Session--*Performance Measures Matter: Tips and Techniques for Collecting & Leveraging Bike/Pedestrian Data*

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the science of insight

Presentation—*A Transportation Forecasting View of Bicycle & Pedestrian Data*

Jeff Frkonja (RSG)

March 15, 2014

Agenda

- Different Perspectives on Active Transport Data
- How Travel Forecasting Views the World
- Data from which Forecasting forms its Views
- A Vision of an Active Transport Data Program

Stars mark links to useful resources or examples

RSG creates data, models, and analytics to support good decision-making
http://www.rsginc.com/

Perspectives on AT Data

SAFETY

"EXPOSURE" -- SYSTEM LEVEL

How many bicyclists and pedestrians?

How many vehicles?

What physical design features and environmental conditions?

Ped/Bike Data Needs for Safety

- Pedestrian*
  - Total Daily Two-Way Pedestrian Count/Exposure
  - Crossing Pedestrian Count/Exposure
  - Sidewalk Presence
  - Crosswalk Presence/Type
  - Intersection/Junction Geometry
  - Type of Intersection/Junction
  - Pedestrian Signalization Type
  - Pedestrian Signal Special Features
  - Circular Intersection - Pedestrian Facility
  - Circular Intersection - Crosswalk Location
- Bicycle*
  - Bicycle Count/Exposure
  - Presence/Type of Bicycle Facility
  - Width of Bicycle Facility

*Based on FHWA Model Inventory of Roadway Elements (MIRE) http://www.mireinfo.org/

Slide Courtesy of Nancy Lefler

Health

American Heart Association.
life is why™

EPIDEMIOLOGICAL/POPULATION LEVEL

How Much Physical Activity?

- Walking, Walking to Transit, Bicycling

What Promotes Physical Activity?

- Personal Interventions ("…my doctor says…")
- Environmental Interventions (urban and building forms that promote active behavior)
- Attitudes

http://www.heart.org/HEARTORG/GettingHealthy/PhysicalActivity/Physical-Activity_UCM_001080_SubHomePage.jsp

Travel Forecasting

What does Travel Forecasting Tell Us?

What places PRODUCE trips?
What places ATTRACT trips?
HOW MANY TRIPS produced/attracted?

What is the DESTINATION of each trip?
What is the ORIGIN of each trip?

By what MODE are trips made?

By which ROUTES are trips made?

From a safety perspective:

- HOW MANY bicyclists and walkers
- WHERE they are in the system
- HOW MANY vehicles are around
- on what FACILITIES

- ULTIMATELY: HOW MANY INCIDENTS?

For forecast "scenario" (= supply characteristics plus demand characteristics)

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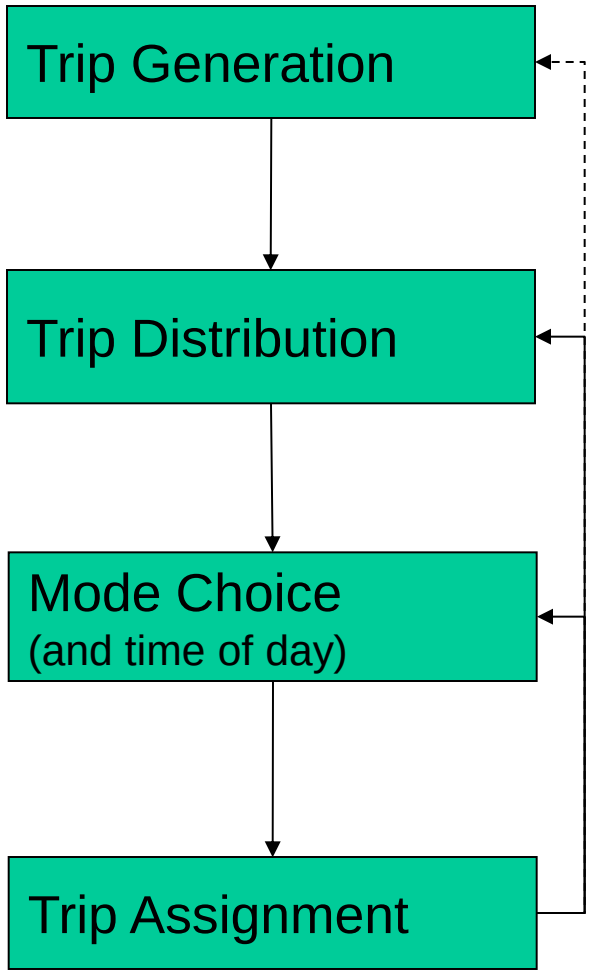
Generic Model Software Flowchart



For forecast "scenario" (= supply characteristics plus demand characteristics)

From what is model built?

Real peoples' travel behavior

Household Travel Survey

- From Where? To Where? = Origin/Destination
- When? = Departure/Arrival Time
- Why? = Purpose
- How? = Mode
- Who are you? = Age, gender, income, etc.

