Travel Surveys: Moving from Tradition to Innovation  
Issues Paper on Survey Technology

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I. TECHNOLOGY  

A. General Survey Technology

1. Envisioning the Survey Interview of the Future, Chapter 3: Technology and the 
   Survey interview/Questionnaire (Couper 2007) - This chapter discusses how 
   technology has shaped how survey interviews are administered. A useful diagram 
   showing how the different technologies are connected to each other is provided, as 
   well as a discussion on the benefits and implications of moving to self-administered 
   methods.

2. Data Collection Technologies – Past, Present, and Future (Sen and Bricka) - This 
   paper provides an overview of the technology that has been used in travel behavior 
   research. Emerging technologies are discussed, and recommendations are given
about how these new technologies should be designed to meet the needs of travel demand models.

3. **Impact of New Technologies in Travel Surveys** (Wermuth, Sommer et al.) – This paper discusses several surveying technologies that are computer-based, including Global Positioning Systems (GPS), mobile phones, Geographical Information Systems (GIS), and the internet. Computer-assisted telephone interviewing techniques such as computer-assisted telephone interviewing (CATI), computer-assisted personal interviewing (CAPI), and computer-assisted self interviewing (CASI) are also discussed. The authors also discuss their views on how future developments will be made in the area of computer-based travel surveys.

4. **Understanding How Technology Changes Have Influenced How Students Interact With Surveys in a University Environment** (Wygant, McClendon et al. 2012) – This poster helps to convey the results of research performed to better understand preferences in survey technology among college students. The profiles of students using each technology type are assessed, as well as question types that present challenges for each type of survey technology. The data were collected at a private US-based university.

B. **How can we better collect and automate the travel survey data we are already collecting?**

   a. **Computer-Assisted Personal Interviewing (CAPI)**

      1. **Survey Mode Preference among Enrollees in the World Trade Center Health Registry** (Yu, Brackbill et al. 2012) - The World Trade Center Health Registry (WTCHR) follows 71,000 individuals to track the long-term health impacts associated with the 9/11 attacks. This research considered what factors are associated with survey mode preference. Higher costs are associated with a phone call rather than mail or web-based approaches. The researchers performed a logistic regression on survey mode choice to determine what characteristics were significant in persons opting for either the web or mail survey mode over the phone-based option. They found that older persons, and less educated persons, had greater odds of preferring phone survey methods over the web. Similarly, persons who were Hispanic, male, or belonged to low income groups seemed to prefer the phone over mail at a significant level. Knowing this information will allow survey designers to help ensure a higher response rate, while utilizing the cheapest survey mode possible.

      2. **Design of a CAPI Instrument for conducting SP Travel Surveys** (Khan, Ferreira et al. 2006) – This article details how a Computer Assisted Personal Interviewing (CAPI) instrument was used to capture travelers’ responses to the potential for additional transit, walking, and cycling options along a route from Redland Shire to Bisbsane City in Australia. This research will play a critical role in the creation of a local transportation plan.

      3. **From Analysis to Action: Use of Paradata in a CAPI Environment** (O'Hare 2012) – This paper discusses work that has been performed by the U.S. Census Bureau in
using paradata to combat trends of nonresponse and demographic bias by adjusting the survey approach taken.

4. **Incorporating Computer-Assisted and Real-time Data Collection Methods into a Field Survey in a Developing Country Setting: Lessons Learned from a Longitudinal Maternal-Child Health Survey in Eight Mesoamerican Countries** (Mokdad, Wetmore et al. 2012) - This research discusses the experience of using CAPI technology to survey people in Central and South America about their household and available health facilities. Administering the CAPI survey using netbooks resulted in reduced errors and less time than paper-based methods. An additional benefit of this survey approach was the ability to gather feedback from interviewers in real-time—thus allowing for a quick turn-around time in incorporating improvements to the survey. These features are useful in the setting of surveys performed in developing countries.

b. **Computer-Assisted Telephone Interviewing (CATI)**

1. **The Impact of Cell Phones in Longitudinal Studies** (Loew and Morgan 2012) - Utilizing cell phones in longitudinal studies may be helpful in minimizing attrition rates, since cell phone numbers can remain unchanged despite people moving. A three year cohort study was performed to test the hypothesis that use of cell phones in performing a survey is a more effective approach in minimizing attrition rates from wave to wave of participation in longitudinal studies, compared to using land lines. The attrition impact from other contact modes—such as email, postal mail, new address searches, contact referrals—were also assessed. The study population consisted of military personnel.

