Transportation Modeling Forum

Transportation Analysis & Modeling | Data Science
August 25, 2026

Agenda

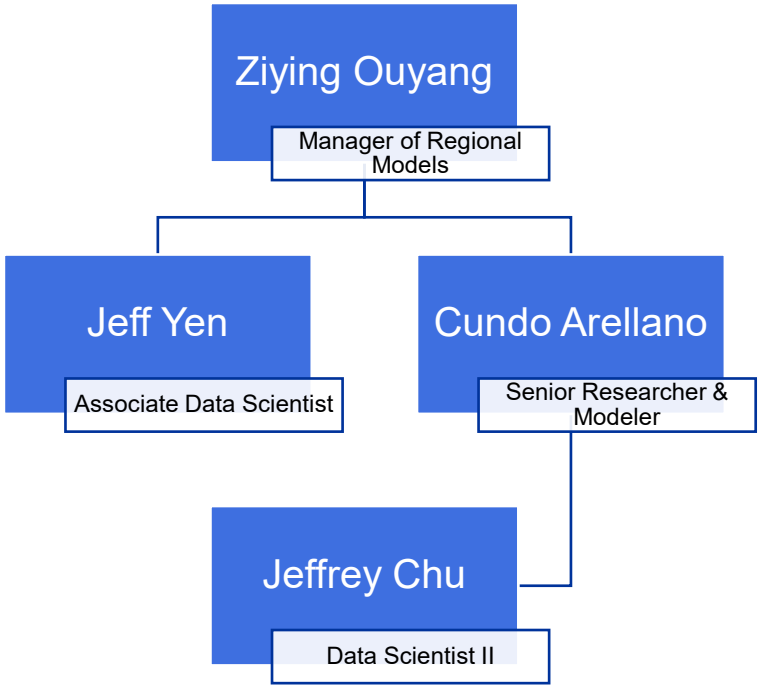
- Welcome
- PopulationSim
- ABM3 Land Use Converter Tool
- Regional STOPS Model
- ABM4 & 2029 Regional Plan
- Questions & Discussion

Welcome

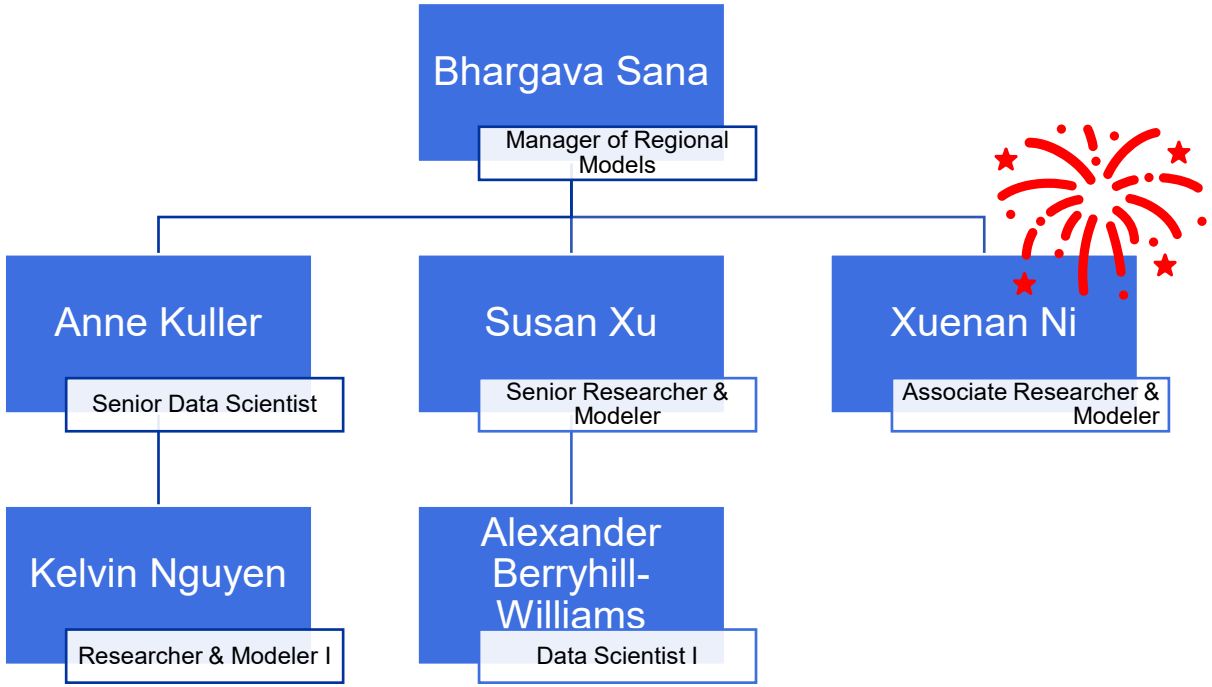
- 27th Transportation Modeling Forum
- Grace Miño (Senior Director of Data Science and IT)
  - Opening Remarks
  - Data Science Department Updates

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

https://github.com/SANDAG/Population-Sim

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?

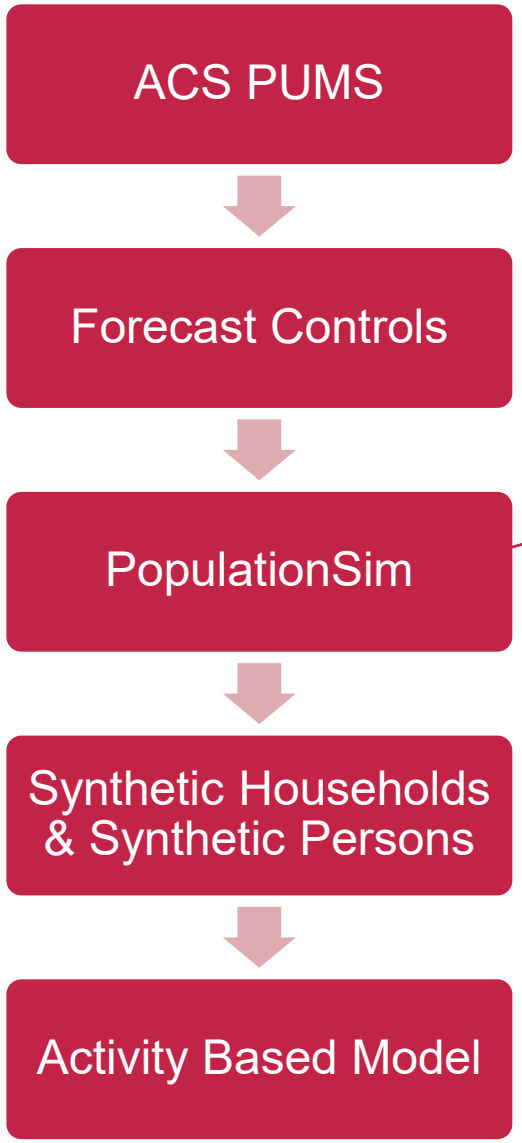
PopulationSim is a population synthesizer.

