American Association of State Highway and Transportation Officials
Special Committee on Research and Innovation

FY2020 NCHRP Problem Statement Outline

1.   **Capturing Low-Incidence/High-Impact Travel in Household Travel Surveys**

2.   **Background**

"Low-incidence" travel behavior is difficult to capture in a traditional household travel study (where typically one day of travel is collected from a representative sample of households in a region). Behaviors or travel choices that do not occur frequently may fall into different categories:

- Behaviors that a small number of people participate in or consider in their travel choice set. This might include travel modes that are used frequently by a small number of people (bicycling, vanpool, etc.) or new or emerging travel modes that may not be widely used yet (carshare, rideshare, e-bikes, automated vehicles, etc.)
- Travel behavior in the context of complex analytical structures (complicated tour patterns, decisions that are related to household interactions)
- Behaviors that a large number of people may participate in, but may not engage in frequently enough to be captured in a one-day travel diary (long-distance travel, trip replacement behavior such as home delivery of goods and services, etc.)

As discussed in a recent Travel Model Improvement Program (TMIP) post, a sufficient number of surveys need to be captured for that travel class to be estimated correctly in a travel demand model: around 1,000. It is important to be able to collect enough observations of these behaviors to better analyze the current and future demand for different types of travel; to better understand how these rare or new types of behaviors affect the overall demand for transportation resources; and to understand how these emerging alternatives may affect "traditional" transportation behavior. Because these behaviors are rare, alternative methods for sampling enough observations in a regional travel study need to be identified and tested. Despite their low-incidence, many of these alternatives have outsize effects on the transportation system. (E.g. Long-distance travel accounts for a large segment of the VMT, even though it is a small percent of trips).

This proposal was developed from a Research Needs Statement from the Travel Survey Methods Committee (ABJ40). As seen in the Literature Review below, a number of research projects have concluded that this topic needs further research and has thus led to this submission.

3.   **Literature Search Summary**

Koppelman, F. and C. Chu. *Effect of Sample Size on Disaggregate Choice Model Estimation and Prediction.* Transportation Research Record 944, pp.60-69. 1983. – This paper notes the necessary sample sized required for model estimations by market segment.

Schiffer, R. *National Cooperative Highway Research Program Report 735: Long-Distance and Rural Travel Transferable Parameters for Statewide Travel Forecasting Models.* Transportation

Research Board. 2012. – This report notes that "trips of more than 100 miles account for less than 1 percent of all vehicle trips but 15.5 percent of all household-based vehicle miles." It also notes that most surveys are not adequately capturing this travel and only national survey and two statewide long-distance surveys and 2 other statewide surveys were able to be used for that project.

Donnelly, R. and R. Moeckel. *National Cooperative Highway Research Program Synthesis 514: Statewide and Megaregional Travel Forecasting Models: Freight and Passenger.* Transportation Research Board. 2017. – Notes that 65 percent of states have an active statewide model, showing the need for long-distance data collection.

Berliner, R., Aultman-Hall, Lisa, and Circella, Giovanni. *Exploring the self-reported long distance travel frequency of millennials and generation X in California.* Transportation Research Board. 2018. The report notes that "The patterns of infrequent long-distance trips are poorly understood especially compared to the better_studied (and understood) local daily travel patterns and calls out limitations of MPO surveys and the NHTS.

<u>In-Progress or Proposed</u>

Kockelman, K. *The Rise of Long-Distance Trips, in a World of Self-Driving Cars: Anticipating Trip Counts and Evolving Travel Patterns Across the Texas Triangle Megaregion*. Project for DOT – Current project to predict VMT long-distance trips by CAVs and other impacts.

Rauch, E. *Optimizing Technology for Collecting Long-Distance Travel Data.* Project for Arizona DOT. – Project notes that "the long-distance component of the FHWA's National Household Travel Survey (NHTS), has not been updated since 2002 and even then had an insufficient sample size for the Southwest. Better data for current travel behavior is needed." This project is only looking at the technology to capture LD trips.

Aultman-Hall, L. *Long Distance Travel in the United States*. Project for National Center for Sustainable Transportation – This project is producing a synthesis white paper that includes the research needs in this area.

Goulias, K. and K. Janowicz. *Long Distance Travel in the California Household Travel Survey (CHTS) and Social Media Augmentation*. Project for University of California Center on Economic Competitiveness in Transportation – This paper is looking at the CA LD survey and the possibilities of integrating travel with social media and other data sources.

