

11th International Conference on Transport Survey Methods 2017

**In the Era of Big Data: Facing the
Challenges**

Transportation Research Procedia Volume 32

**Esterel, Canada
24 – 29 September 2017**

Editors:

**Patrick Bonnel
Marcela Munizaga**

**Catherine Morency
Martin Trepanier**

ISBN: 978-1-5108-7401-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© by Elsevier B.V.
All rights reserved.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

TRANSPORT SURVEY METHODS - IN THE ERA OF BIG DATA FACING NEW AND OLD CHALLENGES	1
<i>Patrick Bonnel, Marcela A. Munizaga</i>	
<u>SECTION 1: BIG DATA ANALYSIS OR NEW DATA COLLECTION METHODS USING NEW TECHNOLOGIES OR MEDIA</u>	
WORKSHOP SYNTHESIS: SMART CARD DATA, NEW METHODS AND APPLICATIONS FOR PUBLIC TRANSPORT	16
<i>Maguelonne Chandesris, Mohsen Nazem</i>	
INSIGHTS OF HUMAN-TRANSPORTATION SYSTEM INTERACTIONS INFERRED FROM PUBLIC TRANSIT OPERATIONAL DATA	24
<i>Frédéric Roulland, Jos Rozen, John C. Handley</i>	
ANALYZING LONG-TERM TRAVEL BEHAVIOUR: A COMPARISON OF SMART CARD DATA AND GRAPHICAL USAGE PATTERNS	34
<i>Yeun-Touh Li, Takenori Iwamoto, Jan-Dirk Schmöcker, Toshiyuki Nakamura, Nobuhiro Uno</i>	
ASSESSING THE PUBLIC TRANSPORT TRAVEL BEHAVIOR CONSISTENCY FROM SMART CARD DATA	44
<i>Catalina Espinoza, Marcela Munizaga, Benjamin Bustos, Martin Trépanier</i>	
WORKSHOP SYNTHESIS: PASSIVE AND SENSOR DATA - POTENTIAL AND APPLICATION	54
<i>Doina Olaru, Alejandro Tudela</i>	
ESTIMATION OF BUS PASSENGERS' WAITING TIME AT A COACH TERMINAL WITH WI-FI MAC ADDRESSES	62
<i>Takahiko Kusakabe, Hideki Yaginuma, Daisuke Fukuda</i>	
ORIGIN-DESTINATION ESTIMATION USING MOBILE NETWORK PROBE DATA	69
<i>Patrick Bonnel, Mariem Fekih, Zbigniew Smoreda</i>	
USING 5 PARALLEL PASSIVE DATA STREAMS TO REPORT ON A WIDE RANGE OF MOBILITY OPTIONS	82
<i>Catherine Morency, Martin Trépanier, Nicolas Saunier, Hubert Verreault, Jean-Simon Bourdeau</i>	
WORKSHOP SYNTHESIS: USE OF SOCIAL MEDIA, SOCIAL NETWORKS AND QUALITATIVE APPROACHES AS INNOVATIVE WAYS TO COLLECT AND ENRICH TRAVEL DATA	93
<i>Elisabeth Ampt, Tomás Ruiz</i>	
EXPLAINING SOCIALLY MOTIVATED TRAVEL WITH SOCIAL NETWORK ANALYSIS: SURVEY METHOD AND RESULTS FROM A STUDY IN ZURICH, SWITZERLAND	99
<i>Sergio Guidon, Michael Wicki, Thomas Bernauer, Kay W. Axhausen</i>	
NEED-BASED TRAVEL BEHAVIOR ANALYSIS: NEW POTENTIAL FOR MOBILITY SURVEY	110
<i>Floridea Di Ciommo, Francesca Pagliara, Maurizio De Crescenzo</i>	
WORKSHOP SYNTHESIS: NEW DEVELOPMENTS IN TRAVEL DIARY COLLECTION SYSTEMS BASED ON SMARTPHONES AND GPS RECEIVERS	119
<i>Adrian C. Prelipcean, Toshiyuki Yamamoto</i>	
ASSESSMENT OF TRIP VALIDATION INTERFACES FOR SMARTPHONE-BASED TRAVEL SURVEYS	126
<i>Angela Ferreira, Nibert Brändle, Peter Widhalm, Cristina Olaverri-Monreal</i>	
SMARTPHONE APP VERSUS GPS LOGGER: A COMPARATIVE STUDY	135
<i>Peter R. Stopher, Vivian Daigler, Sarah Griffith</i>	
IDENTIFICATION OF ACTIVITY STOP LOCATIONS IN GPS TRAJECTORIES BY DBSCAN-TYPE METHOD COMBINED WITH SUPPORT VECTOR MACHINES	146
<i>Lei Gong, Toshiyuki Yamamoto, Takayuki Morikawa</i>	
COLLECTING TRAVEL DIARIES: CURRENT STATE OF THE ART, BEST PRACTICES, AND FUTURE RESEARCH DIRECTIONS	155
<i>Adrian C. Prelipcean, Yusak O. Susilo, Gyöző Gidófalvi</i>	
WORKSHOP SYNTHESIS: WEB-BASED SURVEYS, NEW INSIGHT TO ADDRESS MAIN CHALLENGES	167
<i>Andres Monzon, Caroline Bayart</i>	