- 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

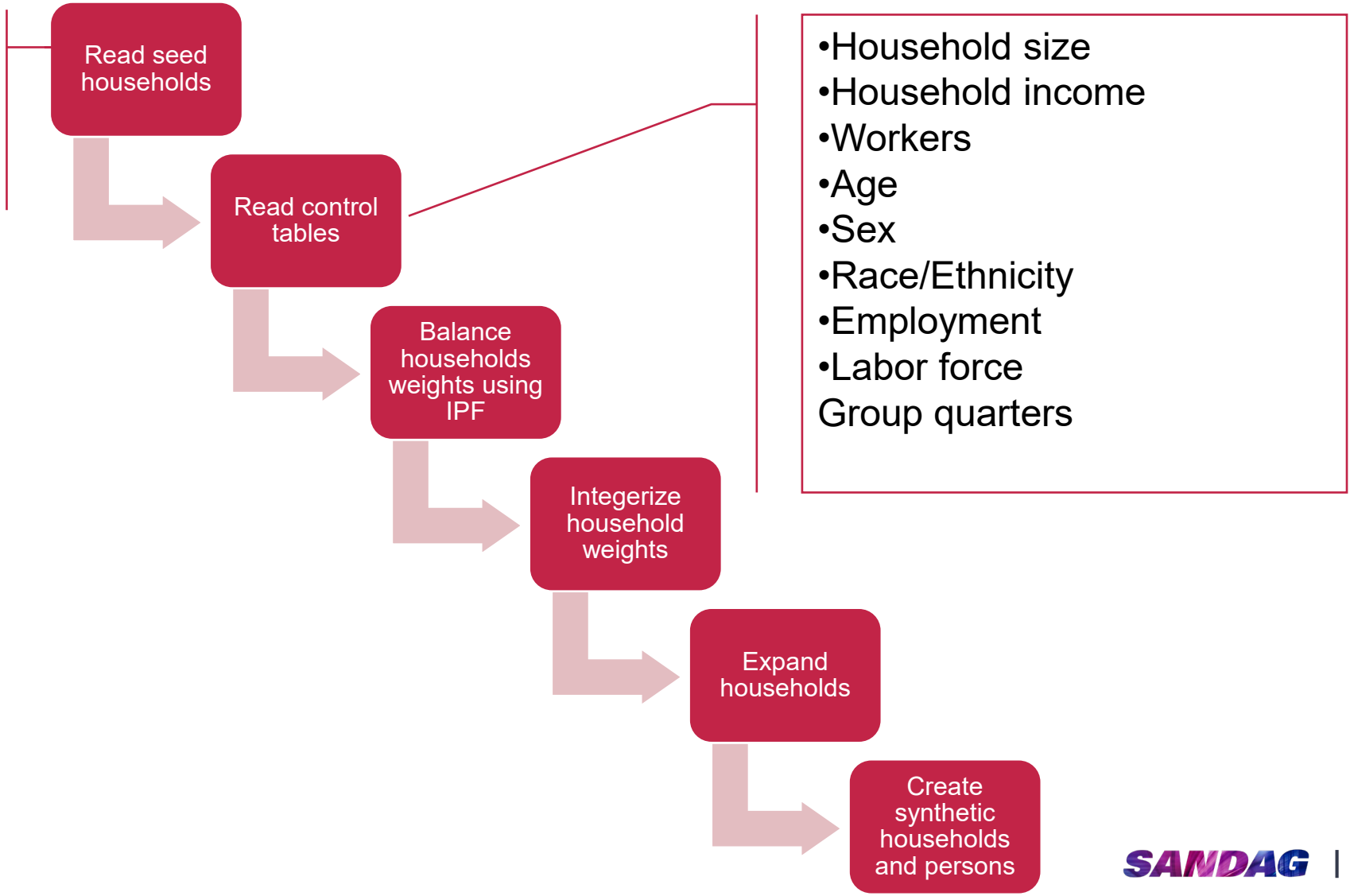


Inputs
- ACS PUMS
- SANDAG Forecast

Outputs
- Synthetic households
- Synthetic persons

How PopulationSim Works

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



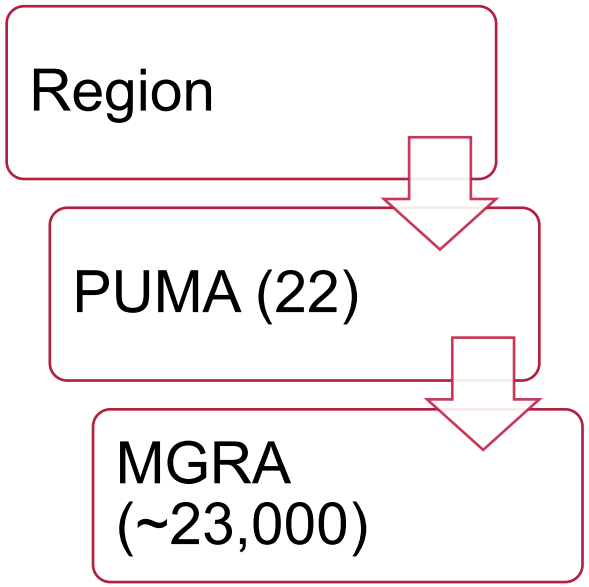
- Household size
- Household income
- Workers
- Age
- Sex
- Race/Ethnicity
- Employment
- Labor force

