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## Robo-Taxi Service Design, Modeling and Simulation

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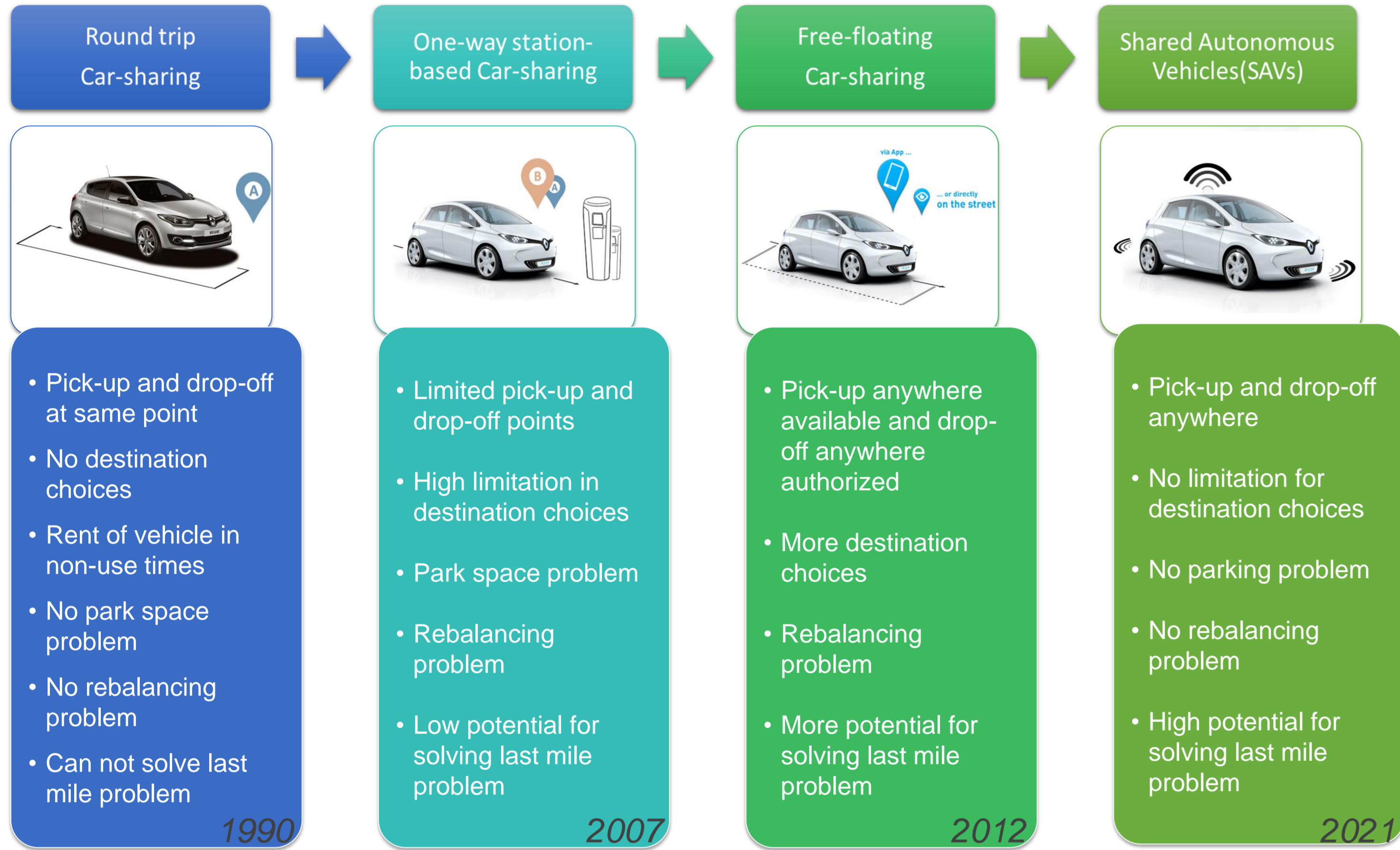
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## Context

Bike-sharing  
 Car-sharing  
 Ride-sharing  
 Scooter-sharing  
 Ride-hailing  
 ...

**SHARED-USE VEHICLE SYSTEMS**  
 shifting the *private mobility* from *ownership* to *service use*

### Shared-use vehicle systems evolution



### Advantages of SAVs (Robot Taxis) over non-automated shared vehicles

- Obviating the need for continuing the rental while at their destination
- Not worrying about whether a shared vehicle will be available when the traveler is ready to departing.
- Anticipate future demand and relocate in advance to better match vehicle supply and travel demand.

