



# ActivitySim: A Common ABM Platform



Puget Sound Regional Council

# ActivitySim Overview

- ActivitySim is a next generation ABM platform being developed by a consortium of MPOs, AMPO & RSG.
- For PSRC, ActivitySim will eventually replace Daysim, which is the ABM in Soundcast.
- The transition to ActivitySim will be well thought out and sensitive to the needs of our user community.
- We anticipate that the differences between platforms and impacts to most users will be negligible.

# ActivitySim- Why?

- Existing ABM Platforms:
  - Models are implemented in a bespoke manner.
  - As part of a contract with no concern for others.
  - Innovations are hard to implement across platforms.
  - Are more prototype than platform. Not much usability, transparency stability, extensibility and optimization.
  - Leads to an industry full of prototypes, nothing really amazing.

# ActivitySim- Why?

- A real need for collaboration:
  - ABMs need to be usable, transparent, stable, optimized
  - Requires consistent thoughtful ownership and effective cooperation
  - ActivitySim has demonstrated that a collaborative ABM platform is possible and preferable to the alternative/status quo
  - Benefits clearly outweigh the cost/effort.

# ActivitySim Partnership

- Led by the Association of MPOs
- All agencies participate in decision making and set annual development priorities
- Pooled funding
- New agencies are welcome
- 7 years of successful collaboration



# ActivitySim Goals & Principles

## Goals

- Create an activity-based travel modeling platform
- Unify best practices
- Reduce development costs
- Reduce maintenance costs
- Collaborate

## Principles

- Open Source
- User-friendly
- Documented
- Stable
- Extensible
- Optimized

<http://www.activitysim.org>

# ActivitySim Approach

- Design based on an existing best practice model (MTC's CT-RAMP)
- Implement in Python using best software development practices and popular data science libraries.
- Facilitate extensibility through modular design.
- Continuously integrate and test
- Document comprehensively
- Affiliated packages such as PopulationSim, Benefit Cost.

# ActivitySim Features

- Utilities/Variables:
  - Expressed as user configurable expressions
- Multiprocessing
  - Python is single threaded but supports parallel operations.
- Pipelining
  - Model can be started/stopped at any point
- Tracing and logging
  - All calculations traced to CSVs for tagged households and ODs



# ActivitySim Status

- Pre 2018- Software development work to implement all sub-models.
- A full implementation of MTC's TM1 was completed in 2018.
- Extensive verification for each sub-model.
- ARC & SEMCOG have contracts to implement ActivitySim.

# ActivitySim- Current Phase

- Phase 5- First time adding improvements/features beyond TM1.
  - Support for two zone systems
  - Support for modeling TNCs and for-hire vehicles
  - PopulationSim integration
  - Model estimation mode
  - Support for three zone systems and transit virtual path building

# ActivitySim- Future Development

- Phase 6- Went through a rigorous scoping exercise.
  - Complete estimation mode
  - Telecommute Model
  - Transit Pass Ownership
  - Input checking and error handling.
  - Test system to handle multiple implementations
  - Performance Enhancements

# ActivitySim- Conclusion

- Feel that ActivitySim offers the best approach to make continuous model improvements and leverage new components and features.
- Thanks!
  - Joe Castiglione, PMC Chair
  - Partner Agencies
  - Ben Stabler and Jeff Doyle, RSG