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

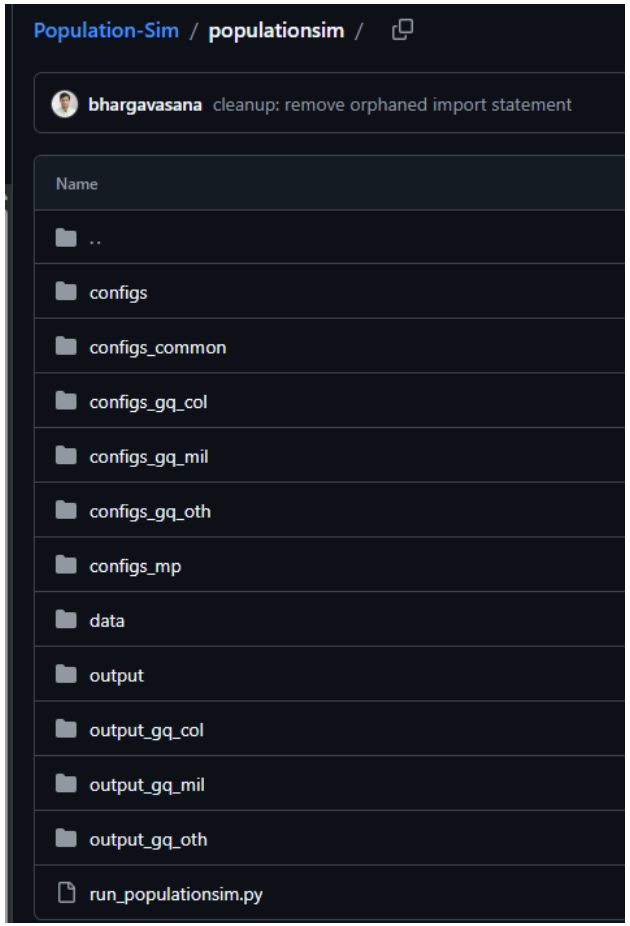
Three separate synthesis runs

- Military
- College
- Other

Why separate?