2. **Exploring Conversational Interviewing in the American Time Use Survey** (Edgar, Denton et al. 2012) - Instructing interviewers collecting travel survey data to implement a conversational interviewing technique may help the respondent recall more accurate details of their travel. Such an approach also allows for question meaning to be clarified through conversation between respondent and interviewer. An analysis using data from the American Time Use Survey was performed, wherein researchers strived to determine what approach interviewers were taking (i.e., scripted, conversational, mix). More specifically, what aspects of the conversational interviewing approach were used? Does level of conversational approach differ by interviewing experience level? Does using the conversational approach improve the data quality obtained?

c. **Web-based Surveys**

1. **Data Quality from Low Cost Data Collection Methodologies** (Traugott 2012) - Within this paper, the quality of data collected through relatively cheap methods that are either web-based or performed using interactive voice recognition (IVR) techniques are compared to the quality of data collected by a more extensive 2010
American National Election Study. The survey specifically focuses on people’s opinion of Obama’s citizenship.

2. *Characteristics of Web Based Surveys and Applications in Travel Research* (Alsnih 2006) – This paper discusses the advantages and disadvantages of moving from in-person and telephone survey modes to web-based surveys. In-person surveys are often problematic due to the logistics of reaching those being surveyed due to security measures; not to mention the fact that the person being surveyed may not be available to be interviewed when the surveyor is present. Telephones often have screening, which may make performing interviews for surveys difficult. Web access is becoming more and more prevalent, which may make it a viable survey technology. However, there is the potential for bias given that persons of higher socio-economic status may have more access to the web than the poor.

3. *Comparison of Mail and Web-Based Survey Distribution Methods: Results of Surveys to Leisure Travel Retailers* (Cole 2005) – This research compares the survey results obtained using two different types of survey technology; paper-and-pencil and web-based. Comparisons were made using samples taken from members of the American Society of Travel Agents. The author found that the response rate was higher for the paper-and-pencil method and that it also was associated with fewer missing data items.

4. *Internet access: Is everyone online yet and can we survey them there?* (Smith and Spitz 2009) - This paper considers whether using the internet as a means of recruiting individuals to participate in a survey creates coverage error by creating a sample that is significantly different from the population. The authors consider two case studies to answer this question; one dealing with road pricing surveys and one dealing with transit origin destination surveys. The proportion of persons willing to participate in future surveys via mail or email were not significantly different for persons with internet access versus the population as a whole. Thus, the authors conclude that using the internet for surveys should not produce significant coverage error.

5. *Use of Mobile Devices to Access Computer-optimized Web Instruments: Implications for Respondent Behavior and Data Quality* (McClain, Crawford et al. 2012) – This paper indicates that the small screen associated with smartphones may impact the data results and quality of web-based surveys. Data from a national web-survey involving college students from nearly 100 universities were used in analyzing the survey experience for mobile-phone users. Efforts were made to encourage mobile phone respondents to return to answering the survey using a computer. In analyzing the data, the authors. The authors discuss the challenges that need to be addressed with using mobile devices for web surveys.

6. *Internet Data Collection for the American Community Survey and Census* (Tancreto, Hil et al. 2012) – This session contains research that address issues related to whether the internet is a feasible and effective surveying tool. A high percentage of Americans now have access to the internet in their homes, so research into its use within surveys is important. Tests performed by the U.S. Census Bureau are detailed as they relate to the American Community Survey and the Population and Housing Census.
d. Video Data Collection

1. *Using Automatic Vehicle Identification Data for Travel Time Estimation in Hong Kong* (Tam and Lam 2008) – The article detail research involving a solution algorithm that can be used to produce a Real-Time Traveler Information System. The validity of the estimates produced by the algorithm was checked through an observation survey of traffic. Using real-time and off-time data, the algorithm was able to accurately determine current and instantaneous travel times. This is one application of video data that can be used to support capture travel data that in turn will empower travelers with more real-time information.