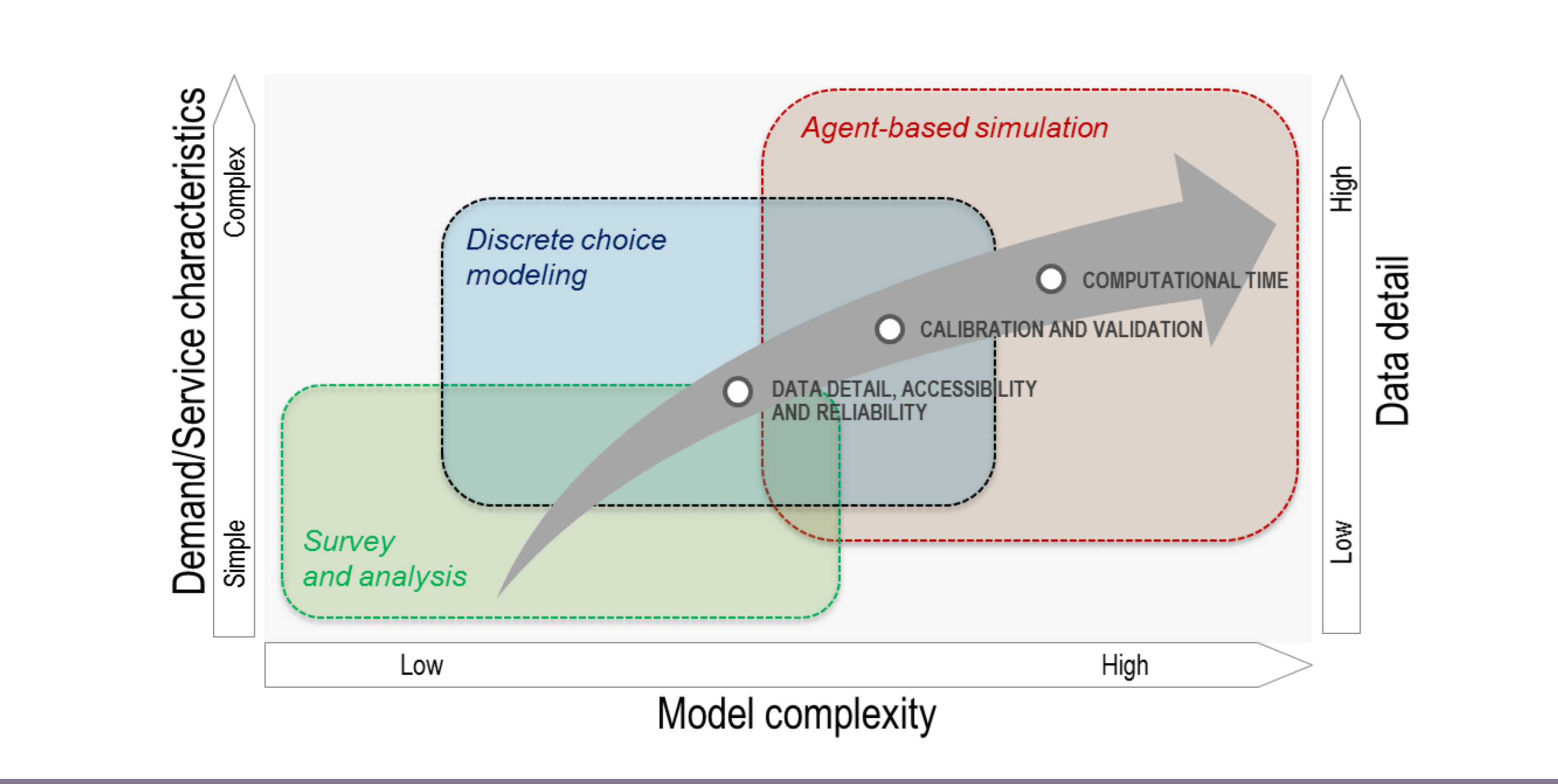
## Objectives

**Two major research axes:**

- Develop a design methodology for Robot Taxis systems
- Conduct sensitivity analysis by using multi-modal traffic simulation environment

Current studies	Expected results
<ul style="list-style-type: none"> <li>Predicting the usefulness of autonomous vehicles</li> <li>Estimating the number of shared autonomous vehicles needed to serve an existing demand</li> </ul>	<ul style="list-style-type: none"> <li>How the new travel mode would interact with existing travel options?</li> <li>How customer preferences influence the mode choice?</li> </ul>

