Beyond GPS and traditional time-geography issues

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Problem 1

- Data intensive approaches over VERY long periods → HUGE Respondent Burden
- Try to eliminate obvious, trivial, and easily derived information
- Develop devices that provide supplementary data

The HATO Device

FIGURE 2 Exterior view of BCALS

TABLE 1 Data to be acquired

Data (Numerals indicate geographic points of observation.)	Bytes
X-axis acceleration (32 Hz)	2
Y-axis acceleration (32 Hz)	2
Z-axis acceleration (32 Hz)	2
Atmospheric pressure sensor (32 Hz)	2
Angular velocity (32 Hz)	2
Ultraviolet ray (32 Hz)	2
Direction (32 Hz)	2
Sound (10 Hz)	2
PS location (latitude, longitude, altitude, velocity, direction) (1 Hz)	23
Elliptical error of GPS location measurement	15

88-day continuous recording (battery duration: about 3 days)

OS is TRON (activity identification programs can be embedded/rewritten in C)

Signatures (locations)

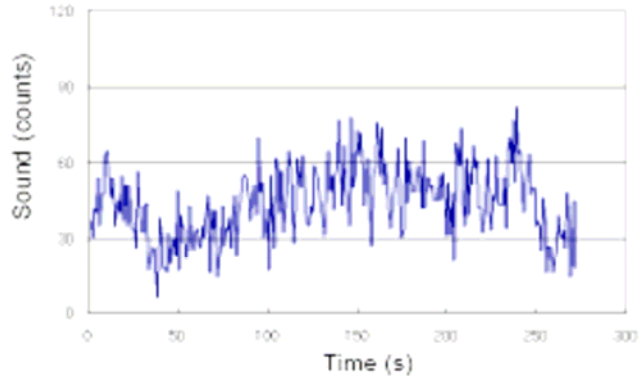
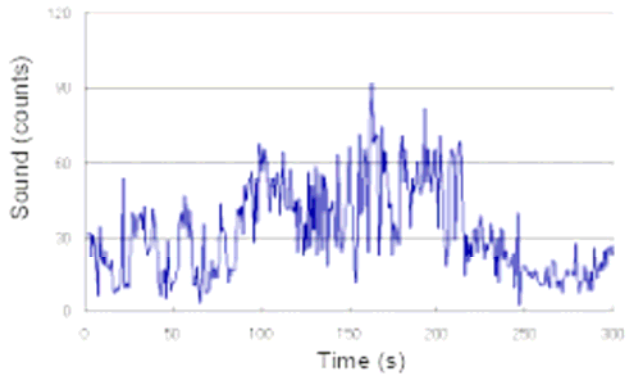


FIGURE 5 Drugstore



• • • FIGURE 6 CD shop

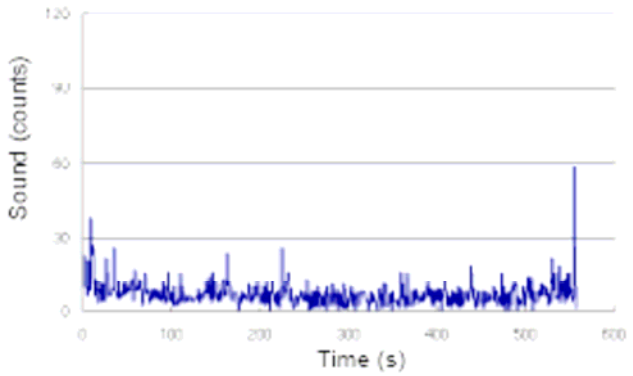


FIGURE 7 Bookstore

• • • FIGURE 8 Laboratory

Signatures (modes)

