

Brief Encounters

Sensing, Modeling and Visualizing Urban Mobility
and Copresence Networks

Vassilis Kostakos

*Madeira Interactive Technologies Institute
University of Madeira*

Eamonn O'Neill¹, Alan Penn², George Roussos³, Dikaïos Papadongonas³

¹University of Bath, ²UCL, ³Birkbeck College

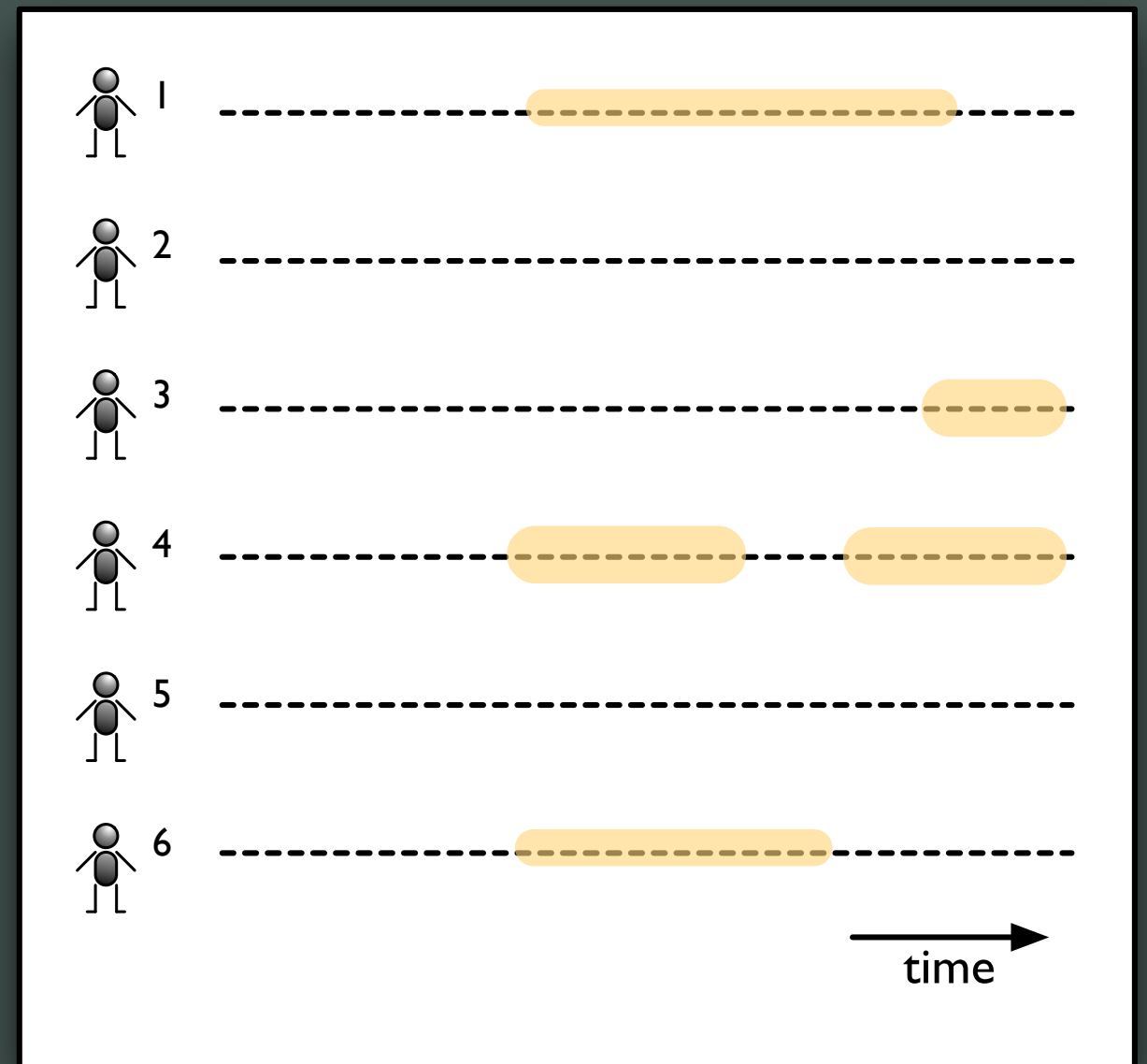
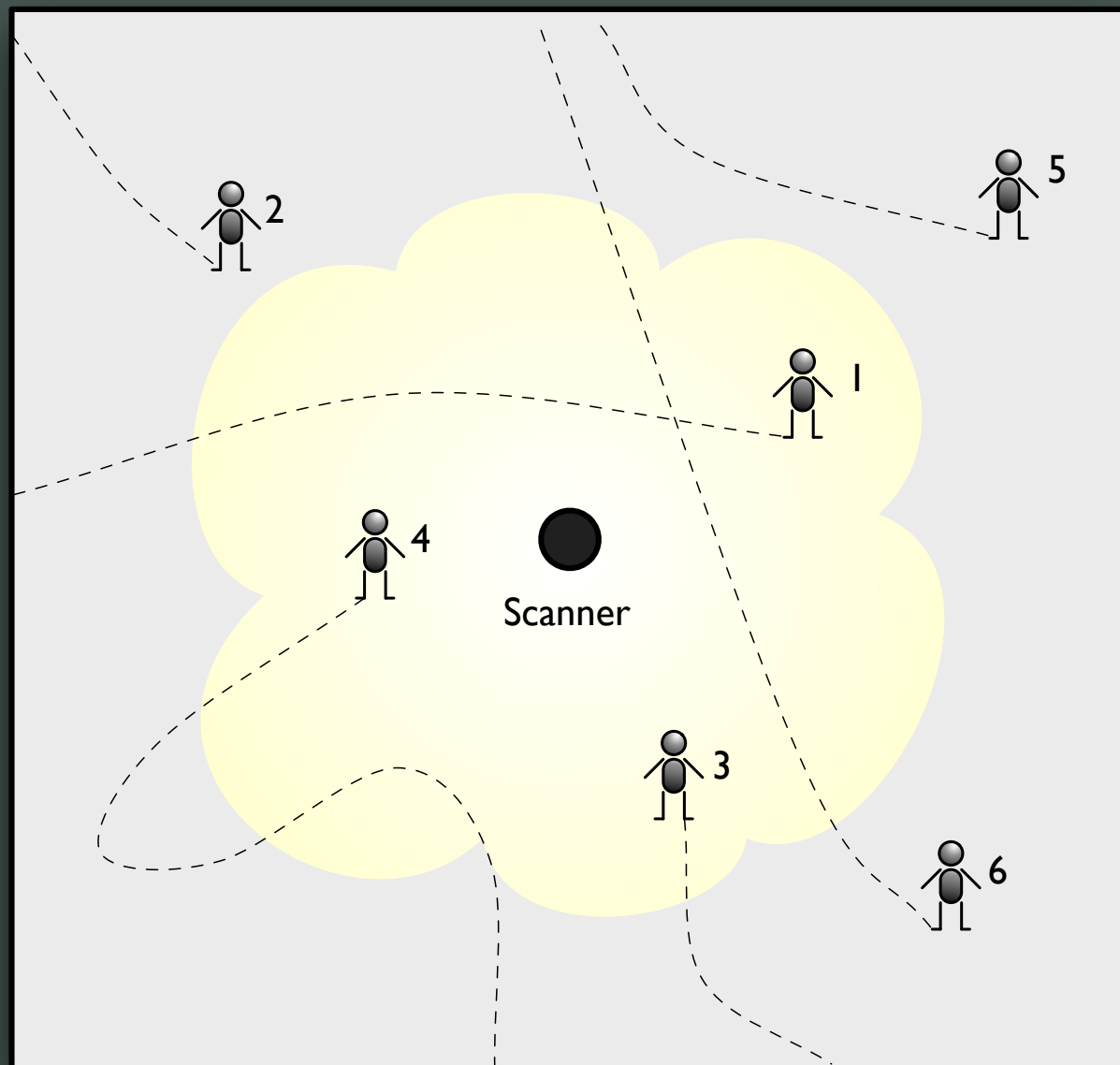
Outline

