Texas A&M Transportation Institute

Saving Lives, Time and Resources

Opportunities & Challenges Using Passively Collected Data In Travel Demand Modeling

TMIP Webinar
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Overview

- Project background
- Data Types & Use Review
- Web survey results
- Applications to Advance Use of Data
- Conclusions

Project Background

- Southwest Region University Transportation Center-Funded Study
- Co-researchers
  - Ipek N. Sener, PhD
  - Richard J. Lee

Project Background

- Passive data used roadway operations monitoring
- Stand-alone GPS units used for supplements to personal travel surveys.
- Mobile phones and particularly smart phones have enhanced supplemental use.
- Instances of replacement of some forms of travel surveying – like external or corridor.

Project Background

- Barriers to wider use of data in model development?
- Research into passive data collection methods to replace old method of external data collection.
- Replacement for traditional data in model development?

Data Types & Uses

Cell Data

- Identified efforts directed toward applications in:
  - Model calibration
  - Route choice modeling
  - Trip distribution modeling
  - Activity-based modeling
- Numerous sub-regional/corridor applications

Data Types & Uses

Cell Data

- Sub-regional/corridor applications examples
  - Trip length
  - District-to-district flows
  - Highway traffic volume
- Generally comparable
- Algorithms/model-based techniques for distinguishing activities

Data Types & Uses

GPS

- Supplement to traditional travel survey
  - Improve accuracy of diaries
- External data sets
  - Transit & truck event-driven data
- GPS-only surveys

Data Types & Uses

GPS - Smartphones

- Research in use of other on-board technology with GPS
  - Mode detection
  - Purpose imputation
- App-based data collection
  - Specific use apps
  - Passive?

Data Types & Uses

Bluetooth

- Initially small geographies & single corridors
  - Travel times
- Expanded use
  - Travel times
  - O/D matrix estimation
  - Route choice
  - Mode detection

Data Types & Uses

Bluetooth

- Considerations
  - Scale
  - Infrastructure dependent

Other Technologies

- Social Networking Data
- Smart Card Data

Data Uses - Summary

- Integration of with traditionally collected data
- Hybrid approaches attractive
- Key challenges to wider use
  - Data fusion
  - Margins of error/sample bias
  - Data processing standardization