2. *Collection of Vehicle Activity Data by Video Detection for Use in Transportation Planning* (Grant, Gillis et al. 2000) – This paper considers how data collected using video cameras can be used in improving transportation models. Data are collected from a freeway in Atlanta. Based on comparisons between traffic information collected via the video and actual values, the authors determined what parameters are ideal for data collection. Based on the results, recommendations are made on the location and site conditions that would be ideal for video data collection for use in transportation models.

C. Where can technology take us?

a. Global Positioning Systems (GPS)/Onboard Diagnostics (OBD)/Activity Monitoring/Geofencing

1. *Identifying Trips and Activities and Their Characteristics from GPS Raw Data Without Further Information* (Schuessler and Axhausen 2008) - This paper focuses on the description of a post-processing procedure that is able to determine trips and activities, including several characteristics, such as modes and routes from GPS raw data without any further information. It is applied to GPS records collected in the Swiss cities of Zurich, Winterthur and Geneva with 4882 participants, each of which carried an on-person GPS-receiver for 6.65 days on average. The data outcome is compared to the Swiss Microcensus 2005 to prove that it is ready for further applications, such as discrete choice model estimations.

2. *Collecting and Processing Data from Mobile Technologies* (Stopher 2008)- In the past decade or so, mobile technologies that can be used to track the movement of people, freight consignments, and passenger and freight vehicles have evolved rapidly. Initially, this paper reviews the major categories of such technologies, including mobile telephones, Global Positioning System (GPS) devices, Personal Data Assistants (PDAs), and the use of laptop computers and advanced communications systems.

3. *Applications of New Technologies in Travel Surveys* (Wolf 2004) - This paper discusses the potential for GPS data to become more automated with time. There is the potential to provide for automated processing and imputation of missing data.
There is the potential for data obtained from sources other than GPS (i.e., cell phones or RFID tag readers), or data originally collected for purposes other than travel behavior, to be utilized in the automation or imputation process.

4. **Vehicle-Based Surveys: Toward more accurate and reliable data collection methods** (Madre and Kalinowska 2008)- In this Resource Paper the first point to raise is what research and policy questions (environmental issues, energy consumption, infrastructure building, etc.) can be addressed using vehicle-based surveys possibly also combined with administrative data.

5. **A GPS-GIS method for travel mode detection in New York City** (Gong, Chen et al. 2012) – This article details research pertaining to the use of GPS data in a GIS algorithm to identify travel mode in an urban area that is susceptible to the urban canyon effect. By comparing the mode use determined using the developed GIS algorithm to the mode recorded in the GPS mode travel diaries associated with two samples. The overall mode match rate for the two samples was 82.6 percent, which is relatively high and encouraging.

6. **A Trip Reconstruction Tool for GPS-based Personal Travel Surveys** (Chung and Shalaby 2005) – This article discusses efforts to create software that is able to reconstruct the travel link and mode used for a given trip. Using GPS data, a GIS-based map-matching algorithm is used to test the algorithm’s usefulness using data from downtown Toronto. The results are promising, with 79 percent of the links identified correctly and 92 percent of the trip modes identified correctly.

7. **Evaluating the Ability of Global Positioning System Receivers to Measure a Real-World Operating Mode for Emissions Research** (Jackson, Aultman-Hall et al. 2005) – This research involved testing the ability of a Global Positioning System (GPS) to capture second-by-second velocity and acceleration data. This type of information may be useful in emissions research. The authors found that, based on five runs along a 65-mile stretch, the GPS receivers were just as good at measuring velocity as the ScanTool.

8. **Deriving and validating trip purposes and travel modes for multi-day GPS-based travel surveys: A large-scale application in the Netherlands** (Bohte and Maat 2009) - In this article, the authors document research performed to assess whether selecting GPS as the survey technology used for a survey is valid. For one week, 1104 participants participated in the GPS-based survey. The trip purpose and travel mode results obtained were compared to the proportions obtained from the Dutch Travel Survey. The shared obtained were similar, and the authors suggest that some of the differences may be derived from the idea that the GPS is able to collect information about some trips that are missed with paper diary methods.

9. **The Role of Instrumented Vehicle Data in Transportation Decision Making** (Guensler and Williams 2002) - This paper discusses a study that was performed in Atlanta, wherein 1100 vehicles participated in a NHTSA safety study. Data related to speed, acceleration, origin, destination, and route choice were collected for two years. Additionally, 500 vehicles participated in an insurance-based study that lasted for three years where participants’ driving was monitored. The authors discuss how the data collected in these studies have the potential to be used in various settings;
including congestion studies, control measure evaluation, and vehicle emissions modeling.

