



Transportation Modeling Forum

Transportation Analysis & Modeling | Data Science
August 25, 2026

Agenda



Welcome



PopulationSim



ABM3 Land Use Converter Tool



Regional STOPS Model



ABM4 & 2029 Regional Plan



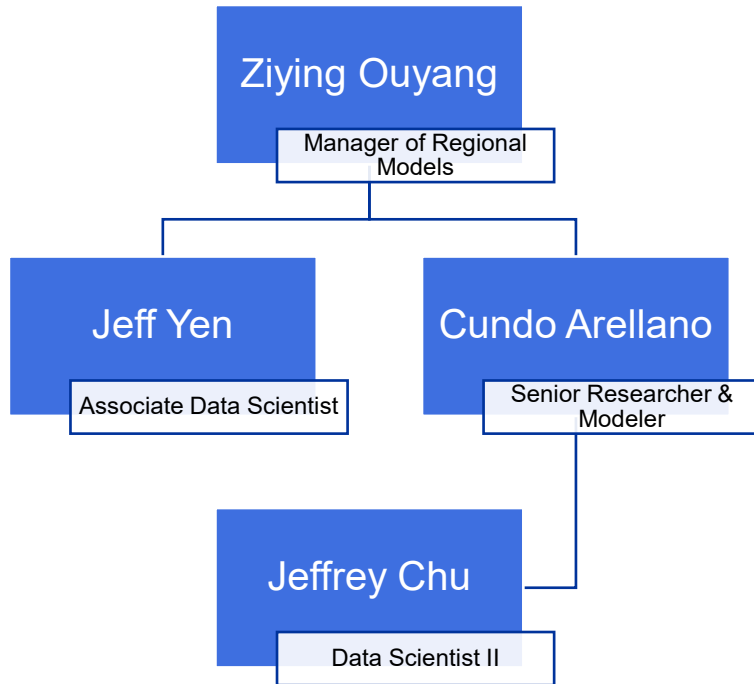
Questions & Discussion

Welcome

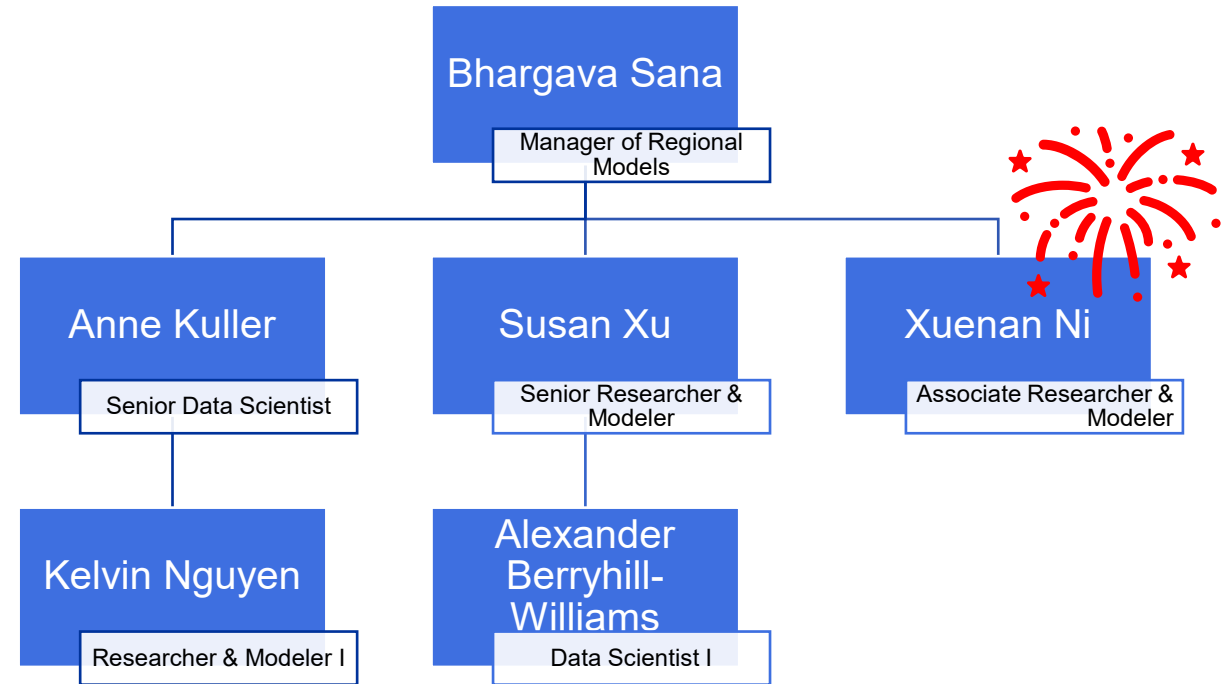
- 27th Transportation Modeling Forum
- Grace Miño (Senior Director of Data Science and IT)
 - Opening Remarks
 - Data Science Department Updates

Welcome – Transportation Analysis & Modeling

TAM - Application



TAM - Development



Follow Up

- 2025 RP Data Dissemination
 - [Mode Choice by Jurisdiction](#)
 - [SB743 VMT Map](#)
 - [Transportation Forecast Information Center \(TFIC\)](#)
 - [Modeling Data Request Form](#)
 - or data@sandag.org
- Service Bureau
 - Fully operational after ABM3 Land Use Converter Tool
 - Expected Fall 2026
 - Support for Member Agencies



PopulationSim

Susan Xu

PopulationSim at SANDAG

From Regional Forecasts to Synthetic Populations for ABM

Today we'll cover:

- Why do we need a synthetic population?
- What is PopulationSim?
- How does SANDAG use PopulationSim?
- Key components of our implementation
- Recent improvements
- Future work

Why Do We Need PopulationSim?

Forecasts typically provide

- Total population
- Households
- Employment
- Age distribution
- Income distribution

But an Activity-Based Model requires

- Individual households
- Individual persons
- Household composition
- Workers
- Students
- Household income
- Household size
- Person attributes

PopulationSim converts aggregate forecasts into disaggregate households and persons.

What is PopulationSim?