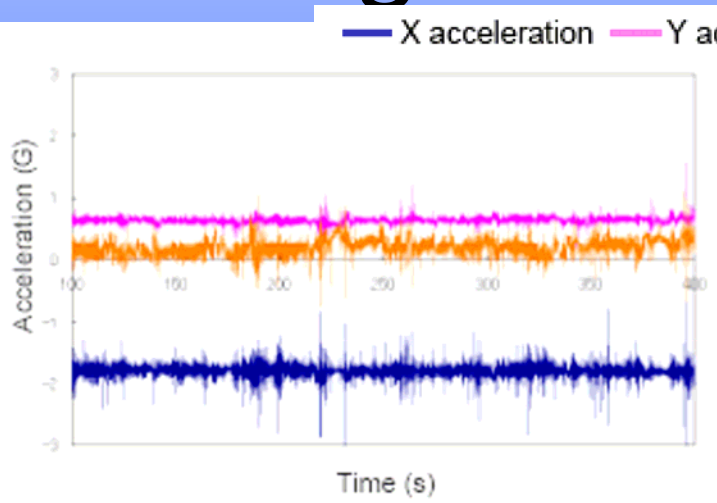


FIGURE 11 Acceleration data of motorbike travel

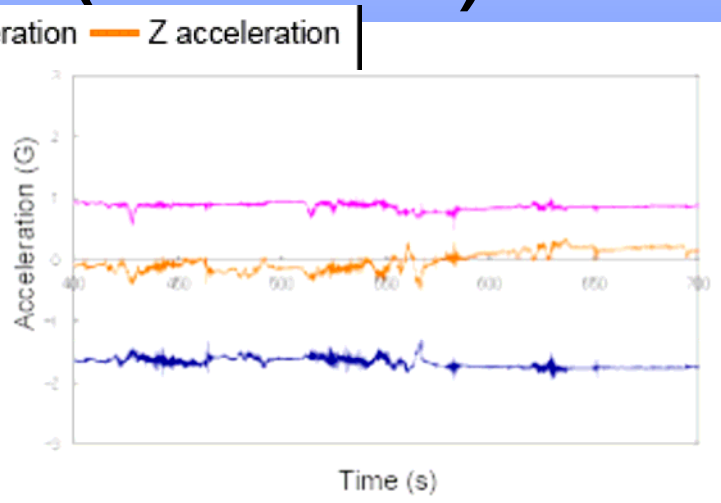


FIGURE 12 Acceleration data of automobile travel

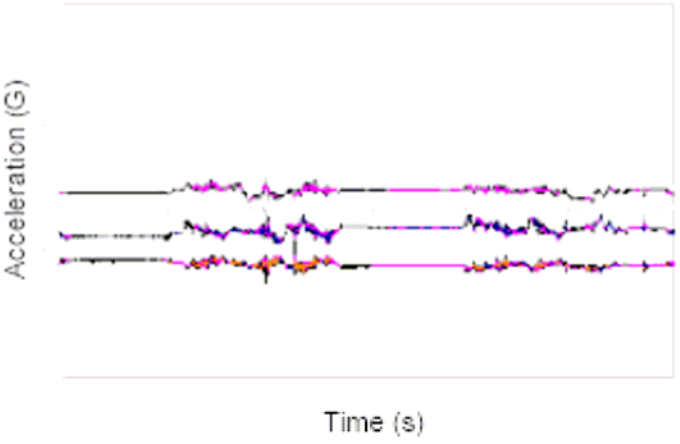


FIGURE 13 Acceleration data of bus travel

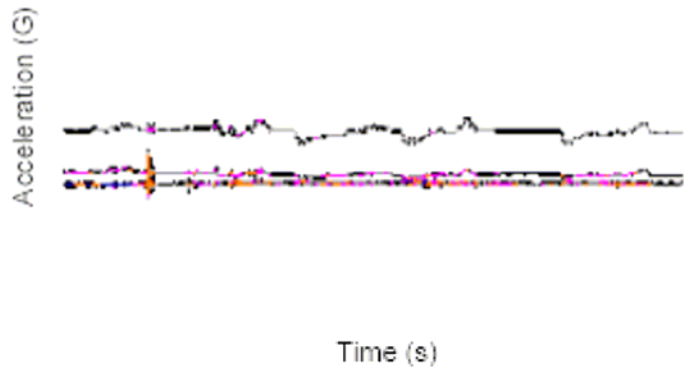


FIGURE 14 Acceleration data of train travel

Signatures (non-motor modes)