- Different demographics
- Different locations
- Different control totals

Merged into final synthetic population



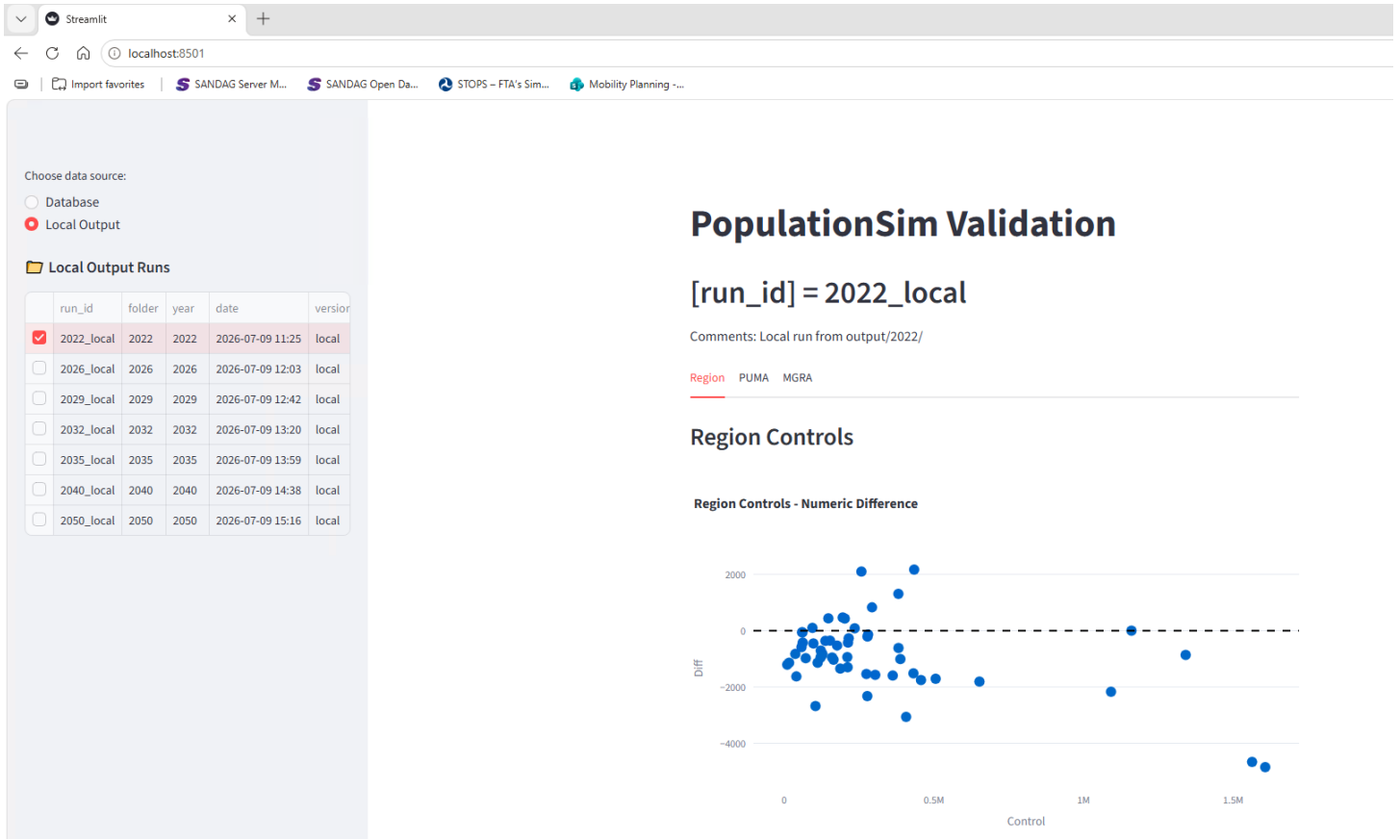
Outputs & Validation

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

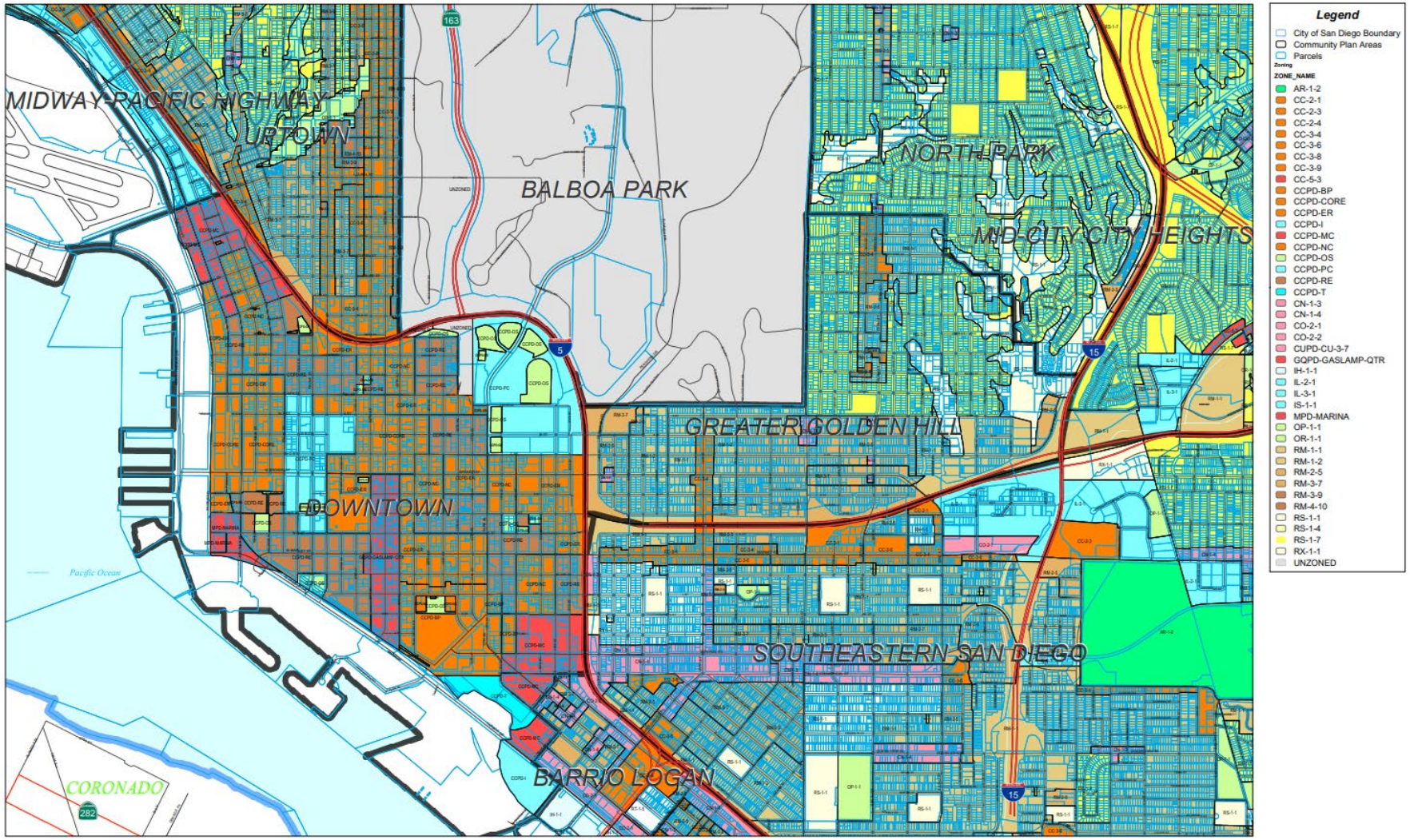
Potential future enhancements:

