



***Densely sampled Tracking  
Data (DTD)  
Some Applications and Challenges***

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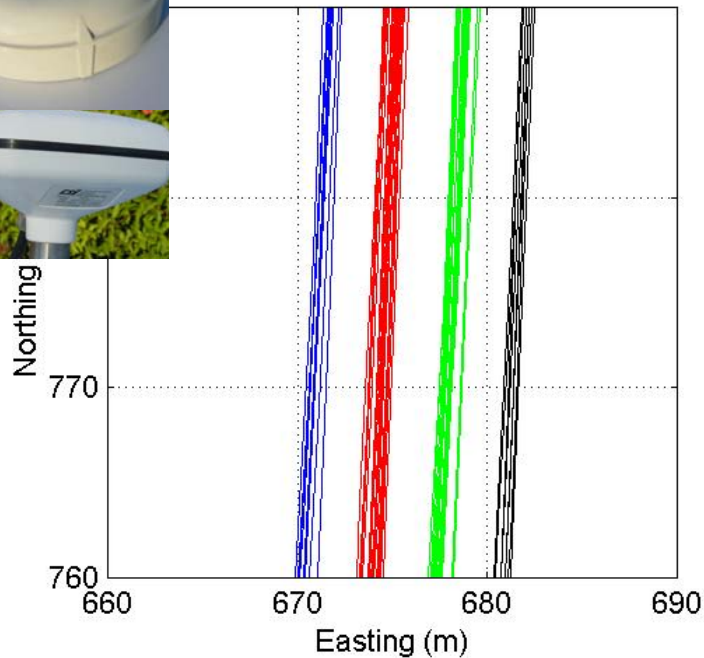
# Great GPS Mapping Challenge