…GPS augmented…

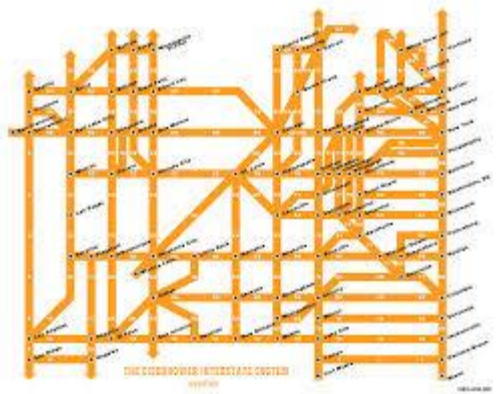
- By what route? = Path (route)

Observed System and Land Use Data

- Traffic Counts
- Transit Surveys/Boardings
- Bike/Ped Counts
- Census/ACS/CTPP
- Employment Data
- Urban Form

“Supply” Data

- Roads
- Bike Trails
- Buses
- Trains
- Ferries
- Sidewalks



Statistics

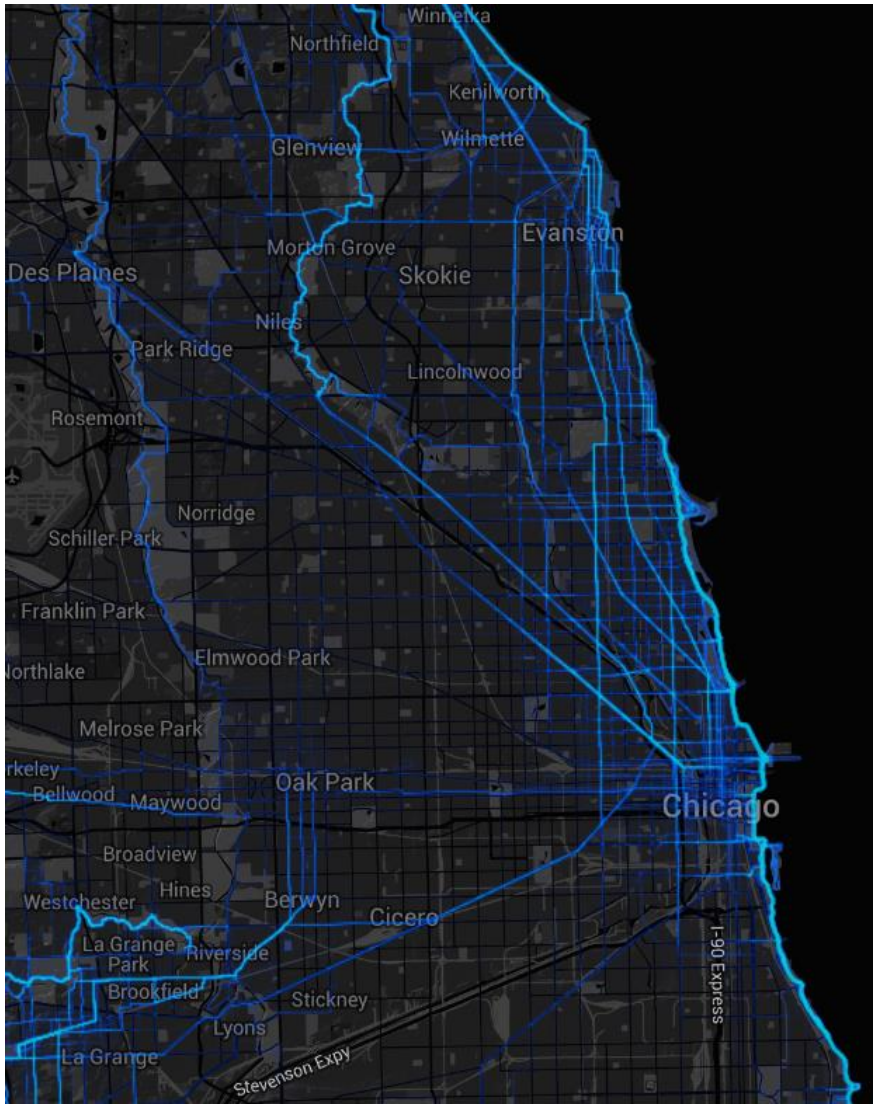
$$Prob(y_{iN}=1) = \frac{\exp(v_{iN})}{\sum_{j \in U} \exp(v_{jN})}$$

- …but don't fret about the math: *statistics simply help us understand observed data in ways that let us estimate or forecast situations we can't observe directly.*

From what is model built?

“CrowdSourced” Route Data

- CycleTracks
- http://www.sfcta.org/modeling-and-travel-forecasting/cycletracks-iphone-and-android
- Strava
- http://labs.strava.com/