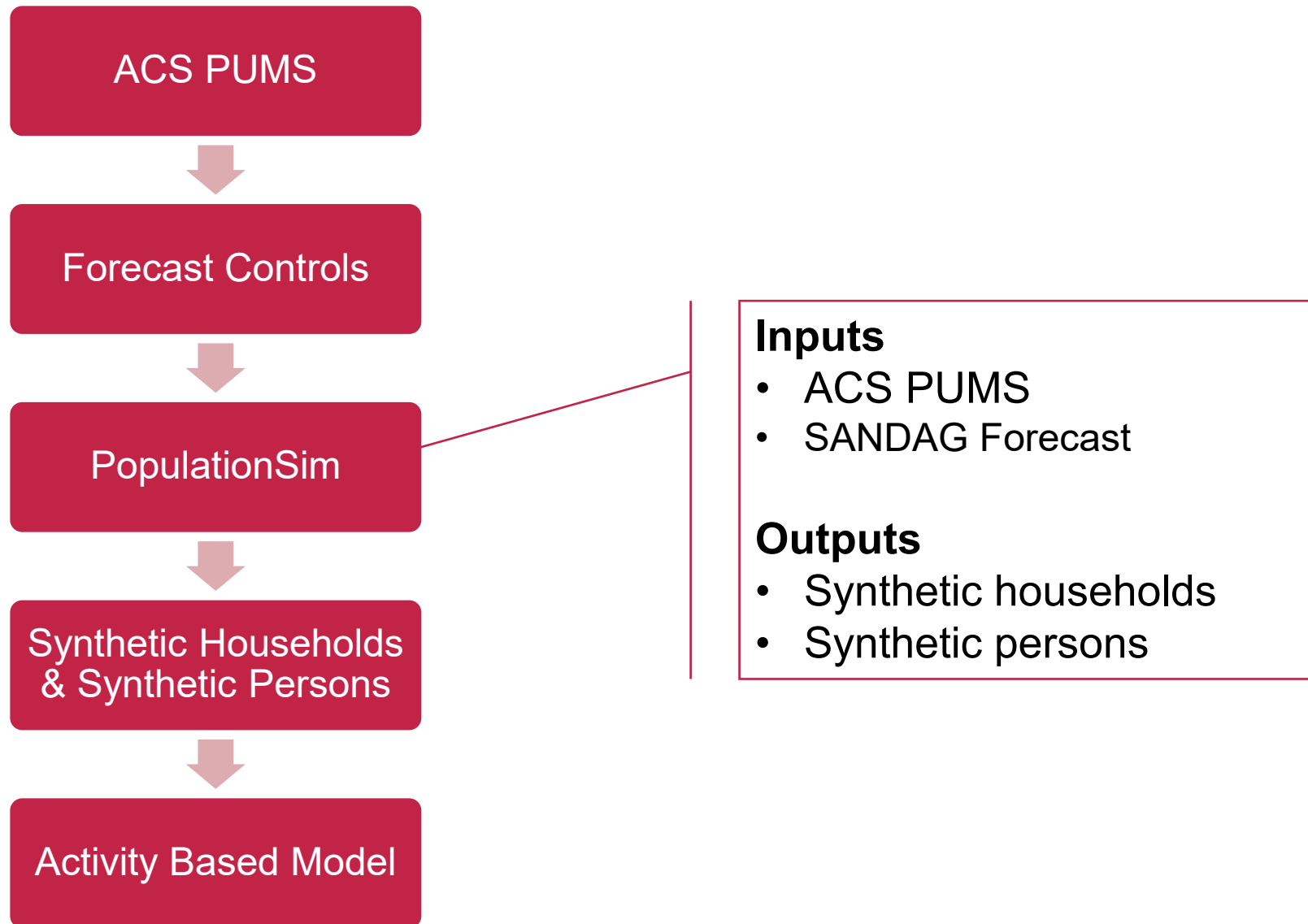
PopulationSim is a population synthesizer.

- Starts with real sample households from ACS PUMS
- Uses demographic control totals
- Adjusts household weights
- Expands households
- Produces a synthetic population

Advantages

- Preserves disaggregate household structures
- Matches forecast control totals
- Supports multiple forecast years
- Produces inputs for ActivitySim

PopulationSim in the SANDAG Modeling Framework



How PopulationSim Works

- ACS PUMS 2017–2021
- Household records
- Person records

Read seed
households

Read control
tables

Balance
households
weights using
IPF

Integerize
household
weights

Expand
households

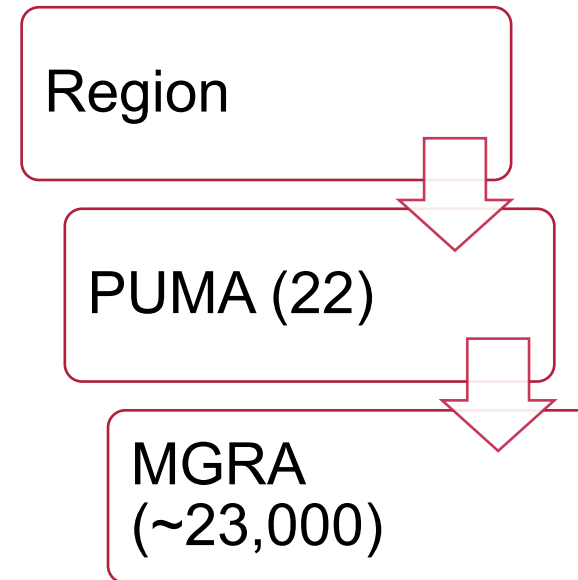
Create
synthetic
households
and persons

- Household size
- Household income
- Workers
- Age
- Sex
- Race/Ethnicity
- Employment
- Labor force
- Group quarters

Geographic Hierarchy

Why this hierarchy?

- ACS PUMS is available at PUMA level
- ABM operates at MGRA level
- Regional controls ensure consistency



SANDAG Implementation Highlights

Highlights

- ActivitySim PopulationSim (latest version 0.10.0)
- Three-level hierarchy
- 54 control variables
- Multiple forecast years
- Parallel processing
- Separate Group Quarters synthesis

Group Quarters Processing

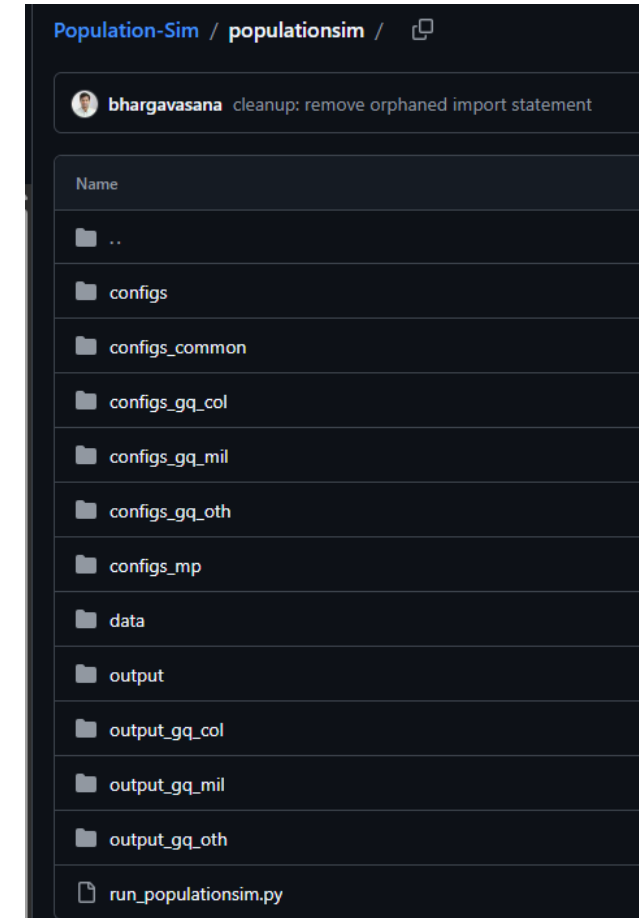
Three separate synthesis runs

- Military
- College
- Other

Why separate?