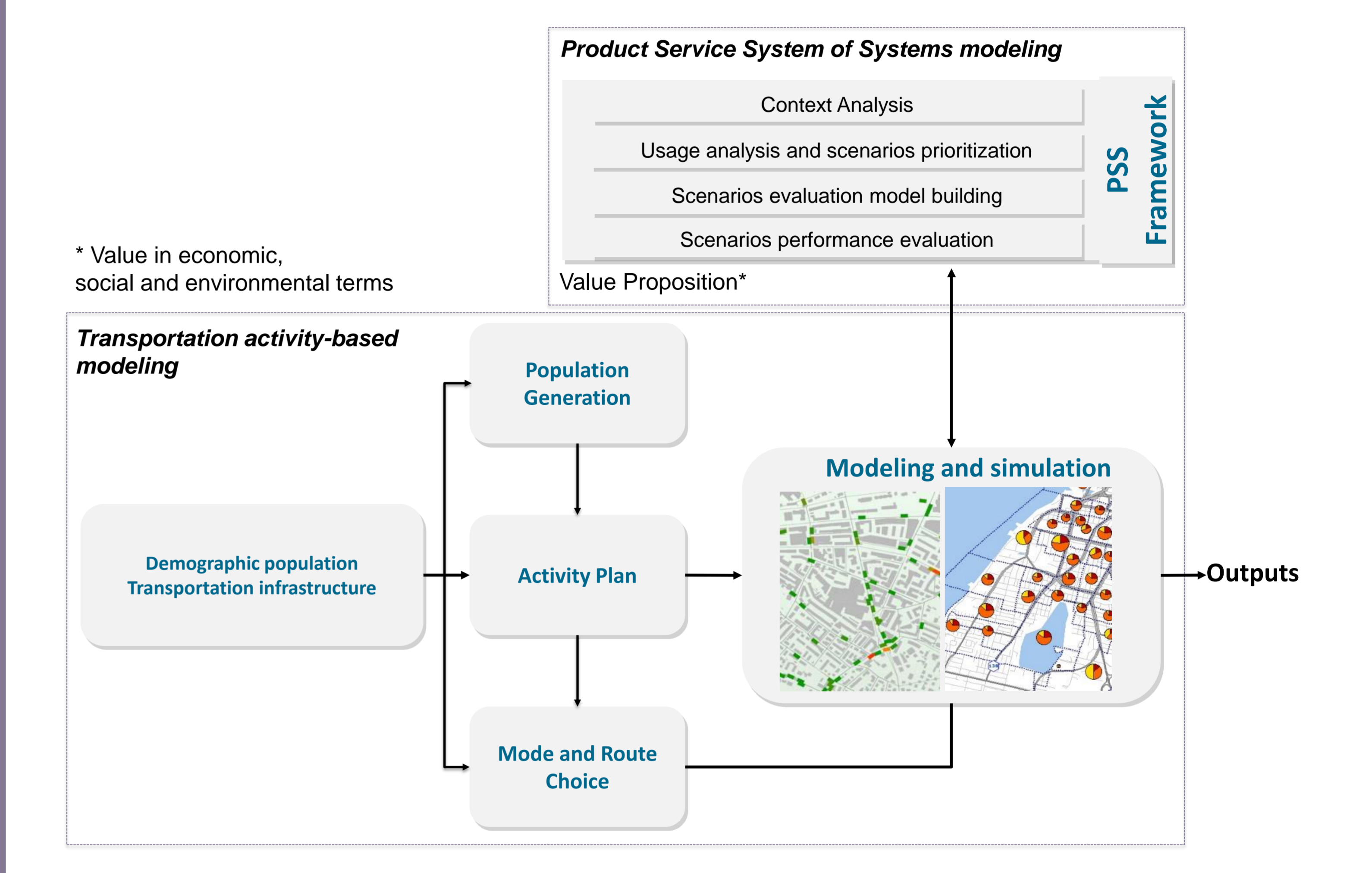
## Approaches



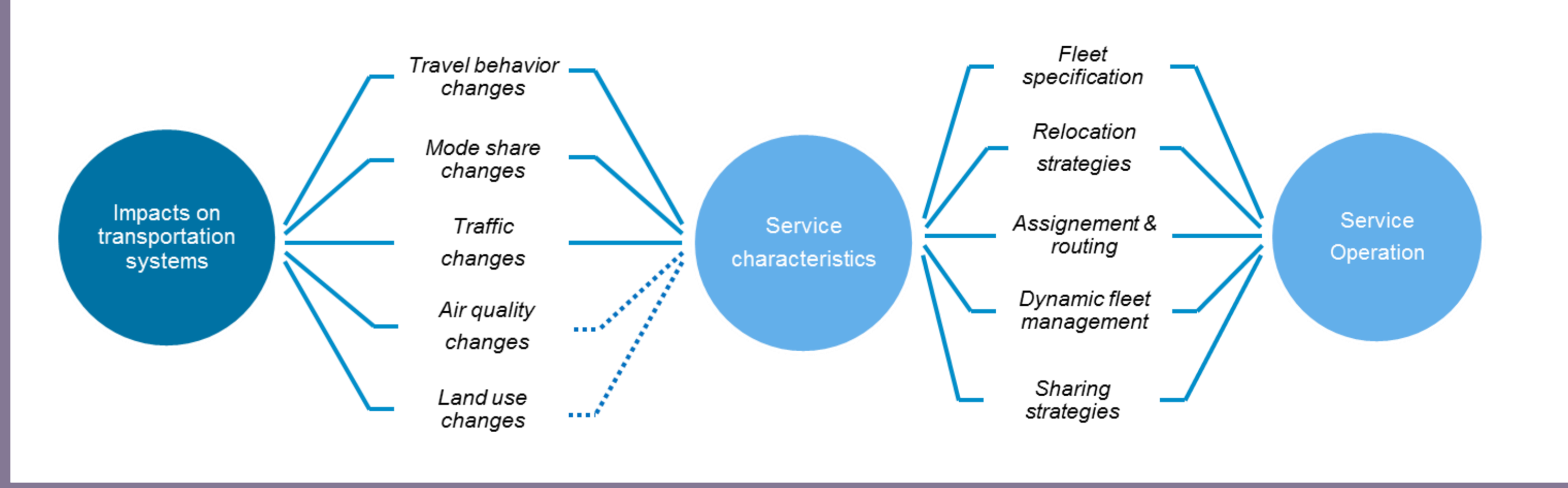
## Challenges

- DATA DETAIL**: Travel should be modeled at the individual level with explicit modeling of the modal choice. It requires *individual socio-demographic data*.
- DATA RELIABILITY**: These systems are not in operation yet so a stated preferences (SP) survey would be needed. It could be *costly and not necessarily result in reliable and complete model*
- MACROSCOPIC MODELING WITH MICROSCOPIC DETAILS**: Model should be sensitive to short-distance trips so *extremely fine-grained spatial information at the parcel level is needed*