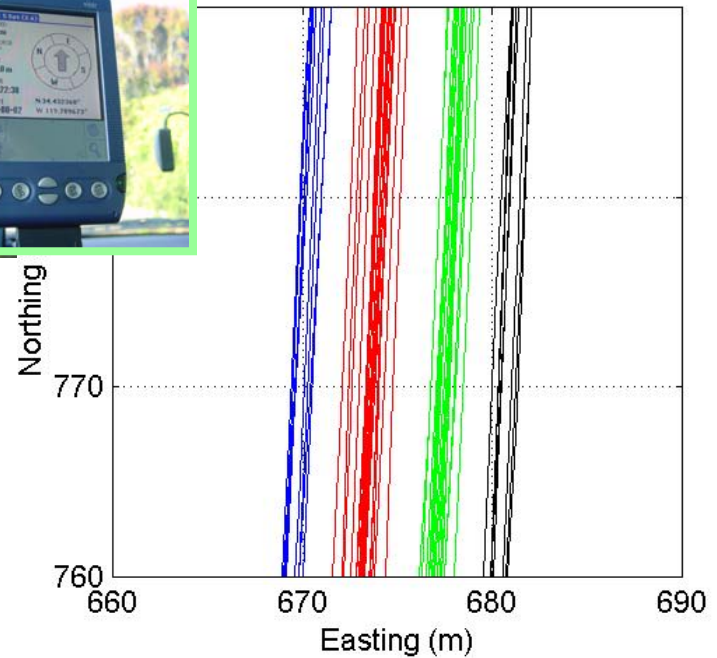
# \$2,000 D-GPS vs \$150 PDA-GPS