10. Search for a global positioning system device to measure person travel (Stopher, FitzGerald et al. 2008) – This article discusses advances in Global Positioning Systems (GPSs) that allow for accurate travel to be measured using a small system that can be carried by individuals. They are as small as mobile phones and often are operated by batteries. Specifically, the authors discuss improvements in the software that runs these small GPS systems and how the data can be utilized.

11. Advances in Mobile Data Collection-New Methods, New Opportunities, New Challenges (Roe, Keating et al. 2012) – This session of the 67th Annual AAPOR Conference contained presentations related to various facets of Smartphones. The first included presentation abstract highlights the reduced costs associated with improved surveying technologies and the improved efficiency of tracking operations. Smartphones provide a large amount of personal data and may include such features as a built-in camera, Global Positioning System (GPS), or accelerometer. The second abstract included within the session compares surveys done using Smartphones to surveys performed using a computer. The presenters provide recommendations for future Smartphone survey development. The abstract associated with the third presentation considers the use of short-message service texting to help maintain survey samples in longitudinal surveys. They present results obtained in a related study dealing with self-monitoring of individuals with asthma. The fourth abstract indicates that their presentation will provide example and case studies of how to apply in-the moment data through the use of mobile phones. The final abstract details challenges faced in moving from paper-and-pencil techniques to using Smartphone apps to gather information. A study on this topic is performed by capturing the television viewing behavior of persons in the sample. In addition to comparing paper-and-pencil methods to those employed using Smartphones, the presenters also compare differences in the app approach (i.e., gamification vs. not).

12. The Effectiveness of Collecting and Transmitting Data Via Cell Phones in Poor Cell Coverage Areas (Mooney and Buckley 2012) – Arbitron developed an electronic Portable People Meter (PPM) that collects information related to media exposure. The data are stored on the meter until participants are able to transfer the data to using their home phone telephone line. However, using a new meter developed by Artibritron that has cellular capabilities, the data can be directly transferred to Arbitron. However, this may be an issue in poor cell-phone coverage areas. Researchers went to four metropolitan areas and recorded information using five PPMs, a cell phone, and GPS. Poor cell-coverage has implications in collecting data via cellular means, and should be addressed.
b. Social Media

1. Viability of Using Facebook to Increase Response Rates in an ABS Survey (Ruggiere, Sams et al. 2012) - The purpose of this research was to determine whether Facebook could be used as a means to improve the response rate of a survey. Persons taken from a random address-based sampling survey were matched to Facebook accounts based on names and cities. Through the created Facebook account, persons in the sample were encouraged to participate in the survey when contacted. However, the authors found that too often the Facebook account set-up as part of this study was labeled as spam, which resulted in the study being ended prematurely.

2. Interactive and Gaming Techniques to Improve Survey-Session (Dean, Sage et al. 2012) - Part of the research presented in this session considers research pertaining to the use of Facebook and how the Facebook Graph Application Programming Interface can be used to stream data in real time. Using data collected from military personnel, this research considers how Facebook applications can be used as a technology to administer questionnaires and recruit survey participants. The limitations associated with the resulting sample of survey participants and other limitations associated with this surveying technique are discussed.

c. Bluetooth

1. Advances in Travel Survey Technology (Bricka and Murakami 2012) – Bluetooth technology is one of the emerging technologies discussed within this paper. It is a relatively low-cost technology that operates using media access control (MAC) addresses and is a feature included within several cell phones. A study performed by the Texas Transportation Institute is cited, wherein data collected using more traditional external survey techniques in 2002 were compared to data collected using Bluetooth technology in 2011. The study results indicate that Bluetooth technology can help in differentiating between commercial and non-commercial vehicles through the use of classifications tubes near Bluetooth readers. It is currently not possible to distinguish between non-resident and resident travel via Bluetooth, so other technology must be used for this purpose. Additionally, the level of Bluetooth penetration is unclear.

