

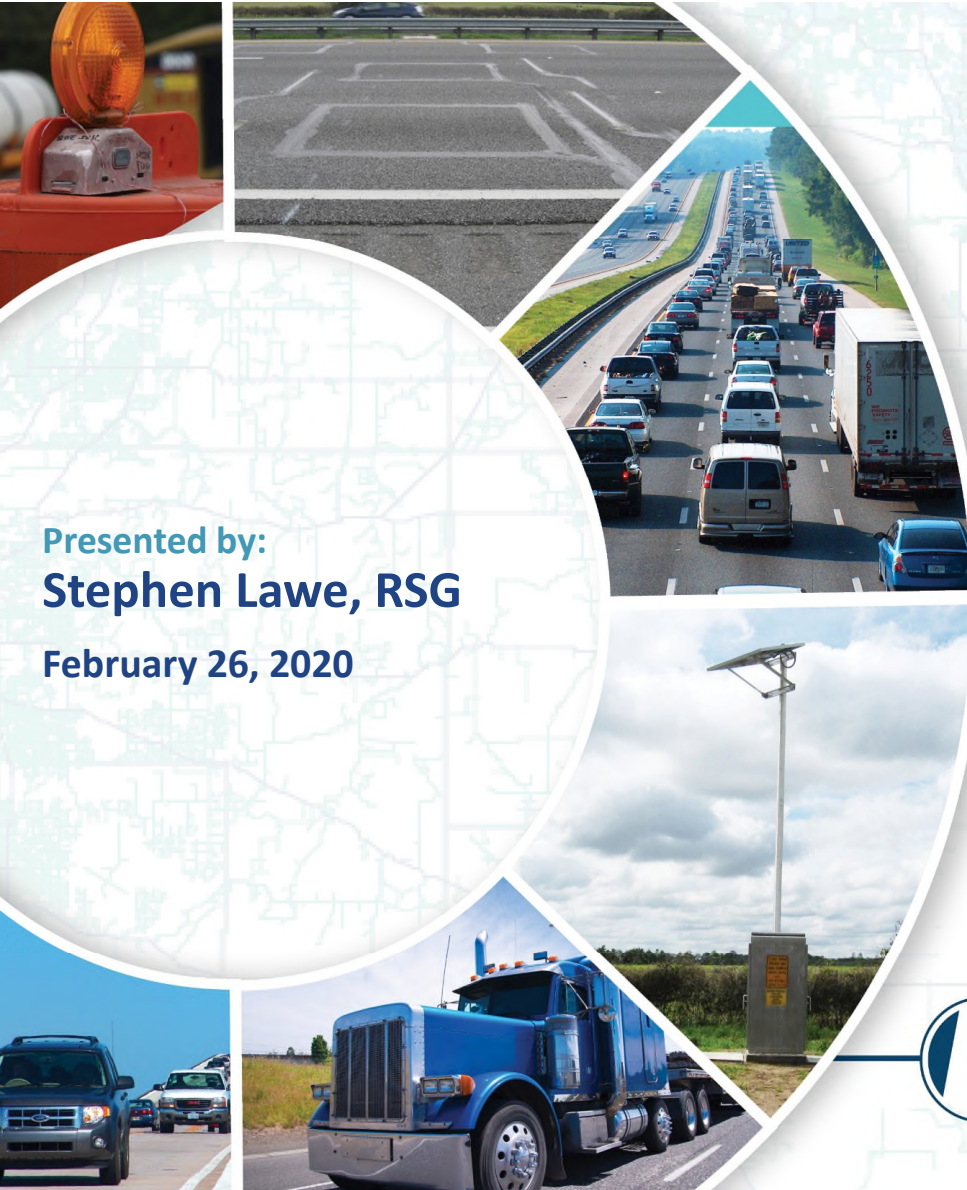
JOINT FLORIDA
Model Task Force & Transportation
Data and Analytics Workshop



Presented by:
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February 26, 2020

Evolution of Behavior Data

Why we need data scientists





If Florida lizards can do it ...