- Different demographics
- Different locations
- Different control totals

Merged into final synthetic population



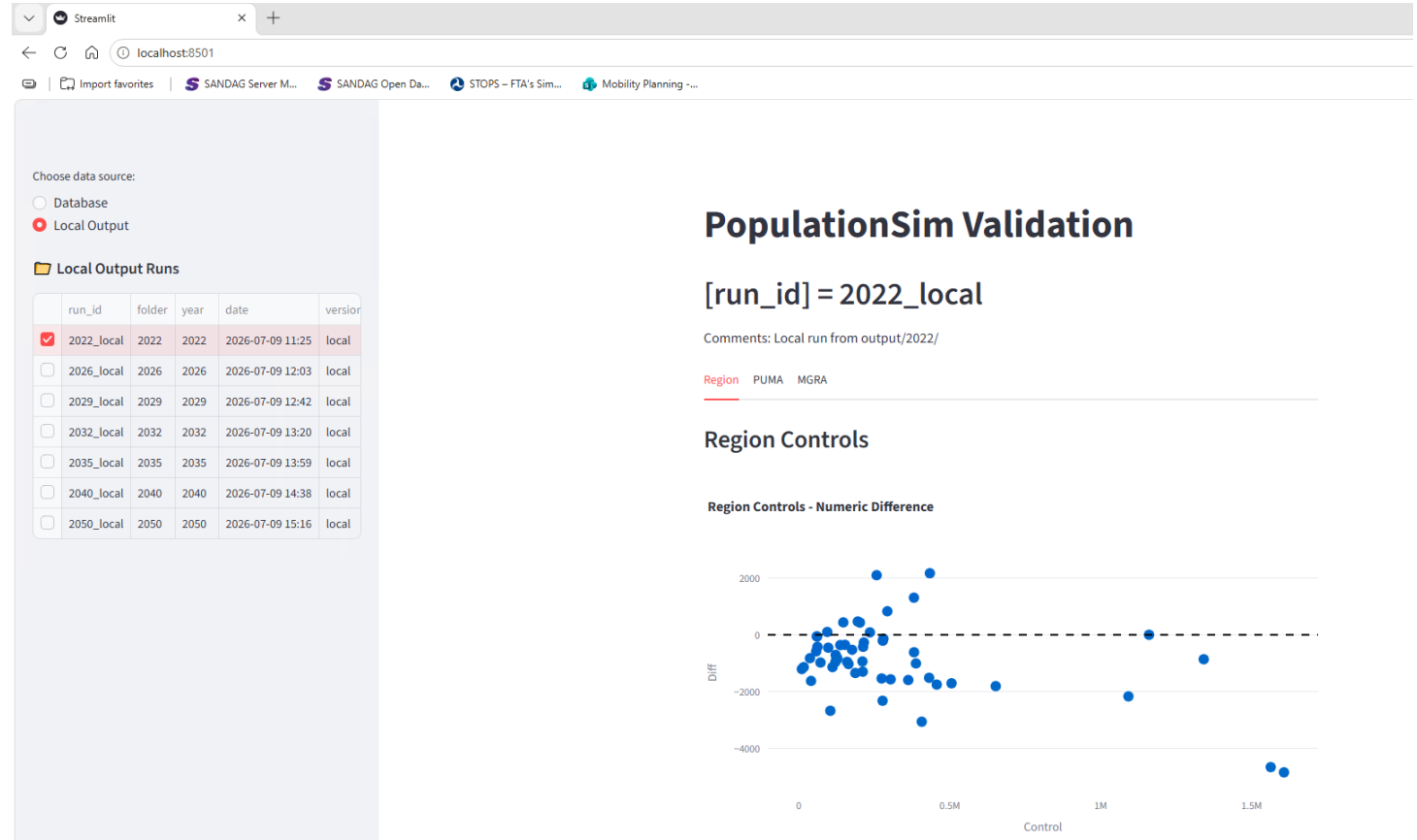
Outputs & Validation

Outputs

- Synthetic households
- Synthetic persons

Validation

- Compare against controls
- Summary statistics
- Interactive dashboard
- Geographic review



Recent Updates at SANDAG

- Migration to newer PopulationSim/ActivitySim versions
- Improved Group Quarters workflow
- Production-ready implementation
- Refactoring and modularization
- Database integration enhancements

Future Directions

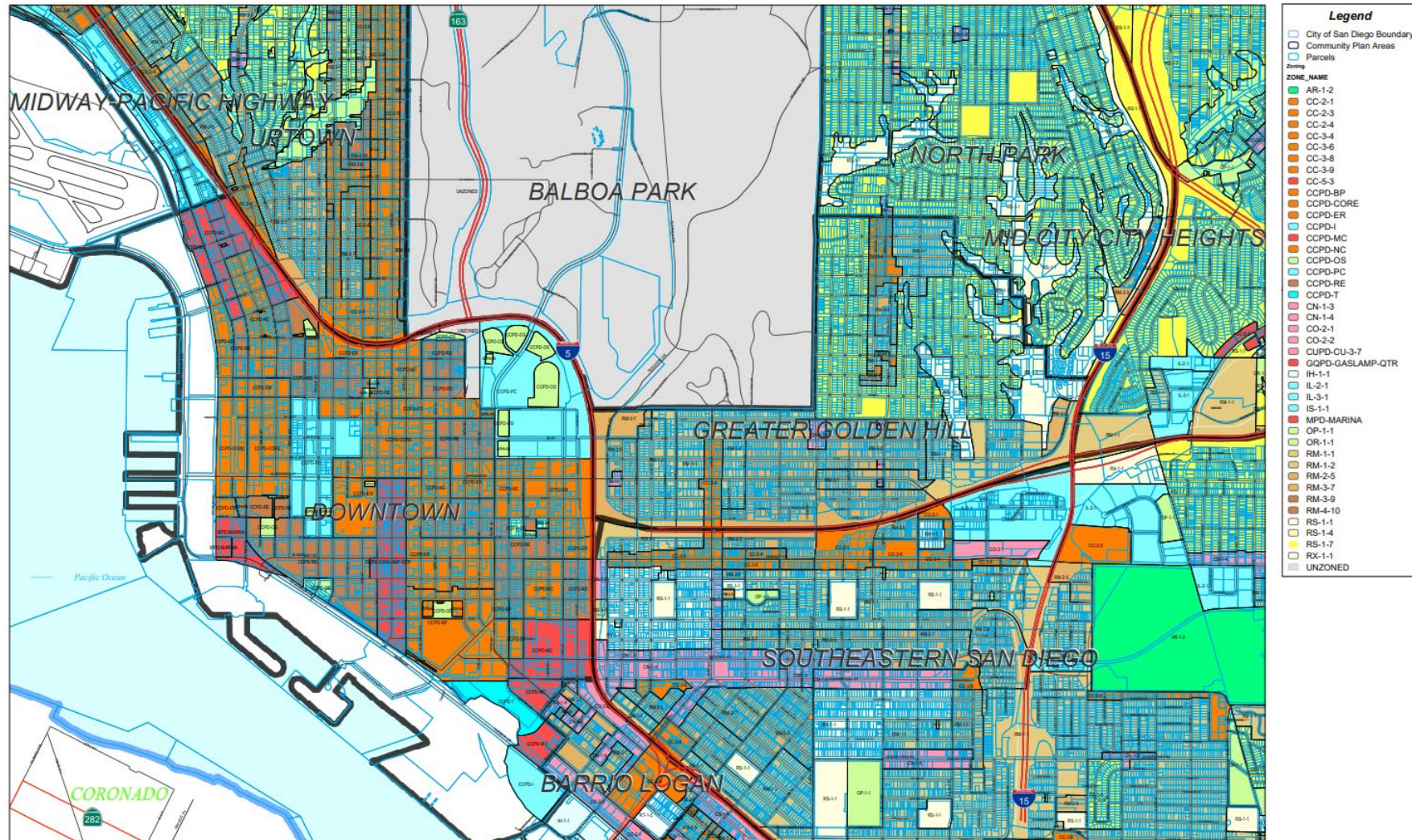
Potential future enhancements:

- Additional validation metrics
- Better visualization tools
- Easier configuration management
- Enhanced cloud or database integration

ABM3 Land Use Converter Tool

Cundo Arellano

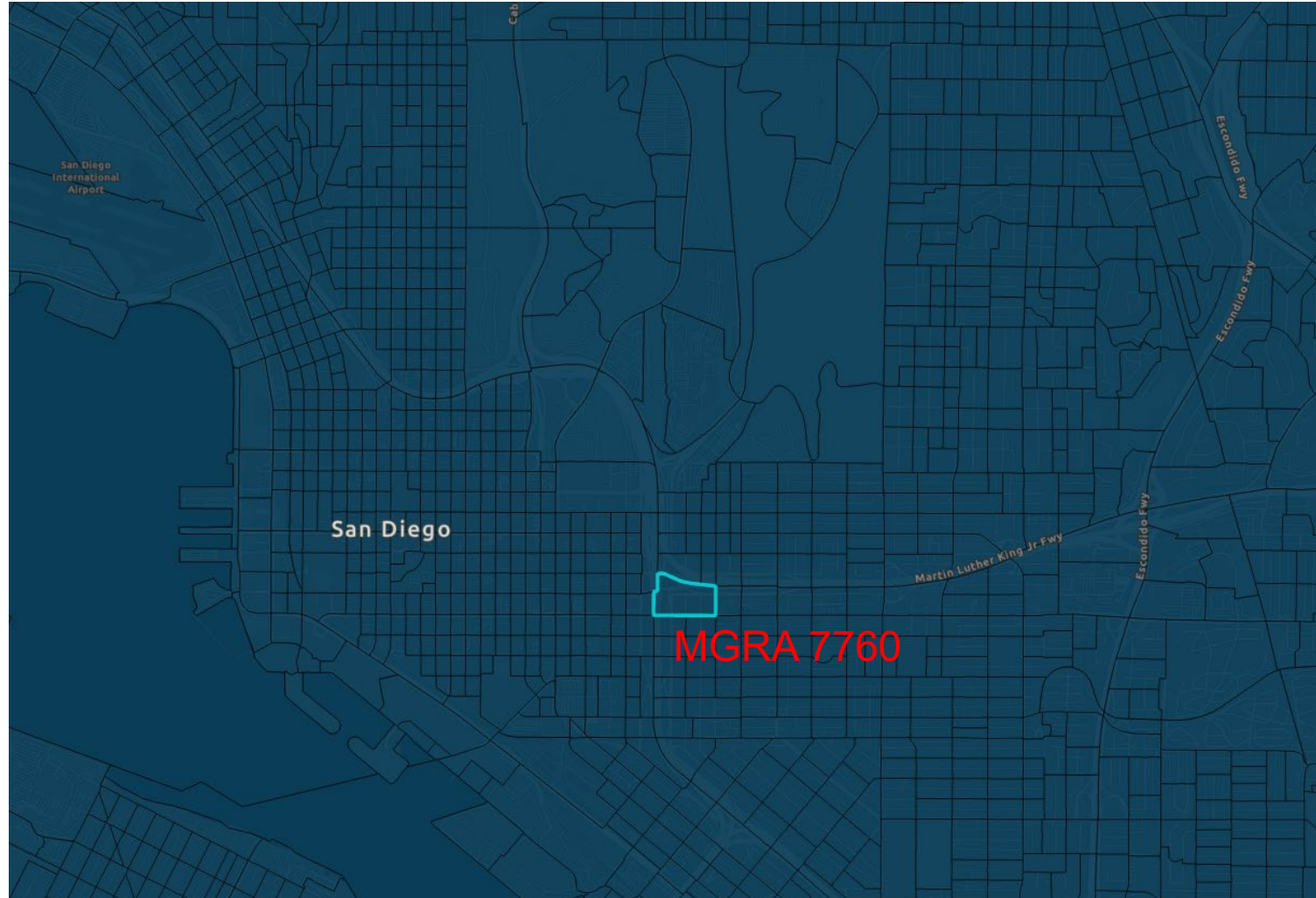
Land Use in ABM3



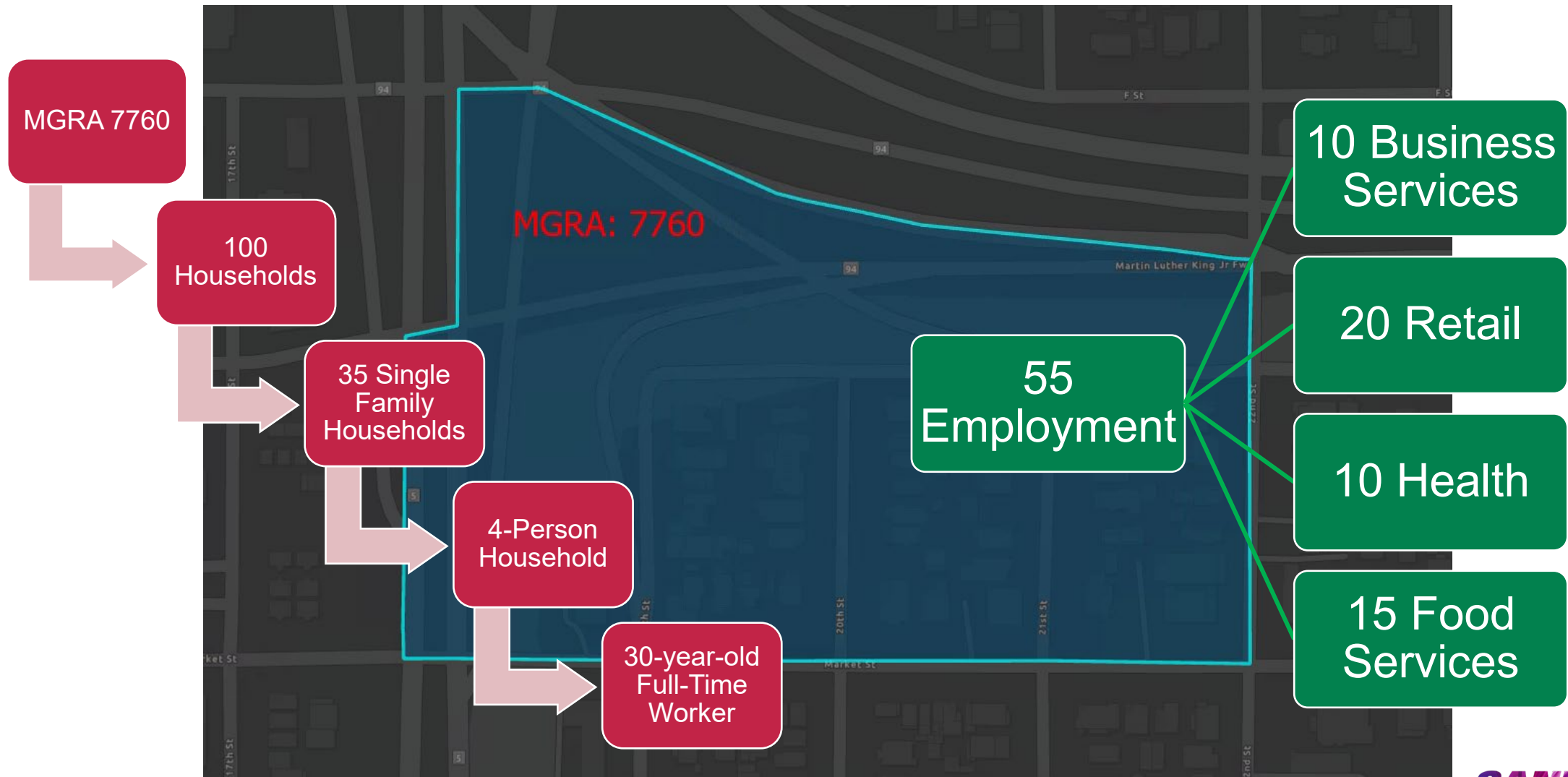
