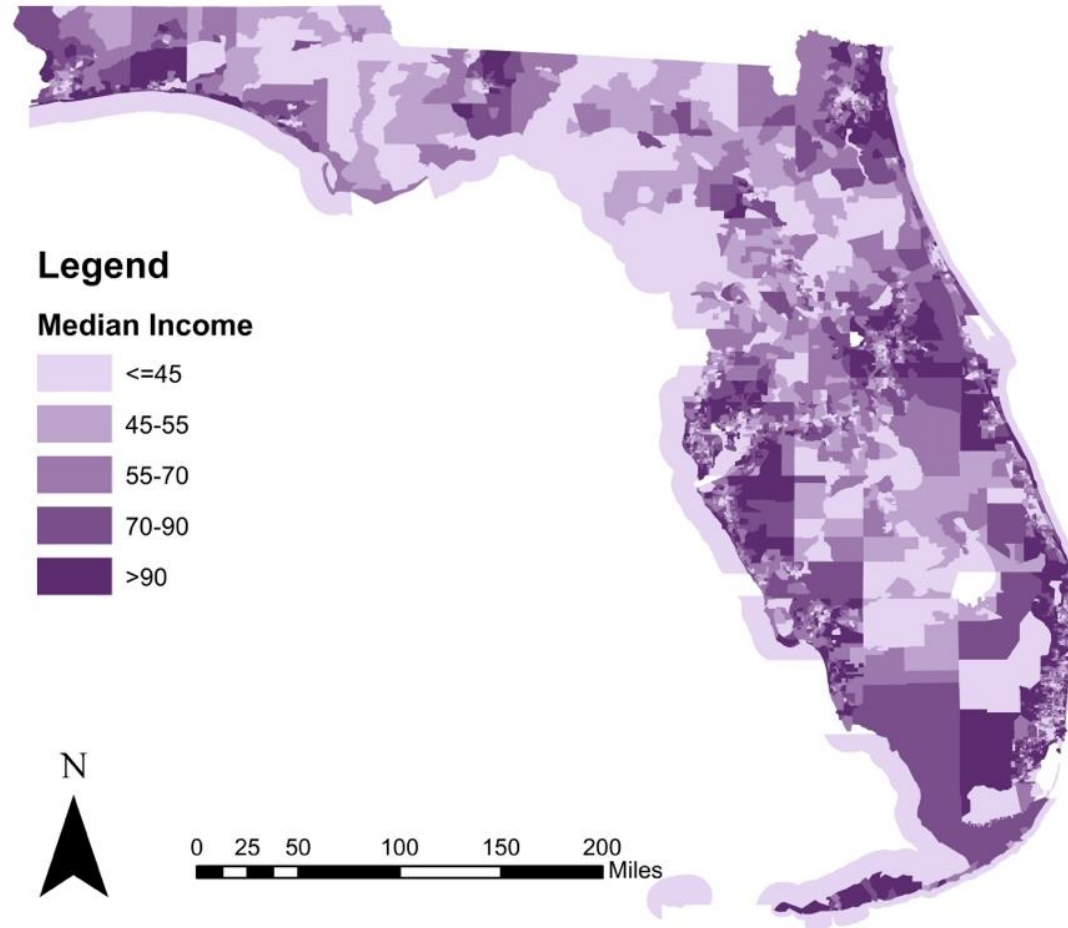
Parcel Level Land Use Forecast for 2025

Block Group Data Sample



Block Group Population Forecast for 2025

Census Tract Data Sample



Census Tract Median Income Forecast for 2025

How Can the Data Products Be Used?

Use Case 1

Direct consideration in travel demand models as land use variables at different spatial resolutions (BG, CT and county)

- ◆ Every urban/rural jurisdiction in Florida can readily use the data developed for
 - ◆ Running travel demand models with a universal template of variables
 - ◆ Jurisdictions can examine future growth generators and types of land use changes
 - ◆ Explore opportunities to influence patterns to grow their revenue (from tax and business)

Use Case 2

Identify locations where land use patterns are changing significantly and evaluate future transportation infrastructure needs

- ◆ Use the data products to study how land use patterns are likely to evolve and identify transportation needs
 - ◆ Increasing residential (such as single-family parcels) will require different infrastructure relative to commercial establishments
- ◆ Explore how current transportation infrastructure is performing in locations with similar patterns right now and plan proactively for the future

Use Case 3

Proactively examine how land use needs impact safety – study current locations with similar land use and their safety needs and plan for future developments.

- ✦ Pro-active safety planning will be possible with the data products
- ✦ We can use the data products to identify future locations that have a land use pattern that corresponds to high crashes currently
 - ✦ Proactively plan and apply these corrective measures for these locations that can allow us to avoid re-design or retrofitting
- ✦ Explore what patterns contribute to safety and pro-actively apply these for different locations based on their evolutionary paths

Takeaways

We are building a standard sociodemographic, land use and economic indicator framework for Florida

Land use changes at the parcel level in open-source software that can be aggregated at any resolution including BG, CT and county for ready adoption in Florida

Several potential Use cases are identified for future adoption of these data products

The data presented should be available for all of you to use in 2-3 months

Acknowledgements

◆ Team Members

- ◆ Sudipta Tirtha
- ◆ Lauren Hoover
- ◆ Md Istiak Jahan
- ◆ Dewan Parvez
- ◆ Susmita Sarker

◆ FDOT personnel

- ◆ Thomas Hill (program manager and main advocate)
- ◆ Vladimir Majano
- ◆ Terry Corkery

◆ Others

- ◆ Sheldon Harrison
- ◆ Krishnan
Viswanathan

Questions?

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Freight Discussion

Jeanette Berk

MentiMeter Instructions (Live Poll)

Welcome to the Live Poll!

Scan the QR Code with your phone to access the questions. Your answers will show up on the screen.

We look forward to hearing your thoughts!



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Thank you for attending!