2. Using Bluetooth to capture passenger trips on public buses (Kostakos) – This article discusses how Bluetooth hardware can be used in collecting origin-destination information for passengers using public buses. This information may be useful in improving the public transit services that are provided.

d. Smartphone

1. Advances in Travel Survey Technology (Bricka and Murakami 2012) – One emerging technology is the ability to use GPS technologies that exist within smart phones. There are several advantages associated with using smart phones for travel survey purposes. It allows individuals to use a device that they own and are already familiar with, thereby minimizing the costs associated with distributing equipment.
specifically for travel survey data collection. It may also make collecting data for longer periods of time more feasible. Travel survey collection is largely made possible by individuals downloading applications to their smart phone. This paper cites three examples of pilot studies that were used to test the viability of using smart phones for travel survey purposes (TRAC-IT-developed as part of a Center for Urban Transportation Research project for the Florida DOT; PTV Pace Logger-developed by NuStats, in collaboration with Portland Metro; and Quantifiable Trainer-developed by UC Berkeley).

2. **Automating Mode Detection Using Neural Networks and Assisted GPS Data Collected Using GPS-Enabled Mobile Phones** (Gonzalez, Weinstein et al.) – This research considered the use of neural networks and GPS data collected using mobile phones to determine the mode of travel. A critical point algorithm was used to reduce the required GPS data. These efforts should contribute to reduced burden on the traveler through automated processes that eliminate the need to manually report trip characteristics.

3. **A Survey of Mobile Phone Sensing** (Lane, Miluzzo et al. 2010) - This magazine article points out some of the applications that are available with smart phones (i.e., accelerometer, digital compass, gyroscope, GPS, microphone, camera). These sensing capabilities available through mobile phones have potential applications in a variety of fields, including transportation. This article provides an overview of existing algorithms, applications, and systems associated with mobile phone sensing, and discusses some of the challenges associated with this emerging technology.

4. **Using GPS-enabled cell phones to track the travel patterns of adolescents** (Wiehe, Carroll et al. 2008) – This article uses GPS-enabled cell phones to track 15 adolescent girls taken from a clinic setting. The participants were tracked for a week. The authors feel that GPS-enabled cell phones are a promising technology that can be used to promote better health among adolescents by tracking their travel to environments that may be harmful to their health and potentially intervening by promoting better health behavior.

5. **Completing Complex Intercept Surveys on Cell-enabled iPads** (Dayton, Driscoll et al. 2012) – This research was presented as part of a demonstration session. The presenters explained the work they have done in using the App for Personal Interviewing (AppPI) to survey anglers working along docks, beaches, and boats. The presenters conveyed some of the features that the iPad interviewing technique provides; including the GPS component that can help interviewers know where to go during the interview process. Advantages over the more conventional paper and pencil method were expressed.

6. **Understanding Smartphone Usage to Take Web Surveys: A Cross Country Analysis** (Stapleton 2012) - This paper considers smartphone use across over 20 countries in an effort to answer questions about the demographics of who is using smartphones in web surveys, what types of smartphones are being used, the rate of smartphone use in web surveys, and resulting data quality. Based on the results, the authors make recommendations on what countries appear to be able to optimize their web survey results through allowing smartphone use.
7. **A Focus Group Pilot Study of Use of Smartphone to Collect Information about Health Behaviors** (Dube, Hu et al. 2012) – This paper describes the qualitative results drawn from a researcher facilitated discussion on the perceived feasibility of using Smartphones in gathering information related to public health and behavior. The focus groups were broken into two age groups; 18-34 and 35-64.

8. **Time Use Data Collection Using Smartphones: Results of a Pilot Study Among Experienced and Inexperienced Users** (Scherpenzeel, Morren et al. 2012) – This paper details research related to the feasibility of using Smartphones for time use research (TUR). To test a Smartphone app developed by CenERdata for TUR purposes, researchers selected 50 participants who owned an Android Smartphone and 50 participants who did not own a Smartphone. Those participants who did not own a Smartphone were supplied with an Android Smartphone with the app already downloaded and those already owning a Smartphone could download it. Differences in the response behavior for the two groups were observed and used in analyzing the feasibility of collecting TUR data using a Smartphone.

9. **A Direct Comparison of Mobile Versus Online Survey Modes** (Wells, Bailey et al. 2012) – This research compares the results obtained using Smartphones and the web. The study consisted of 1500 Smartphone owners who were broken into four groups. Two of the groups were given a web-based survey and two of the groups were given a Smartphone survey. Differences among the survey design for the four groups allowed researchers to see differences linked to frequency scale, closed vs. open-ended other categories, text-box size, and response option order. The results will help in optimizing mobile surveys performed using Smartphones.

