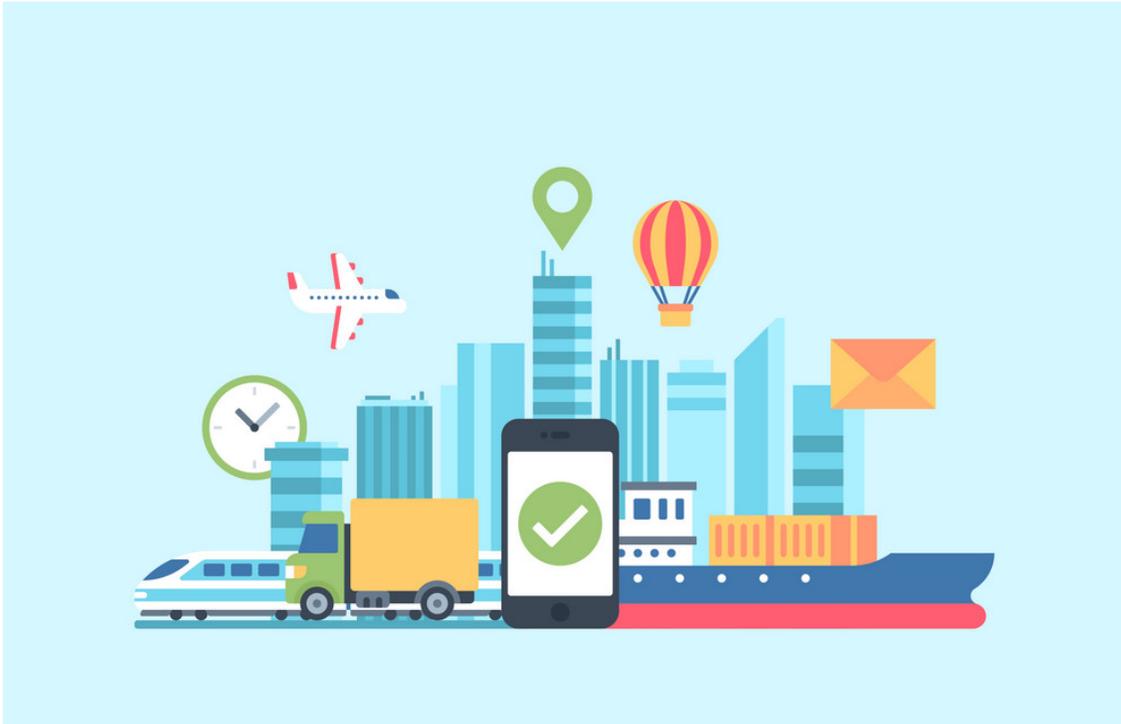


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## T-SCORE Research and Outreach Update



### Greetings!

Welcome to another monthly newsletter from [Transit- Serving Communities Optimally, Responsively, and Efficiently \(T-SCORE\) Center](#), a US Department of Transportation funded research center. In this edition we share some recent research work with a focus on the integration of transit with ride-hailing and announce exciting news that highlights the work T-SCORE has been involved in.

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### Thought Leaders in Transit: Ride-hailing

As mentioned in previous newsletters, T-SCORE conducted interviews with two dozen experts on the future of transit in summer 2021. Regarding ridesharing, experts acknowledged that TNCs and transit generally interact in both complementary and competitive ways, and the different contexts in which they interact are critical. They noted that in some places where the need for transit

service is not currently being met, TNCs are helping fill that gap. Similar to transit, TNCs thrive in areas with low-car ownership, so TNCs and transit could work together to change the mobility landscape and provide an alternative.

Several experts suggested that the ability for TNCs to shift rides away from transit may be limited. According to one expert, TNCs are most disruptive when they enter a new market in a new city, but market share stabilizes after two or three years. Additionally, as prices continue to rise and pressures mount to improve compensation, TNCs will lose some of their appeal. A different expert explained that while TNCs are replacing trips in the urban core, “there's a natural limit to how many they can replace based upon the road capacity”. As such, the impact of the competition will be mitigated by space, congestion, and pricing, especially if transit is given priority over general traffic. Two experts also noted that users of ride hailing and TNC services are often of a higher income bracket and a younger age demographic than the majority of transit riders, indicating less of a rider overlap.

When considering the broader impact of TNCs on urban mobility, one expert expressed that geometrically, there isn't an alternative to transit in major cities,” and people may “keep chasing techno gizmos to try to avoid just solving the problems of cities with the only tools that actually work, which is the need to share space effectively”.