Our industry uses data to understand behavior to inform policy.

Our industry uses data representing the physical environment (e.g., roads) and a blend of natural and social sciences to understand human behavior in the transportation system.



We do this to inform policy.



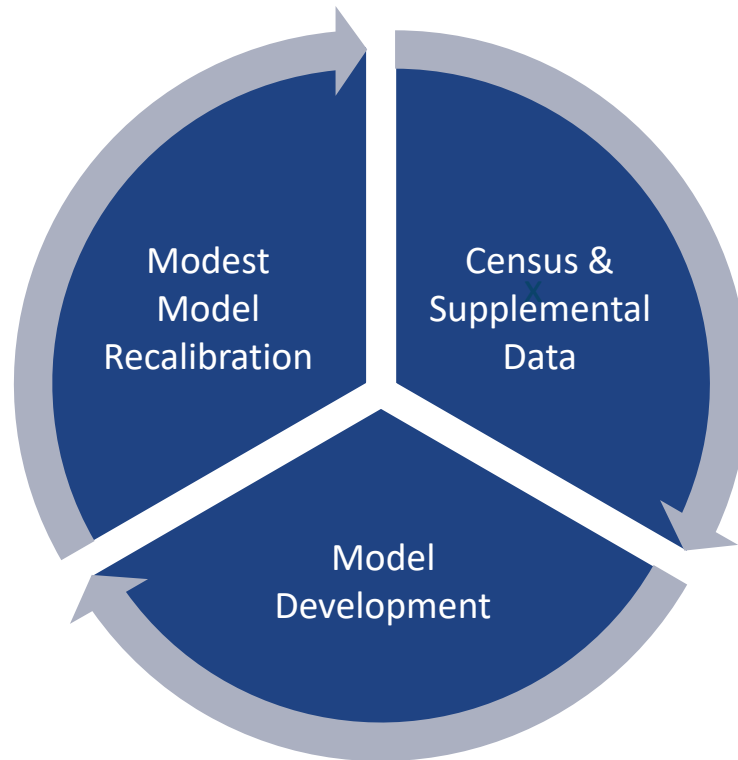
There are two key takeaways from this this presentation.

- 1 Historically our industry has operated in a data-scarce world and we overstate the credibility that data provide.
- 2 Future abundance of robust data sources will require us to evolve our treatment of data quickly and substantially.



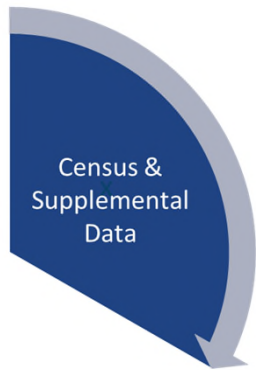
Historically, travel behavior data has had a 10-year lifecycle.

For close to 70 years, travel modeling and behavioral data development has operated on a 10-year lifecycle.





We are now seeing a 1 to 2-year lifecycle on data development.



- Several MPOs and DOTs are performing annual or bi-annual surveys to capture the rapidly changing behavioral landscape.
- The cost is much the same as a large survey conducted every 10 years – just spread out over a longer period
- These are smaller sample and sometimes longitudinal
- Surveys may be aggregated or compared during to support insights



Over this 70-year period travel survey methods have evolved.



In-person surveys were common but became too costly and intrusive.



Paper surveys dominated for many years, but response rates decreased as junk mail took hold. Data quality was also a challenge.



Phone surveys played a critical role for years, but caller-id and declining land line ownership became a challenge.



Computer-based and later internet-based surveys continue to play an important role. There are still, however, reporting challenges.