Travel Forecasting Data Needs

Forecasters Want it All…

TRANSPORTATION RESEARCH BOARD

BICYCLE & PEDESTRIAN DATA SUBCOMMITTEE DATA FRAMEWORK

Travel Monitoring

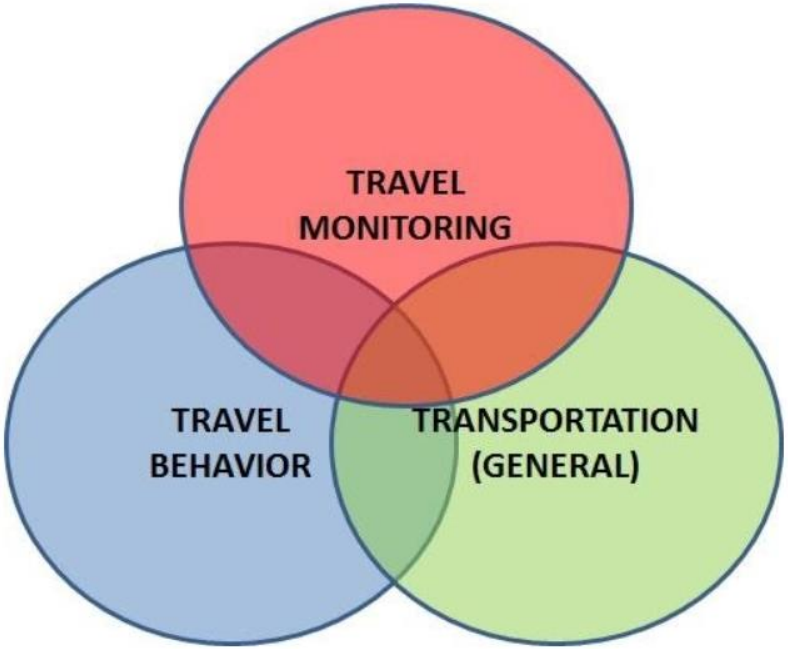
- Bike Counts
- Ped Counts
- Vehicle Counts

General Transport

- System Supply
- Facility Design/Geometry

Traveler & Travel Characteristics

- Demographics
- Trip Purpose
- Home and Destination Locations



Supply & Land Use Data

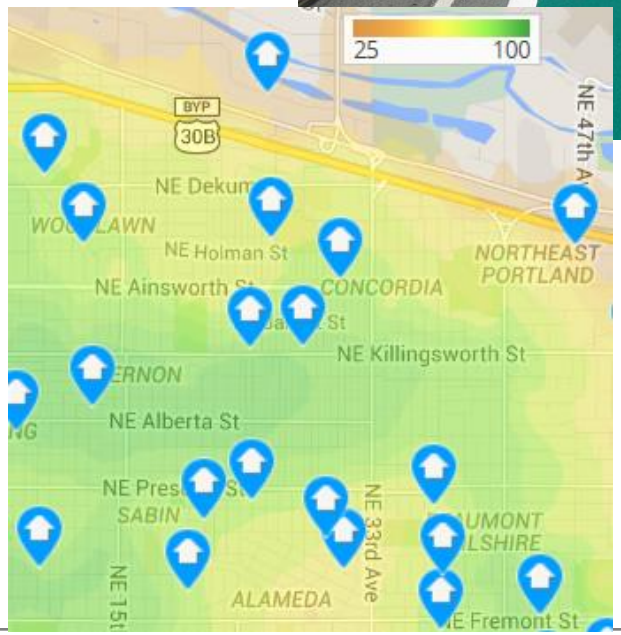
FOUNDATION UPON WHICH ALL OTHER DATA REST

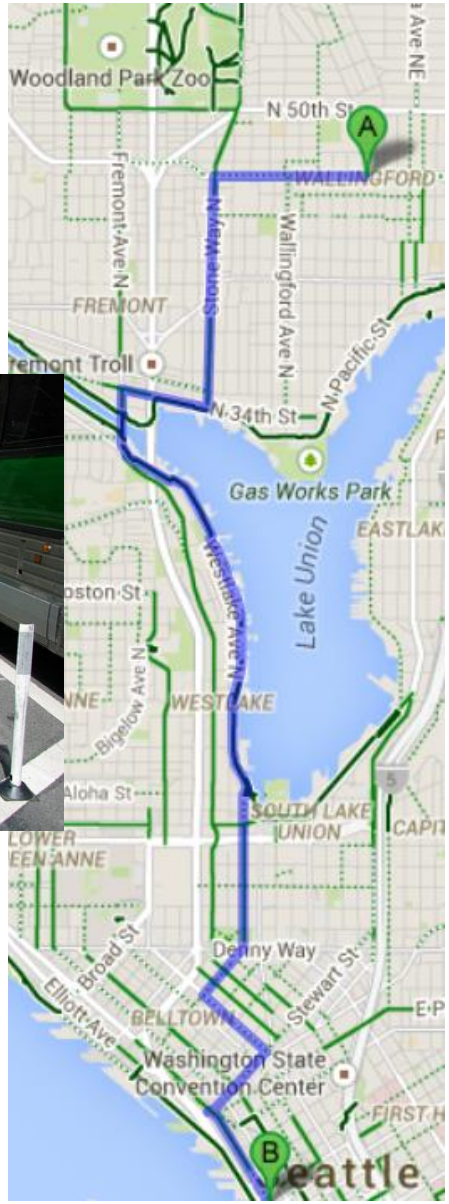
Framework

- Where travelers can be
- What facility type
- What geometry

Surroundings

- Places to Live
- Places to Go
- Streetscape





https://www.walkscore.com/

Behavioral Data

If Travel Mode = bike

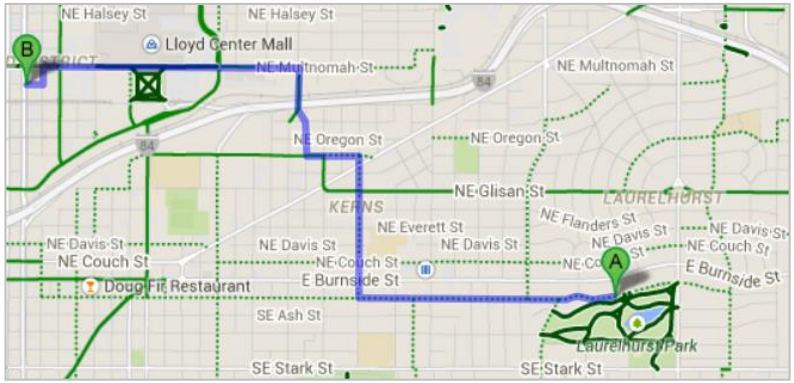
Please tell us about <Name>'s trip from Home to Son's daycare.