10. **Do Surveys that are Completed on Mobile Devices Differ from Surveys Completed Online, Over the Phone, or Via Mail?** (Gluck 2012) - Arbitron has a Portable People Meter than allows for the electronic log of radio listening. For this research, panelists could choose on the method they used to respond. They could fill-out a paper survey and mail it back, use the web, call, or use a web-based quick code. Gluck analyzed differences between the various types of data collection, including differences in item nonresponse.

11. **Measurement and Methodological Challenges in Utilizing Passive Meter Technology on Smartphones** (Kilger and Boals 2012) - This research discusses findings from a small three-month pilot test. A passive meter was used to monitor the mobile device behavior (essentially what the phone was used for) for persons using four different Smartphone platforms. Difficulties in this endeavor are discussed, as well as some initial data on mobile device uses.

12. **The Role of New Technologies in Powering, Augmenting, or Replacing Traditional Surveys** (Link and Buskirk 2012) – The material from this AAPOR shortcourse points out the need to shift the way that we view technology in surveys. It is typical to focus on data collection speed, accuracy, creating greater complexity, and reducing costs. However, too often the areas of greater accuracy, in the moment measurement of behaviors and attitudes, new types of data which could provide fresh insights, and enhanced respondent engagement are overlooked. The research performed in several key social science journals over the past few years has largely been lacking in the
area of how smartphones and Social Media can be used as data collection tools. Rather than simply consider how technology can be used to perform traditional surveys better, we should be focusing on the questions that need to be answered to explain a phenomena and how technology can be utilized to better collect these data. Despite the fact that technology is constantly changing, research should be performed now because there is a lot to learn about the science how technology can be used to collect data. The percentage of the population who owns a Smartphone or tablet is increasing, which may also expand the ability to utilize these devices in survey research. The areas of form & function, reciprocity, gamification, and social sharing are addressed as ways to spur better user engagement. Multiple studies considering the effects of screen size and question display and size are provided. The authors conclude by stressing the need to “Find ways to expand into new areas and in so doing broaden the nature of the tools we use (Link and Buskirk 2012).”

13. *Time use data collection using Smartphones-Results of a pilot study among experienced and inexperienced users* (Scherpenzeel, Morren et al. 2012) – This research considered the use of Smartphones in collecting time use data by making two key comparisons; paper diary results compared to Smartphone results and Smartphone owners compared to inexperienced users. Though similar, some slight differences existed between the paper diary and the Smartphone diary. The Smartphone version was closed answers and provided codes for activities. Additionally, notifications were available via the Smartphone and the diary entries were connected to GPS data related to movements. In comparing these two survey methods, the Smartphone diary was found to save time, provide more data, and be of a similar data quality as the paper diary. In order to compare Smartphone users to inexperienced users, 50 respondents who owned an Android Smartphone and 50 respondents without a Smartphone were selected from an online panel. The respondents without a Smartphone were loaned a Samsung Gio. Among the conclusions found in comparing these two user groups were that the respondents without a Smartphone were able to participate in the time use survey with video instruction, had a similar response on the second day, reported more difficulty in understanding how the App worked, and produced results that were of a slightly higher data quality than their Smartphone-owning counterparts.

14. *Using Smartphones to Collect Bicycle Travel Data in Texas* (Hudson, Duthie et al. 2012) – This research describes research performed in Austin in collecting biking data via a Smartphone app. More specifically, an app originally created and used by the San Francisco County Transportation Authority (SFCTA) called CycleTracks, was used. Data were collected over a six month period, wherein bikers in the Austin area were encouraged to download the app for free and use it to track their biking trips. Then, using ArcGIS, researchers worked to determine the bike route used for the trip. When the app is first downloaded, the user is given the option to provide information such as age, gender, home and work zip code, and email address—though providing this information was not required. Data cleaning, completing the network, and map-matching were among the tasks required to obtain useful data. It is the hope that this information will allow planners to address the concerns found along biking routes to
make biking in Austin safer and more attractive. Although not the first time that an app of this type was utilized, it was a first in the Austin area and provides an example of how CycleTracks can be utilized in mapping bike routes, to others who may be considering the use of this app.