Source: <https://www.sandiego.gov/sites/default/files/legacy/development-services/zoning/pdf/maps/grid15.pdf>

Land Use in ABM3

- Series 15 MGRAs

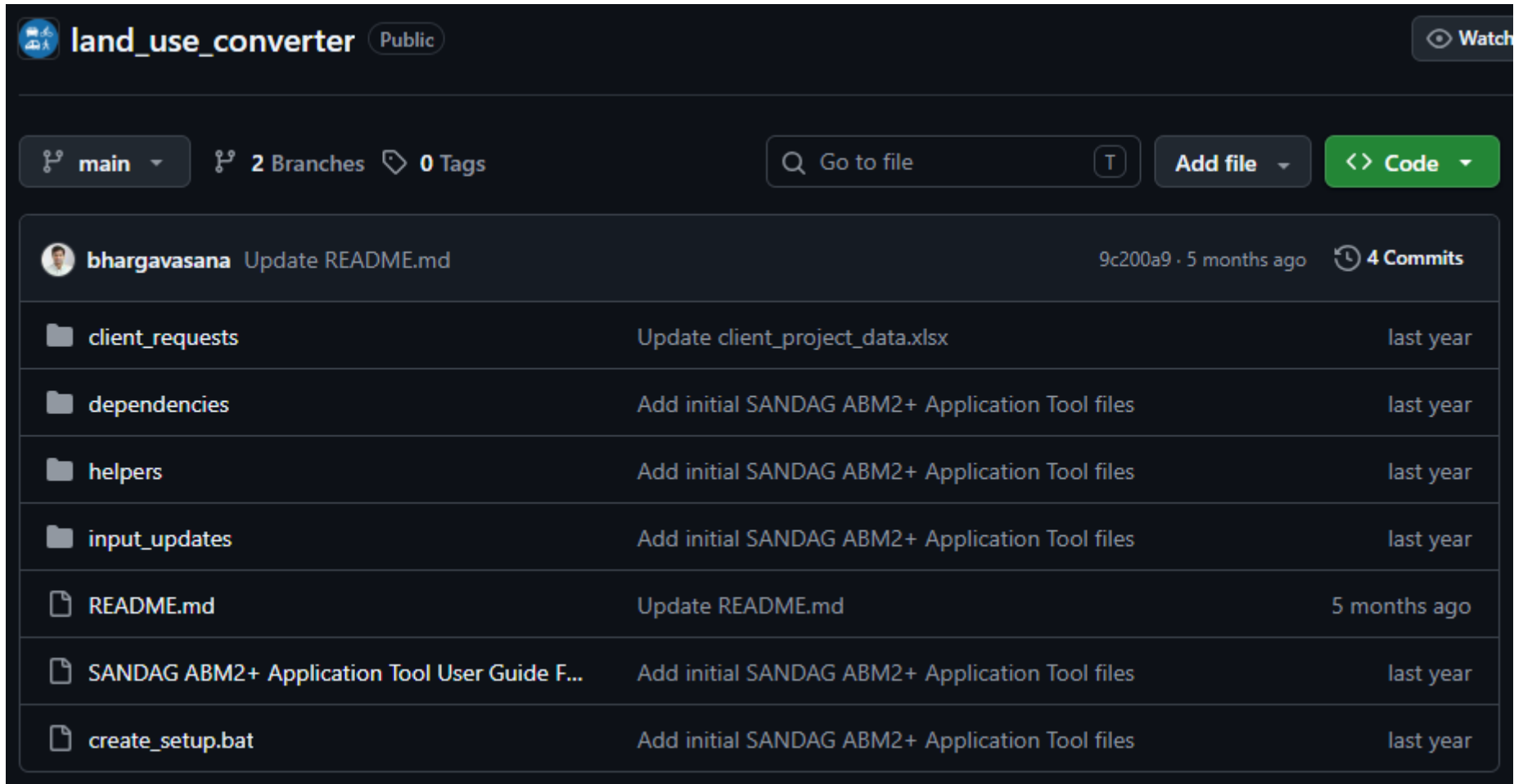


Land Use in ABM3



Land Use Converter Tool

[SANDAG ABM2+ Service Bureau Enhancements Final Report \(2022\)](https://github.com/SANDAG/land_use_converter)