Viewing trip **1** of 11 total trip(s).

Time departed from Home:	7:15 AM
Time arrived at Son's daycare:	7:35 AM
Main purpose of trip	Go to school/childcare
Main way traveled on trip:	Bicycle
<if bike> Did you travel on an off-street path and/or designated bike lane during this trip?	Select… ▼

Surveys

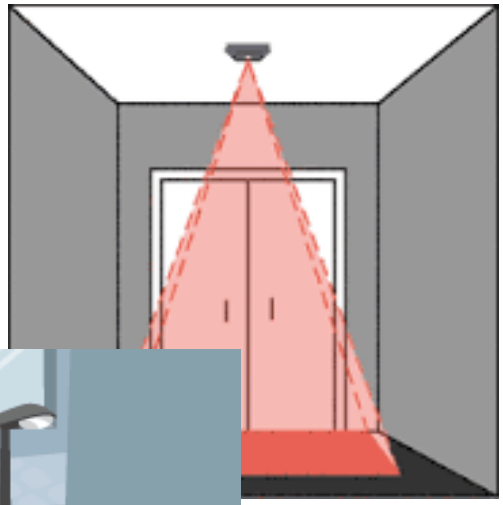
- Household Travel Diary
- Transit (or other mode) Origin-Destination
- Spatially-enabled Route Choice
- **See your region's Metropolitan Planning Organization site, or the NHTS**



National Household Travel Survey: http://nhts.ornl.gov/

Monitoring Data

AKA “SYSTEM PERFORMANCE” DATA



Counting People and Bicycles

- How many
- When

Challenges

- Target Identification
- Geographic Coverage
- Variability

Lower Image Courtesy Eco Counter (http://www.eco-compteur.com/)

Monitoring Data

EXAMPLE AGENCIES

Delaware Valley Regional Planning Commission

- Metropolitan Planning Organization
- **http://www.dvrpc.org/Traffic/**

Colorado State Department of Transportation

- State DOT
- **https://data.colorado.gov/Transportation/Colorado-Bike-and-Pedestrian-Count-Data/55wz-dapi**

Portland State Transportation Research and Education Center

- Academic Research
- **http://trec.pdx.edu/about/#1586/Bicycles_and_Pedestrians**

Monitoring Data

TIP: STRIVE FOR LONGITUDINAL, CONTINUOUS COLLECTION

TIP: COVERAGE IS IMPORTANT BUT ONLY WITH GOOD OBSERVATIONS

Portland

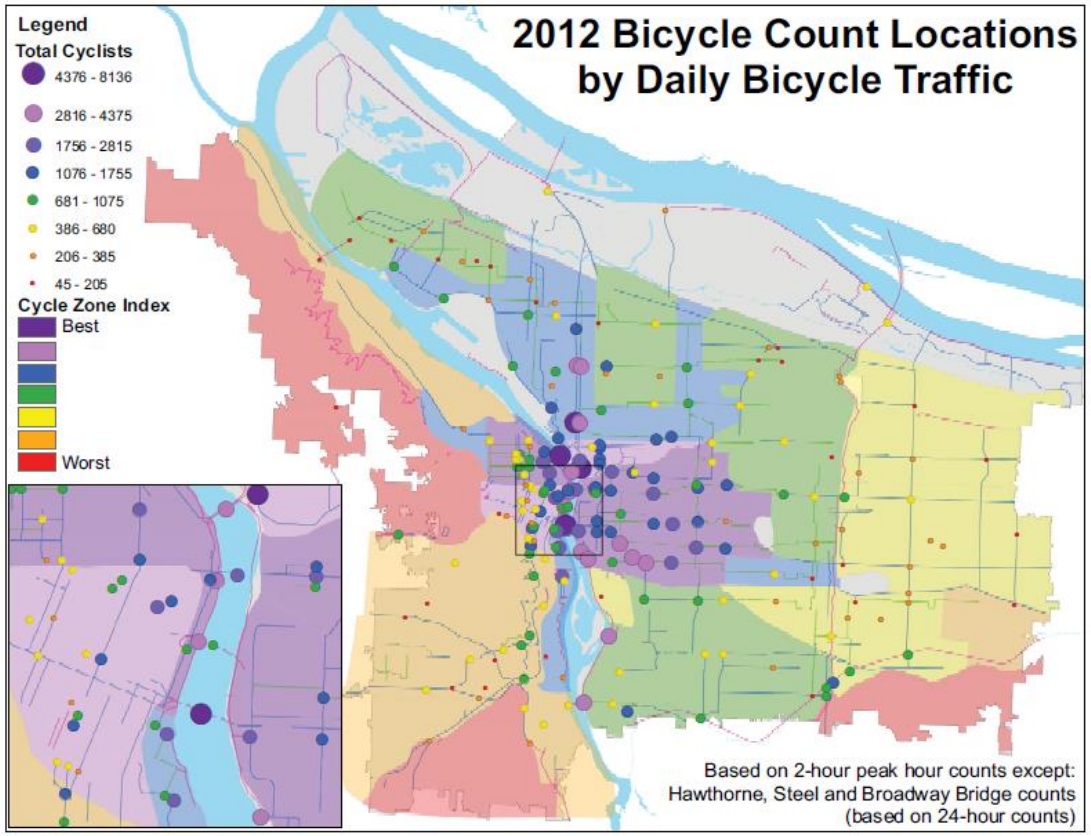
- Longitudinal (multi-year)
- https://www.portlandoregon.gov/transportation/44671

