Riding in Real-Time: Information Provision and User Behavioral Response in Public Transportation Systems

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Start: September 2010
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FUTURE URBAN MOBILITY

The Challenge

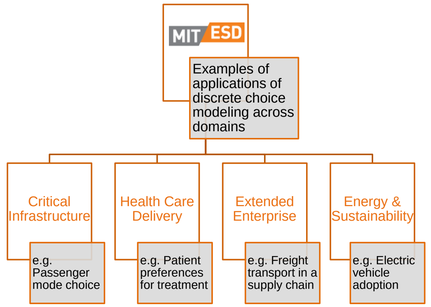
- Urban systems are becoming increasingly digitized, which has important implications for metropolitan mobility systems
- Public transportation providers are leveraging ICTs to improve system operations and provide information to travelers
- Rapid adoption of mobile technologies by travellers - namely smartphones - has enabled distribution of real-time, personalized information on-the-go

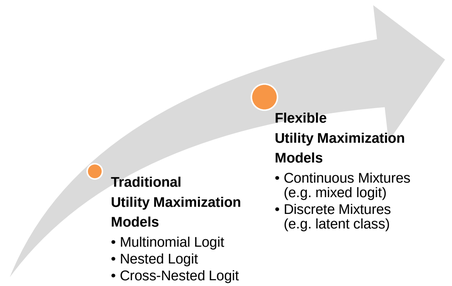
Image source: reroute.it

Image source: T-on-Time

Methodology

Discrete choice modeling has a long tradition in analysis of complex socio-technical systems, particularly regarding consumer decisions. Recent advances have set forth new, flexible models that may increase behavioral realism.





Potential Case Studies

The proposed research approach conducts similar experiments in multiple cities with the goal of understanding what effects are specific to each region and those applicable across all contexts.

London

Image source: tfl.gov.uk

Boston

Image source: mbta.com

Singapore

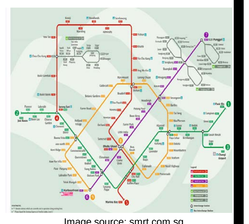
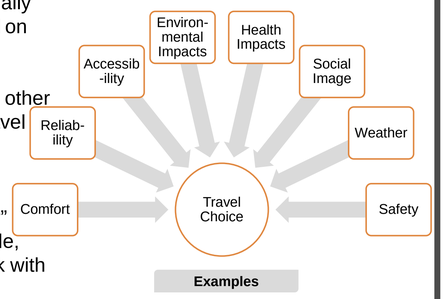


Image source: smrt.com.sg

Theoretical Background

- Transport planners traditionally model travel choices based on travel time and cost
- The literature suggests that other "softer" factors influence travel choices
- Real-time, personalized information on these "softer" factors is becoming available, creating a transport network with nearly perfect information



Research Question and Objectives

- **Research Question:** Will new sources of real-time, personalized information influence the behavior of travelers?
  - Will they improve the experience of existing transit riders?
  - Will they attract new riders to transit?
- **Hypothesis:** Individual travelers have heterogeneous responses to these new information sources
- **Objective:** Quantify these variations in order to understand their potential impacts on the larger system

Planned Research

- The planned research approach conducts stated and revealed preference discrete choice experiments to evaluate the impact of new information sources on short term travel decisions (e.g. mode, route, and departure time choice).

Simple Example: Comfort

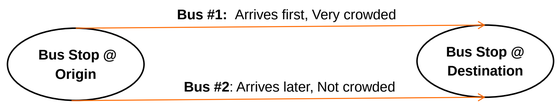


Image: Orchard Road, Singapore

- **Question:** If you had real-time bus arrival and crowding information, would you wait longer for a less crowded bus?
- **Experimental Design**
  - Data collection via stated preference surveys
  - Vary information for bus arrival times and crowding
- **Data Analysis**
  - Multinomial Mixed Logit for Departure Time Choice
  - Utility Equation: $U = \beta_1 WT + \beta_2 CR + \varepsilon$
  - Where: WT=Wait Time, CR=Crowding
  - Captures individual taste heterogeneities

Random Coefficients

Image source: coolinsights.blogspot.com

Expected Contributions

- Increased understanding of the role of information in complex socio-technical systems
- Methodologies for improved demand modeling in public transportation systems
- Insights specific to regional case studies, such as information provision strategies

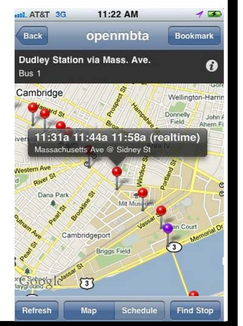


Image source: openmbta.org

Thank You!

- This research is funded in part by the Singapore MIT Alliance for Research and Technology (SMART) and a US Department of Transportation (DoT) Eisenhower Scholarship.
- Thanks to my doctoral committee for their expert guidance.
- I am grateful to my fellow ESD PhD students and Master of Science in Transportation students for their support.
- I would also like to thank Francisca Rojas, Postdoctoral Research Fellow at the Kennedy School of Government, Michael Frumin, Systems Engineering Manager at MTA, and Joshua Robin, Director of Innovation at the MBTA.

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