Survey of Use of Passively Collected Data

MPOs and Model Practitioners

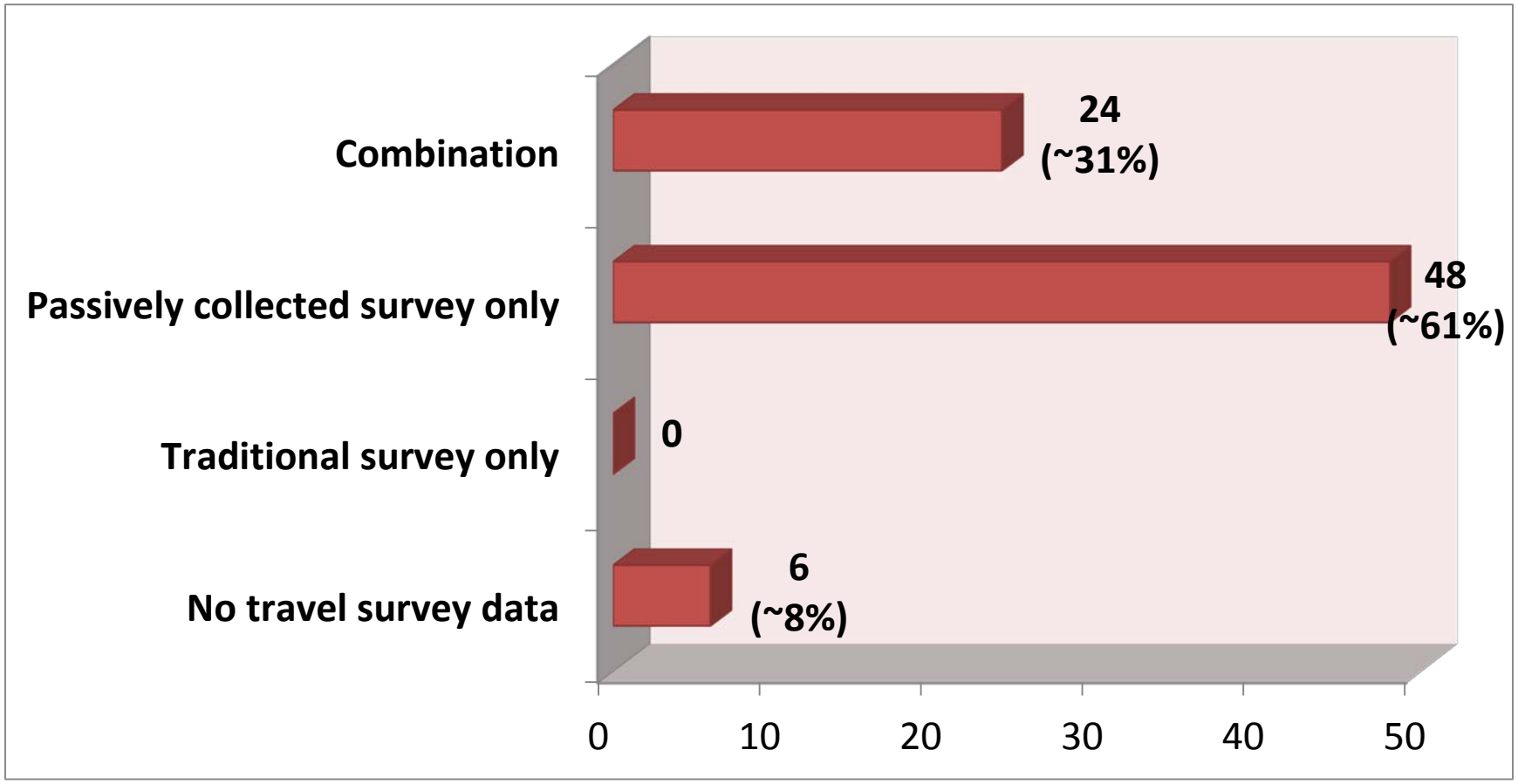
- Region Characteristics
- Use of survey data
- Why/how used passive data used
- Type of passive data used
- Concerns about passive data
- Data merging/imputation

