

**rMOVE**  
by RSG



## "In the Moment" Travel Study A GPS Smartphone Application

2015 Planning Applications Conference  
**Atlantic City, New Jersey**

# Background



## **What is rMove?**

A GPS-enabled smartphone application, written for iOS and Android, aiming to capture all needed information for modern household travel diaries.

## **Has it been used?**

Yes - rMove was recently tested in Indiana by 300 people. PSRC is piloting this week and Ohio DOT will pilot this fall.

# Motivations for Developing rMove

## Data quality and completeness:

- Reduce recall bias
- Much more likely to always have smartphone with you
- Ability to collect days (or weeks) of travel data

## Reduction in participant burden:

- Faster and easier than completing paper, web, or phone surveys long after travel has finished.

## Scalability and cost reduction for agencies:

- As app matures, incremental costs should be reduced allowing longer data collection periods and recruitment of more households.

# Study Sponsor & Primary Study Goals

## Study Sponsors:

- FHWA Office of Planning
- FHWA Office of Policy
- Madison County Council of Governments

## “In the Moment” Research Questions:

- Will a smartphone method be a truly viable as a 100% replacement for traditional survey methods?
- Can we reliably collect GPS-based travel information via a low burden smartphone application?
- Will the resulting data be equal or better in quality?



# Software Feature Set

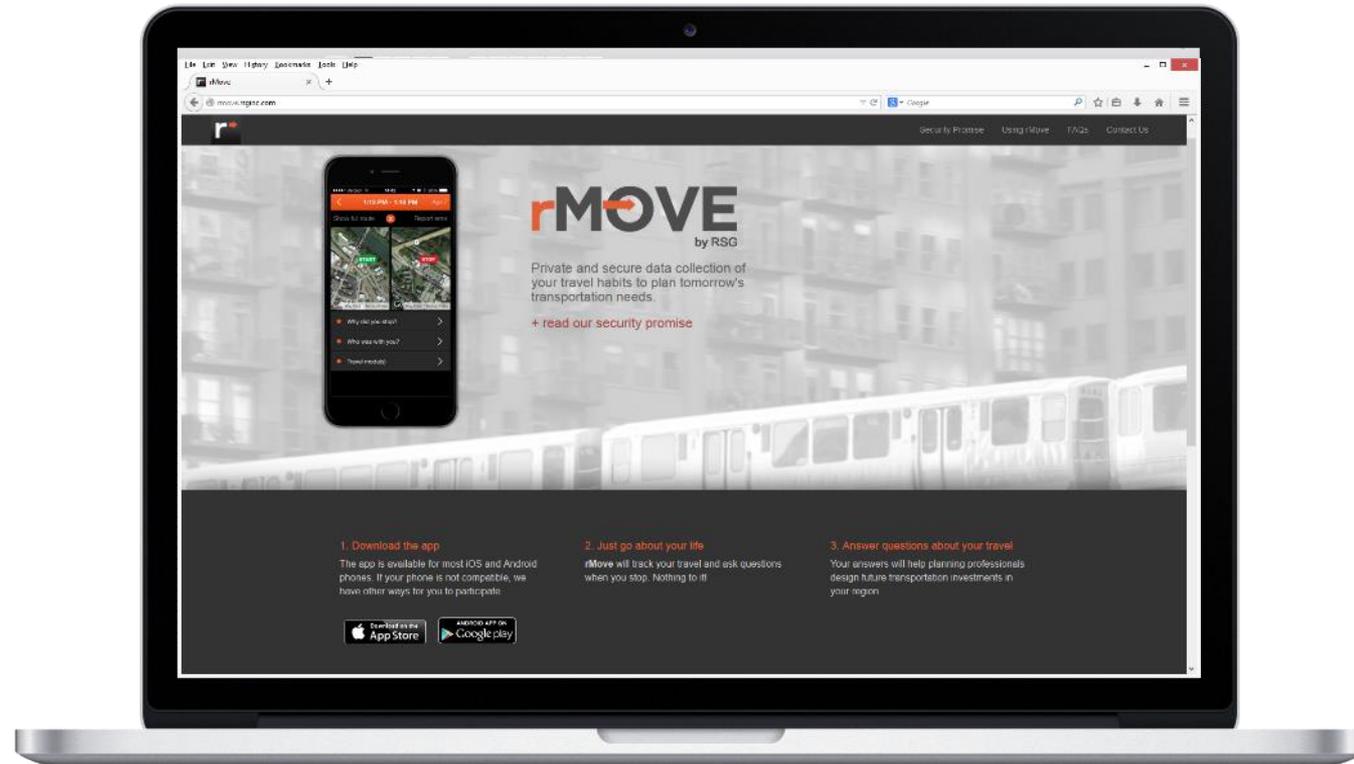
# rMove Store Listing: The Basics

- Support Website

- Android Store Listing



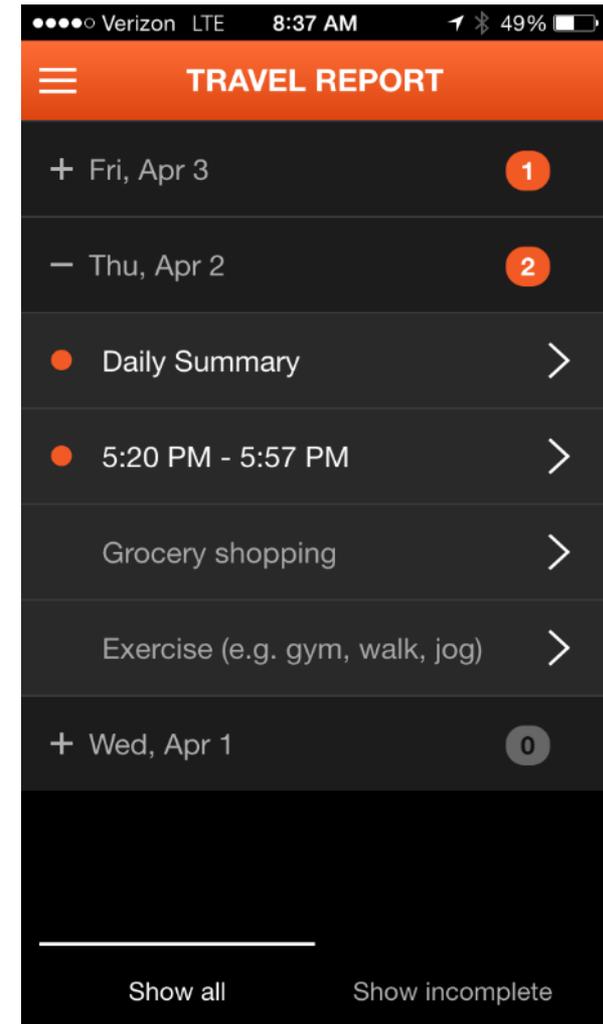
- Apple Store Listing



# Underlying Technology (When & Where)

- Automatic trip start & end/stop detection
- Automatic recording of trip path & duration
- Multiple smartphone sensor utilization (GPS, compass, WiFi)
- Automatically runs in background & on device power-up
- Adaptive GPS collection technology to optimize battery life

HOME SCREEN



# Data Transfer & Communications

- Automatically encrypted transfer of data to server immediately after each trip is complete (assuming connection)
- Automatic monitoring of hardware – issues messages if GPS/WiFi turned off
- In-app messages indicating start and end of assigned data collection period

**HOME SCREEN**

The screenshot shows the 'HOME SCREEN' of the rMove app. On the left is a 'Menu' with options: 'Give us Feedback', 'About rMove', and 'Terms & Conditions'. The main area is titled 'TRAVEL REPORT' and shows a list of trips. The top trip is for 'Wed, Apr 15' with a red circle containing the number '1' next to the time '11:57 AM - 12:07 PM'. Below it are other trips for 'Tue, Apr 14', 'Mon, Apr 13', 'Sun, Apr 12', 'Sat, Apr 11', and 'Fri, Apr 10', each with a '0' next to it. Callouts point to the menu icon, the '1' in the red circle, and the trip time '11:57 AM - 12:07 PM'.