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

ABM3 Land Use Converter Tool

Cundo Arellano

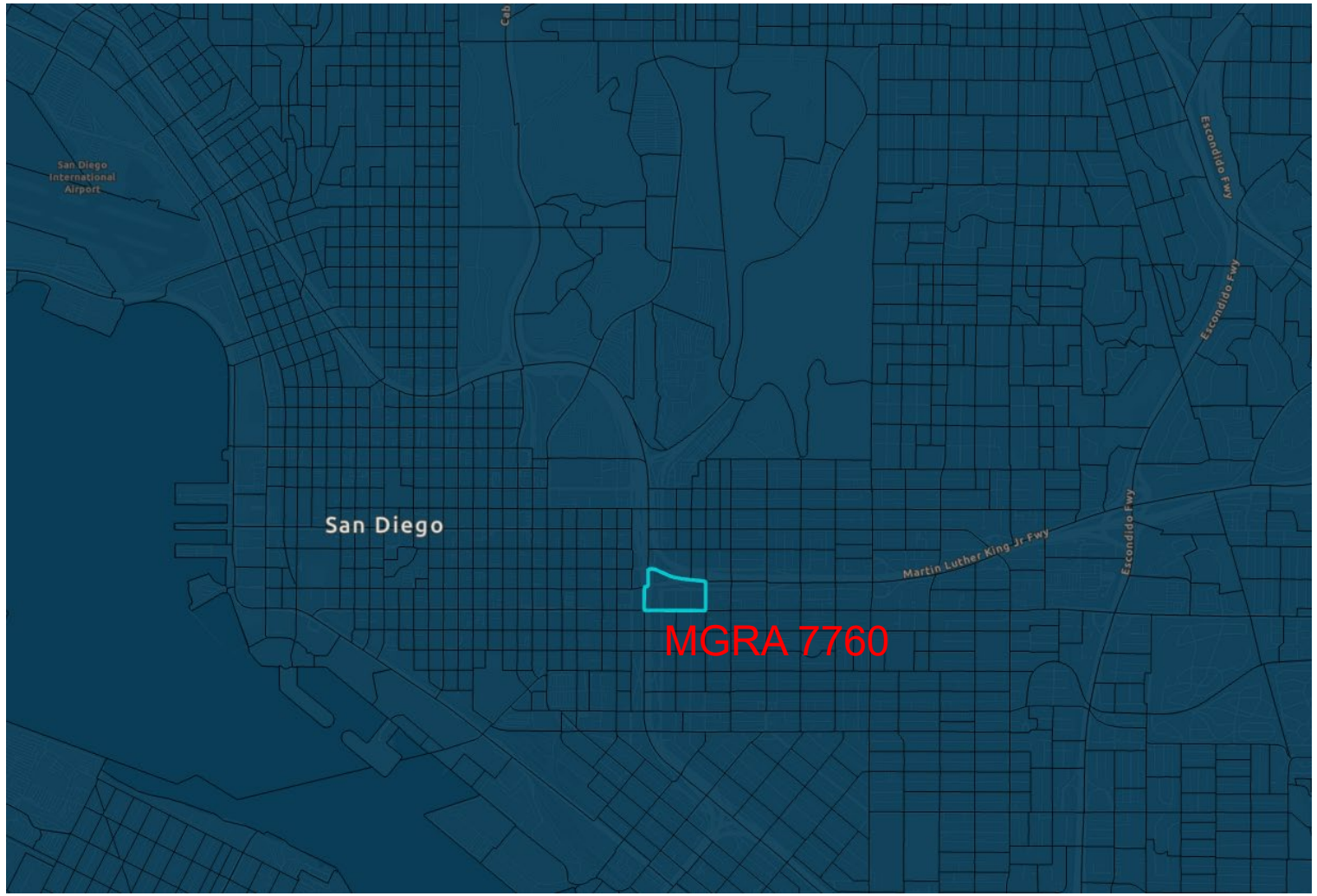
Land Use in ABM3



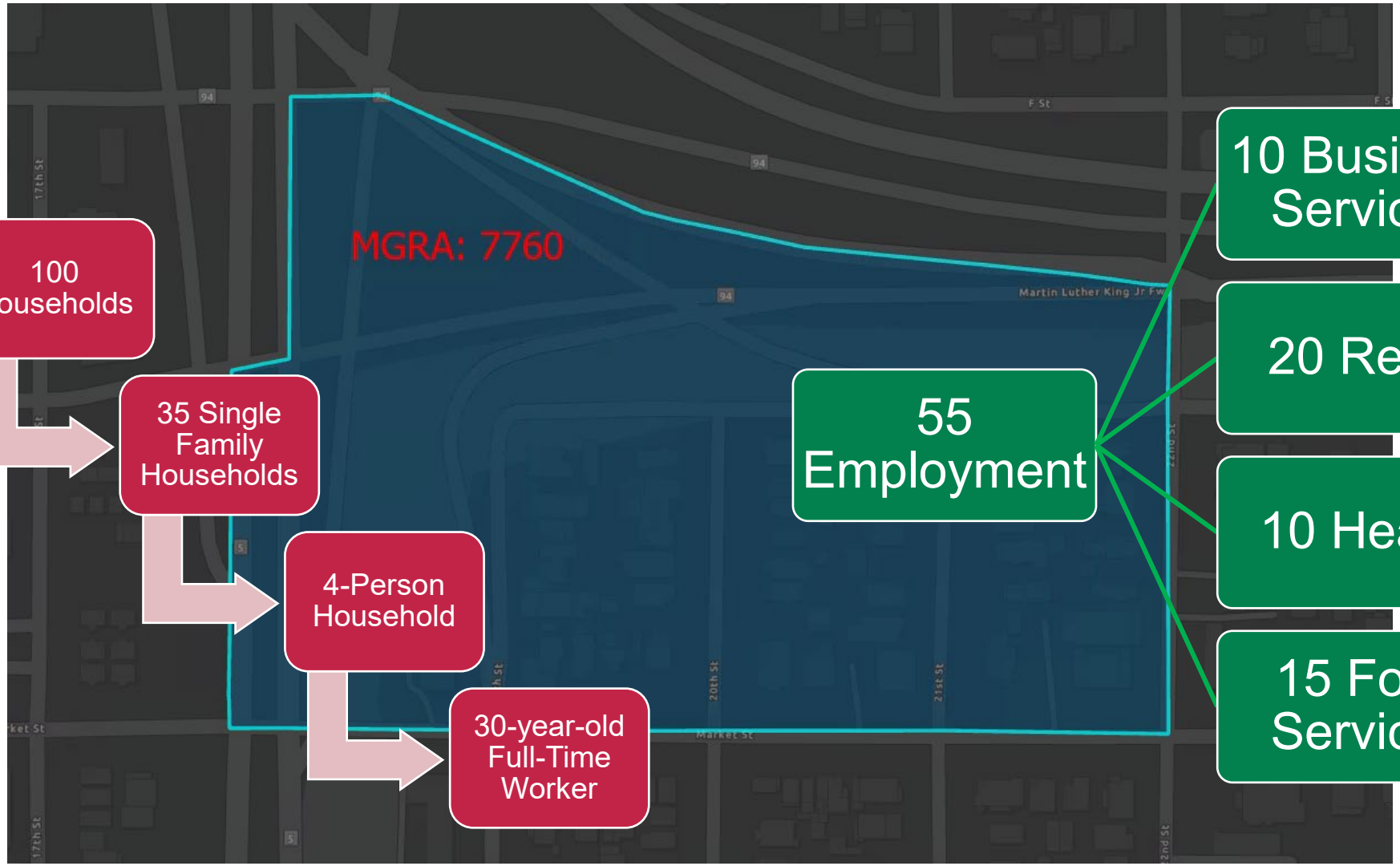
Source: https://www.sandiego.gov/sites/default/files/legacy/development-services/zoning/pdf/maps/grid15.pdf