Survey of Use of Passively Collected Data

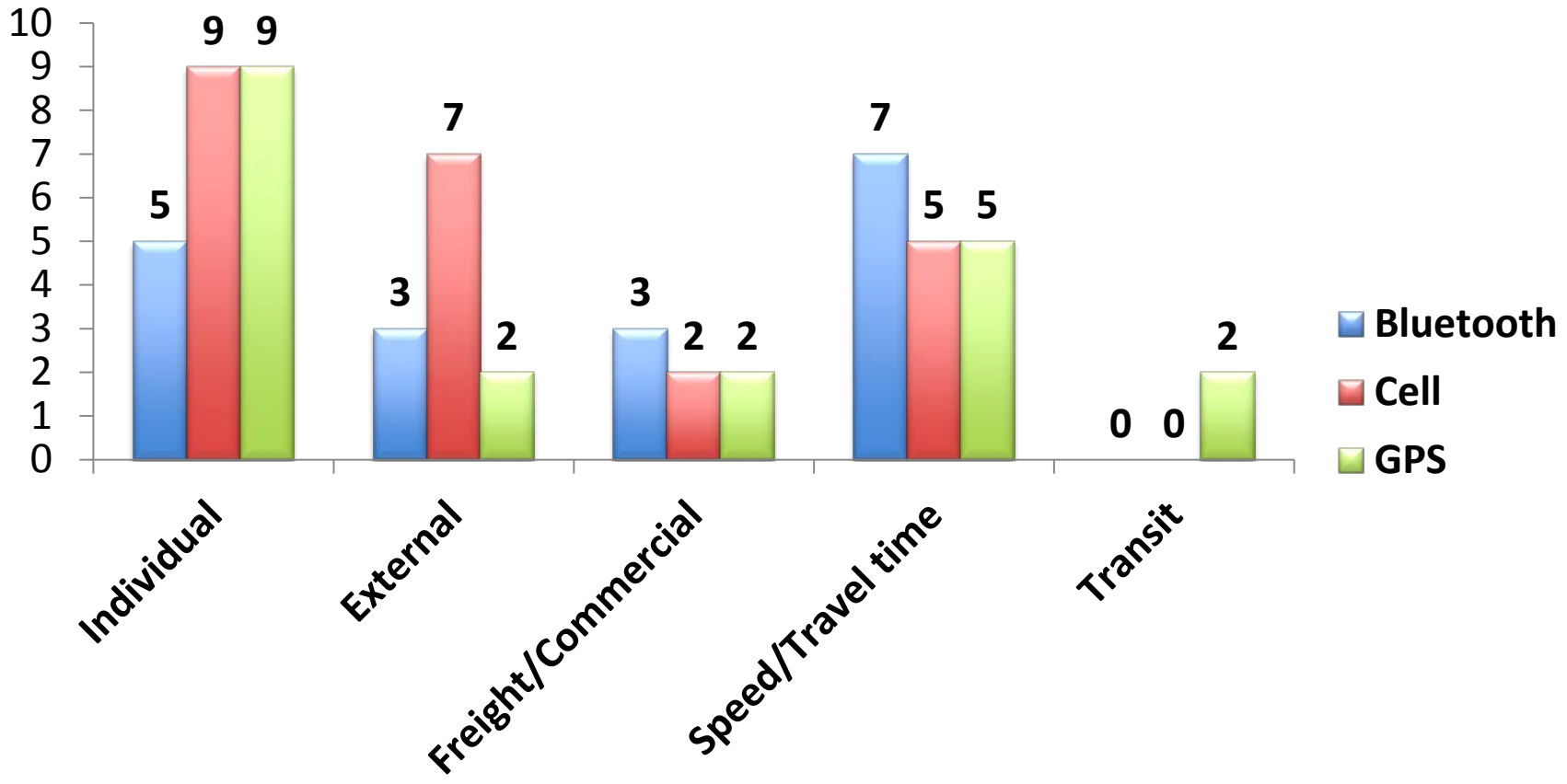
Follow-up for details on

- Use of passively-collected data
- Model accommodation of passive data
- Comparisons to other data sources