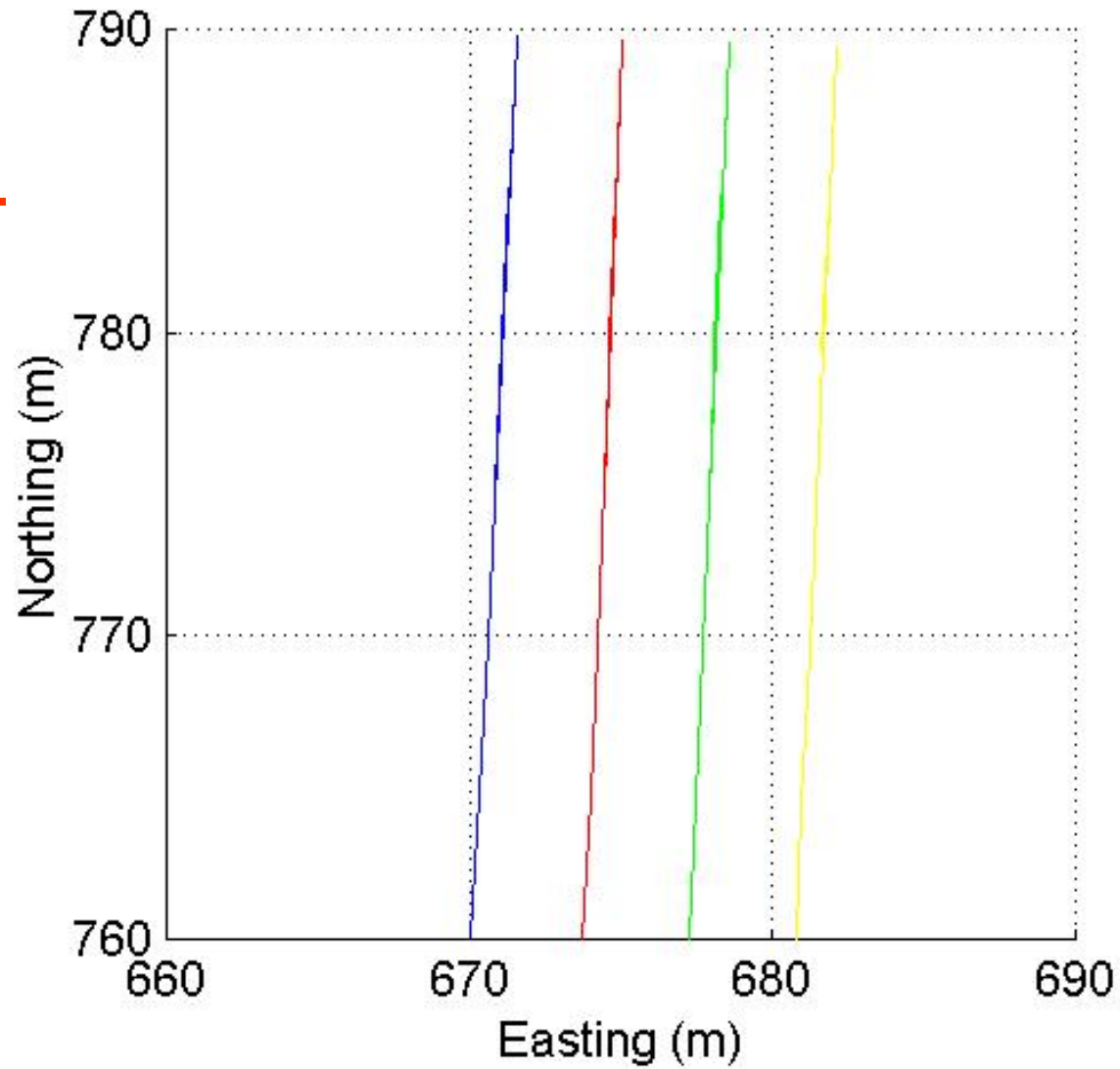
Trimble Placer GPS 400

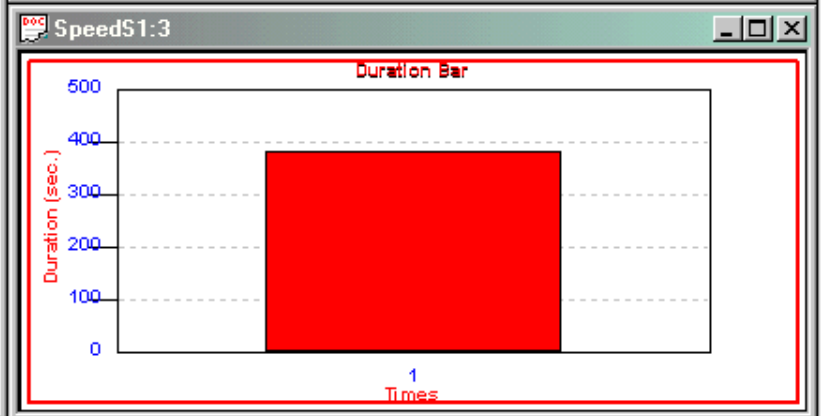