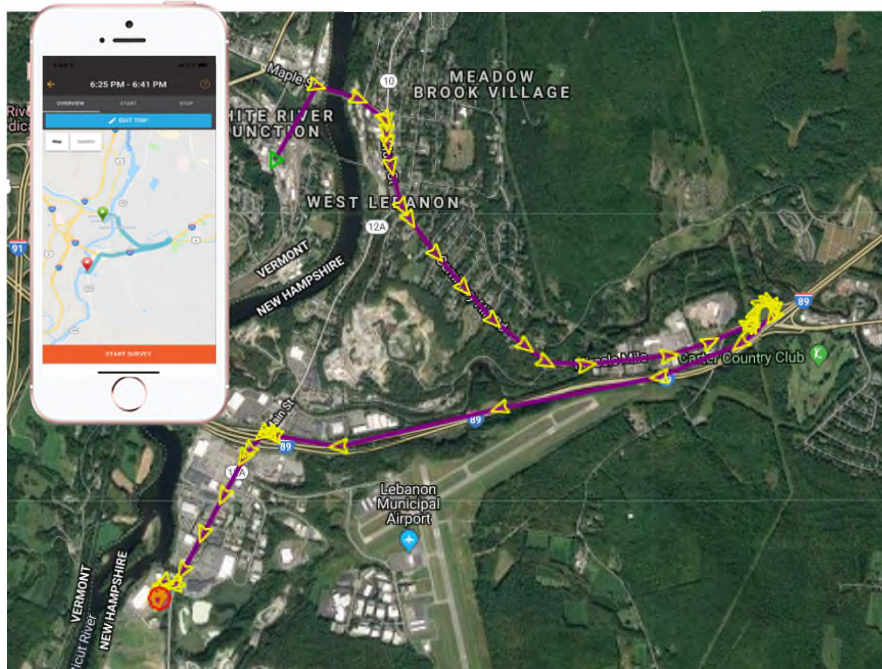
Bringing us to today and smartphone apps...



Ah yes, the smartphone survey app...

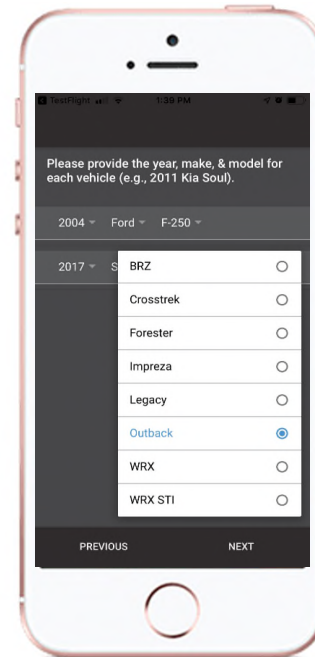


AUTOMATED LOCATION AND TRIP CAPTURE



Note: Trip trace shown with permission of traveler

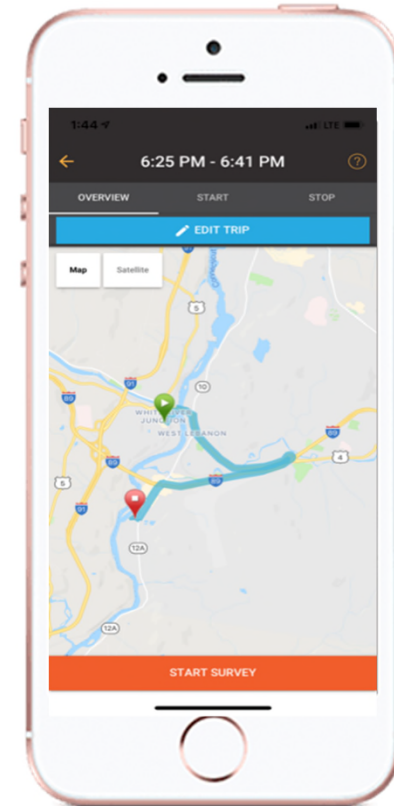
CUSTOMIZABLE SURVEYS





Smartphone-based surveys have several benefits.