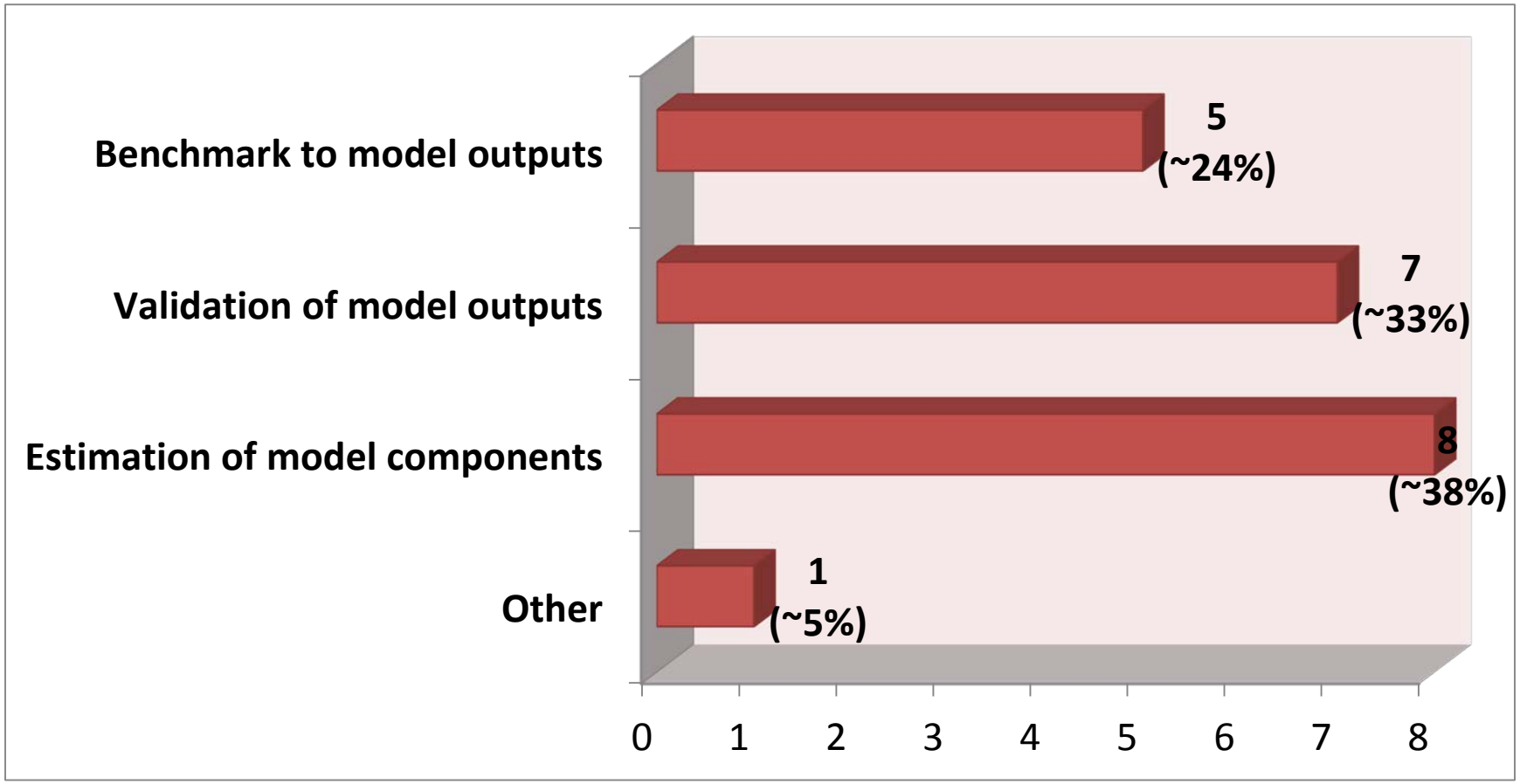
Use of Travel Survey Data



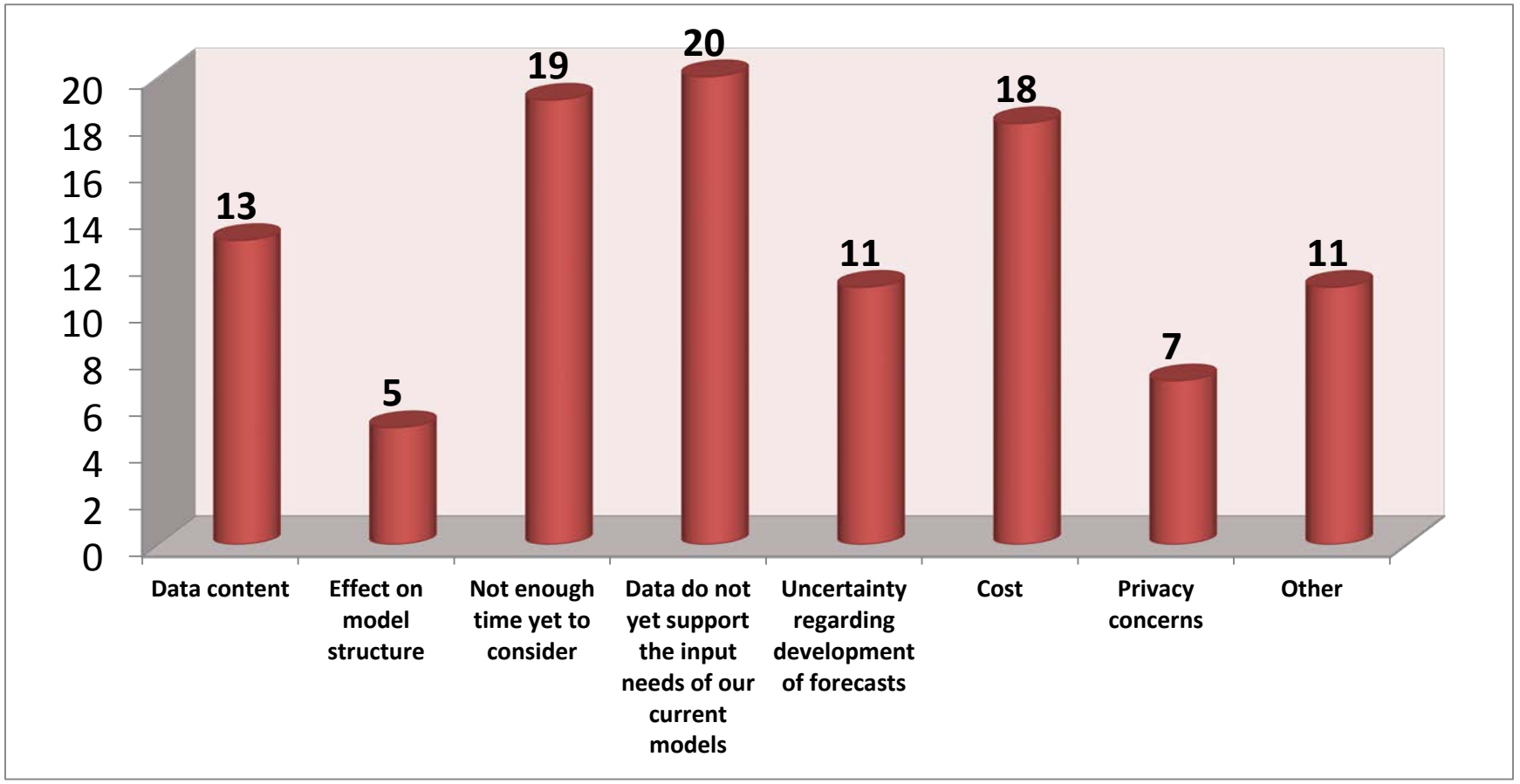
Passively Collected Travel Survey Data – Type