Land Use in ABM3

- Series 15 MGRAs

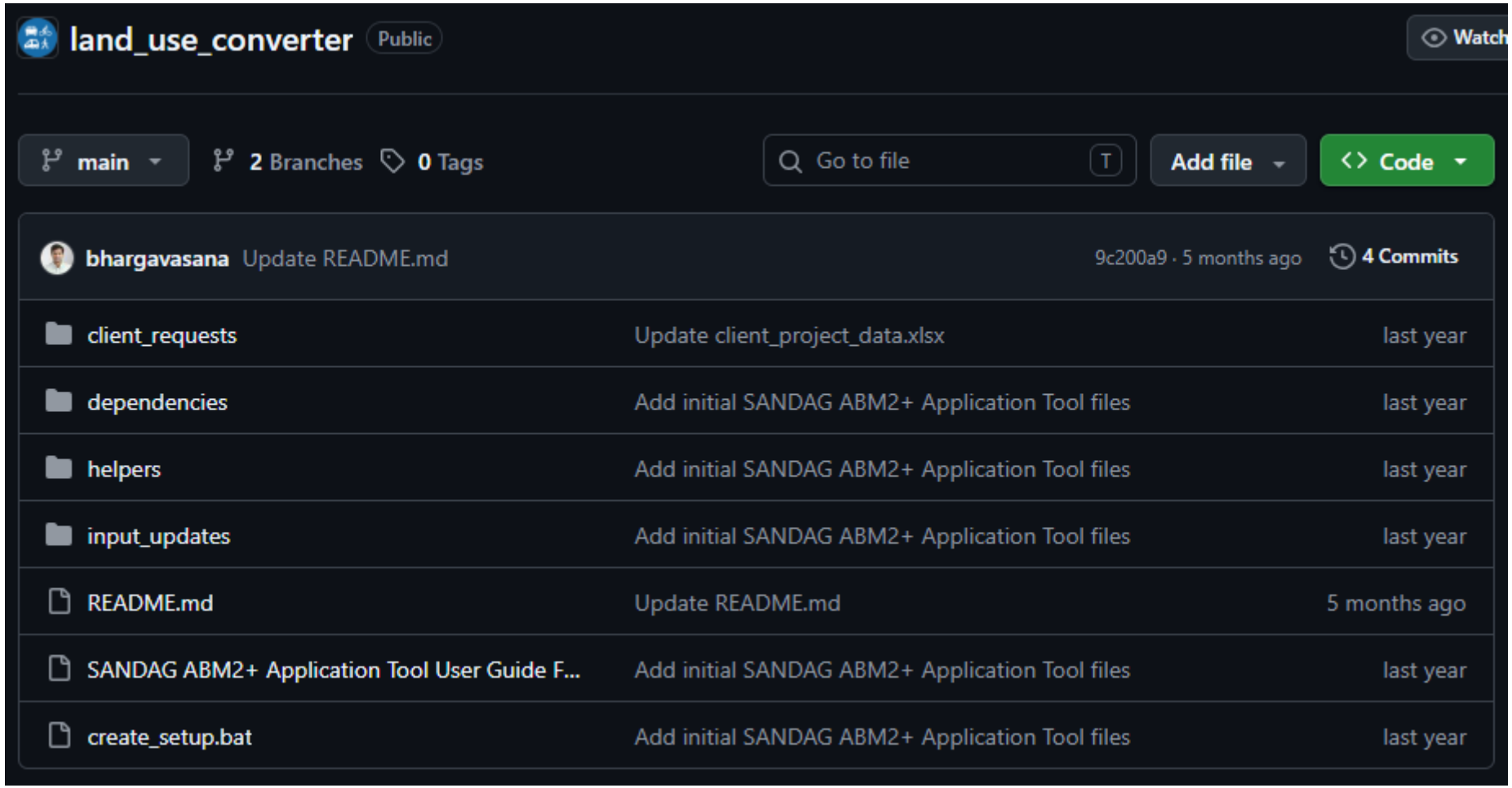


Land Use in ABM3



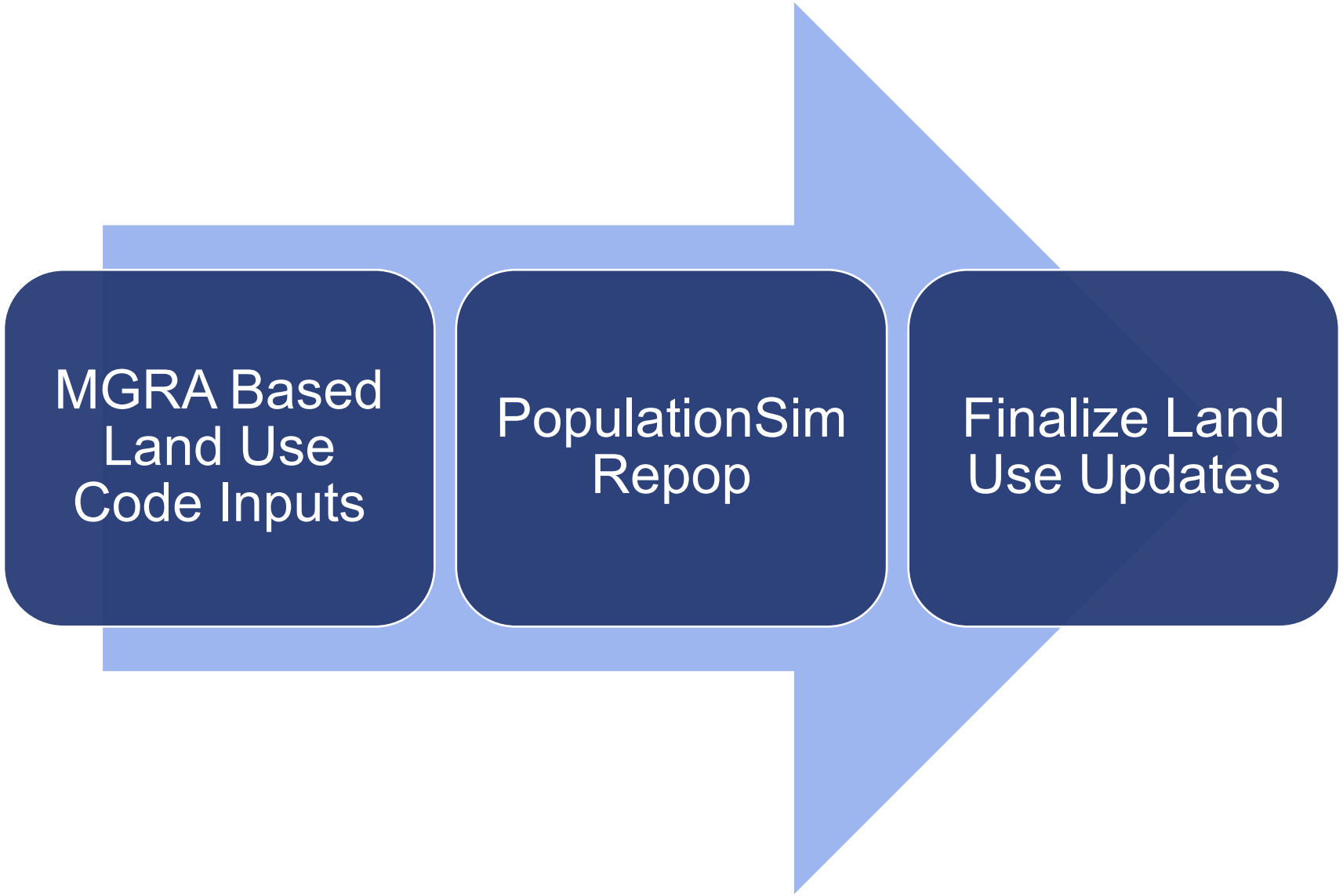
Land Use Converter Tool

SANDAG ABM2+ Service Bureau Enhancements Final Report (2022)