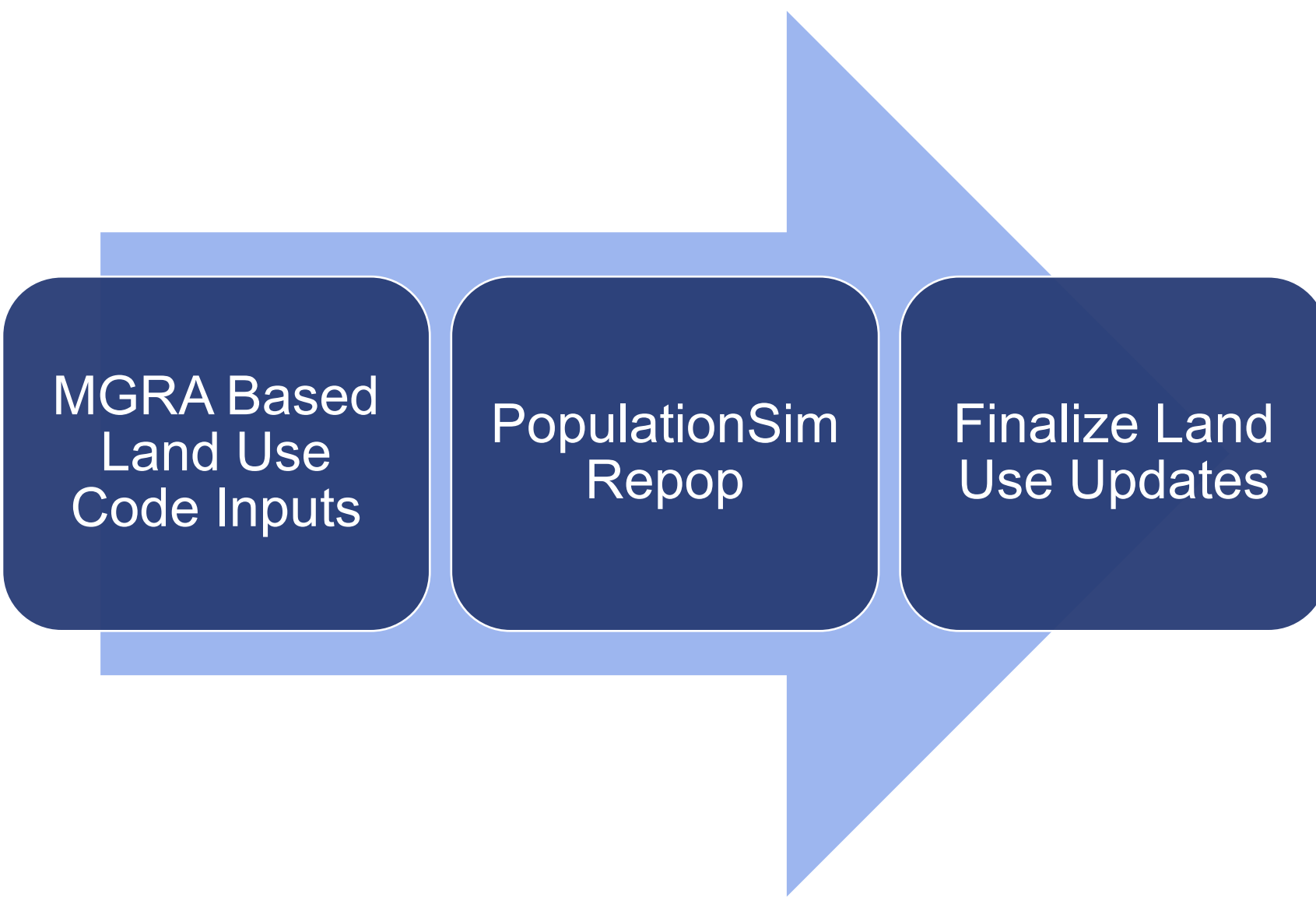


The screenshot shows the GitHub repository page for 'land_use_converter'. The repository is public and has 2 branches and 0 tags. The user 'bhargavasana' has updated the README.md file 5 months ago. The repository contains several folders and files, including client_requests, dependencies, helpers, input_updates, README.md, SANDAG ABM2+ Application Tool User Guide F..., and create_setup.bat. The commit history shows that the initial SANDAG ABM2+ Application Tool files were added last year.

File/Folder	Commit Message	Commit Date
client_requests	Update client_project_data.xlsx	last year
dependencies	Add initial SANDAG ABM2+ Application Tool files	last year
helpers	Add initial SANDAG ABM2+ Application Tool files	last year
input_updates	Add initial SANDAG ABM2+ Application Tool files	last year
README.md	Update README.md	5 months ago
SANDAG ABM2+ Application Tool User Guide F...	Add initial SANDAG ABM2+ Application Tool files	last year
create_setup.bat	Add initial SANDAG ABM2+ Application Tool files	last year

https://github.com/SANDAG/land_use_converter

Land Use Converter Tool



MGRA Based
Land Use
Code Inputs

PopulationSim
Repop

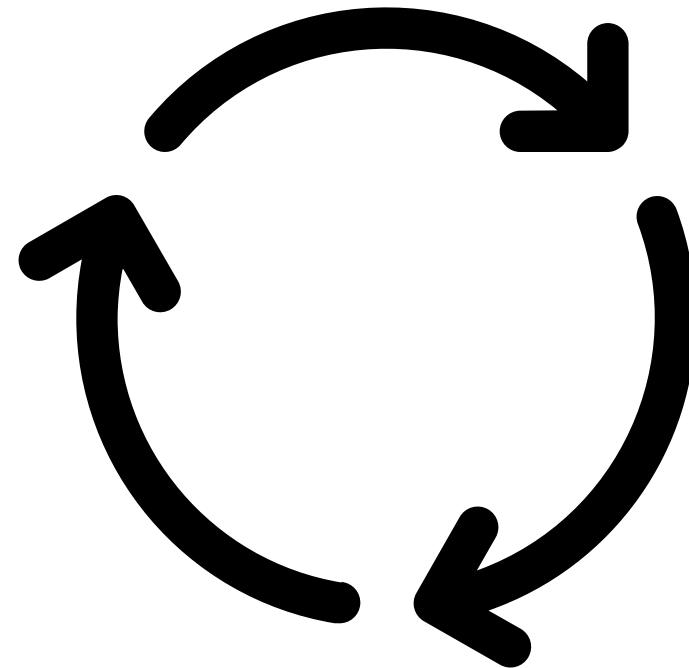
Finalize Land
Use Updates

Outputs

- MGRA Based Input File
- Persons File
- Households File

Updates for ABM3

- Update underlying inputs
 - Employment densities
 - Series 15 compatibility
- Software updates
 - Python
 - PopulationSim
- Make tool more lightweight
 - Simpler environment
 - Easier maintenance



Current Status & Next Steps

- Tool is for subarea edits
 - Not meant to replace formal Land Use modeling
- Early development stage
 - Data collection
 - Methodology finalization
 - Call for comments
- Independent of ABM
- Open-Source Tool
 - https://github.com/SANDAG/land_use_converter

Regional STOPS Model

Alexander Berryhill-Williams, Xuenan Ni

What is STOPS

- Simplified Trips-on-Project Software
- Developed by FTA
- Designed to evaluate ridership impacts of proposed major transit investments
- Uses a nationally developed model framework, informed by Census/CTPP Journey-to-Work data
- Can be calibrated to local travel patterns and observed transit ridership
- Commonly used to support project planning and FTA Capital Investment Grants (CIG) analysis