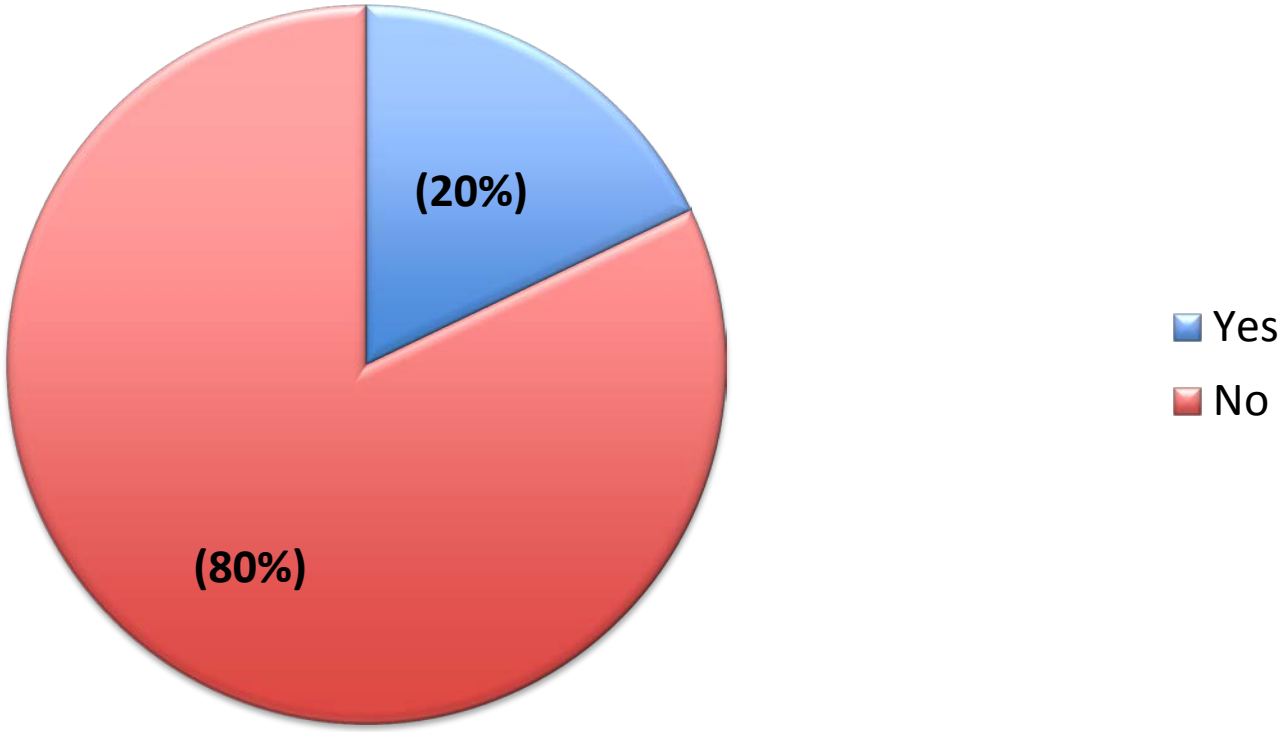
Passively Collected Travel Survey Data – Use in Travel Modeling



