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Final Report

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Sensing the Baby Boomers: Tracking Older Adults' Travel Behavior Using Android-Based Smartphones

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The New England University Transportation Center is a consortium of 8 universities funded by the U.S. Department of Transportation, University Transportation Centers Program. Members of the consortium are MIT, the University of Connecticut, University of Maine, University of Massachusetts, University of New Hampshire, University of Rhode Island, University of Vermont and Harvard University. MIT is the lead university.

This project intends to demonstrate the possibilities for using smartphones to obtain highly resolved behavioral information for older adults, especially leading edge baby boomers. Towards this end, we are implementing a pilot study which will help to establish the foundation for larger-scale, widely-applicable, and more-reliable smartphone-based travel and activity data collection efforts for the baby boomer cohort, and beyond. The ultimate objectives are to:

- draw upon innovations in communications technologies to enhance travel data collection;
- develop a non-intrusive tool that may be widely used for travel survey purposes; and
- demonstrate the usefulness of the technology in gathering data that can be especially helpful to understanding particular behavioral- and built environment-related characteristics that might influence older adult travel behavior (e.g., safety risks).

We have carried out three phases of research:

1. Literature reviews of relevant research streams;
2. A pilot test of the Future Mobility Survey with Boomers in the Boston area (ongoing);
3. Qualitative research to extend our understanding of the impact of traffic and perceived/actual safety on walking habits of older adults (ongoing).

Literature Reviews

To ensure a strong foundation for our work, we conducted three literature reviews: 1) Qualitative research into older adults' travel, 2) Use of smartphones/apps to conduct travel research and understand travel behavior (across all age groups), 3) Effects of traffic safety concerns on older adults' travel behavior, particularly in high-traffic, mixed-use settings. These literature reviews revealed several important findings:

- a. Moving forward, smartphones will play a critical role in travel research and transportation system improvements. Today, smartphones can provide information about location (GPS, WLAN), motion (accelerometer), proximity (Bluetooth), communication (phone call and SMS logs), and multimedia (camera, media player). They could provide individualized, longitudinal information about travel behavior; support more efficient, healthful, and sustainable day-to-day travel; and improve long-term transportation planning. However, it is important to ensure that older adults are able to participate in research using these technology-based approaches or that alternative approaches are offered to ensure their inclusion in data-gathering, especially as this cohort becomes an increasingly large share of the population.
- b. Qualitative research into older adults' travel behavior is lacking. Such research can provide rich insights into how, where, and why older adults move, and the underlying motivations and values for their travel behavior. Such information can supplement quantitative data and analytical methods, leading to improved data collection and behavioral modeling and subsequent interpretations. Researchers now are qualitatively examining the importance of mobility to older adults; expanding definitions of mobility; links between mobility and wellbeing; older adults' mobility patterns; changes in mobility over time; strategies to adapt to changing mobility; responses to driving cessation; and environmental factors that support/inhibit mobility.

- c. Walking is an important mode of travel for older adults for a variety of reasons. Researchers know that high traffic can decrease older adults' willingness to walk. However, they lack a deep understanding of how older adults respond to traffic safety concerns in their everyday travel behavior (strategies), and how they potentially think about a trade-off between high traffic risks and attractive mixed-use destinations.

The full literature reviews are available from Chris Zegras: czegras@mit.edu.

Future Mobility Survey

We are currently in the process of preparing the Future Mobility Survey (FMS) for testing in the Boston metro area among older adults. As initially developed and piloted in collaboration with the SMART Future Urban Mobility Group in Singapore, FMS involves three components: i) a smartphone application that non-intrusively collects trip and location data ii) a server database that receives and processes the raw data with analysis tools and intelligent algorithms and iii) a web interface with a prompted recall interaction through which the research subject can validate and provide additional detail on the processed data representing their trips and activities.

We received the most recent version of the app from our Singaporean partners in early March. We are making changes to all of these components to make them suitable for application in the Boston area and, more broadly, for other areas of the U.S. We also have recruited a sample of 30 older adults. As soon as the changes to the Boston version of these components are finalized, we plan to have these research subjects collect data for 7 days and validate data for at least 5 days.

A key objective of this research is to ensure that older adults can effectively participate in such a heavily technology-based survey process - and, if not, to recommend appropriate adjustments. Another objective is to gain a deeper understanding of the travel and activity behavior of older adults. To help meet these objectives, we plan to conduct follow-up one-on-one interviews with select research subjects to understand their experiences with both traveling and the FMS process. These interviews will provide us with usability feedback and as well as a qualitative narrative to combine with the FMS data for an even richer understanding of the travel and activity behavior of older adults in the Boston area.

Traffic Safety and Walking Behavior

To better understand how older adults approach walking in high-traffic environments where there may be a trade-off between walking benefits and risks, as well as to identify additional prospective app testers, we are conducting 6 focus groups of older adults (2 groups each of ages 55-64, 65-74, and 75-84), equally divided between people who live in Cambridge within a 5-7 minutes' walk from designated traffic "hot spots" (as determined by previous research) and people who do not. Our objective is to understand, via guided discussion, the mobility conditions experienced in neighborhoods, for which we are interested in assessing FMS's effectiveness in detecting. We will offer all focus group respondents the opportunity to participate in the pilot testing of the FMS app.