- HIGH COMPUTATIONAL TIME**: Model computes probabilities for a large number of alternatives at the individual level. Simulation procedures for real size networks would result in *very long computation times*
- CALIBRATION AND VALIDATION**: For SAVs services there are no real data at hands. It would be difficult to validate if *the model run correctly or not*

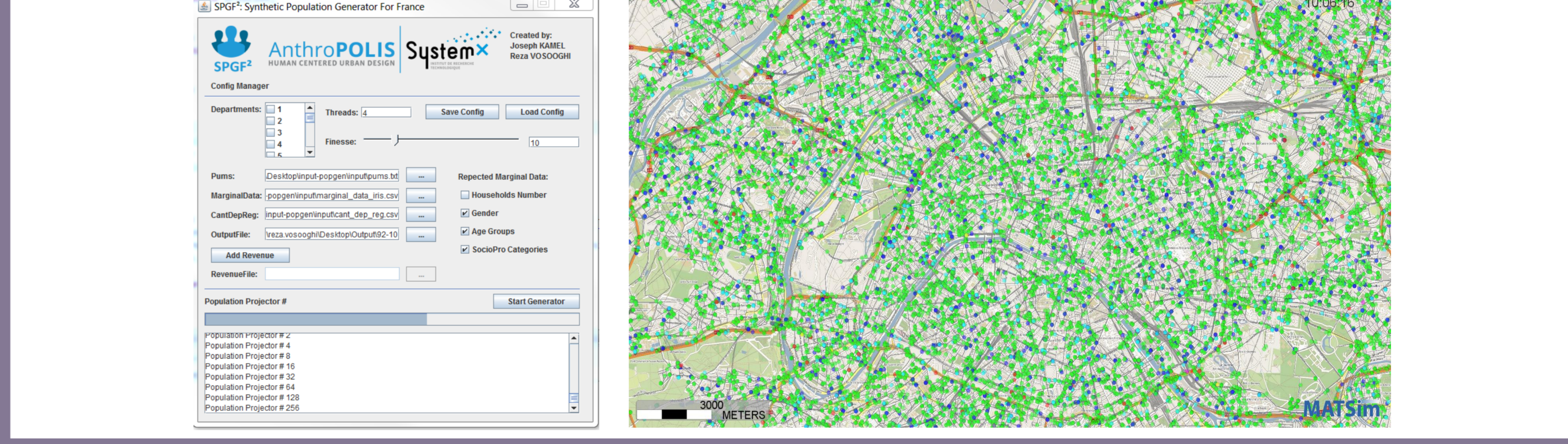
## Design and Modeling Framework



## Expected Results



## Contributions



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