(FCL) FUTURE CITIES LABORATORY GLOBAL

(SEC) SINGAPORE-ETH CENTRE

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Adaptive Planning Pathways in Uncertain Future

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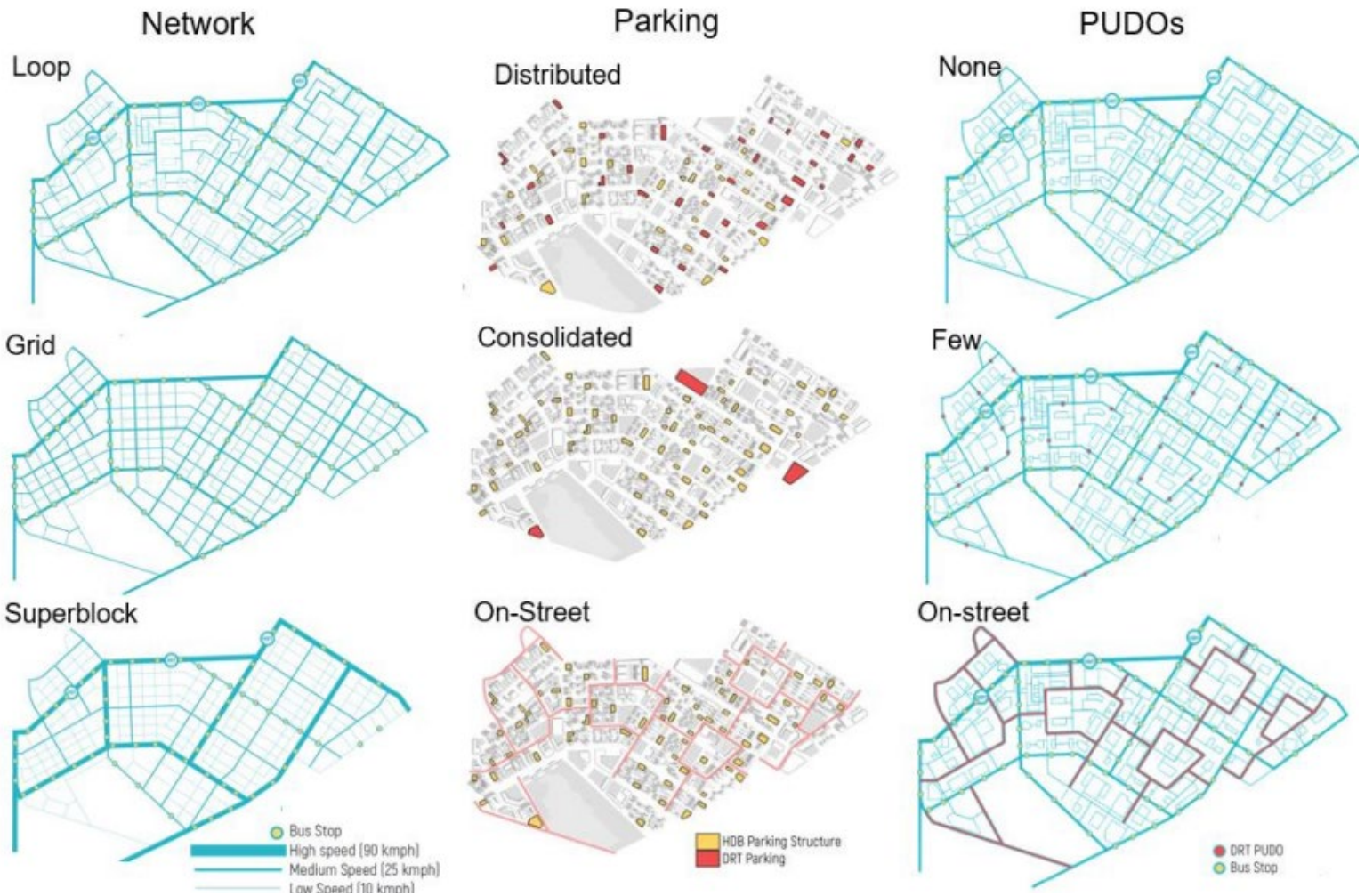
Case Study: Fictitious Neighbourhood