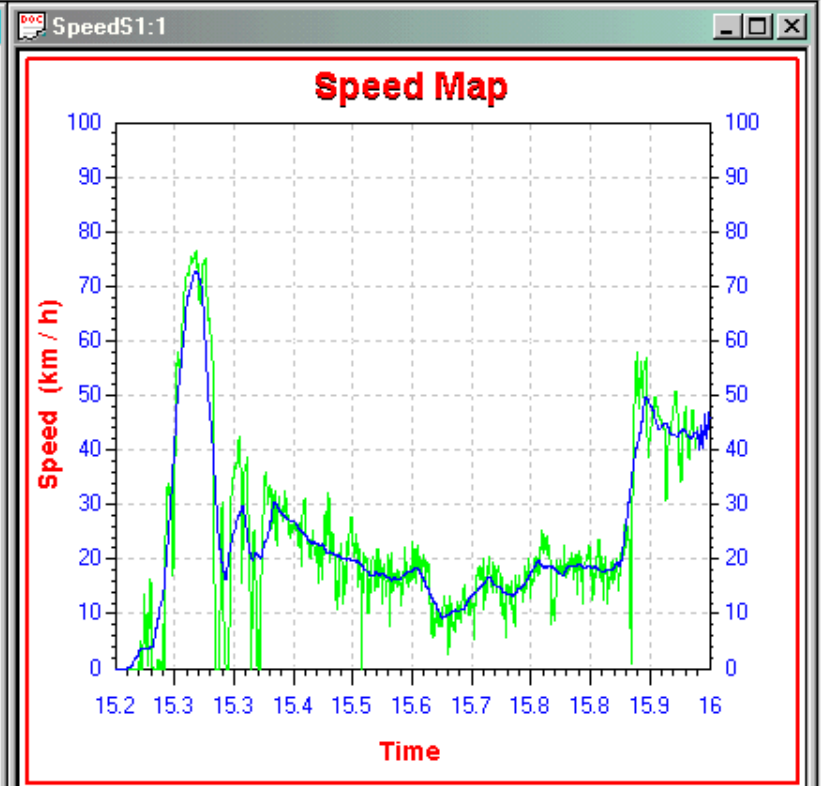
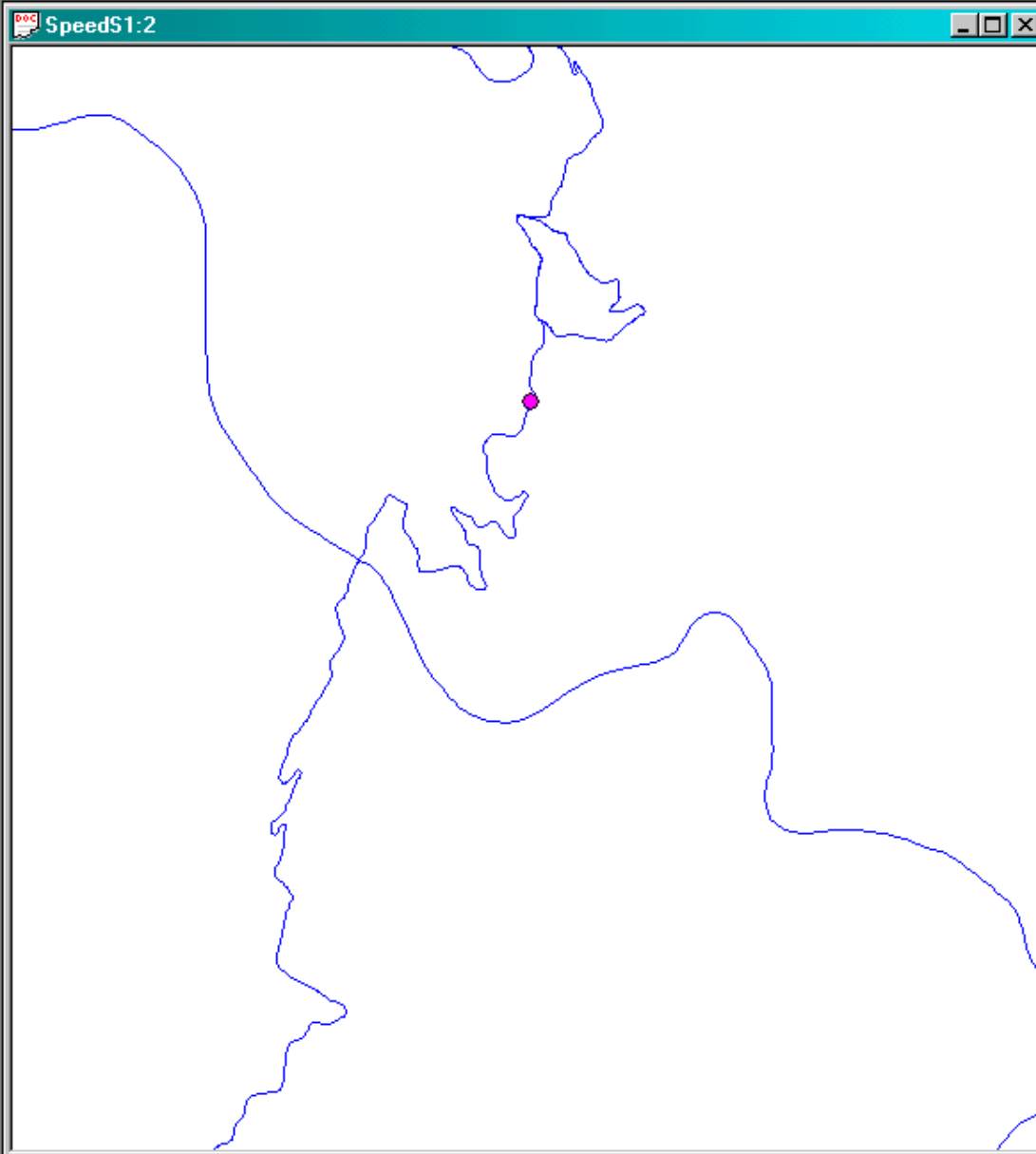