Passively Collected Travel Survey Data – Reasons/concerns for not to use



Passively Collected Travel Survey Data – Should provide the same info?



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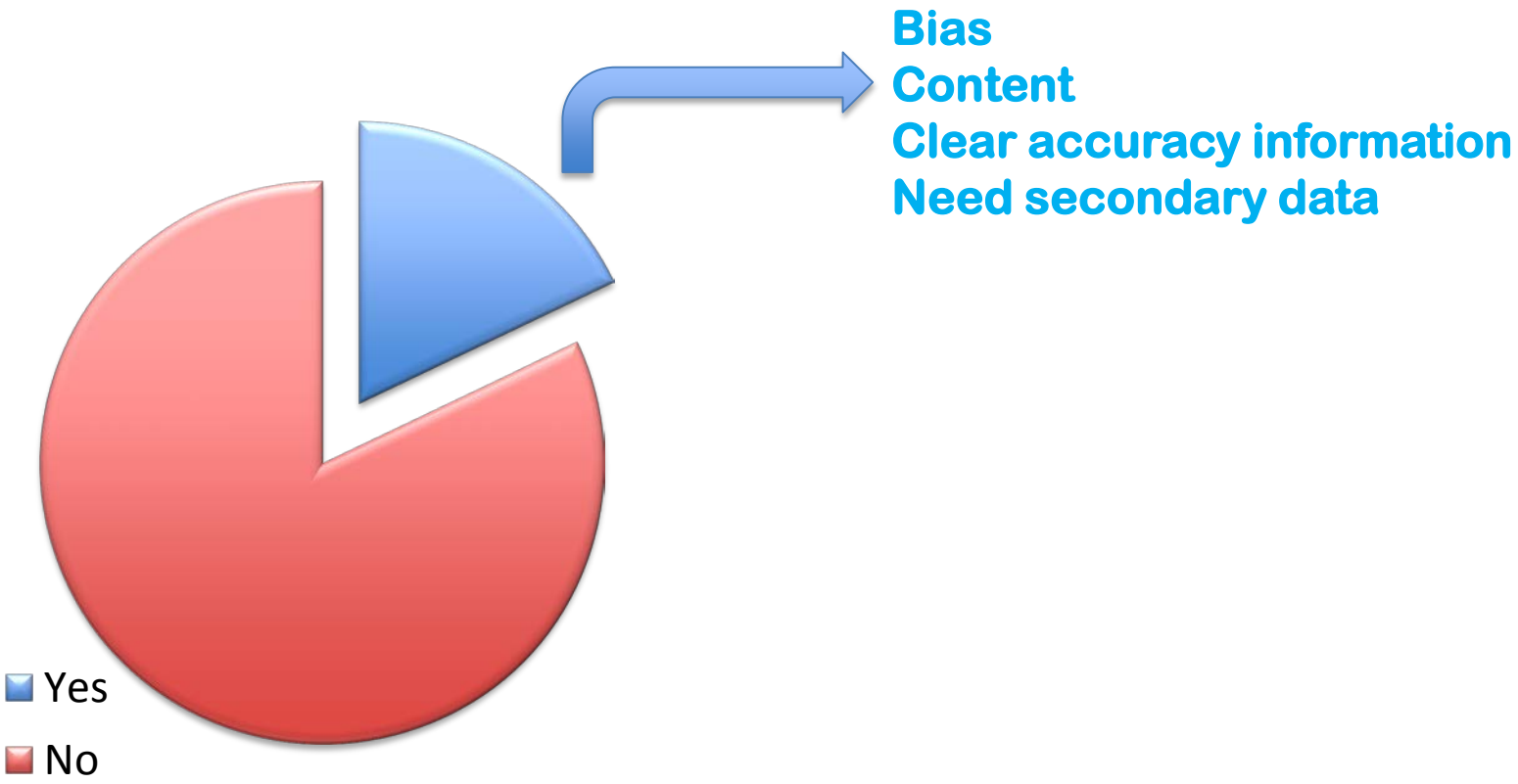