Menu	TRAVEL REPORT
Give us Feedback	– Wed, Apr 15 <b>1</b>
About rMove	● 11:57 AM - 12:07 PM >
Terms & Conditions	Primary workplace >
	+ Tue, Apr 14 <b>0</b>
	+ Mon, Apr 13 <b>0</b>
	+ Sun, Apr 12 <b>0</b>
	+ Sat, Apr 11 <b>0</b>
	+ Fri, Apr 10 <b>0</b>

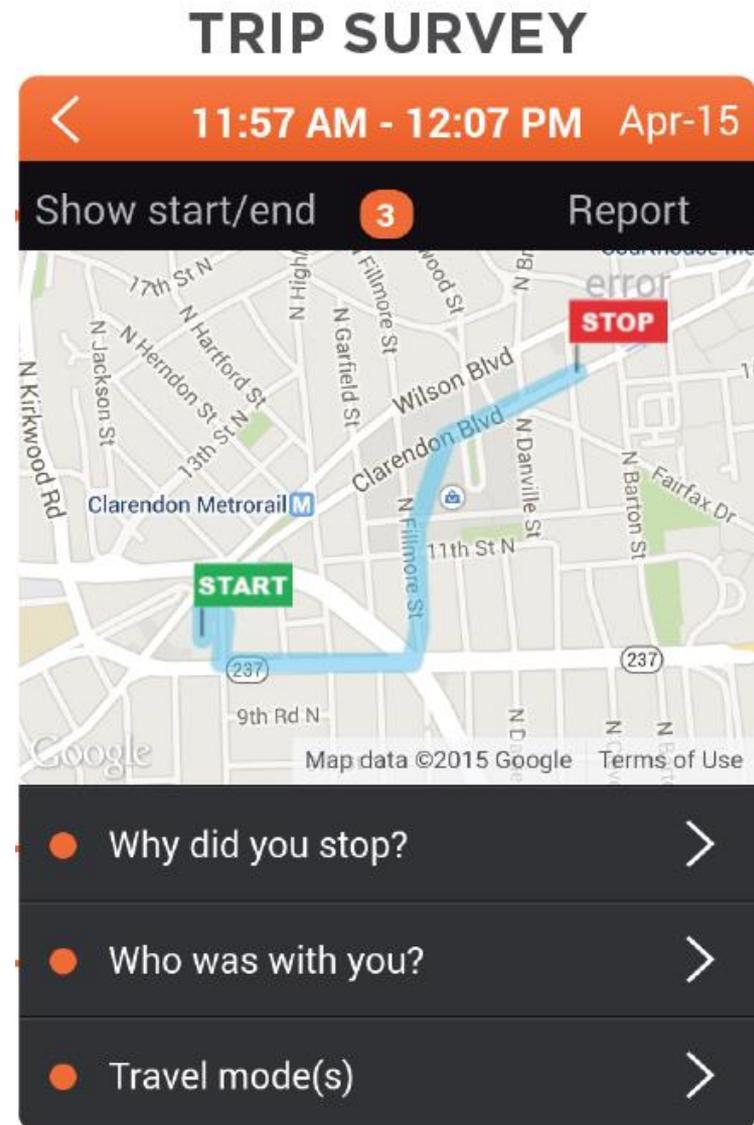
**Number of unanswered surveys**

**Click trip time to answer survey**

**Use the menu button to leave feedback or learn more about rMove**

# Trip Survey (Who, How, Why)

- Customizable in-app trip survey is triggered automatically by stop
- In-app survey has validation and real-time logic based on response
- Selection of which vehicle used and persons in HH on trip
- Ability to give feedback or report errors

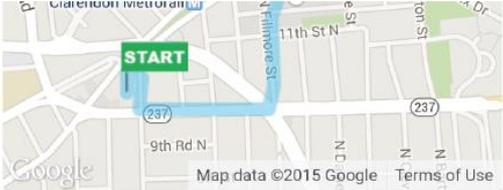


# Trip Survey: Expanded

Why did you stop here (at destination)?

- Went home
- + Went to work/work-related**
- + Went to school/school-related
- Went shopping/ran errand(s)
- Grocery shopping
- Get gas
- Other shopping (e.g. mall)

Expand a list



- Why did you stop?
- Who was with you?
- Travel mode(s)

**Who was with you?**

Non-household members with you?