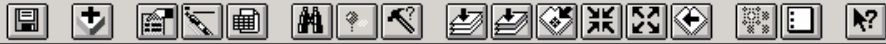
Ian GPS Companion for Visor



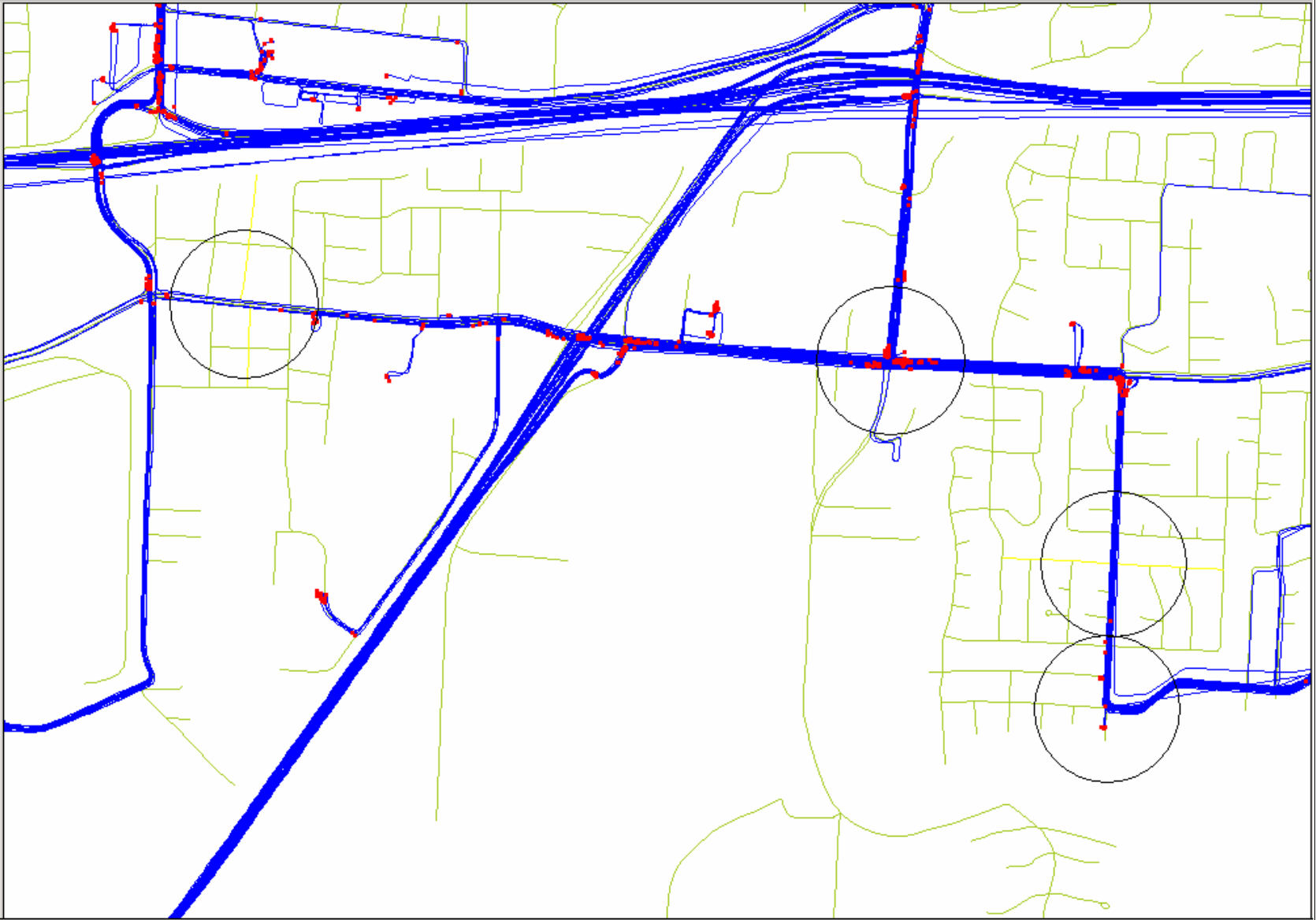
# Lane Center Lines

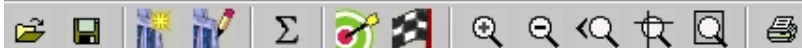






- Ospeed.shp
- Lk13.shp
- Lj1-39.shp
- Li1-17.shp
- Lh21-38.shp
- Lh1-20.shp
- Lg13-22.shp
- Lf3-7.shp
- Le24-42.shp
- Le1-20.shp
- Ld53-70.shp
- Ld33-50.shp
- Ld1-23.shp
- Lc1-20.shp
- Lb4-28.shp
- Lb31-57.shp
- La77-100.shp
- La103134.shp
- Datag.shp





# Retail Forecasting

Where will Joe buy shoes?

- “Nearest” store
- Utility-maximizing choices: attraction/distance ... gravity/Huff model
- Distance from where?

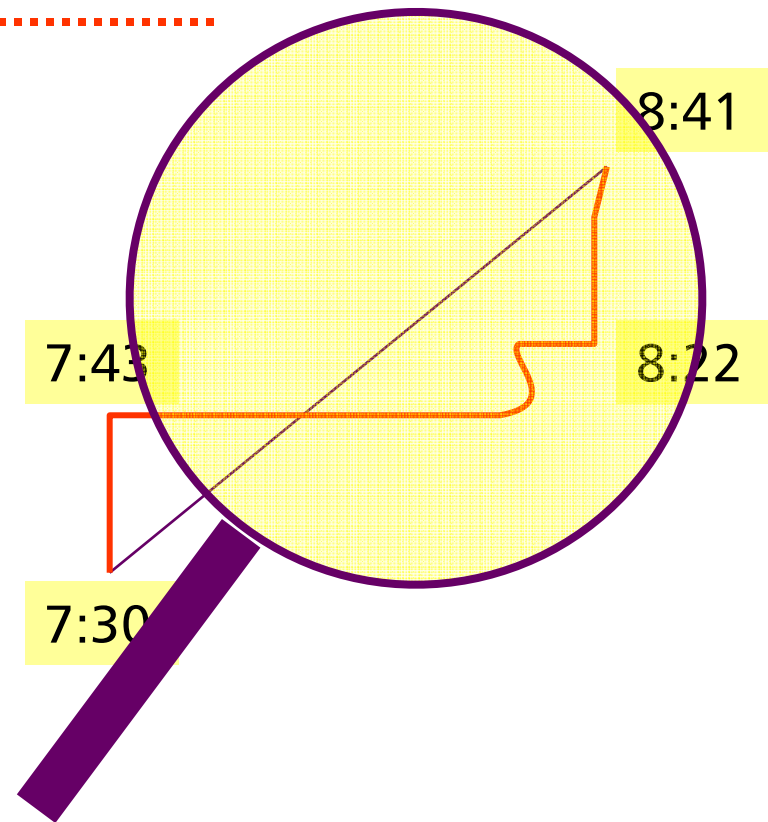
$$P(j | S) = \frac{A_j^\alpha f(d_{ij})}{\sum_{k \in S} A_k^\alpha f(d_{ik})}$$





# Distance

- Straight line
- Network-routed
- GPS-calibrated
- Perceived





# *DTD in Retail*

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Beyond the ATM/transaction record

- Field of Habitual Experience: sort of a Time-Space Prism w/ a spatial awareness component?
- Frequency of visitation (big-ticket)
- Chaining the shopping trip
- Impulsive choices: where, how often?







# *Microscopic DTD*

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- Data
  - Segment times, congestion
  - Intersection delays and queueing
  - Intra-segment behaviors
- Applications
  - Road hazards
  - Familiarity, decision making





# *Technical Challenges*

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- Accuracy: getting worse?
- Power and the lukewarm start
- Data integration: continuity of ( $\Lambda, T$ )
  - Remote sensing
  - Loop detectors





# *Privacy Issues*

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- Coarsening data: residual use?
  - Variety of applications very broad
- Spoofing data ... de-spoofing data
- If we accept cookies, prepare to get tracked





*Thank you!*

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Questions?