Variability

- Continuous Counts
- Seasonal
- Random
- Daily

Coverage

- System-wide
- Choke points



Map: PORTLAND BICYCLE COUNT REPORT 2012. City of Portland. 2012

Monitoring Data

A Hope: Data Standards and Data Sharing

FHWA-Travel Monitoring Analysis System (TMAS)

- National Framework
  - http://www.fhwa.dot.gov/policyinformation/travelmonitoring.cfm
- Standard Data Format—Travel Monitoring Guide (TMG)
  - http://www.fhwa.dot.gov/policyinformation/tmguide/
- Data that feeds the Highway Performance Monitoring System
- Bicycle and Pedestrian data standards & storage added or being added

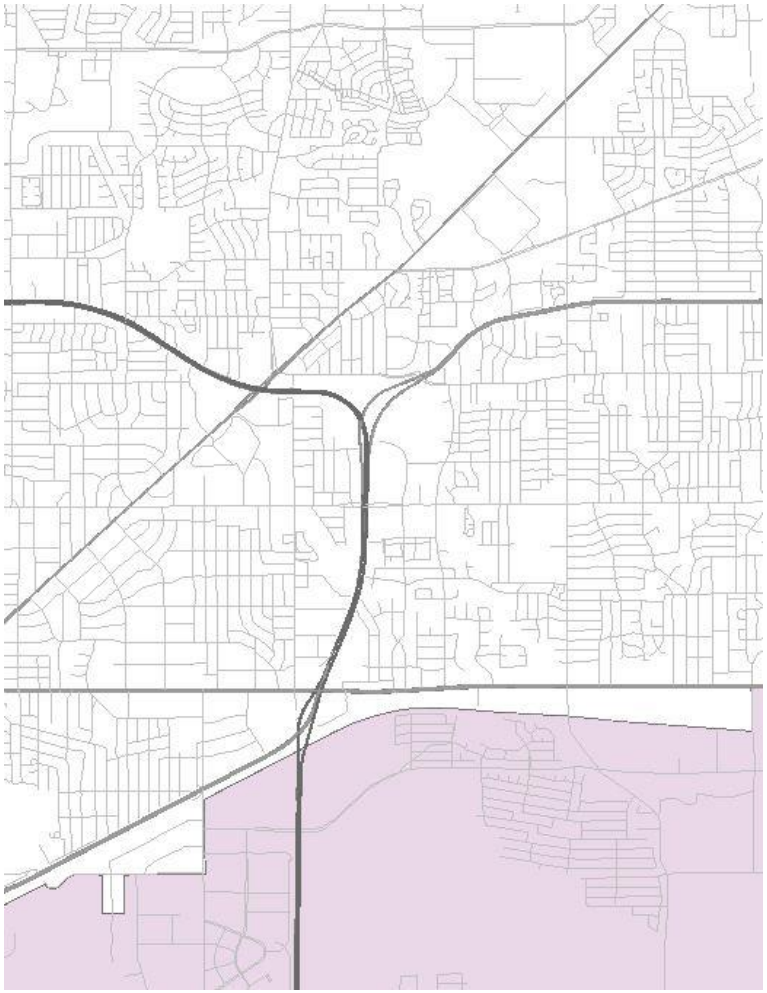
Challenges

- Data compatibility
- Data quality

A Vision for Active Transport Data

