

Insights on Data Quality from a Large-Scale Application of Future Mobility Sensing Technology in Greater Phoenix, AZ

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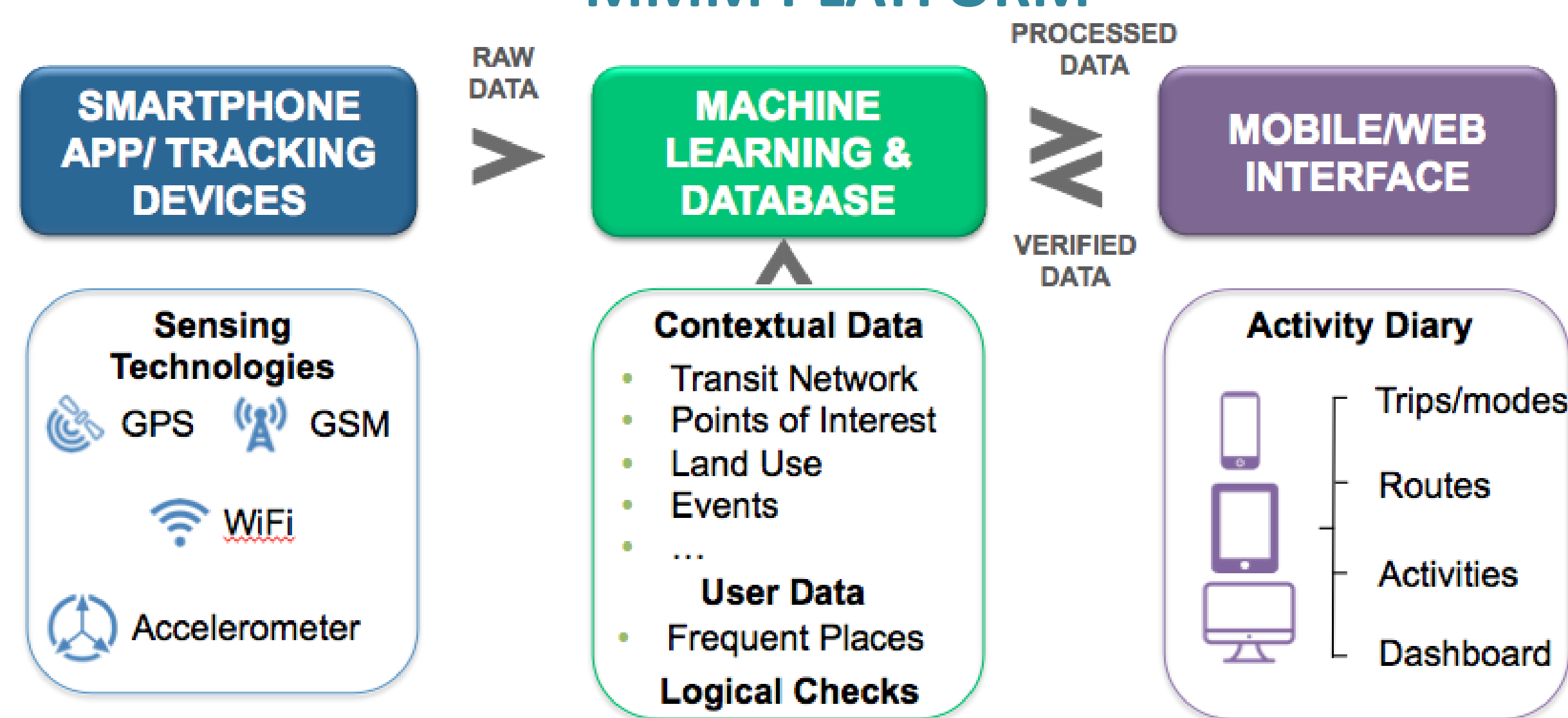
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1 BACKGROUND

- In 2016-17, MAG conducted its first 100% GPS-based survey using the MMM automated travel survey platform. MMM's underlying technology is Future Mobility Sensing (FMS) which leverages sensing technology and machine learning inferences to obtain high resolution, multi-day data.