WEB BASED SURVEY TO MEASURING SOCIAL INTERACTIONS, VALUES, ATTITUDES AND TRAVEL BEHAVIOR	174
<i>Rosa Arroyo, Tomás Ruiz, Lidón Mars, Ainhoa Serna</i>	
TRADITIONAL AND MOBILE DEVICES IN COMPUTER ASSISTED WEB-INTERVIEWS.....	184
<i>Toon Zijlstra, Krisje Wijgergangs, Sascha Hoogendoorn-Lanser</i>	

SECTION 2: “OLD” QUESTIONS BUT NEW CHALLENGES

WORKSHOP SYNTHESIS: INCREASING SURVEY PARTICIPATION LEVELS WITHOUT CHANGING TRAVEL BEHAVIOR.....	195
<i>Stacey G. Bricka, Stephen P. Greaves</i>	
STATE-OF-THE-ART OF INCENTIVE STRATEGIES – IMPLICATIONS FOR LONGITUDINAL TRAVEL SURVEYS	200
<i>Eline Scheepers, Sascha Hoogendoorn-Lanser</i>	
ELICITING PREFERENCES FOR ‘GAMIFIED’ TRAVEL SURVEYS: A BEST-WORST APPROACH	211
<i>Nina Verzosa, Stephen Greaves, Richard Ellison, Adrian Ellison, Mark Davis</i>	
WORKSHOP SYNTHESIS: REPRESENTATIVENESS IN SURVEYS: CHALLENGES AND SOLUTIONS.....	224
<i>Jimmy Armoogun, Adrian B. Ellison, Marie-José Olde Kalter</i>	
DOES SUPERVISION IN MULTI-DAY TRAVEL SURVEYS LEAD TO HIGHER QUALITY? A COMPARISON OF TWO INDEPENDENT SURVEYS	229
<i>Martin Kagerbauer, Juliane Stark</i>	
MONITORING CAR USE OVER EXTENDED PERIOD WITH GPS DEVICES – RETAINING RESPONSE RATES AND UNDERSTANDING REACTIONS	242
<i>Elizabeth Ampt, Mark Davis, Elizabeth Stark</i>	
USING INVERTED RELATIVE ENTROPY TO DETERMINE THE REPRESENTATIVENESS OF SAMPLES IN MOBILITY PANELS.....	253
<i>R.G. Hoogendoorn, M.C. de Haas, C.E. Scheepers, G.M.M. Gelauuff, S. Hoogendoorn-Lanser</i>	
WORKSHOP SYNTHESIS: DEALING WITH IMMOBILITY AND SURVEY NON-RESPONSE.....	260
<i>Karen Lucas, Jean-Loup Madre</i>	
TRAVEL MODE CHOICE MODELING FROM CROSS-SECTIONAL SURVEY AND PANEL DATA: THE INCLUSION OF INITIAL NONRESPONSE	268
<i>M.C. de Haas, R.G. Hoogendoorn, C.E. Scheepers, S. Hoogendoorn-Lanser</i>	
EVALUATING THE BIASES AND SAMPLE SIZE IMPLICATIONS OF MULTI-DAY GPS-ENABLED HOUSEHOLD TRAVEL SURVEYS	279
<i>Gregory D. Erhardt, Louis Rizzo</i>	
THE MILLENNIAL QUESTION: CHANGES IN TRAVEL BEHAVIOUR OR CHANGES IN SURVEY BEHAVIOUR?	291
<i>Mark Bradley, Elizabeth Greene, Greg Spitz, Matt Coogan, Nancy McGuckin</i>	