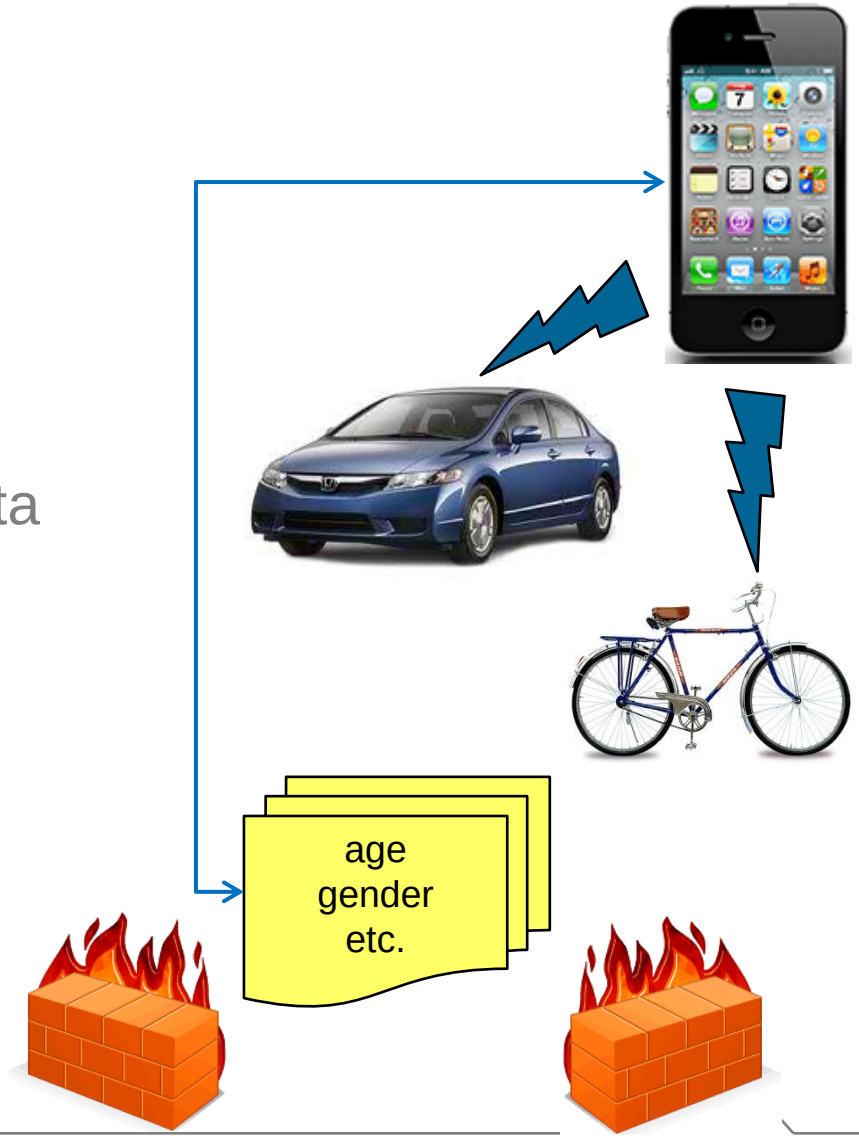
Envision the Ideal Data System…

- Register to a common reference: GIS-based network and land use
- Core of common (but extensible) collection, QC/QA, exchange, and storage protocols
- System and data interoperability (perhaps via Regional ITS Architecture?)



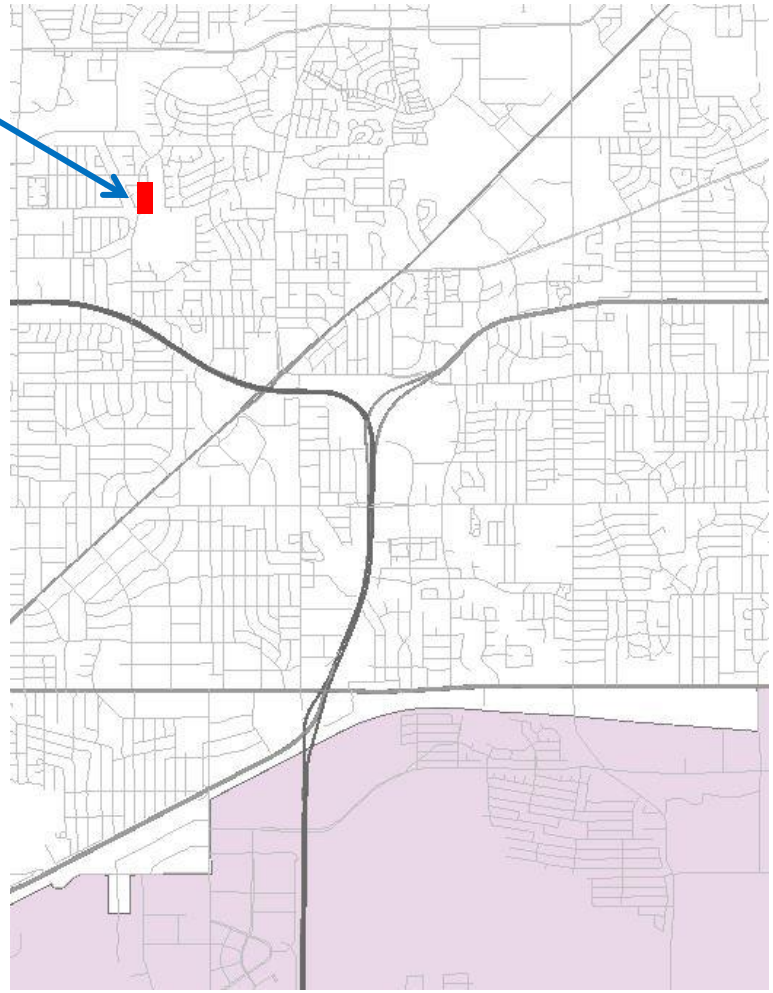
Let's imagine, for a moment…

- All travelers have personal GPS-enabled device
- "Smart" device talks to "smart" vehicle/bicycle to ID mode used, number of occupants
- Device can be related to "anonymized" socio-economic data about user
- Privacy protections are in place and robust
- Public agencies can sample data when needed (without invading privacy)