MMM PLATFORM



2 OBJECTIVES

- Previous research comparing data collected via FMS/MMM to traditional survey data collected in Israel and Singapore show FMS data is more accurate, complete and richer.¹
- We compare data from MAG HTS and NHTS add-on for Phoenix, AZ to understand similarities and differences

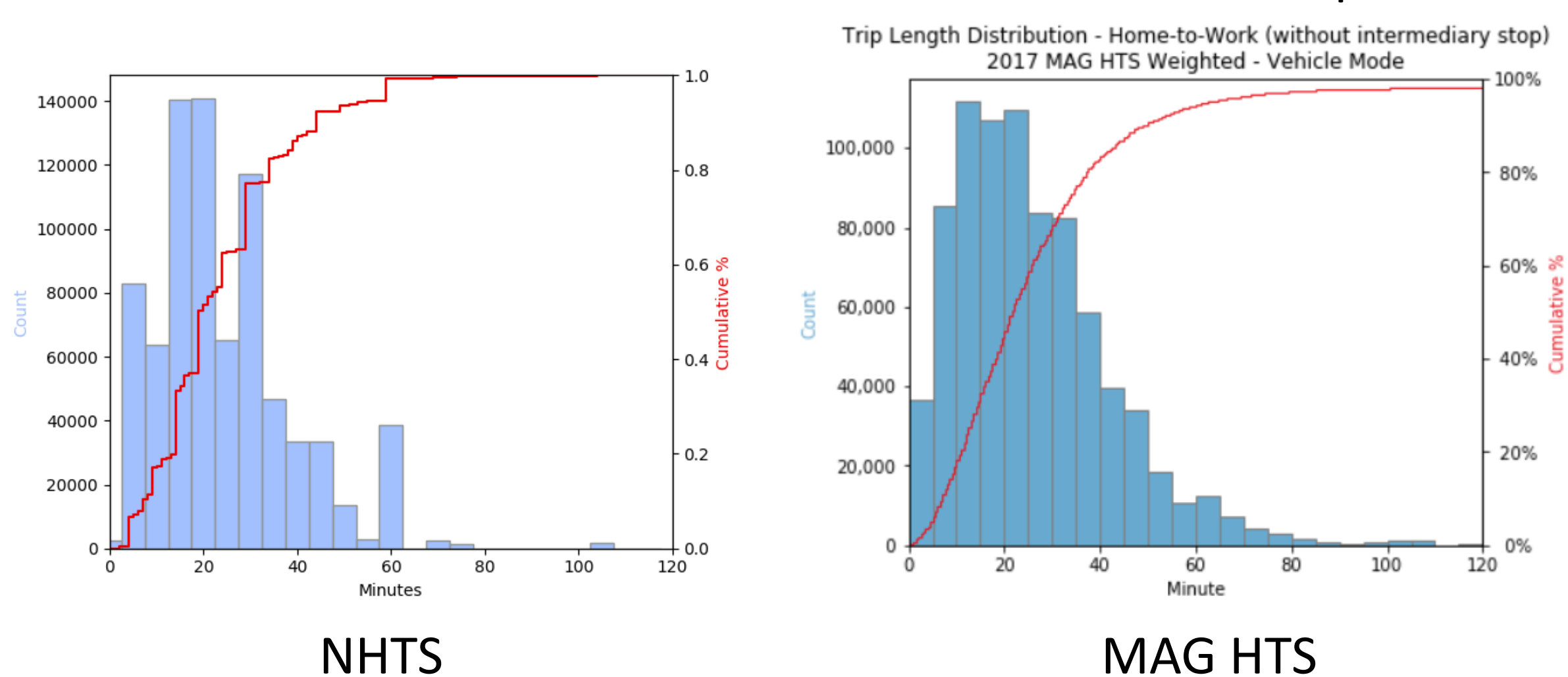
2016-17 Surveys	NHTS Add-On	MAG HTS
Data collection method	Recall aided by optional use of paper travel log	Smartphones and GPS loggers with user verification via MMM
Completion rate	54%	65%
Number of households	735	6,073
Travel days collected	One day	At least 2 days

¹Nahmias-Biran, B., Han, Y., Bekhor, S., Zhao, F., Zegras, C. and Ben-Akiva, M. (2017) "Enriching Activity-Based Models Using Smartphone-Based Travel Surveys", *Transportation Research Record: Journal of the Transportation Research Board*

3 RESULTS

We examine weighted data distributions from MAG and NHTS surveys. Comparisons show similar overall patterns, which validate both datasets, and differences that reveal the advantages of the MMM system.