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## **T-SCORE Research Corner**

### **A Generative Model of Ride-Hail Driver Shifts: Time, Duration, and Location**

T-SCORE work on Ride-hail Driver Behavior was presented at the CASPT 2022 conference in Tel Aviv, Israel by Greg Erhardt based on a paper with co-authors Einat Tenenboim, Yufei Xu, and Srinivas Peeta.

For the past two years, T-SCORE has undergone work to develop a multi-modal optimization model with a multi-agent simulation considering both transit and Transportation Network Companies (TNC) as major competitive modes. A portion of this work has been to obtain a realistic representation of ride-hailing driver behavior for generating a ride-hailing driver fleet that will be embedded in the simulation alongside transit supply and overall demand. By leveraging a unique data set of ride-hail vehicle traces operating in San Francisco, CA, for 1,344,319 trips and 117,579 shifts, we developed a discrete choice model of ride-hailing driver behavior throughout a 24-hour simulation day. The model includes four steps: (1) number of shifts on the simulation day, (2) shift duration, (3) shift starting time, and (4) shift starting location. Based on differences in

driver behavior, we constructed a driver type variable to differentiate between fulltime drivers (working 35+ hours per week), part-time drivers (5-35 hours) and occasional drivers (less than 5 hours).

Findings include that fulltime drivers are more likely to work more shifts per day. Driver's shift duration was dependent on driver type and drivers with more shifts are likely to work longer shifts. Drivers' shift starting times depended on driver type, number of shifts, and shift duration variables. Results revealed two peak periods for shifts' starting times during the simulation day, one around 8AM and another around 6PM. A substantially higher number of shifts started in the downtown TAZs, where population and employment counts and densities are higher. Further, more shifts were found to start in TAZs of higher-, as opposed to lower-, income, and less shifts were found to start in TAZs of higher college student density. Based on the results of these models, a ride-hailing driver fleet was generated for a typical weekday in San Francisco, to be embedded in a multi-agent simulation of the transit system. Ultimately, this simulation will provide transit agencies with a practical tool allowing them to be nimbler in adapting to dynamic conditions, including planning of coordinated on-demand multi-modal transit.

The extended abstract is available on the CASPT website at <https://easychair.org/smart-program/CASPT2022/2022-11-10.html>. The paper is forthcoming.

### **Impact of Ride-hailing on Transit Ridership**

On the subject of ride-hailing impact on transit ridership, previous research by the T-SCORE team showed impacts varied by mode and region size. The introduction of Uber and Lyft in an urban area resulted in 10% - 14% less bus ridership with similar losses to rail ridership in mid-size urban areas, but only 2% less rail ridership in larger urban areas. There is more in the Transit Cooperative Research Program (TCRP) Report 231: Recent Decline in Public Transportation Ridership: Analysis, Causes and Responses, available at <https://nap.nationalacademies.org/catalog/26320/recent-decline-in-public-transportation-ridership-analysis-causes-and-responses>.

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## **T-SCORE in the News**



### **Dr. Kari Watkins: What's next for public transit?**

October 11, 2022

#### **Dr. Kari Watkins: What's next for public transit?**

Dr. Kari Watkins was recently featured on SciLine's Experts on Camera series, an evidence-driven and knowledge-sharing service based out of the American Association for the Advancement of Science (AAAS). In the interview, Dr. Watkins discussed public transit ridership trends, how transit agencies are trying to increase ridership amid increasingly popular remote work options, and how public transit impacts public health and climate change. Dr. Watkins also discusses some of her research on how to make transportation more equitable and eco-friendly, to find out more watch the interview [here](#).



#### **University of Tennessee at Knoxville Team Announcements**

We are pleased to announce that Dr. Candace Brakewood from our team at the University of Tennessee at Knoxville (UTK) was recently promoted to Associate Professor with tenure, congratulations Dr. Brakewood! Additionally, more congratulations are due to our UTK team as undergraduate student researcher Ashley Hightower, graduate student Abubakr Ziedan, and Associate Professor Brakewood will receive the Transportation Research Board's William W. Millar Paper Award for the best paper in the area of public transportation on their T-SCORE funded paper titled: "Current Practices and Potential Rider Benefits of Fare Capping Policies in the United States." The award will be presented in

person at the 2023 Annual Meeting of the Transportation Research Board in January.

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We hope this issue was informative. For more information on the center and related projects please visit our website. T-SCORE is continuously looking for research partners for future collaborations, especially transit agencies. Please get in touch if you are interested!

Thanks for reading,  
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