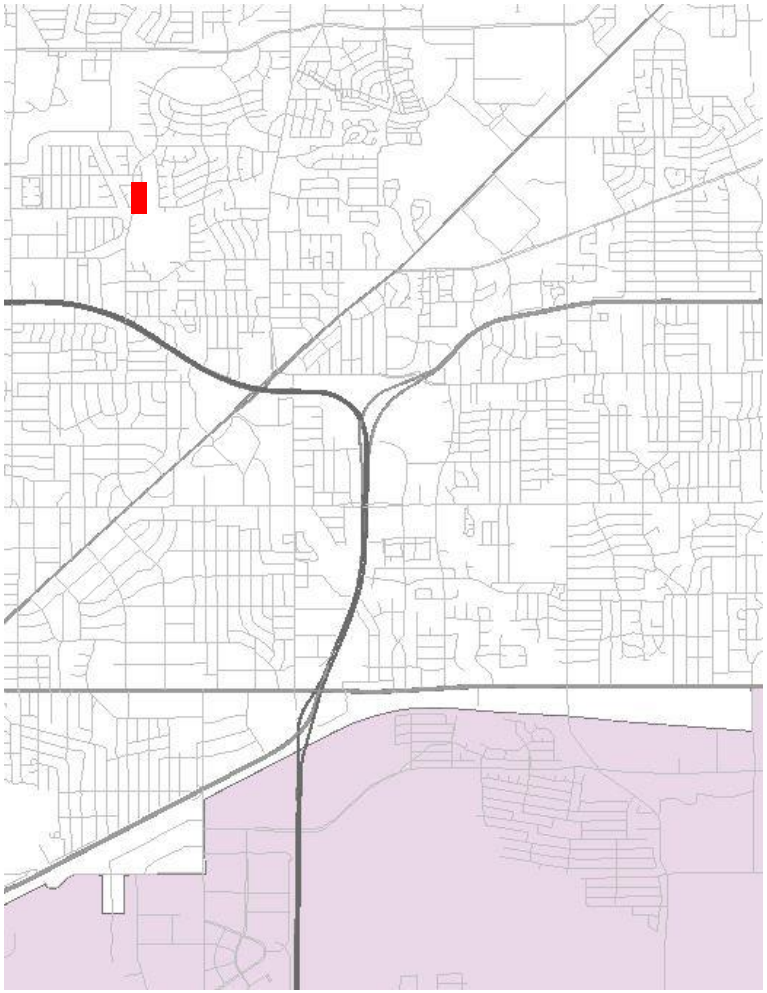
What could we know?

- Pick a facility, any facility…
- …in our GIS-based reference system.



What could we know?

- How many bicyclists (or motorists, or transit riders, or…) on given date/time?
  - System Performance (counts)



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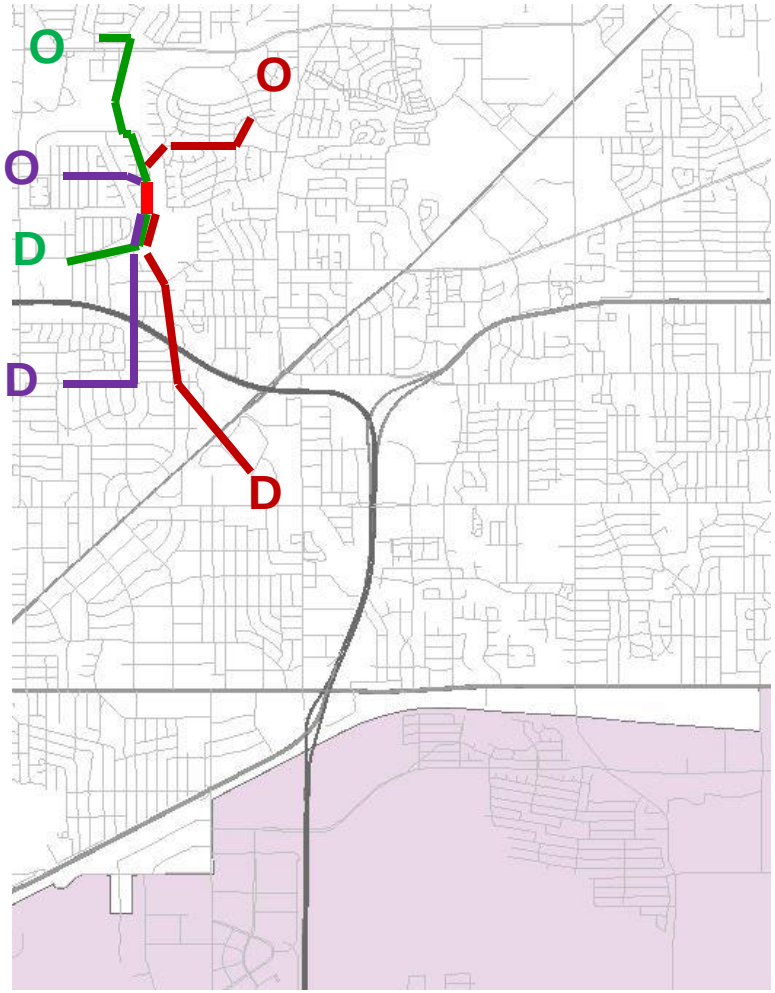
- Where are those cyclists coming from? Going to? By what path? Why?
  - Traveler behavior (survey)