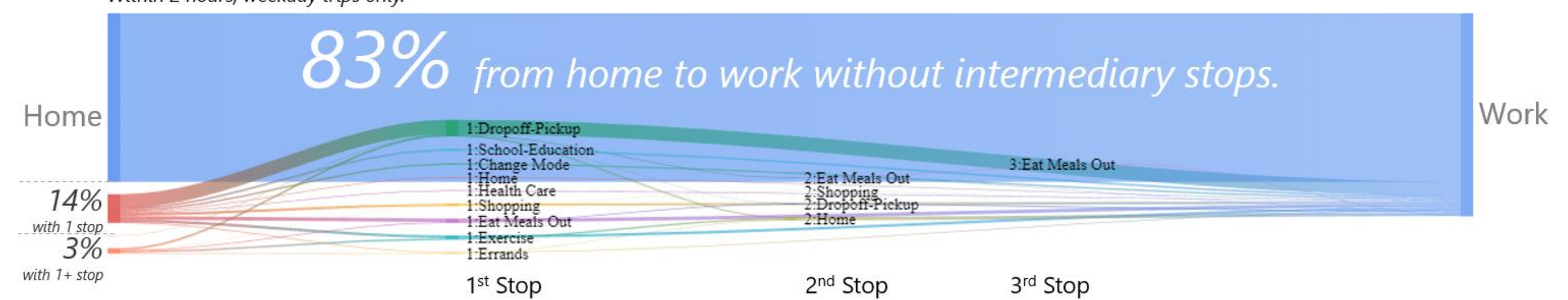
(1) Travel time distribution for direct home to work vehicle trips



NHTS respondents, reporting travel from recall, naturally tend to round travel times, which leads to jumps in travel time distribution curve, whereas travel time detected by FMS app gives much smoother distribution.

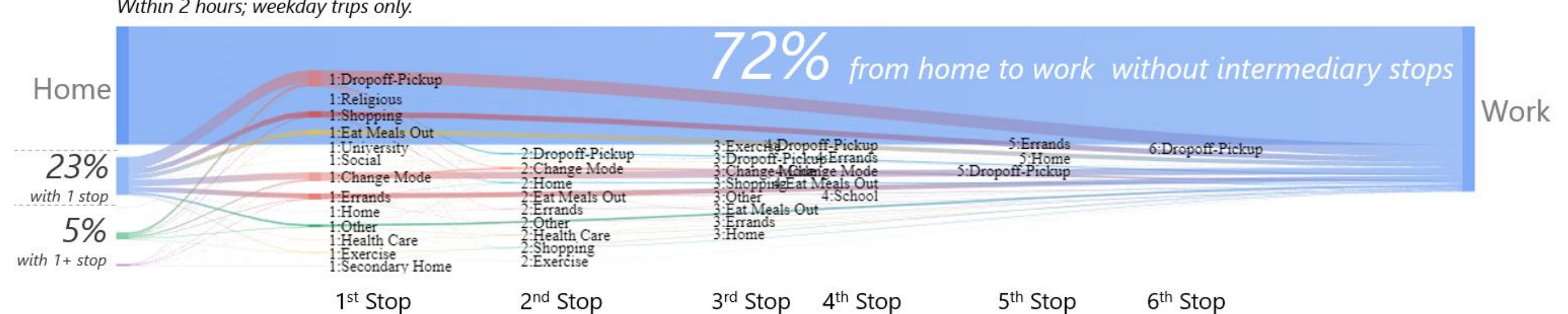
(2) Intermediate stops during home to work trip

Home-to-Work Journey - 2017 NHTS (Weighted, MAG Region)
Within 2 hours; weekday trips only.



Main types of intermediate stops include: Drop-off/pickup, Eat meals out, Exercise, Shopping

Home-to-Work Journey - 2017 MAG HTS (Weighted)
Within 2 hours; weekday trips only.