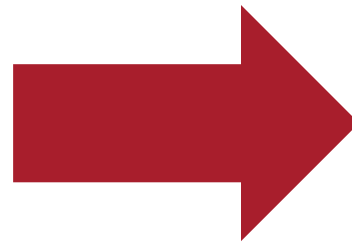
- **Better Data:** In-app survey has validation and real-time logic based on response
- **More Data:** Surveys usually run for at least a week but can run for a month
- **Reduced Respondent Burden:** Auto-fill of previous trip and GPS data makes it easier





Stop asking “Is This Data Right” and ask “How Should We Use This Data”

- More frequent surveys
- More survey days
- More data sources
(e.g., passive data)

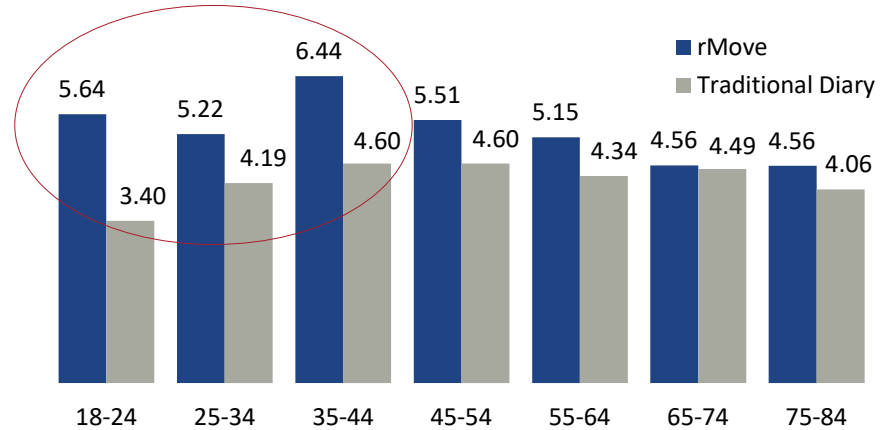


greater data diversity
and data disparity
than ever before

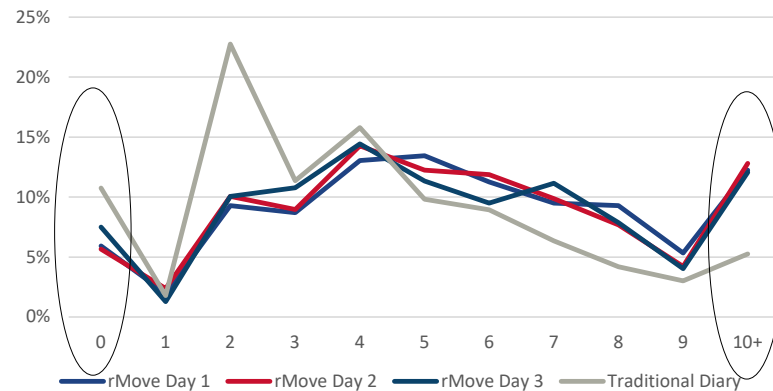


The way we are collecting data is changing our conclusion.

- 22% of trip surveys answered within 15 minutes of travel
- Higher and more stable trip rates among young adults and higher trip rates across income brackets