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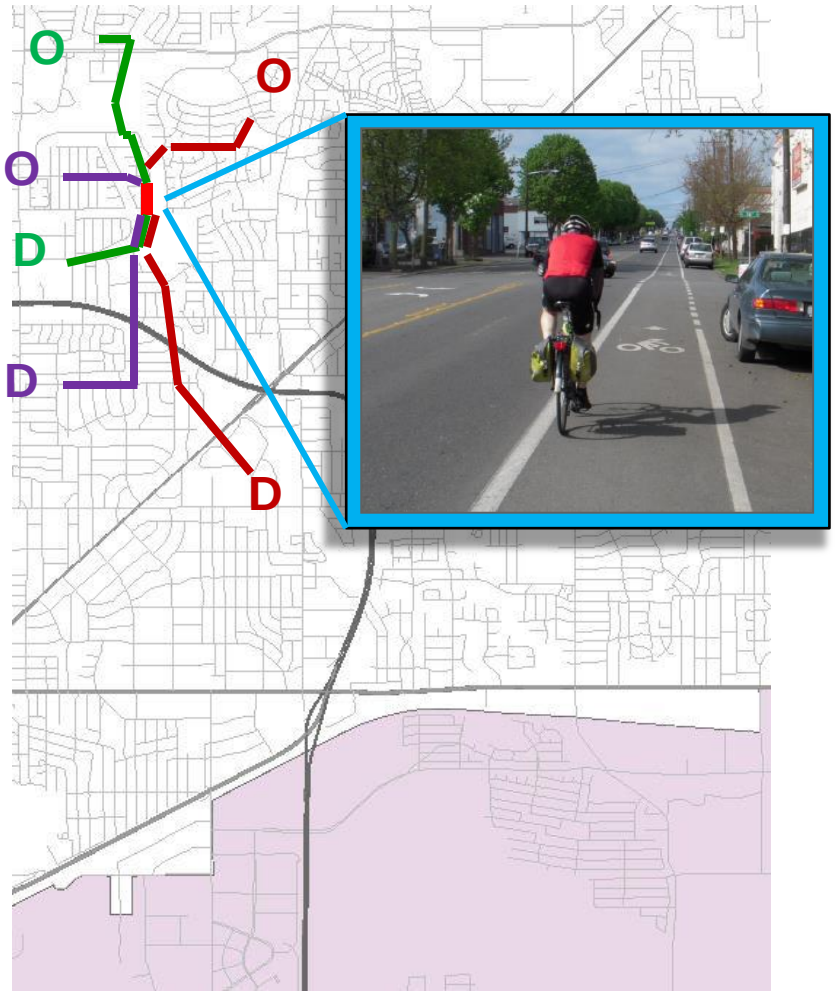
- How many bicyclists (or motorists, or transit riders, or…) on given date/time?
  - System Performance (counts)
- Where are those cyclists coming from? Going to? By what path? Why?
  - Traveler Behavior (survey)
- Does the facility have bike lanes? Good pavement conditions? Bike-actuated signals? History of accidents?
  - General Transport Data (system characteristics, safety)



Concluding Thoughts

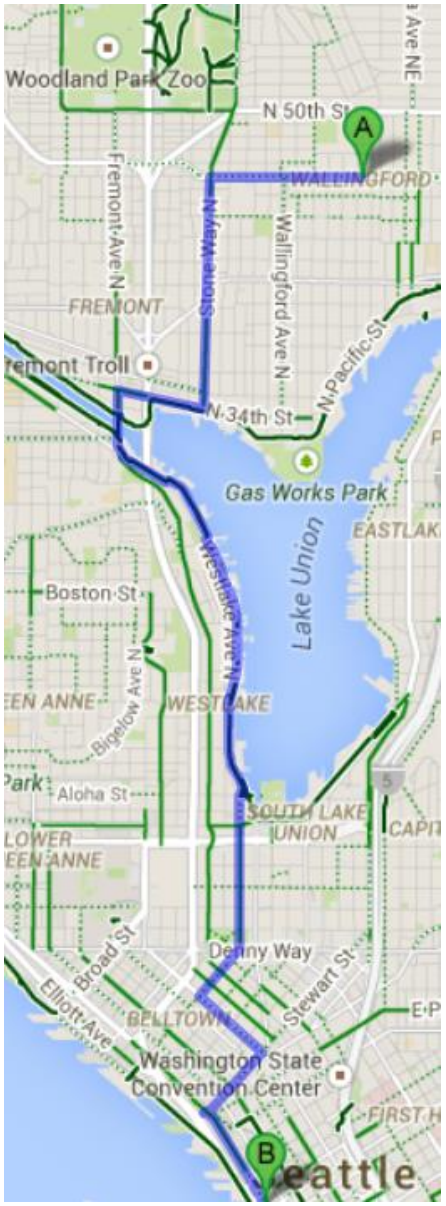
Plan Thoughtfully for Data Collection

Preparation

- Pedestrians & Bicycles are Different
- Continuous/Longitudinal Monitoring/Counting
- Be “in” for the long haul—have an evolution strategy

Coordination

- Data will be collected by different agents/agencies
- Look for synergies
- Seize and Create opportunities



Thank You!

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