STOPS Main Menu-v2.53 - 02/28/2024

Initial STOPS Set-up Steps

Select GIS Executable: ArcGIS Pro
C:\Program Files\ArcGIS\Pro\bin\ArcGISPro.exe

Select Python Executable*: C:\Program Files\ArcGIS\Pro\bin\Python\Scripts*

* - Only used for ArcGIS

Scenario Set-up Steps

1. Select/Create Parameter File: C:\STOPS\Run0\Run0.ctl

2. Edit Parameter File: FILES FOUND!

3. List and Check TAZ and CTPP Files: FILES FOUND!

4. Define Forecast Years: FILES FOUND!

5. List and Check GTFS Files: FILES FOUND!

5a. EXST GTFS Test 5b. NOBL GTFS Test 5c. BLD GTFS Test Optional

6. Specify Station Locations: FILES FOUND!

Data Preparation Steps

7. Create Station Buffers: FILES FOUND!

8. Define Districts, Station Groups, and Zonal Data: FILES FOUND!

9. Create MPD-TAZ Equivalency and Generate Zonal SE Forecasts: FILES FOUND!

10. Prepare Pedestrian Environment Data: FILES FOUND!

STOPS Batch Steps

Current Year: 2023 Opening Year: Not Defined 10 Year: Not Defined 20 Year: Not Defined

11. Run Batch Steps: COMPLETE!

CTPP Extract: COMPLETE!
GTF Path: COMPLETE!
GTF Post: COMPLETE!
Prepare Forecast Years: COMPLETE!
STOPS: COMPLETE!

STOPS Reporting

12. Report STOPS Results

13. Map STOPS Trip/Time Results 13a. Map User Benefits

14. ZZZ Query From Zone To

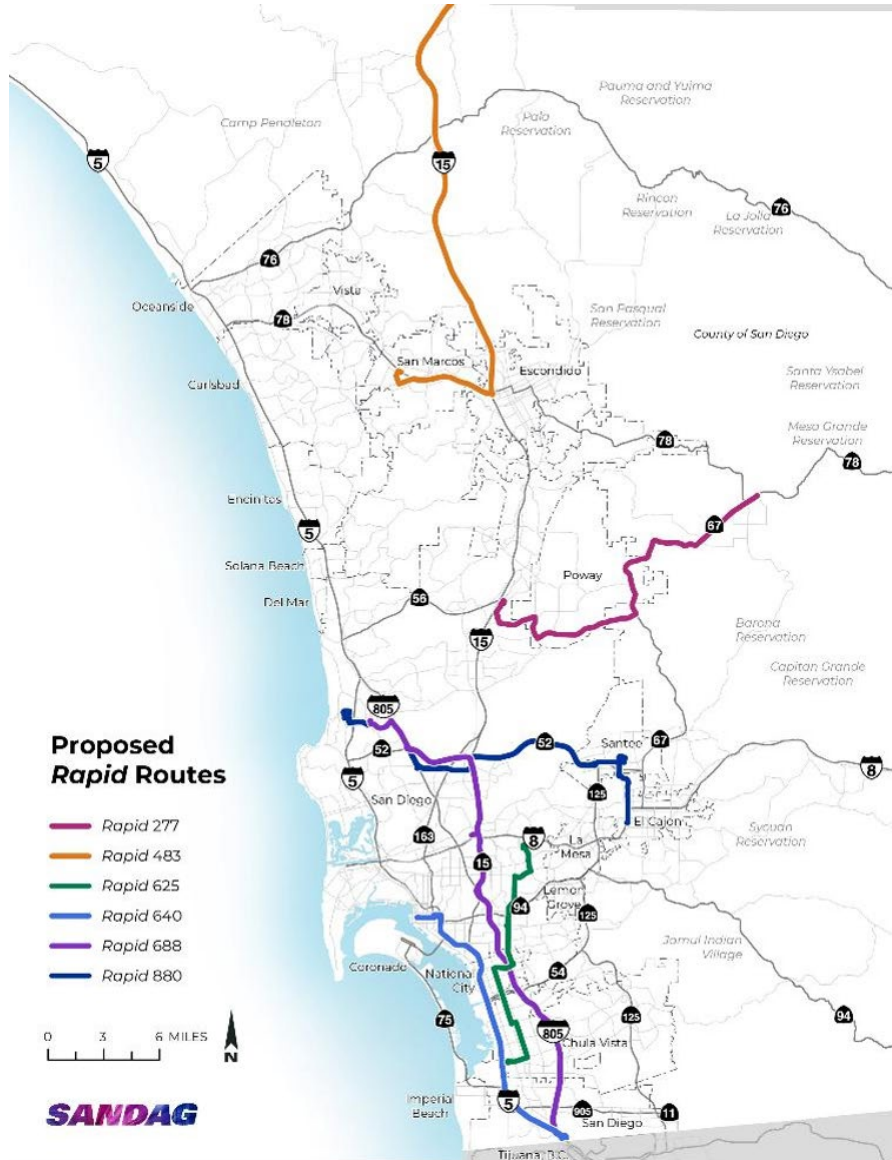
☐ Use these zones to generate detail when running STOPS

Messages

1. STOPS Returned to Main Menu

Update File Status Exit

Why STOPS and Why Now



- 6 proposed rapid routes
- Upcoming corridor studies
- Framework to consistently evaluate transit projects