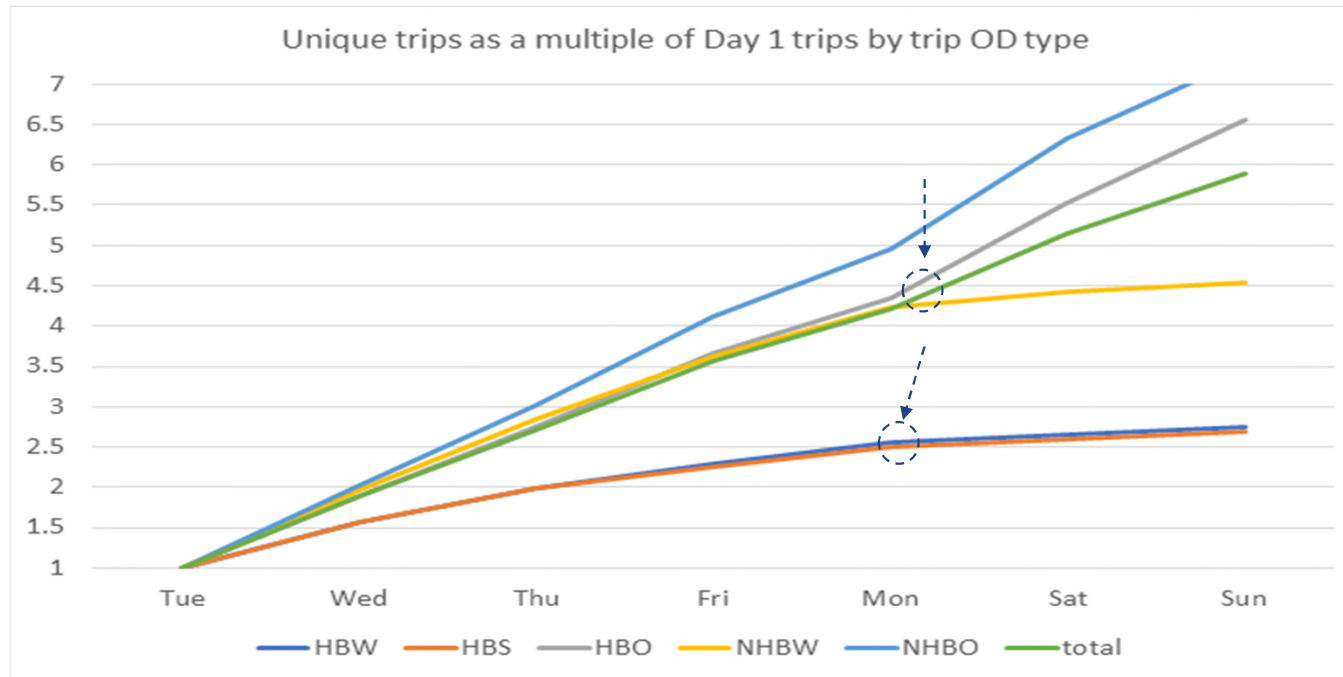
- Fewer no-travel person-days
- More 10+ trip person-days
- Higher trip rates overall





More data means more complexity.

Across all purposes, 5 weekdays of data provide 4.4 times as many unique trips as one day. (For home-based work and school, the ratio is 2.5)





What about the role of passive data (i.e., big data, LBS data)?

Passive data all by itself is of little use, no matter how “big” it is.
It needs various types of other data and models to make it useful...

- Expansion to the general population
- Calibration, validation to remove biases
- Imputation to add information (mode, purpose, socio-demographics, etc.)
- Behavioral models to extrapolate to the future