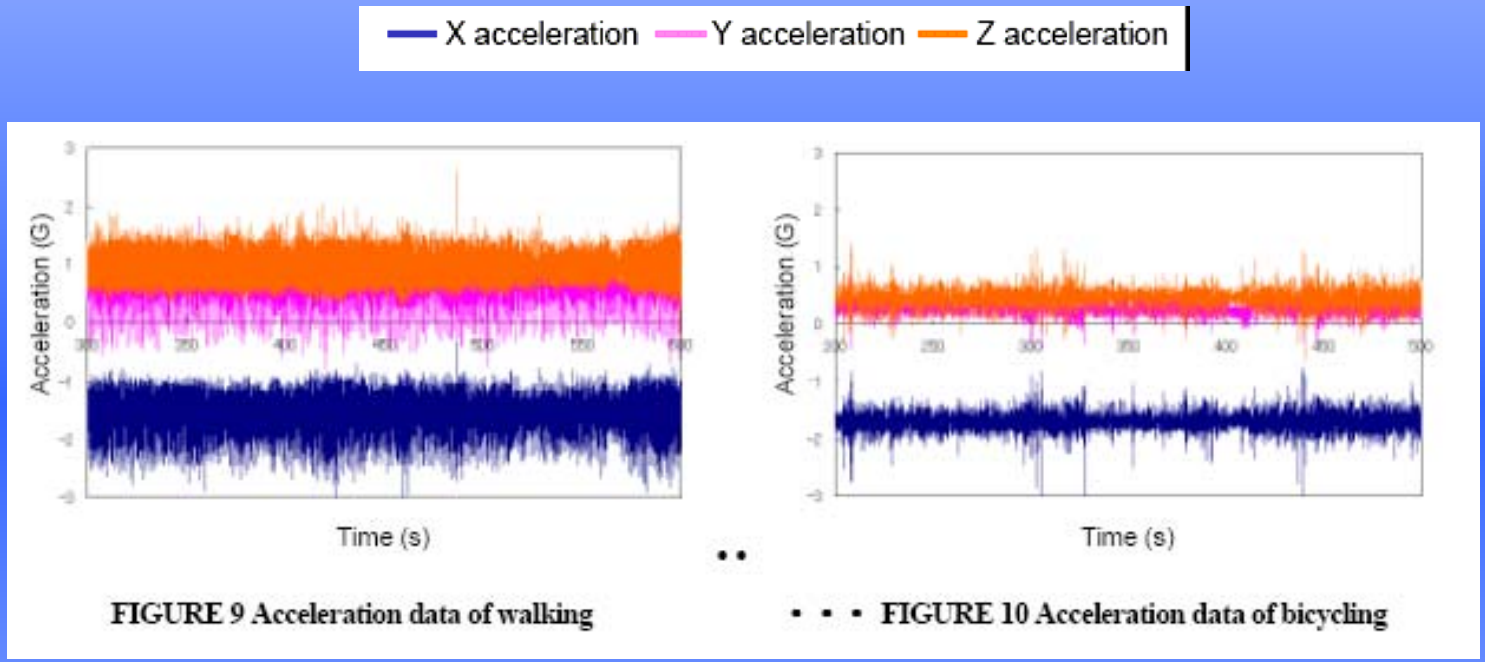


FIGURE 9 Acceleration data of walking

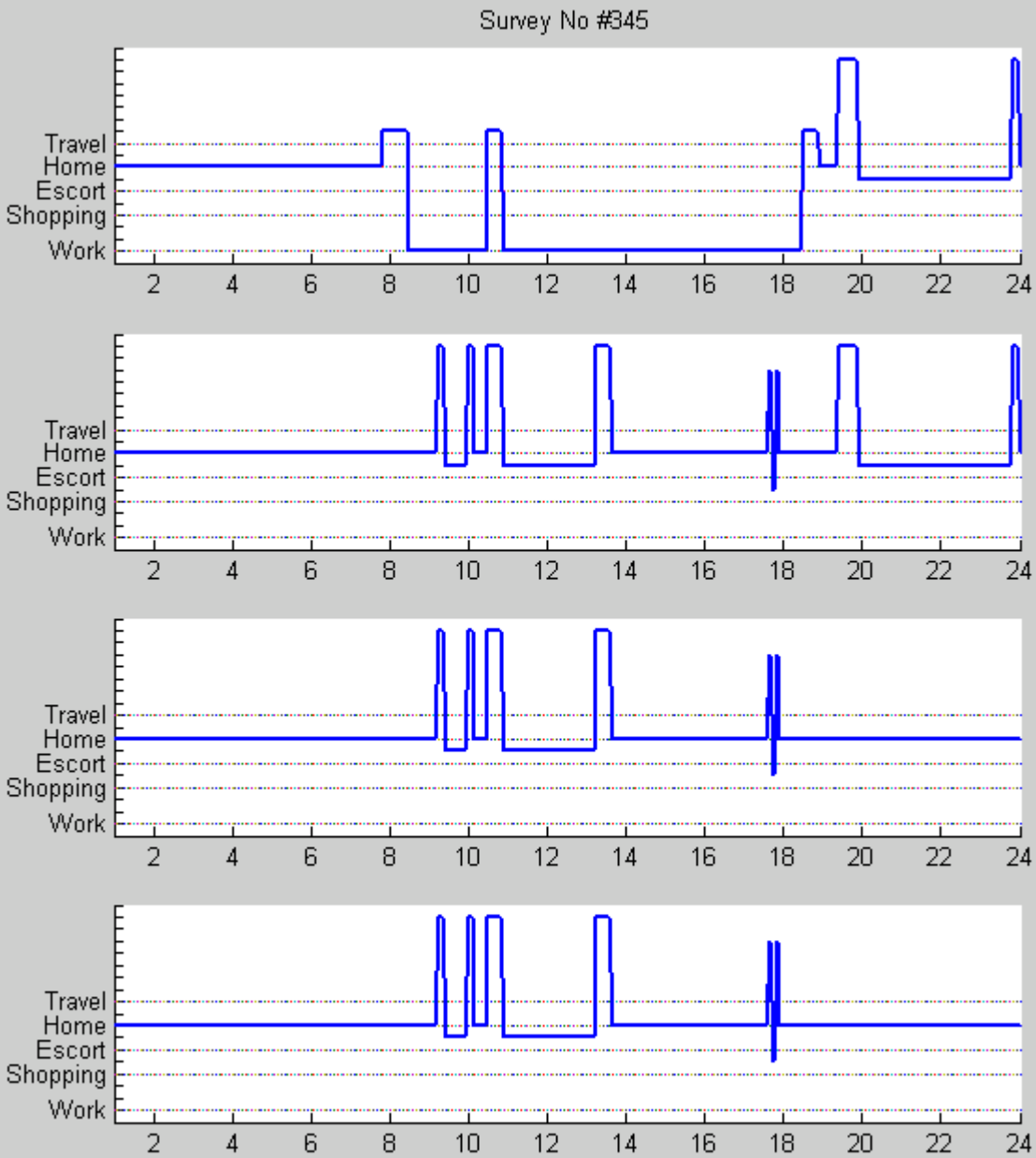
FIGURE 10 Acceleration data of bicycling

Problem 2

- We participate in activities for others
- We participate in activities with others
- We allocate tasks and receive assignments of tasks
- Three aspects critical for policy analysis models

- We develop models to reflect these aspects (among many others) and have very limited data to estimate-verify-validate our models

Family Example (time trace from South Perth)