4.   Research Objective

Research objectives are to identify and analyze methods for sampling people or households and incidences of rare or emerging travel behaviors, including how to incorporate new methods into household travel survey data collection. This may involve looking at non-traditional sampling methods or survey designs and overcoming the practical and logistical barriers to finding and collecting samples of rare behaviors. Research objectives should also consider how the data can be weighted and analyzed on its own and within the context of a traditional "representative" household travel survey dataset.

Potential research tasks may include:
- Identification of the types of behaviors that cannot be easily captured in a traditional travel survey
- Determination of which behaviors have sufficient impacts on the transportation system or on transportation model systems as to warrant changes in survey methods.

- Synthesis of non-traditional or non-representative sampling methods to capture low-incidence travel behaviors, and/or supplemental or special generator survey methods
- Analysis of non-traditional sampling methods (data quality, cost-effectiveness, integration of data with traditional household travel survey data)
- Comparison of traditional survey methods with the resulting data fused with Big-Data (e.g. StreetLight or AirSage)
- Analysis or recommendations for how sampling methods can be applied across different modes or different regions

A variety of datasets are available for this analysis including the NHTS and the Ohio 1-year long-distance dataset, 1-7 day regular HTS and StreetLight data, and the Minneapolis/St. Paul MN regional HTS datasets. The California survey may also be made available.

5. Implementation Planning

The next National Household Travel Survey (NHTS) is being developed and fielded in the coming five years. It is anticipated that the upcoming NHTS will be able to implement some of the methods resulting from this project in order to capture the full range of travel behavior. Additionally, States and MPOs conduct their own surveys, and it is anticipated that these methods will be implemented in those efforts as well. The results from this study will be presented at the TRB Annual Meeting at the ABJ40 committee meeting and will be added the travel survey manual wiki. It is also possible to give presentations at the TRB Transportation Planning Applications Conference and as a TMIP presentation.

6. Estimate of Problem Funding and Research Period

Recommended Funding:

$300,000
It is estimated that this project could take a senior and a junior staff member one full year.

Research Period:

24 months, including reviews

7. Urgency and Potential Benefits

As mentioned earlier, 65% of states have statewide models that need accurate long-distance travel, and the upcoming NHTS is imminent. Emerging, low-incidence travel modes are becoming critical policy issues in regional and statewide long-range plans that need quality data to analyze and forecast. Ideally, results from this study will be able to support the development of the NHTS sample frame and instrument as well as the rest of the state DOTs and MPOs. Ohio DOT is spending upwards of $8 million for HTS data collection. This project will help with targeting the low-incidence travel needed to make both the statewide and regional models accurate in predicting those trips.

8. Person(s) Developing the Problem Statement

Provide name, title, organization, telephone number, and email address for each contributor.

Rebekah Straub Anderson, P.E., Transportation Engineer, Ohio Department of Transportation, 614-752-5735, rebekah.anderson@dot.ohio.gov

Jonathan Ehrlich, P.E. (MN), Manager: Transportation Research and Modeling, Metropolitan Council, 651-602-1408, jonathan.ehrlich@metc.state.mn.us

9. **Nomination for AASHTO Monitor**

The AASHTO Monitor may be assigned by NCHRP staff.

FHWA Liaison – Daniel Jenkins, P.E., Senior Transportation Specialist, FHWA Office of Highway Policy Information, 202-366-1067, daniel.jenkins@dot.gov

10. **Potentially Interested AASHTO Councils and/or Committees**

SCOP

11. **Submitted By**

Provide contact information for individuals submitting or supporting this problem statement. If an organization, e.g., an AASHTO committee, is listed, include the name and contact information for an individual associated with the organization.

Rebekah Straub Anderson, P.E., Transportation Engineer, Ohio Department of Transportation, 614-752-5735, rebekah.anderson@dot.ohio.gov

Tae-Gyu Kim, Ph.D., Model Research and Development Group Supervisor, North Carolina Department of Transportation, 919-707-5735, tae-gyukim@ncdot.gov

Jonathan Ehrlich, P.E. (MN), Manager: Transportation Research and Modeling, Metropolitan Council, 651-602-1408, jonathan.ehrlich@metc.state.mn.us

ABJ40 – Travel Survey Methods Committee

Please submit completed problem statement at:

http://bit.ly/NCHRP2020Submittal

Questions on the process can be directed to lsundstrom@nas.edu.