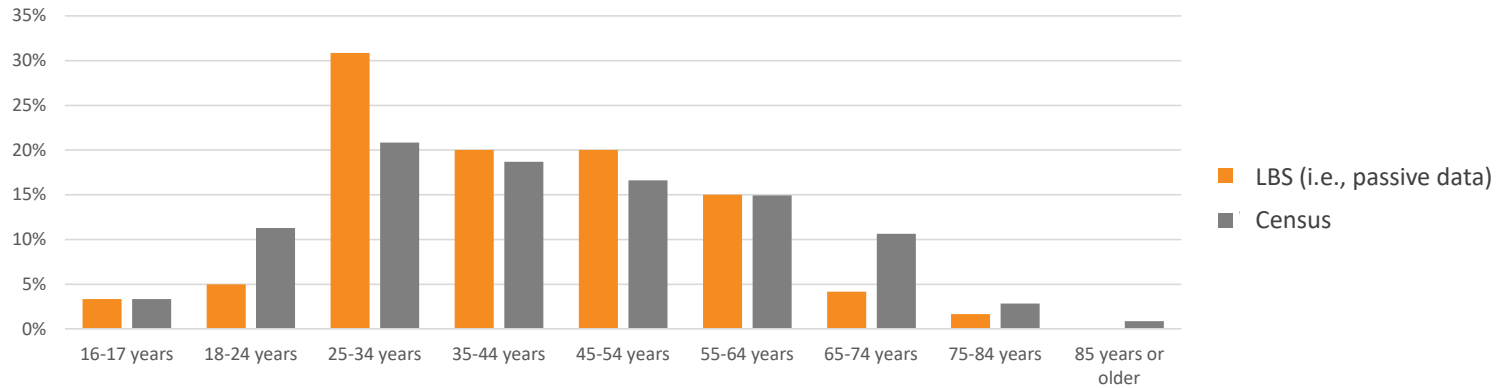


To be useful, passive data must undergo careful validation checks and we must be clear on how those are accomplished.

INCOME

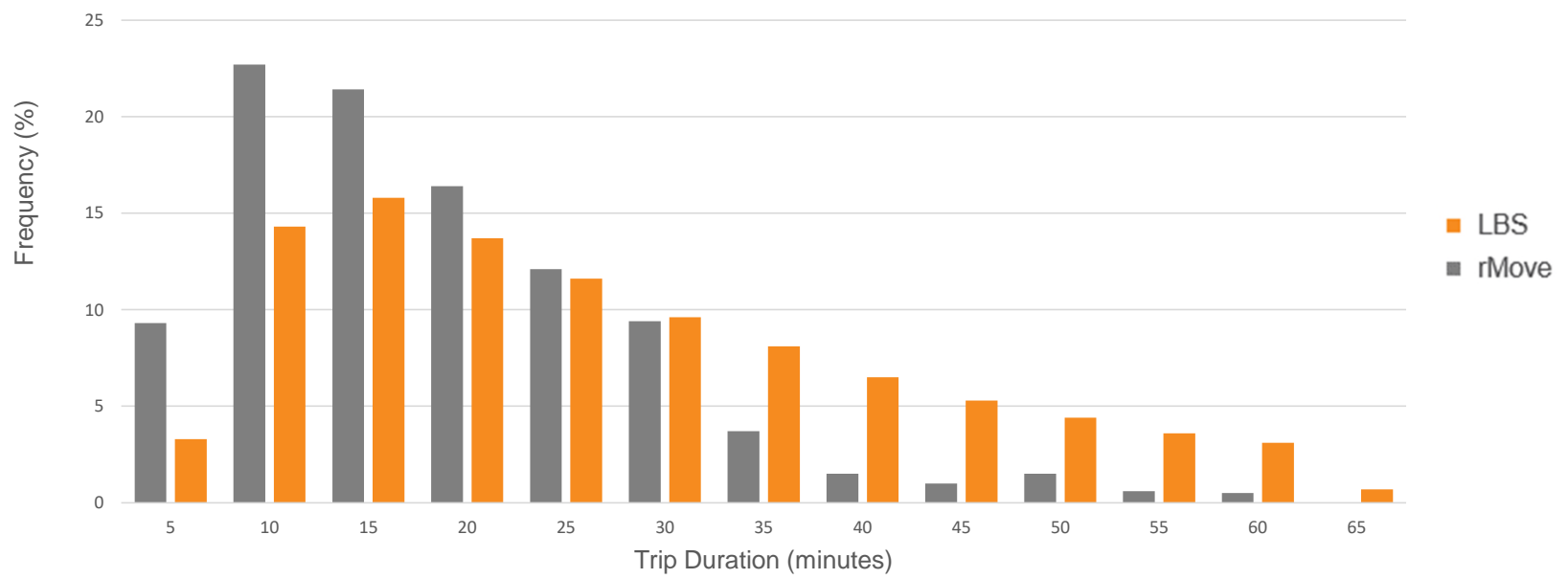


AGE





Passive data can vary significantly from reported survey results.