0	<b>1</b>	2
3	4	5+

Household members with you? (SELECT ALL)

- Just me
- Adam ✓

How did you travel? (SELECT ALL)

- Own vehicle (or motorcycle, moped)
- 2004 Xterra
- 2014 Kia Sorrento
- Other vehicle in my household
- + Other vehicle (e.g. rental, carshare, taxi)
- + Any bus (e.g. public, school)
- Walk/jog/wheelchair

# Obtaining User Feedback

- General feedback button
- Error messages assist in correcting data with user's input
- End of day “daily survey”
- Conducting follow-up survey this week

Scroll down to enter details

## ERROR SCREEN

< Please tell us about our error.

traveling

The stop shown is incorrect; I didn't go there

I was not moving; the map just makes it look like I was

The start time or end time is incorrect

I made other stops along the way ✓

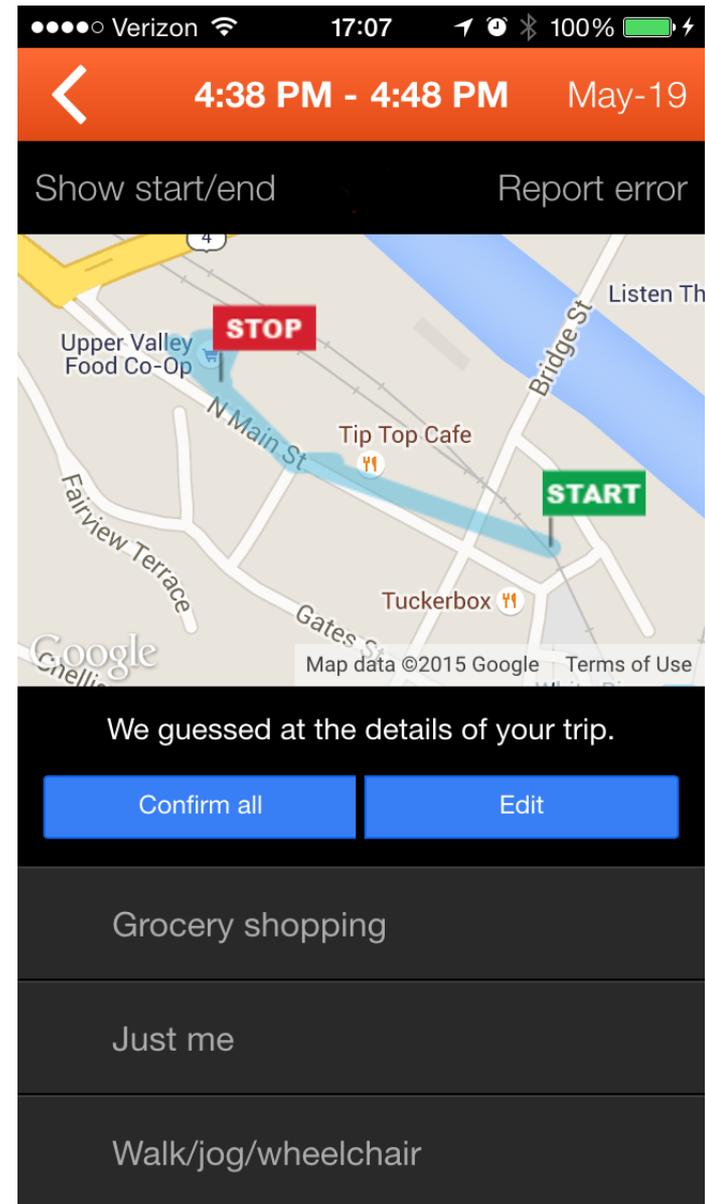
Please provide any additional detail about the error.

I also stopped for gas.

Cancel Done

# Trip Matching

- Trips will be matched to reduce respondent burden
  - that have the same start and stop locations
  - trip distance
- Answers from matched trips are pre-populated so users can accept or change details for the trip





# Conducting the Project

# Methodology

- Recruited households also completed 2014 diary survey
- Asked to participate for 7 consecutive days

HH completed 2014 Study and volunteered for future surveys

HH invited to 2015 Study

HH takes 2015 Recruit Survey (updates HH info & smartphone ownership)

HH sent info on travel dates and instructions for downloading rMove app

HH answers trip surveys on smartphone during assigned travel date period

HH sent reminders to complete unanswered surveys & instructions to uninstall



# Timeline

HH completed 2014 Study and volunteered for future surveys

Spring 2014

HH invited to 2015 Study

April 2015

HH takes 2015 Recruit Survey (updates HH info & smartphone ownership)

April 2015

HH sent info on travel dates and instructions for downloading rMove app

Tues 28 April–Mon 4 May

HH answers trip surveys on smartphone during assigned travel date period

Tues 5 May–Mon 11 May

HH sent reminders to complete unanswered surveys & instructions to uninstall

Tues 12 May–Fri 15 May

**HH completed 2014 Study and volunteered for future surveys**

1771 households

**HH invited to 2015 Study**

1417 households

**HH takes 2015 Recruit Survey (updates HH info & smartphone ownership)**

383 households (27% of invites)