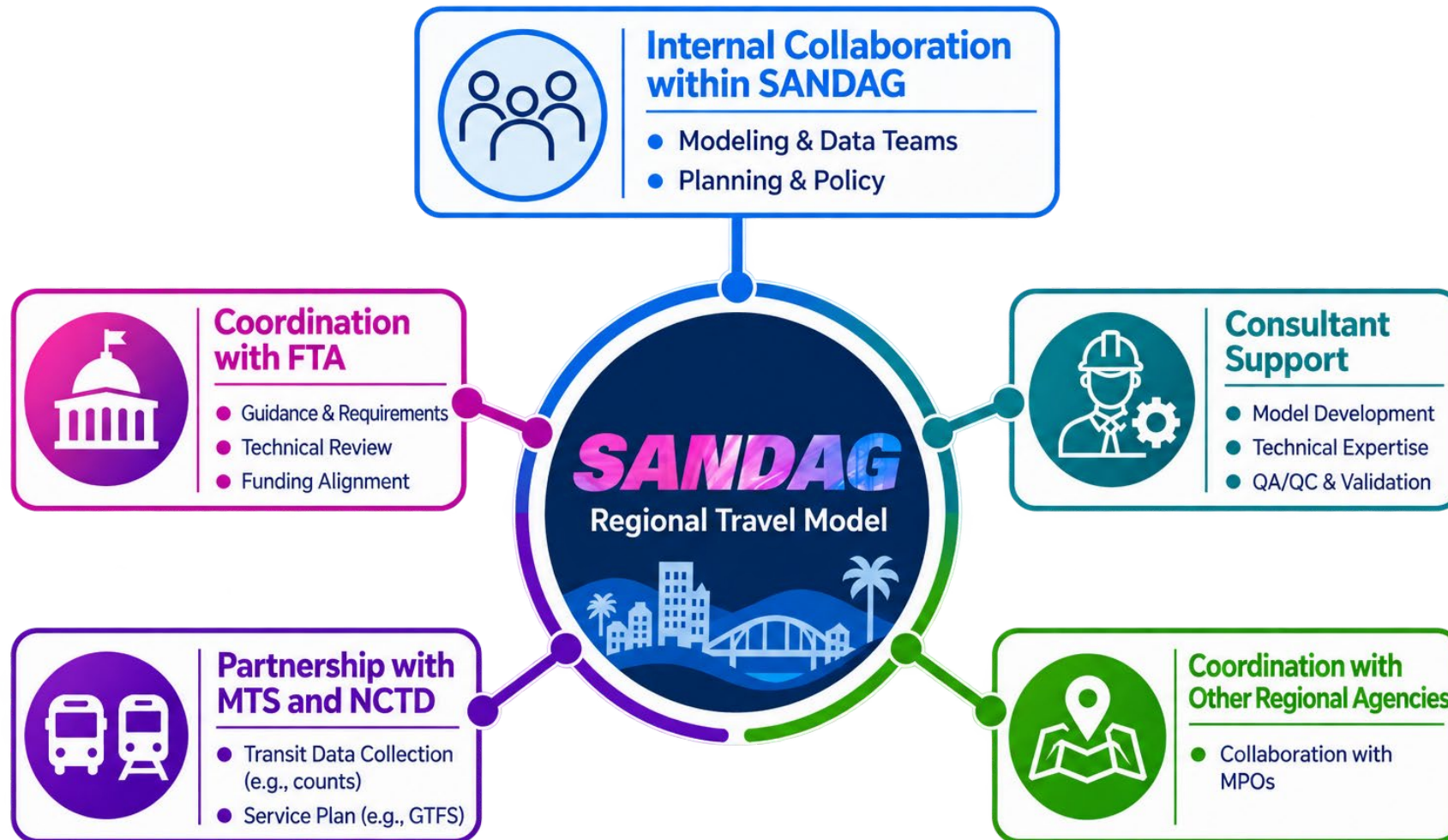
What goes into the model?

- Land use/socioeconomic data from SANDAG ABM
- Auto skims from SANDAG ABM
- GTFS from transit operators
- APC Counts from transit operators
- Onboard surveys, conducted by SANDAG in 2023
- ACS/CTPP provided by FTA

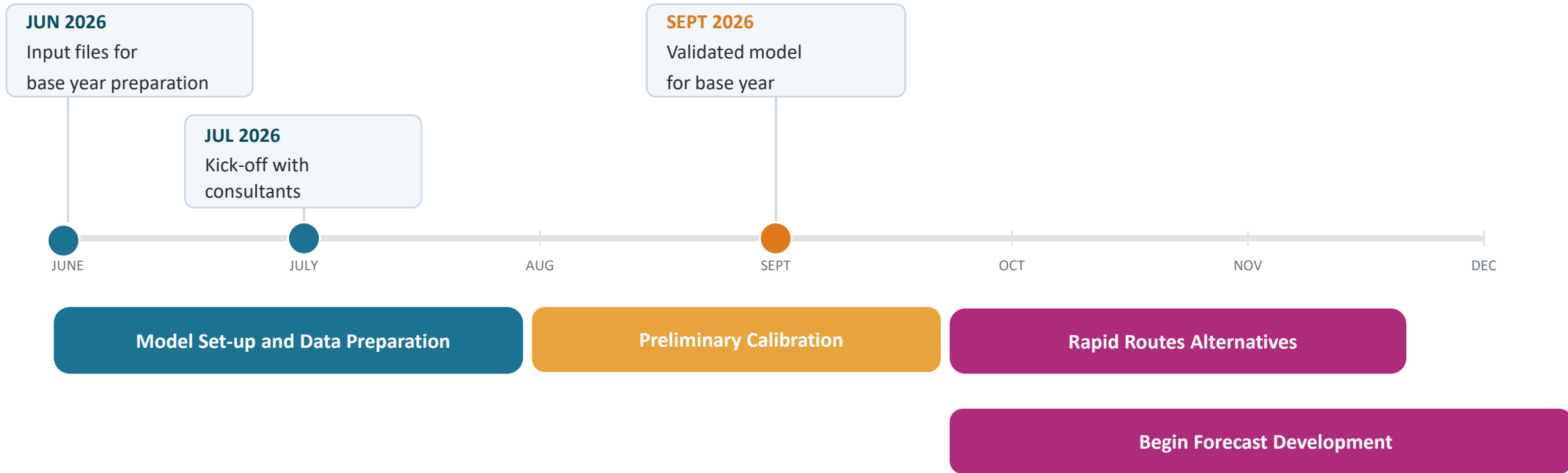
Value Added Through the STOPS Effort

- Network-to-GTFS automation
- Customized district development
- Cross-border travel representation
- Special access markets, including fringe parking

This Is a Collaborative Effort



Where We Are



ABM4 & 2029 Regional Plan

Bhargava Sana, Ziyang Ouyang

ABM Roadmap to 2029 Regional Plan

- Completed
 - ✓ Updated San Diego airport model
 - ✓ Java routines converted to Python
 - ✓ ActivitySim upgraded to v1.5.1
- Next
 - ABM4 (v16.0.0) release target Spring 2027
 - 2025 base year update
 - Scenario testing of Autonomous Vehicle (AV) features
 - Implement ActivitySim 'sharrow' to improve runtime
 - Open-source traffic assignment proof-of-concept



Roadmap (updated quarterly): <https://github.com/SANDAG/ABM/blob/main/ROADMAP.md>

2029 Regional Plan – Data Fundamentals

- Key elements
 - Base year: 2025
 - Future years: 2035, 2045 (anticipated per SB1087), and 2050
 - Air quality conformity years (anticipated): 2029, 2032, 2040, and 2050
 - Regional Growth Forecast: Series 16
 - ABM4
- Local jurisdiction inputs
 - Future land use developments
 - Future General Plan Mobility Elements/Circulation Elements

2029 Regional Plan – High Level Schedule

2027

- Regional Plan kick-off with Board, Policy Advisory Committees, and the public
- Series 16 data collection & regional/subregional forecasts
- Network refinement & model tests
- Emerging technology whitepaper

2029

- Release Draft 2029 Regional Plan and EIR for public comment (spring)
- Adopt 2029 Regional Plan (fall)
- Conduct public hearings for both phases

2026

- Base year data collection and ABM feature updates
- Regional Plan EIR Notice of Preparation (NOP) released

2028

- Continue network refinement
- Network modeling scenarios developed and summarized

Questions & Discussion

RSVP Survey Questions & Comments

- Interest in regional STOPS model
- ABM Calibration for City of Escondido
 - Refer to [ABM3 Model Calibration and Validation Report \(RSG, 2024\)](#)
- Estimated deadline for land use inputs
 - Estimates & Forecast team to reach out Q1 of 2027 and finalize inputs by Q2

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