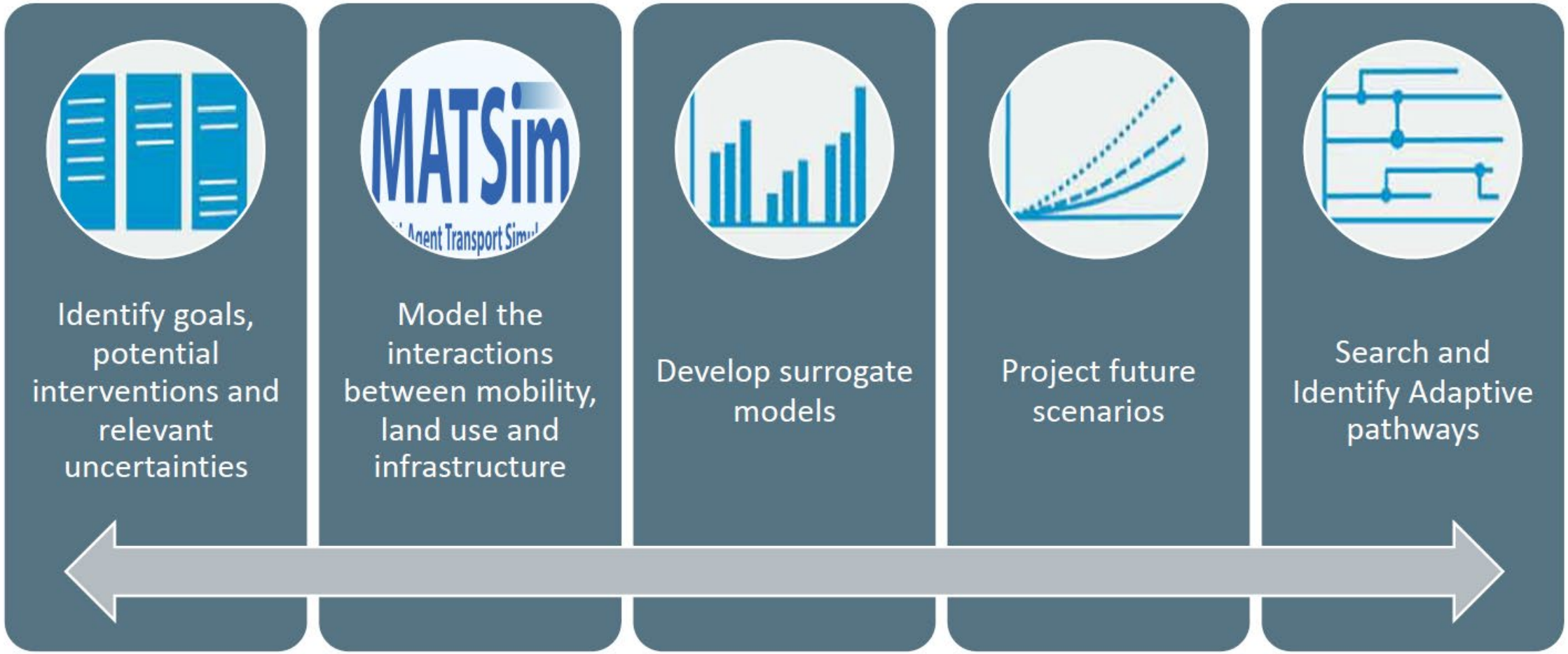
Interventions when transitioning to Shared Autonomous Vehicles (AVs)

1. Networks configurations:
Loop, Grid and Superblock.

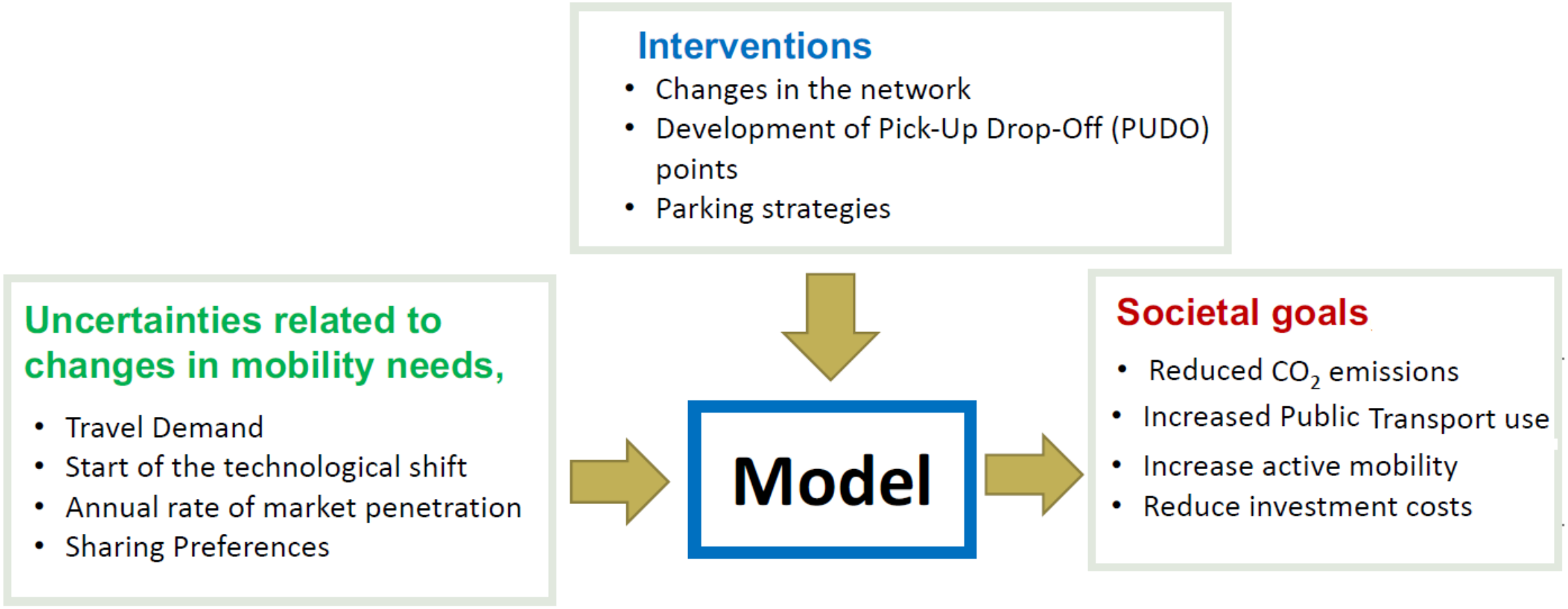
2. Parking strategies:
Distributed, Consolidated and On-street.