**HH sent info on travel dates and instructions for downloading rMove app**

288 households (20% of invites)  
478 people

**HH answers trip surveys on smartphone during assigned travel date period**

171 households (59%)  
295 people (61%)

**HH sent reminders to complete unanswered surveys & instructions to uninstall**

# Preliminary Data Results

- ~12,500 trips
- ~8% of trips were “matched”
- 86% of people answered every single trip survey
  
- Very promising participation rates – especially for added value of 7 consecutive days

## Areas to Keep Improving

- Android phones have wider range of quality, small subset get spurious trips
- Battery life is an issue for a small number of Android devices.
- Matched trips – review and hone to keep reducing burden
- Criteria for participation more complicated – what is a complete?
- Currently fielding in Seattle region – what are similarities and differences in results?

## Next Up: Data Review & Looking Ahead

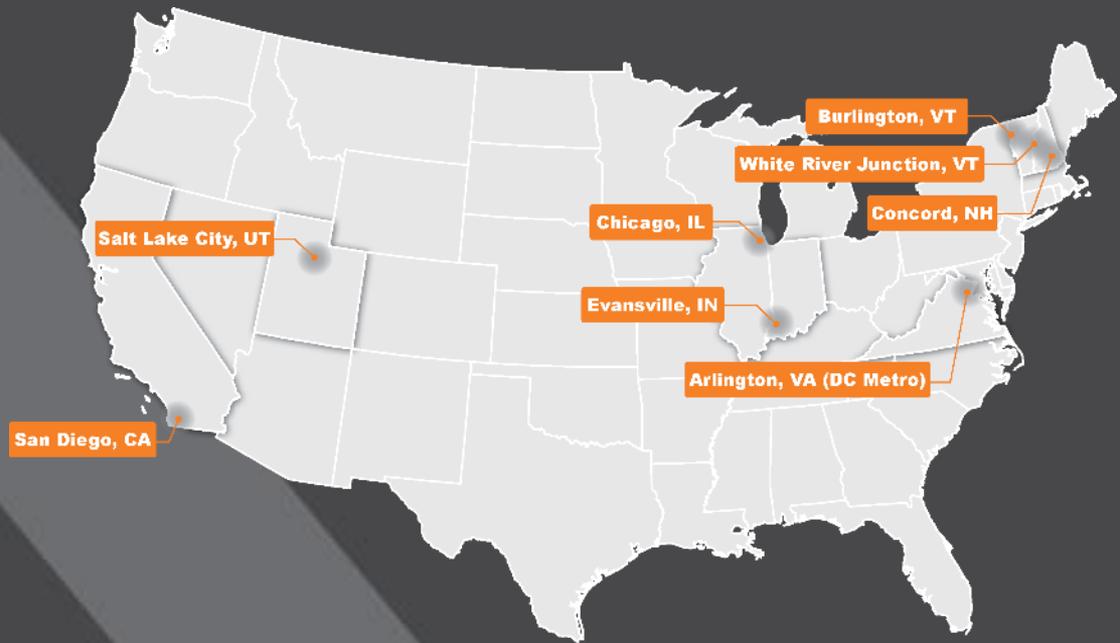
- Issuing follow-up survey(s) for feedback
- Preparing dataset and report
- Further improvements with broad applicability:
  - Household travel surveys
    - 3 to 7-day all travel
    - 3 to 12-month long distance travel
  - Special markets
    - University travel
    - Visitor travel
    - Transit, toll users
    - Commercial vehicles

# Thanks to our Sponsoring Agencies

- Federal Highway Administration
  - Office of Planning
  - Office of Policy
- Madison County Council of Governments
- Indiana Department of Transportation
- Ohio Department of Transportation
- Puget Sound Regional Council

# Contributing Authors

- **Robert Wertman**, Madison County Council of Governments
- **Elaine Murakami**, FHWA Office of Planning
- **Kevin Hathaway**, RSG
- **Michael Geilich**, RSG
- **Leah Flake**, RSG
- **And many others on the RSG team!**



## Contacts

**Elizabeth R. Greene**

Email: [elizabeth.greene@rsginc.com](mailto:elizabeth.greene@rsginc.com)

Tel: 801.456.4907

[www.rsginc.com](http://www.rsginc.com)