From Trend Spotting to Trend Setting: Behavioral Analysis to Guide Transformative Mobility

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The future of shared, connected, autonomous, clean, app-driven vehicles and services promise to transform mobility. Yet over the coming decades, this evolution could play out in heaven or hell scenarios and anywhere in-between. How travelers modify their behaviors in light of these new services is a critical ingredient driving the outcome. Even under the most optimistic scenarios, society's environmental goals cannot be met by technology, operations, and energy system improvements – behavior change is needed. This talk presents behavioral analysis approaches that focus on modeling and influencing trends of travel behavior with an objective of developing tools to guide this transformation towards a more sustainable, efficient, and equitable system.

The behavioral analysis approach builds on urban land use, travel, and activity microsimulation models. These models incorporate a range of individual-level decisions that impact travel, such as residential location choice, auto ownership, and mode choice. The models are based on detailed travel and activity data collected from individuals, and the resulting behavior is specified to be a function of the socio-demographics of the individuals, as well as the transport and land use infrastructure. The models are used to perform "what-of" analyses re potential policies and new technologies and services. For example, cities are trying to navigate a range of policies related to new transport services such as Uber and Lyft. These policies impact price and service and therefore also influence use of these services.

Critical research needs to address transformative mobility within this framework are highlighted, including: flexibility around the uncertainty of future technologies and services; diffusion/adoption of technology and services; location, travel, and activity behavior conditional on adoption; effective nudges and policies to achieve desired outcome; and attitudinal and behavioral trends. Research along a number of these fronts will be presented. One core basis of the research agenda is the need to explicitly represent higher-level decisions of "modality styles" or lifestyles built around particular travel modes. For example, some people drive no matter what, some bike everywhere, and others are more multimodal in their travel patterns. This lifestyle decision is the most critical behavioral decision that leads to aggregate phenomenon such as congestion and sustainability (or lack there-of), and yet the concept does not exist in current travel demand frameworks. Modality styles also provide a more solid foundation for understanding trends over time and how new technologies and services may influence these trends. For example, modality style models have shown that in 2000, 42% of the San Francisco Bay Area's population exclusively considered driving, whereas this share reduced to 23% in 2012. To

effectively change behavior, it is necessary to change behavior at the level of modality style. Policies (traditional such as pricing or non-traditional nudges) as well as new technologies and services can modify modality styles. The framework is being used to study how new services such as Uber and Lyft are influencing modality styles and the potential of behavioral experiments aiming to nudge people towards more sustainable modality-style choices.

The key to understanding the future of transformative mobility is not only to study the immediate impact of current policies, services, and nudges; but also how these impacts influence trends and play out over decades and as new technologies and services are introduced.