SECTION 3: COMBINING SURVEY METHODOLOGIES AND DATA AGGREGATION, FUSION CHALLENGES

WORKSHOP SYNTHESIS: MAKING THE TRANSITION TO NEW METHODS FOR TRAVEL SURVEY SAMPLING AND DATA RETRIEVAL	301
<i>Tobias Kuhnimhof, Mark Bradley, Rebekah Straub Anderson</i>	
REPORTING QUALITY OF TRAVEL AND NON-TRAVEL ACTIVITIES: A COMPARISON OF THREE DIFFERENT SURVEY FORMATS	309
<i>Florian Aschauer, Reinhard Hössinger, Basil Schmid, Regine Gerike</i>	
MIXED MODE SURVEY DESIGN AND PANEL REPETITION – FINDINGS FROM THE GERMAN MOBILITY PANEL.....	319
<i>Christine Eisenmann, Bastian Chlond, Clotilde Minster, Christian Jödden, Peter Vortisch</i>	
THE GERMAN VEHICLE MILEAGE SURVEY 2014: STRIKING THE BALANCE BETWEEN METHODOLOGICAL INNOVATION AND CONTINUITY	329
<i>Marcus Bäumer, Heinz Hautzinger, Tobias Kuhnimhof, Manfred Pfeiffer</i>	
ANALYSES OF MIXED SURVEY MODE EFFECTS IN THE GERMAN NATIONAL TRAVEL SURVEY 2017.....	339
<i>Dana Gruschwitz, Johannes Eggs, Claudia Nobis, Angelika Schulz</i>	

MIXED-MODES SURVEY MEDIA AND DATA COMPARABILITY ISSUES: A FRENCH CASE STUDY	351
<i>Caroline Bayart, Patrick Bonnel</i>	
THE INFLUENCE OF INFORMATION-BASED TRANSPORT DEMAND MANAGEMENT MEASURES ON COMMUTING MODE CHOICE. COMPARING WEB VS. FACE-TOFACE SURVEYS	363
<i>João de Abreu e Silva, Claire Papaix, Guineng Chen</i>	
WORKSHOP SYNTHESIS: HOUSEHOLD TRAVEL SURVEYS IN AN ERA OF EVOLVING DATA NEEDS FOR PASSENGER TRAVEL DEMAND	374
<i>Eric J. Miller, Siva Srikukenthiran, Brittany Chung</i>	
FRENCH HOUSEHOLD TRAVEL SURVEY: THE NEXT GENERATION	383
<i>Olivier Richard, Mathieu Rabaud</i>	
CHALLENGES OF BORDER-CROSSING TRANSPORT DEMAND SURVEYS – METHODOICAL SOLUTIONS AND EXPERIENCES WITH THEIR ORGANIZATION TO ACHIEVE HIGH QUALITY, AN EU-PERSPECTIVE	394
<i>Oliver Röider, Gerd Sammer, Sebastian Riegler, Roman Klementschtz, Bystrik Bezak, Gabriella Balko</i>	
HOUSEHOLD VS. INDIVIDUAL SURVEY PRACTICES – IMPLICATIONS FOR HOUSEHOLD TRAVEL SURVEY EXPENDITURES IN GERMANY	404
<i>Stefan Hubrich, Rico Wittwer, Regine Gerike</i>	
WORKSHOP SYNTHESIS: DATA ANALYTICS AND FUSION IN A WORLD OF MULTIPLE SENSING AND INFORMATION CAPTURE MECHANISMS	416
<i>Elisabetta Cherchi, Chandra Bhat</i>	
SOME PAY MUCH BUT MANY DON'T: VEHICLE TCO IMPUTATION IN TRAVEL SURVEYS	421
<i>Christine Eisenmann, Tobias Kuhnimhof</i>	
A ROBUST DATAWAREHOUSE AS A REQUIREMENT TO THE INCREASING QUANTITY AND COMPLEXITY OF TRAVEL SURVEY DATA	436
<i>Pierre-Léo Bourbonmaïs, Catherine Morency</i>	
WORKSHOP SYNTHESIS: NEW DIRECTIONS IN EXPERIMENTAL DESIGN	448
<i>Ricardo A. Daziano, Bilal Farooq</i>	
USING EYE TRACK DEVICES TO UNDERSTAND INDIVIDUAL DECISIONS PROCESS IN STATED PREFERENCES EXPERIMENTS: AN APPLICATION TO THE CHOICE OF ELECTRIC VEHICLES	454
<i>Elisabetta Cherchi</i>	
A STATED ADAPTATION INSTRUMENT FOR STUDYING TRAVEL PATTERNS AFTER ELECTRIC VEHICLE ADOPTION	464
<i>Joram Langbroek, Joel P. Franklin, Yusak O. Susilo</i>	
INFLUENCE OF CHOICE EXPERIMENT DESIGNS ON ELICITING PREFERENCES FOR AUTONOMOUS VEHICLES	474
<i>Prateek Bansal, Ricardo A. Daziano</i>	
AN ONLINE SURVEY TO ENHANCE THE UNDERSTANDING OF CAR DRIVERS ROUTE CHOICES	482
<i>Hamzeh Alizadeh, Pierre-Léo Bourbonmaïs, Catherine Morency, Bilal Farooq, Nicolas Saunier</i>	
<u>SECTION 4: NEW PERSPECTIVES IN THE ERA OF BIG DATA FOR SPECIFIC SURVEY TOPICS</u>	
WORKSHOP SYNTHESIS: MEASURING ATTITUDES AND PERCEPTIONS IN QUANTITATIVE SURVEYS	495
<i>Kelly Clifton, Juan Antonio Carrasco</i>	
ATTITUDES AND MODE CHOICE: MEASUREMENT AND EVALUATION OF INTERRELATION	501
<i>Juliane Stark, Reinhard Hössinger</i>	
MODELLING IMPACTS OF BELIEFS AND ATTITUDES ON MODE CHOICES. LESSONS FROM A SURVEY OF LUXEMBOURG CROSS-BORDER COMMUTERS	513
<i>Philippe Gerber, Marius Thériault, Christophe Enaux, Samuel Carpentier-Postel</i>	
SENSING COMFORT IN BICYCLING IN ADDITION TO TRAVEL DATA	524
<i>Martin Berger, Linda Dörrzapf</i>	
WORKSHOP SYNTHESIS: SURVEYS ON LONG-DISTANCE TRAVEL AND OTHER RARE EVENTS	535
<i>Regine Gerike, Angelika Schulz</i>	
SURVEYING SOCIAL NETWORK GEOGRAPHY TO MODEL LONG-DISTANCE TRAVEL	542
<i>Lisa Aultman-Hall, Jeffrey J. LaMondia, Hannah Ullman, Madeline Suender</i>	