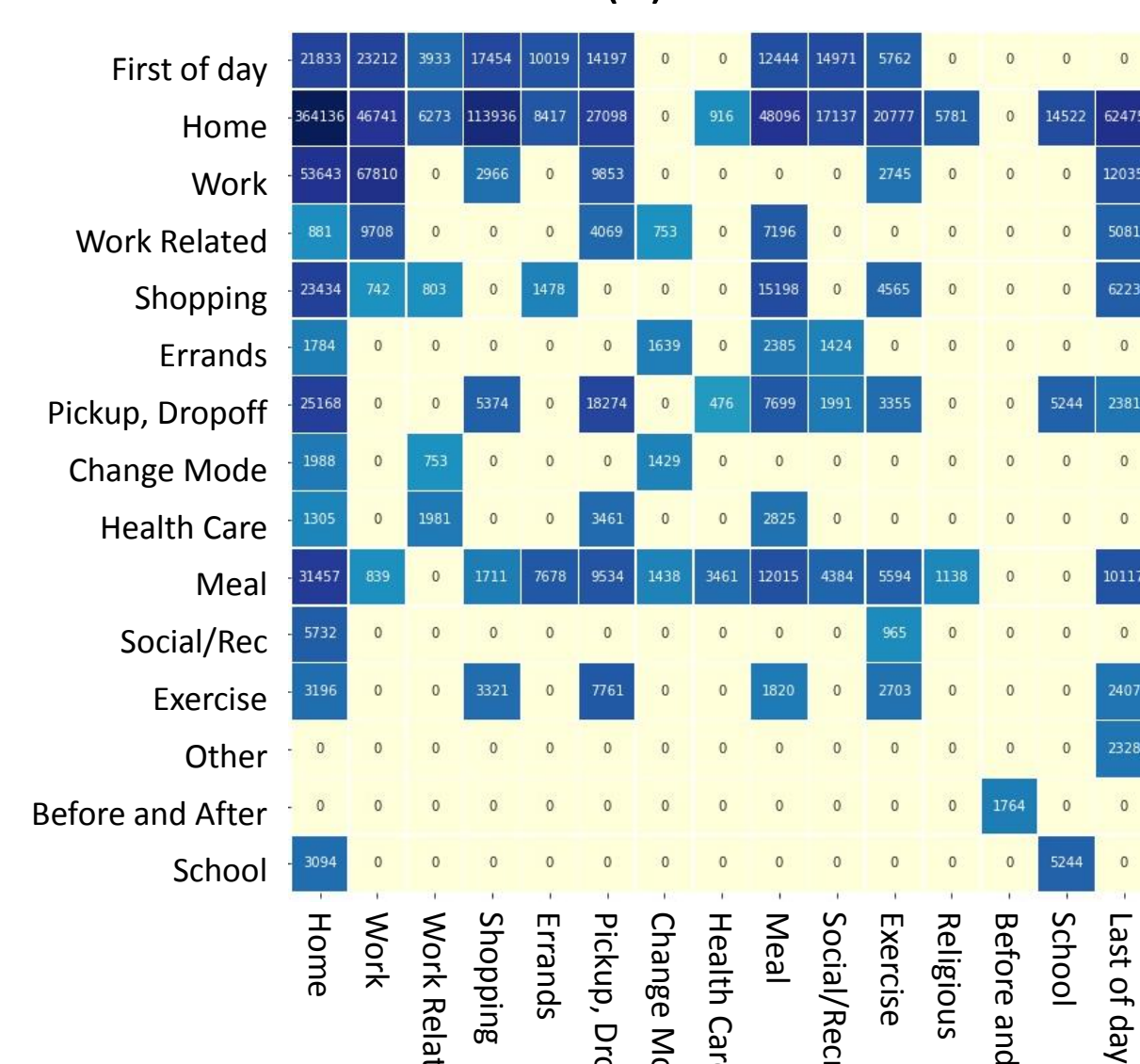


Main types of intermediate stops include: Drop-off/pickup, Change mode/transfer, Shopping, Errands, Eat meals out