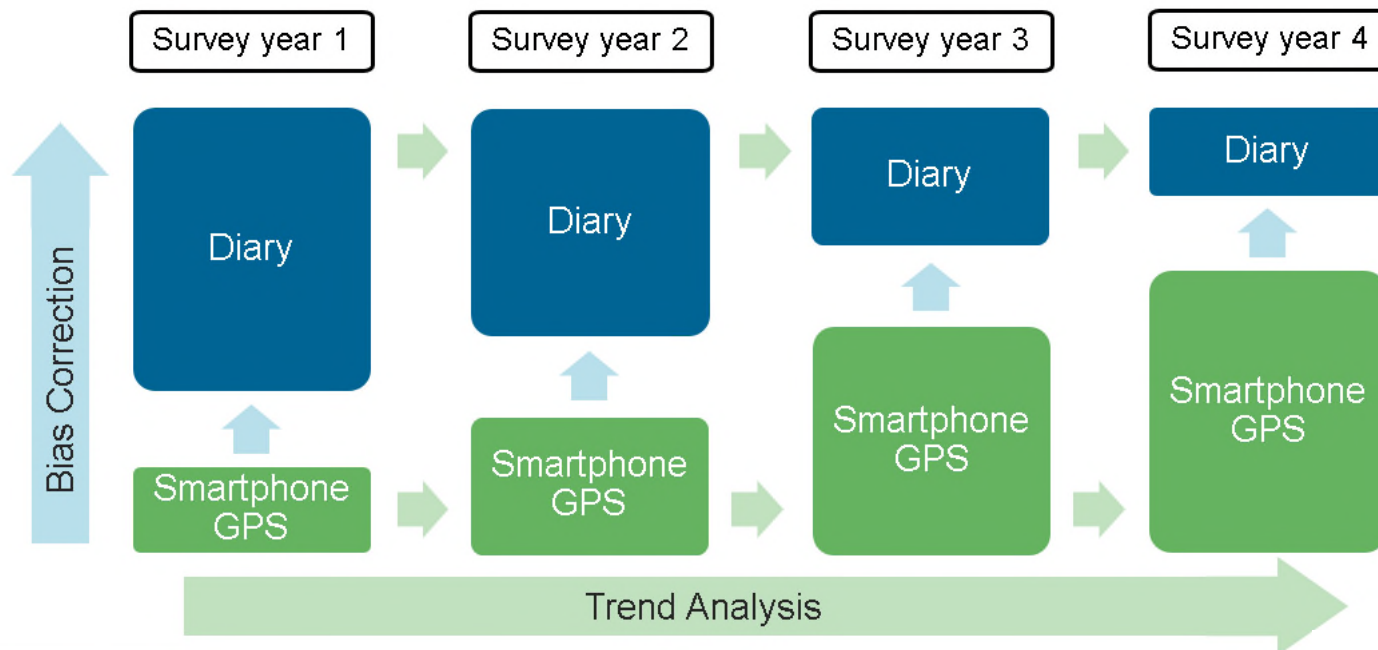
What will the role of travel surveys be in the dawning age of Big Data?

Travel surveys will still be needed to:

- Provide data for bias correction / validation
- Provide data for training imputation models
 - Smartphone-based survey data matched to passive data by device
- Capture changes in travel behavior over time
 - Shifts in preferences, attitudes and constraints



To allow trend analysis against past surveys, a phased approach can be used, with random allocation of households to the methods.





So, why do we need data scientists?

- We will be processing larger amounts of data than ever before
- This data will not tell the same story meaning we must become comfortable with:
 - Data fusion
 - Data reconciliation
 - Data synthesis





Consuming raw data may be hazardous to your model.



VS.



It's not just the raw ingredients,
it's how they're prepared!



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