CONSIDERATIONS ON A SURVEY METHOD TO COLLECT LONG DISTANCE TRAVEL DATA WHEN ONLY ASKING ABOUT THE TWO LATEST JOURNEYS	553
<i>Linda Christensen</i>	
WORKSHOP SYNTHESIS: BEHAVIORAL CHANGES IN TRAVEL – CHALLENGES AND IMPLICATIONS FOR THEIR IDENTIFICATION AND MEASUREMENT	563
<i>Bastian Chlond, Christine Eisenmann</i>	
OFFICE RELOCATION AND CHANGES IN TRAVEL BEHAVIOR: CAPTURING THE EFFECTS INCLUDING THE ADAPTATION PHASE	573
<i>Sascha von Behren, Maike Puhe, Bastian Chlond</i>	
ANALYSIS OF TRAVEL PATTERN CHANGES DUE TO A MEDIUM-TERM DISRUPTION ON PUBLIC TRANSIT NETWORKS USING SMART CARD DATA	585
<i>Mohsen Nazem, André Lomone, Alfred Chu, Timothy Spurr</i>	
DEVELOPMENT OF A NEW METHOD FOR HOUSEHOLD TRAVEL SURVEY DATA HARMONISATION	597
<i>Rico Wittwer, Stefan Hubrich, Sebastian Wittig, Regine Gerike</i>	
ASSESSING CAR DEPENDENCE: DEVELOPMENT OF A COMPREHENSIVE SURVEY APPROACH BASED ON THE CONCEPT OF A TRAVEL SKELETON	607
<i>Sascha von Behren, Clotilde Minster, Johanna Esch, Marcel Hunecke, Peter Vortisch, Bastian Chlond</i>	
COMPARING MULTIPLE DATA STREAMS TO ASSESS FREE-FLOATING CARSHARING USE	617
<i>Grzegorz Wielinski, Martin Trépanier, Catherine Morency, Khandker Nurul Habib</i>	
WORKSHOP SYNTHESIS: VALIDATION UNDER "GROUND TRUTH" IN SURVEYS	627
<i>Gerd Sammer, Alfred Chu</i>	
USING TIME-USE DATA TO ANALYSE TRAVEL BEHAVIOUR: FINDINGS FROM THE UK	634
<i>Teresa Harms, Jonathan Gershuny, Doina Olaru</i>	
THE DILEMMA OF SYSTEMATIC UNDERREPORTING OF TRAVEL BEHAVIOR WHEN CONDUCTING TRAVEL DIARY SURVEYS – A META-ANALYSIS AND METHODOLOGICAL CONSIDERATIONS TO SOLVE THE PROBLEM	649
<i>Gerd Sammer, Christian Gruber, Gerald Roeschel, Rupert Tomschy, Max Herry</i>	
TTS2.0: A RESEARCH AND DEVELOPMENT (R&D) PROJECT ON PASSENGER TRAVEL SURVEY METHODS	659
<i>Khandker Nurul Habib, Eric J. Miller, Siva Srikuenthrian, Martin Lee-Gosselin, Catherine Morency, Matthew J. Roorda, Amer Shalaby</i>	
Author Index	