15. *Intercity Person Trip Tables for Nationwide Transportation Planning in Israel Obtained from Massive Cell Phone Data* (Gur, Bekhor et al. 2009) – This research considers how cell phones can be used in collecting data in Israel for use in travel demand modeling to help ensure that infrastructure investments and projects are justified and funding is allocated effectively. Cell phone ownership is relatively high in Israel. Over the course of sixteen weeks, using samples of 10,000 phones for a given week, over a million person-days worth of data were collected. The sample was taken from data supplied by the “Orange” CP Company—one of three major cell phone providers in Israel. Cell phone data were collected via roughly 2,200 antennas. Time stamps were collected; however, all information that could be used to trace the data to a given cell phone user were not collected, but replaced with an identification number supplied by the cell phone provider. Checks to correct for bias related to cell phone provider distribution were performed. A study to check for errors caused by tracking phone rather than people was performed by comparing the survey data to traffic counts and there appeared to be a good match. The ensuing trip generation model was calibrated differently for different trip types. Because only data related to person trips were collected, the mode split model was created using an existing probabilistic mode split model. The authors conclude by indicating that this is the first time data cell phone positions were applied to a transportation planning model and that cell phone data can in fact be useful in providing data for modeling transportation at the district level.

16. *LocalData, An App That Helps Communities Do Their Own Urban Planning* (Campbell-Dollaghan 2012)-An app, called LocalData, was created by three Code for America fellows that can enable civic leaders to analyze and make use of local survey data. It has a user-friendly interface that makes it simple for a community organizer to gather survey information by sending a link to the Smartphone of volunteers. Given that not everyone has a Smartphone, there is also a paper-based version of the survey that can be filled-out and later scanned-in and geocoded. The app was developed in response to a Detroit project being worked on by both urban planners and community advocates. LocalData will be launched nationally at the end of the year and is already being requested by a variety of parties.

e. Gaming

1. *Researching Travel Behavior and Adaptability: Using a Virtual Reality Role-Playing Game* (Watcharasukam, Krumdieck et al. 2010) – This article describes a gaming platform called Travel Activity Constraint Adaptation Simulation (TACA SIM) that was developed and subsequently evaluating in determining how effective it is in assessing travel behavior adaptation due to a shift in the travel environment—such as a change in fuel price. Participants were found to enjoy the gaming
experience and the authors are hopeful that this type of gaming simulation can be used in travel research that considers the travel behavior and adaptation of travelers.

2. *Interactive and Gaming Techniques to Improve Survey-Session, 67th Annual AAPOR Conference* (Dean, Sage et al. 2012) – This session of the 67th Annual AAPOR Conference contains presentations based on papers that discuss various aspects of how gaming can be used in surveys. The first abstract outlines research that tests whether iPhone surveys that use gamification and social sharing features produces different results than a survey that merely relies on standard mobile survey techniques. This information may be useful in designing surveys to better capture survey information from often hard to reach younger cohorts.

f. Random Moment Surveys

1. *Nielsen Life 360 Approach* (Bailey 2011) – This PowerPoint presentation explains some of the work that has been done related to random moment surveys. Several different forms of this surveying technique exist, including gathering information about a person’s current thoughts, behaviors, and feelings; asking a survey participant to take a picture at random time during the day or when they are engaging in a specified activity; and simply gathering baseline information and demographics. This technology was tested at the 2010 FIFA World Cup in South Africa, and further research using this technology recently occurred at the 2012 London Olympics. Improvements associated with the Olympic data collection effort are the use of geofencing in surveying people, following survey participants’ travel throughout the day using GPS, and assessing what survey participants buy using barcode scanning.

2. *On the Run: In the Moment Smartphone Data Collection* (Scagnelli, Bailey et al. 2012) – This paper discusses efforts made to collect in-the-moment data about the food and beverage consumption patterns of Millennials (18-29 yrs.). As part of a study, 275 Millennials living in Southern California were supplied with an Android phone and instructed to fill-out a survey about the motivation behind their purchase, where they were, what they purchased, and to take a picture of the product. The study duration was one month.
Endnotes


Kostakos, V. Using Bluetooth to capture passenger trips on public transport buses, Lab: USE, University of Madeira

Human Computer Interactio Institute, Canegie Mellon University.


Smith, C. and G. Spitz (2009). Internet access: Is everyone online yet and can we survey them there? Transportation Research Board Planning Applications Conference


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