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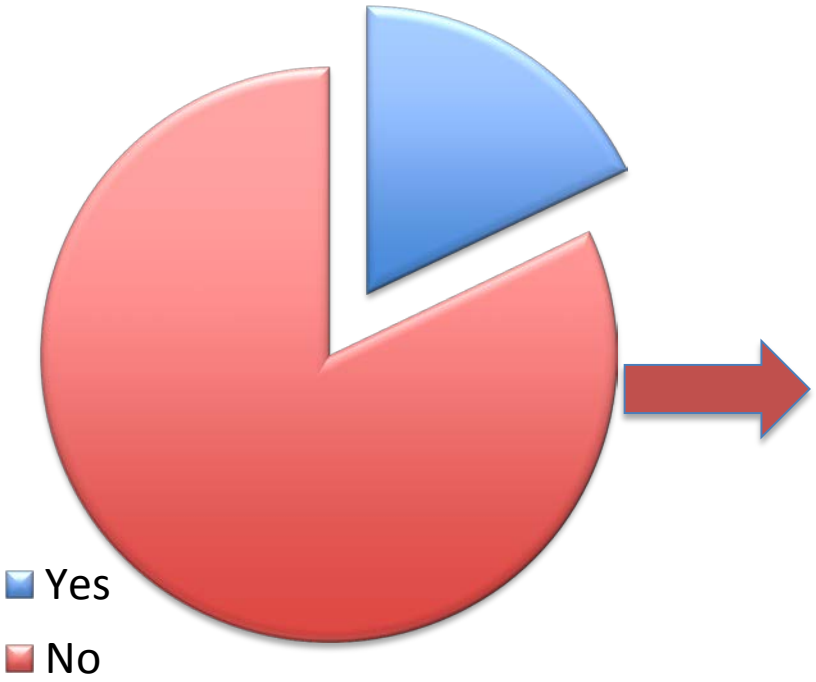

Additional data worth data loss
Supplemental use
Change to model development process

Current & Future Efforts

- Evaluate data content
  - Full or partial trips
  - Trip Chaining
  - Origin, Destination, Route, Mode Precision
- Data Characteristics
  - Evaluation of sampling bias
  - Data expansion

Current & Future Efforts

- Demonstrated use
  - Case studies
  - Proofs-of-concept
  - Small implementations
- Atypical demand
- Supplemental vs. exclusive use
- Continuous data collection

Current & Future Efforts

- GPS for HH Survey Data Collection
  - Accommodations
  - Implications for model development data
- Activity patterns from cell data
  - Studied as supplement
  - Evaluated data processing techniques/models for data imputation
- Comparisons of cell data to model & observed data
  - Aggregation improves comparability
    - Geographically
    - Time

Conclusions

- Passive data collection methods
  - Technology influences uses
  - Limitations of use
- Uses in modeling
  - Modeling of trip patterns, lengths, times
  - Mostly supplement traditional surveys
  - Hybrid uses
  - Some exclusive use as source for model development

Conclusions

- Increased Use through applications that
  - Evaluate data
    - Traditional data substitute
    - Data linkage and fusion
    - Establish traditional survey data statistics
- Potential enhancements by data collectors
- Potential direct access to data

Conclusions

- Increased Use through applications that
  - Capitalize on inherent advantages
    - Amount and variety
    - Elements of a continuous source
  - Non-traditional demand modeling
  - Evaluate use in forecasting contexts
  - Alternative model development methods

Thank You