Male, 40 years, full time worker, driver

Female, 36 years, home duties full time, driver

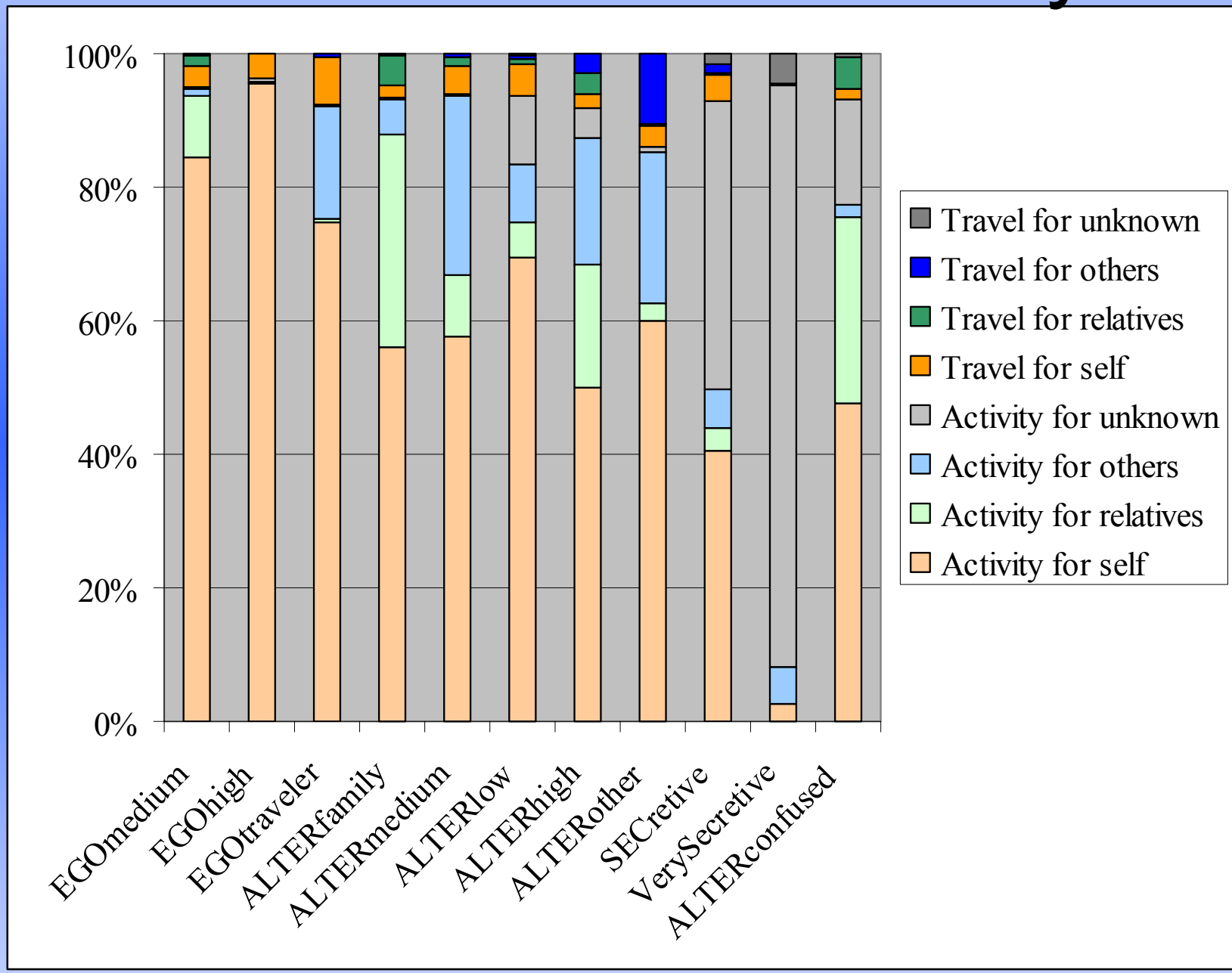
Male, 6 years, primary school

Male, 5 years, primary school

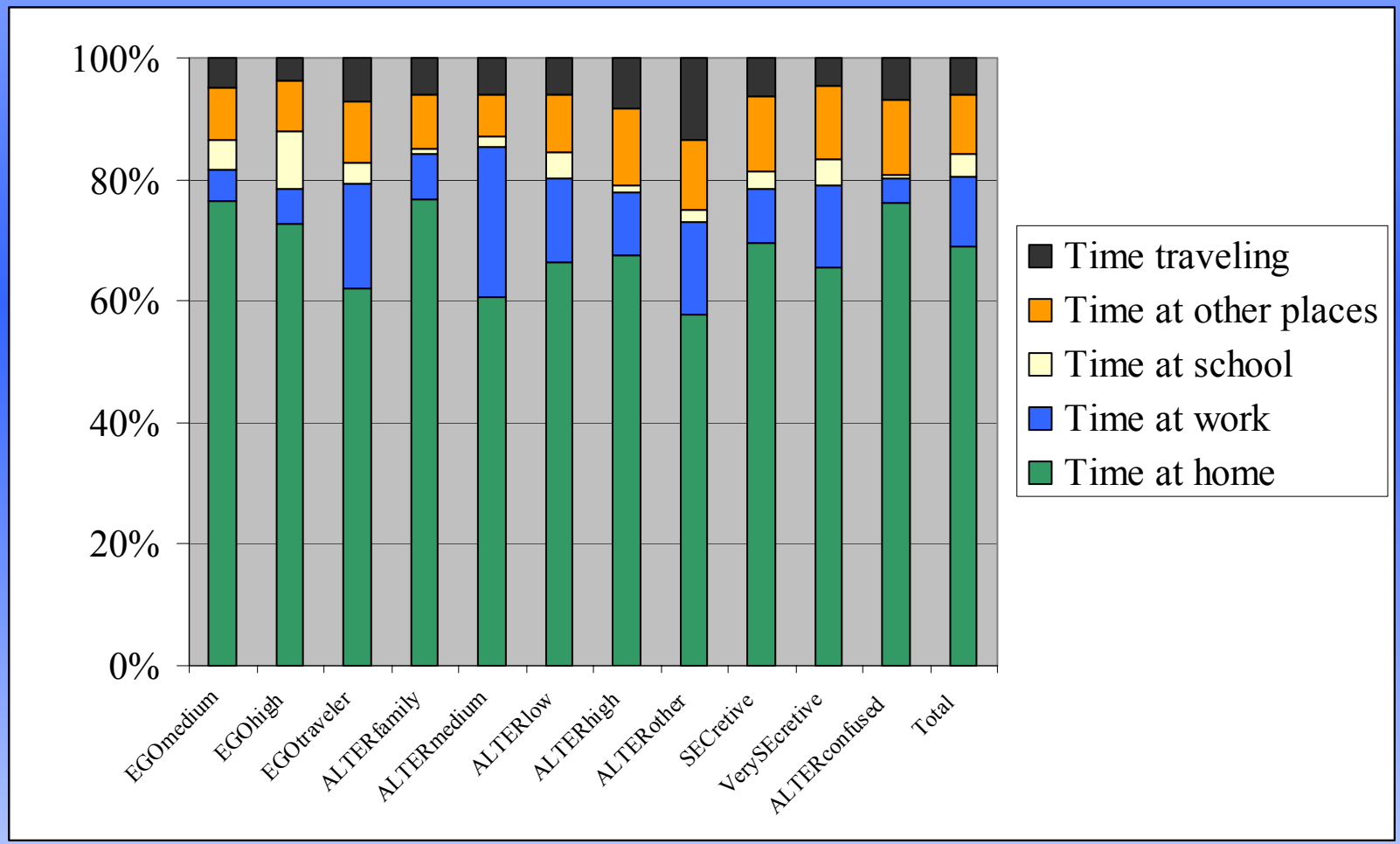
Altruistic vs Self-Serving

Different “styles” at different places

The different altruistic styles

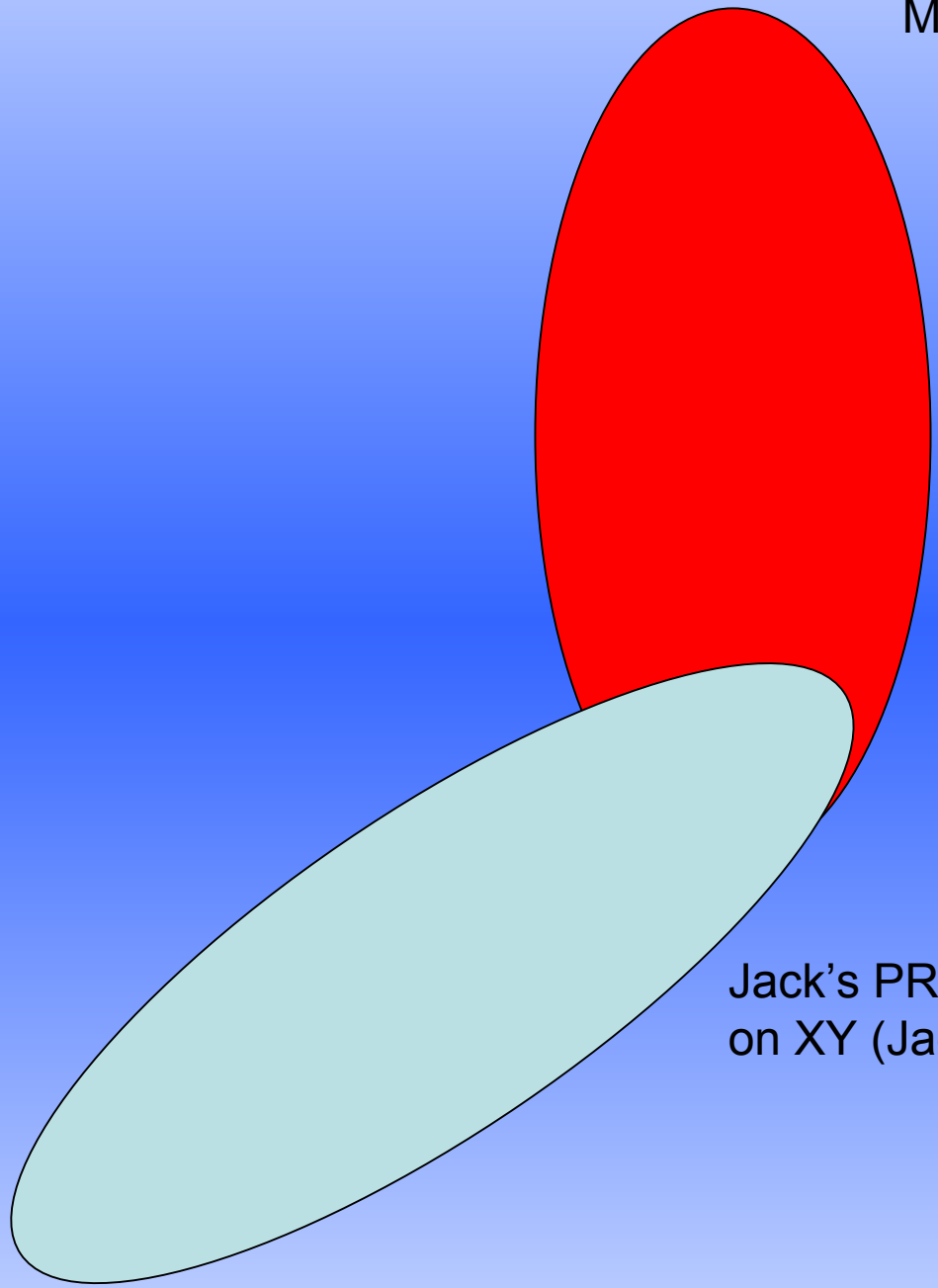


Their heterogeneous presence at places