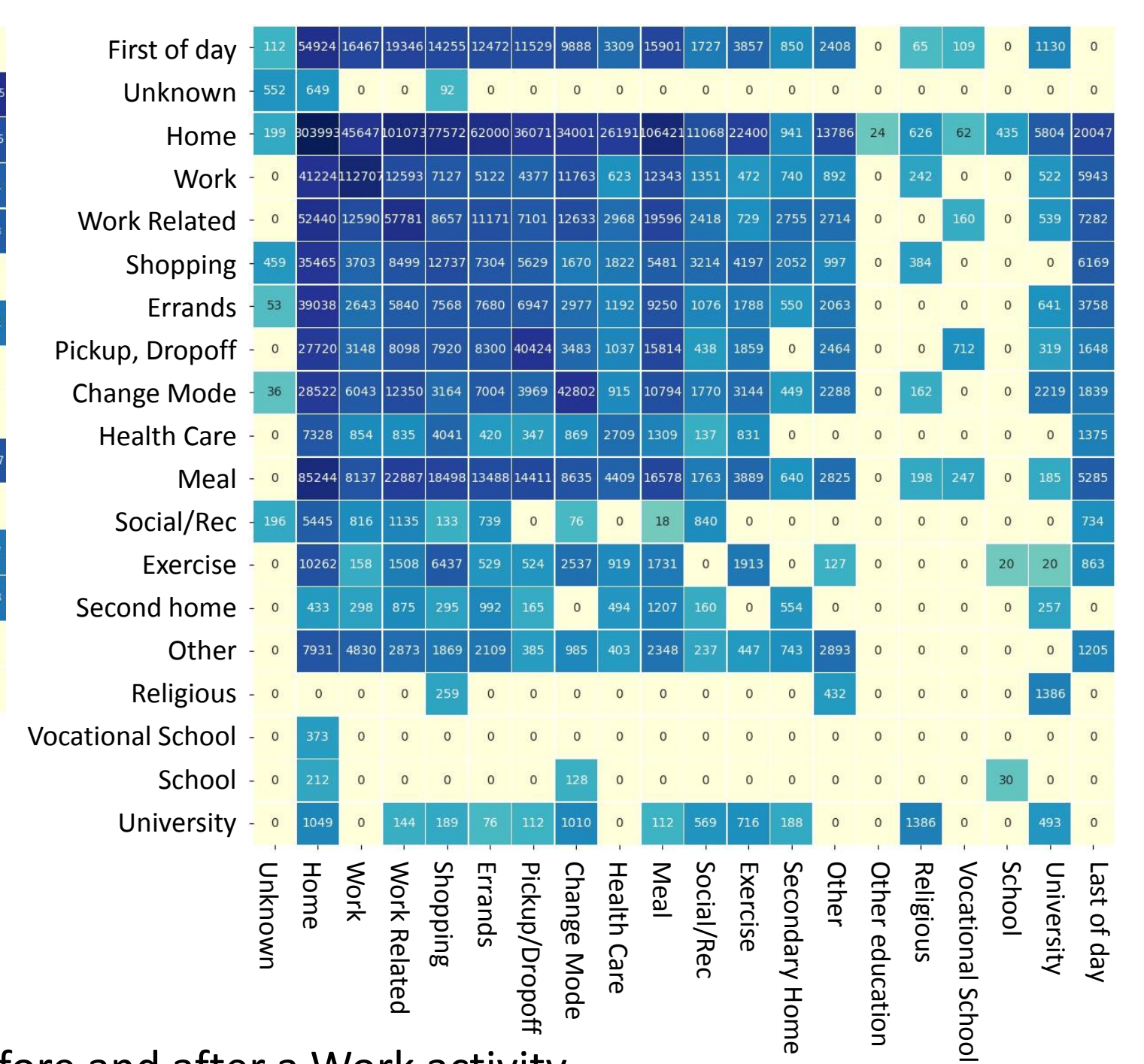
MAG HTS reveals higher percent of passengers making intermediate stops during home to work travel & greater variety of activity sequences.

(3) Activity context for work

(a) NHTS



(b) MAG HTS



Counts of activities before and after a Work activity

- While NHTS shows vast majority of work activities precede and/or are preceded by home activities, MAG HTS shows a much richer activity context.
- People carry out various types of activities, such as shopping, meal, errands etc., before and after work. These activities might be under-reported in NHTS.
- Since FMS is sensitive to location changes, a long work stop may be broken into several smaller ones if the user moved a significant distance during that time (e.g., goes to another part of a campus-like setting).

4 CONCLUSIONS

Preliminary results show that the FMS platform application produced high quality, multi-day data, enhanced by strong respondent support.

- Richer activity context is observed in MAG HTS, showing a large variety of activities before and after work.
- More intermediate stops are captured in MAG HTS besides the main trip destination.
- There is significant rounding of travel times in NHTS, whereas the travel times captured by FMS app are highly accurate.