https://github.com/SANDAG/land_use_converter

Land Use Converter Tool

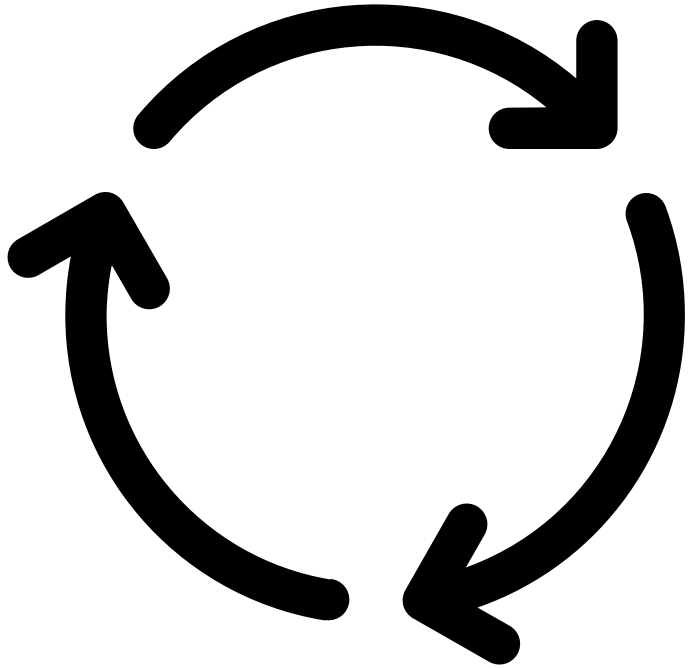


Outputs

- 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

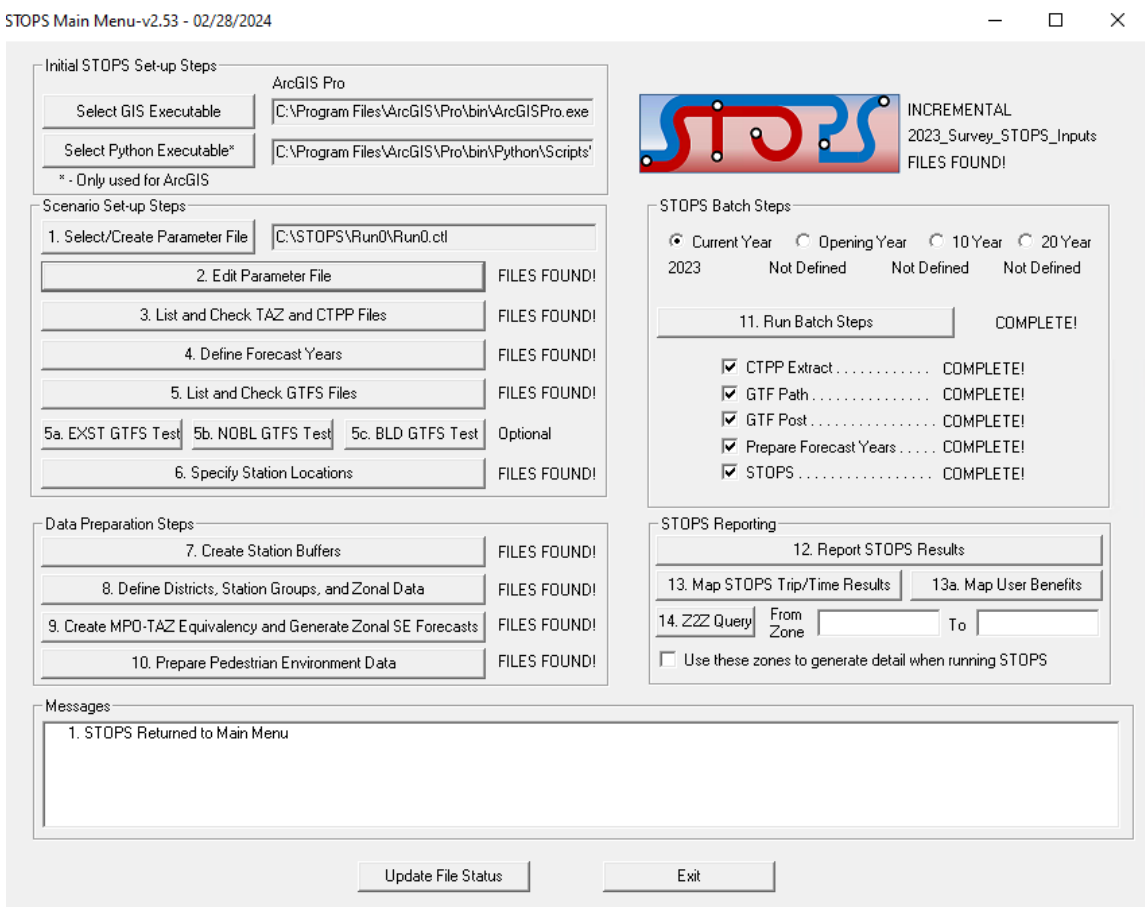
- Tool is for subarea edits
  - Not meant to replace formal Land Use modeling
- Early development stage
  - Data collection
  - Methodology finalization
  - Call for comments
- Independent of ABM
- Open-Source Tool
  - https://github.com/SANDAG/land_use_converter