Distributed household members

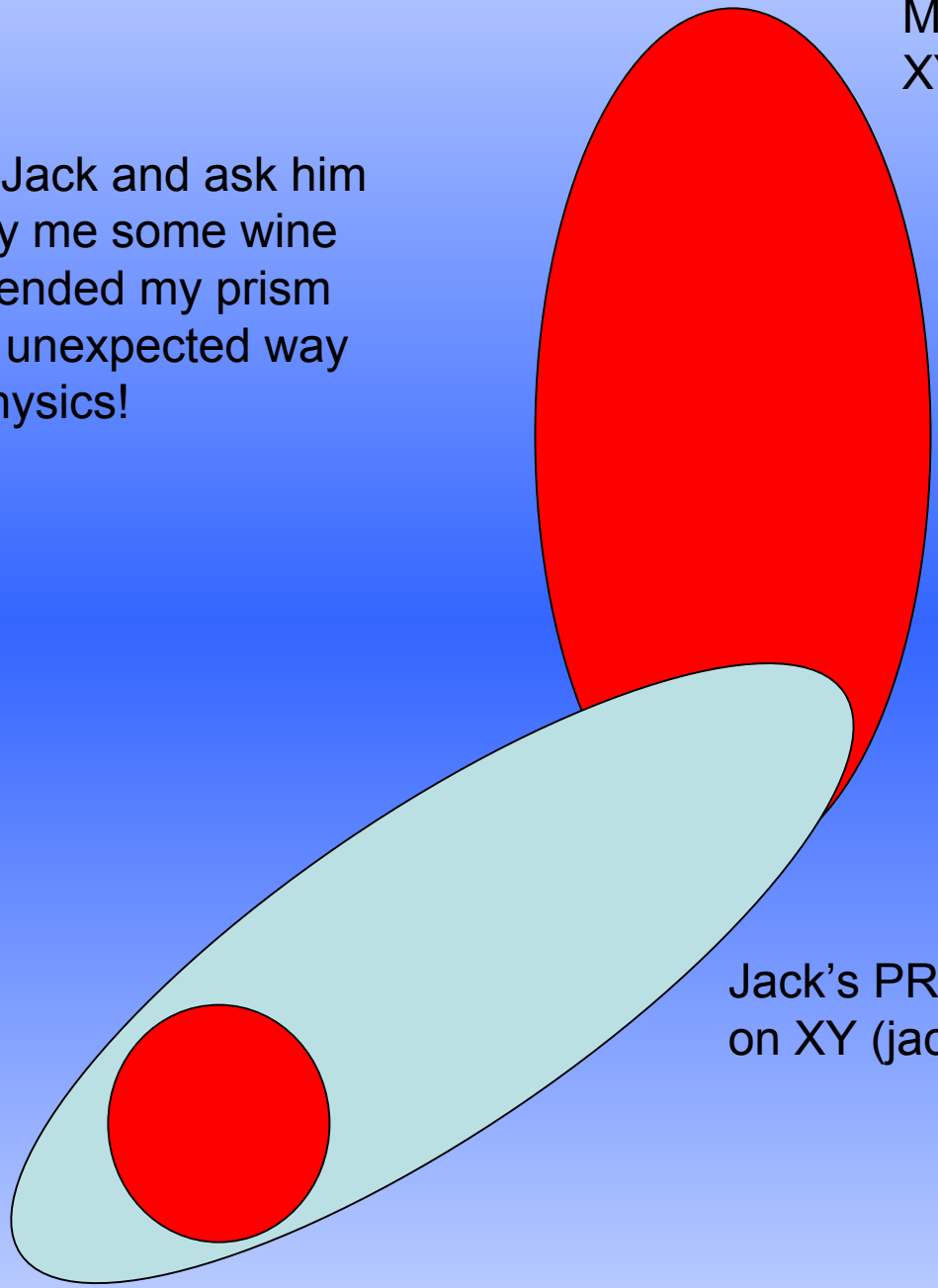
My PRISM projection on XY



Jack’s PRISM projection
on XY (Jack is a friend)

My PRISMS projection on XY

I call Jack and ask him to buy me some wine = extended my prism in an unexpected way for physics!



Jack’s PRISM projection on XY (jack is a friend)

Problem 3

- One key objective is better operations
- We are not working actively to provide interface between “planning models and operations
- Opportunity?

Eye in the Sky – Athens Olympics

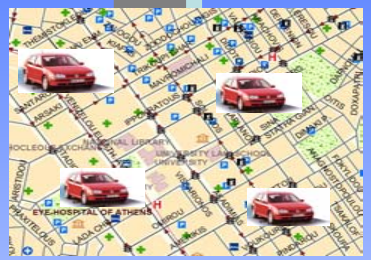
Overview

Camera on board a helicopter

Airborne part

Images acquisition

FCD data acquisition



Floating Cars as sensors in the road network

Terrestrial part

Centre

Traffic data extraction and fusion. Provision of fleet management and mobility services.

Services

In Car Telematics

Mobile and In-Car Services

Dynamic fleet Management

Pre-trip information

Summary Potential Solutions

- Combine GPS with other wireless communications – eliminate useless burden collect more and better detail
- Develop techniques that capture human interactions – personal dataloggers to all persons in a household (major IRB headache!)
- Create data+models interfaces with traffic operations – spatial and temporal resolution and optimal number of probes