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A choice-based recommender system to match supply and demand: Multimodal Mobility as a Service

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Introduction

- ◊ There is a streamlined connection between **demand** and **supply** models in the conventional four-step model for transportation
- ◊ The recent transportation network literature emphasizes optimization, control, and machine learning, with limited integration of economic and demand models
- ◊ We aim to address the research gap through a **choice-based** recommender system regarding Mobility as a Service (MaaS) adoption
- ◊ MaaS denotes a system in which end users can seamlessly plan, book, and pay for multimodal travel through a digital platform
- ◊ The case study will be conducted in Los Angeles (LA), with a stated preference survey designed in collaboration with Prof. Youngseo Kim at UCLA

Public transportation in LA

- ◊ The transit system struggles with **low ridership** due to critical challenges such as safety concerns, unreliability, and limited coverage
- ◊ The LA Department of Transportation launched a **MaaS pilot** in 2022
- ◊ I experienced the light rail and bus services on December 24, 2025 (photos below)



Figure 1: Aviation/Century station

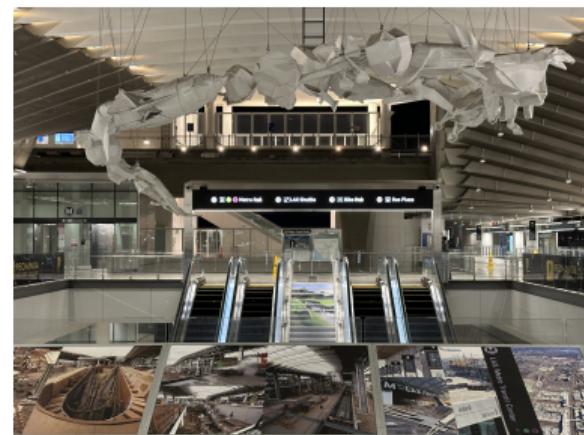


Figure 2: LAX/Metro Transit Center

Survey design

- ◊ The web-based survey includes two discrete choice experiments (DCEs): one on **MaaS bundle subscription** and one on **travel mode choice** involving MaaS
- ◊ To test for potential lock-in effects of bundle subscriptions on MaaS use, we plan to reverse the order of the DCEs for half of the respondents
- ◊ The survey includes psychometric statements on MaaS adoption, multimodal travel, and environmental attitudes to specify a **hybrid choice model** with latent variables

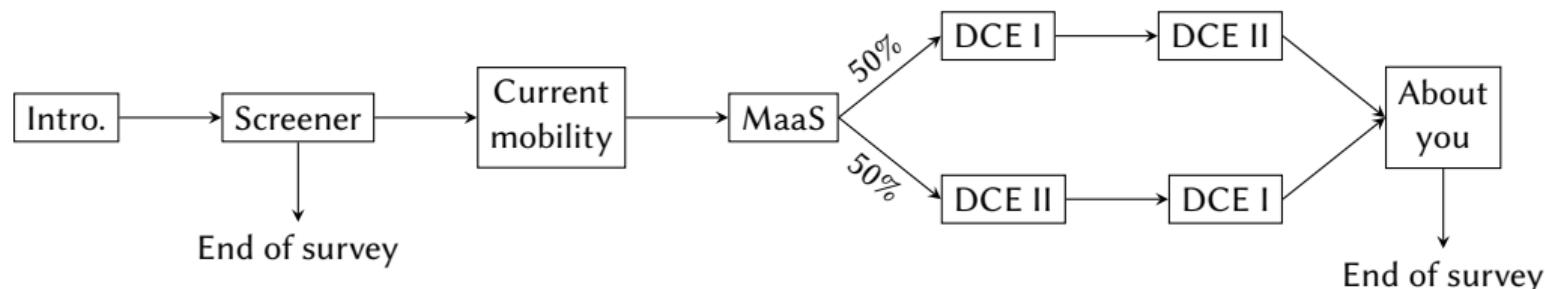


Figure 3: Survey flowchart

Next steps

- ◊ Implement, test, and distribute the survey
- ◊ Estimate a hybrid choice model that jointly represents MaaS bundle subscription and travel mode choice to analyze MaaS demand
- ◊ Derive policy recommendations for targeted marketing based on preference estimates and latent constructs
- ◊ Explore **online estimation** of choice models (i.e., real-time updates of preference estimates) to build a recommender system that matches supply and demand