Regional STOPS Model

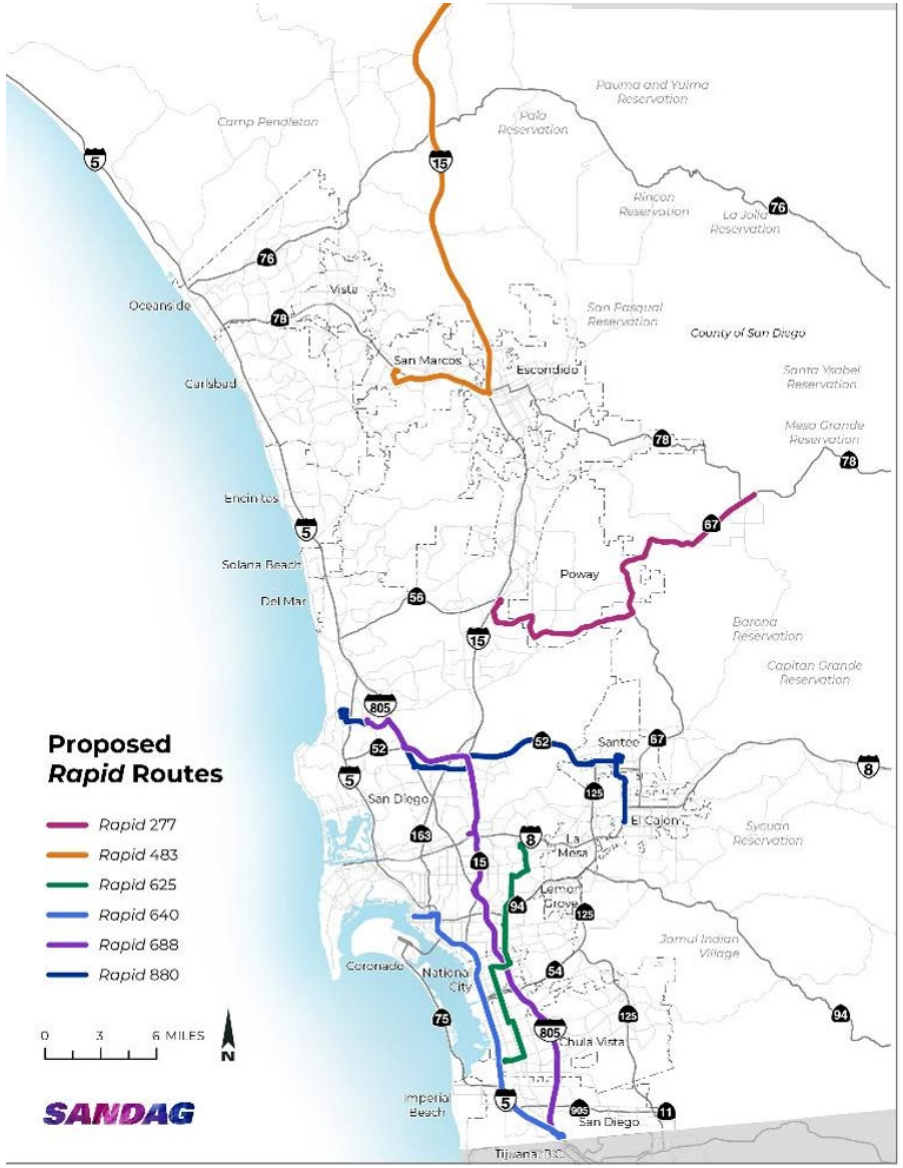
Alexander Berryhill-Williams, Xuenan Ni

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



Why STOPS and Why Now



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

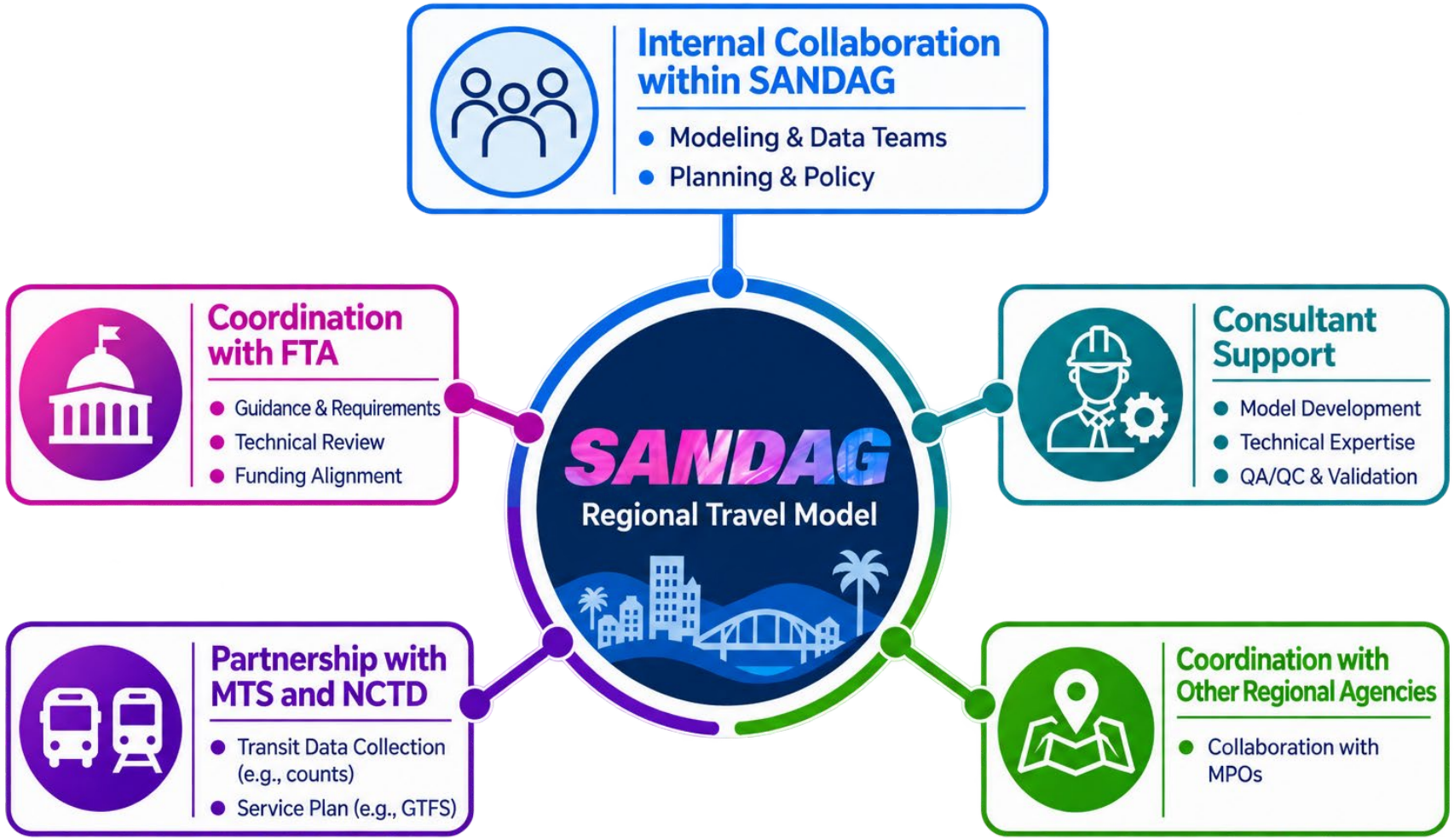
What goes into the model?

- 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

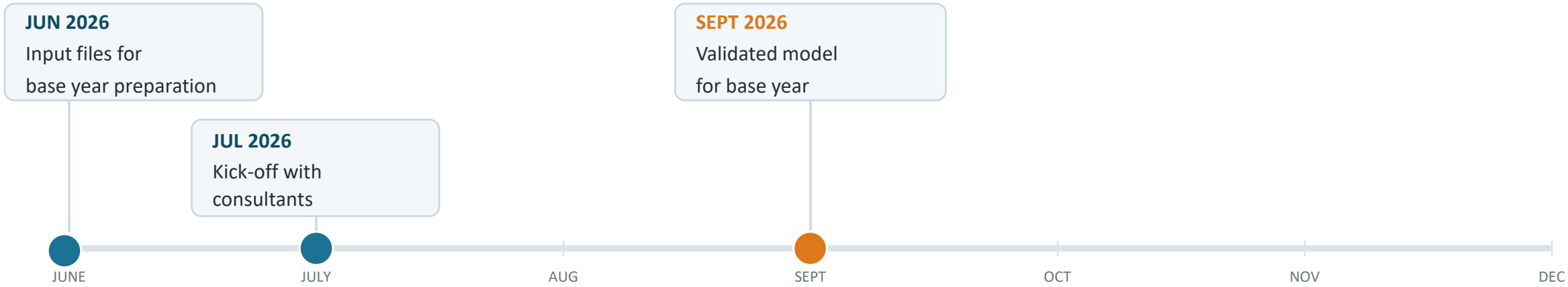
Value Added Through the STOPS Effort

- 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



Model Set-up and Data Preparation

Preliminary Calibration

Rapid Routes Alternatives

Begin Forecast Development

ABM4 & 2029 Regional Plan

Bhargava Sana, Ziying 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

2026

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

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

2028

- Continue network refinement
- Network modeling scenarios developed and summarized

2029

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

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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