3. Pick-up/Drop-off points (PUDOs):
None, Few and On-Street.

Modeling Process



Step 1: Identify Interventions, Uncertainties, Goals



Key Question: Finding **optimal sequencing and timing of interventions**, conditional on how the **uncertain future** evolves, to best achieve several **societal/planning goals**.

Steps 2 and 3: MATSim and Surrogate Model

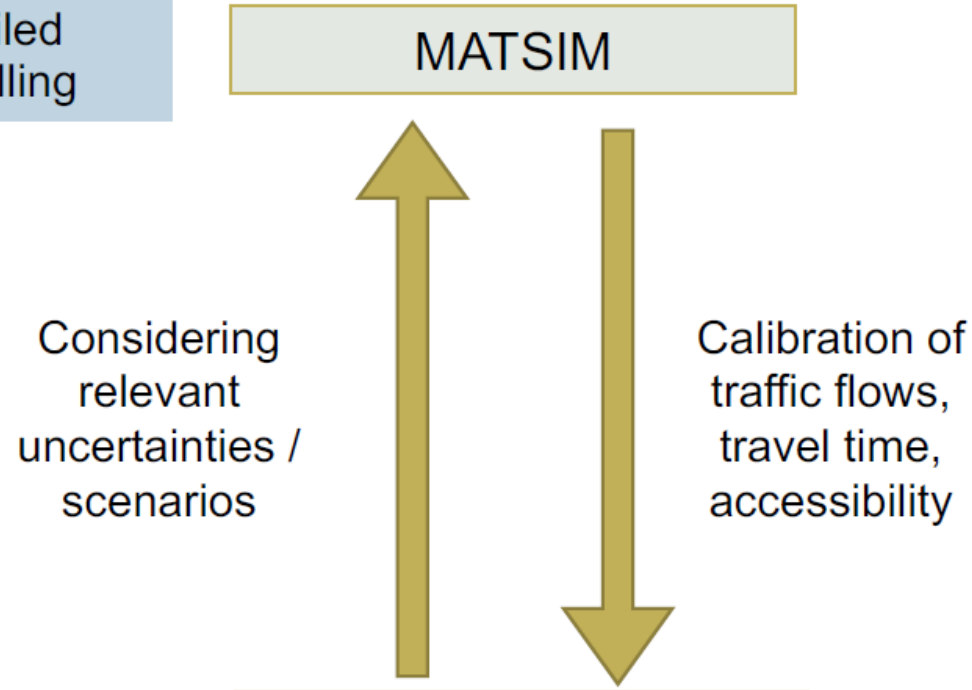
Few hundreds of simulations of specific:

- combinations of interventions
- uncertain factors

Measuring:

- relevant outcomes

→ Detailed Modelling



Thousands of simulations of the 2023-2060 period (yearly)

→ High level Modelling

Steps 4 & 5: Multi-objective Optimization to find Pathways

working draft

- Identify the potential **monitoring indicators** that are most closely related to the performance indicators (e.g., Shared AV kilometers traveled)
- For a given sequence of interventions, there will be multiple values of objective functions due to inherent uncertainty. As a **robustness metric**, we used the **75th percentile** of the objective function, without being overly conservative (e.g., using worst-case metrics).
- Assumed that a **maximum of two transitions** were possible over 40 years during the planning timeframe.
- **Find optimal thresholds (t_1 and t_2) as well as states (s_1, s_2, and s_3)**