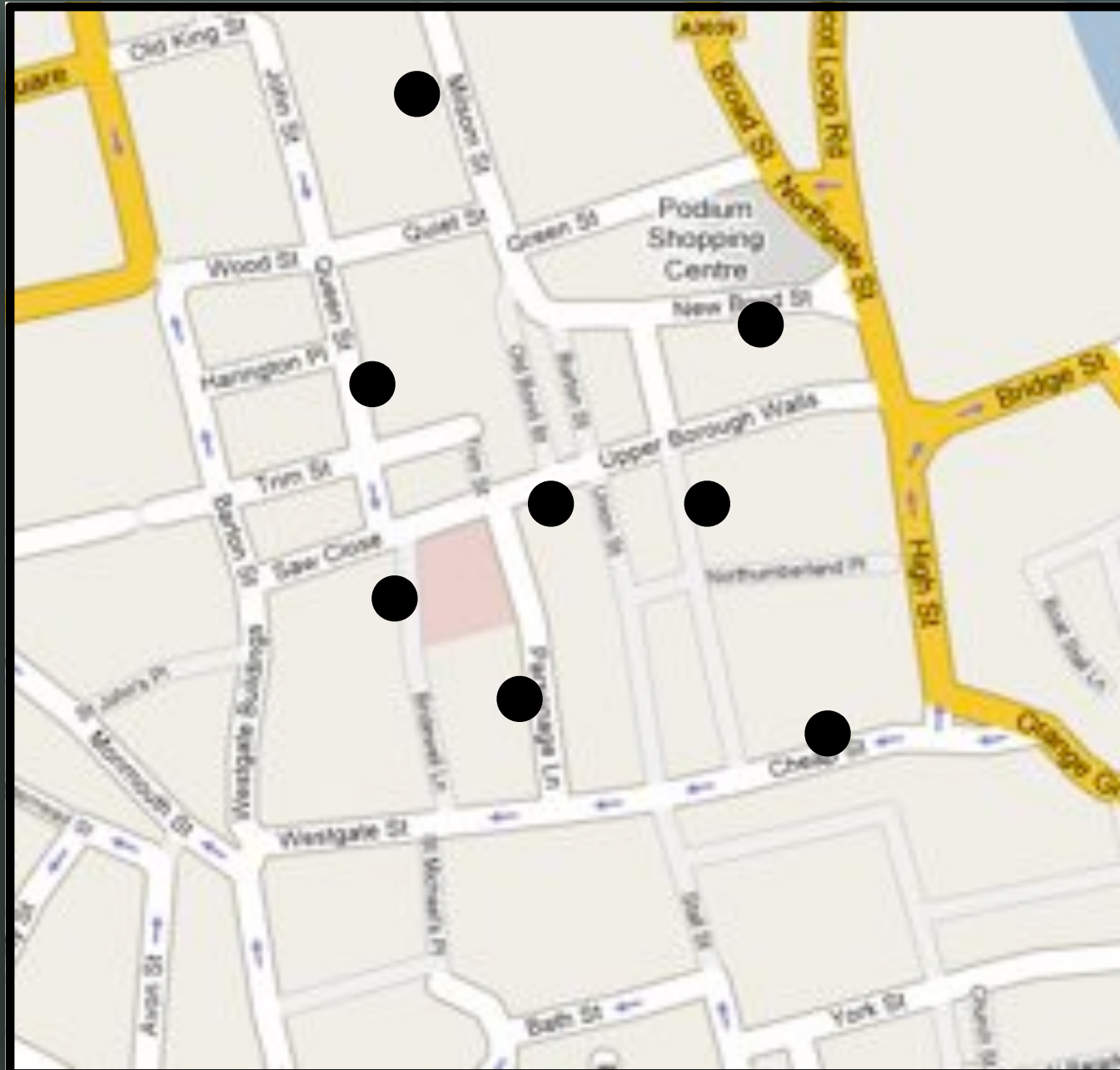
- Motivation
- Data Collection
- Analysis & Visualisation
- Results

Motivation

- Traditional HCI
 - System = Computer + Human
 - Formal descriptions of this system
 - Models (Human processor model)
 - Fitt's law
- System = Computer + Human + Location
 - Technology is increasingly mobile
- Seek tools, techniques and models to **describe** and **predict** “the system”

Data collection





Collected data

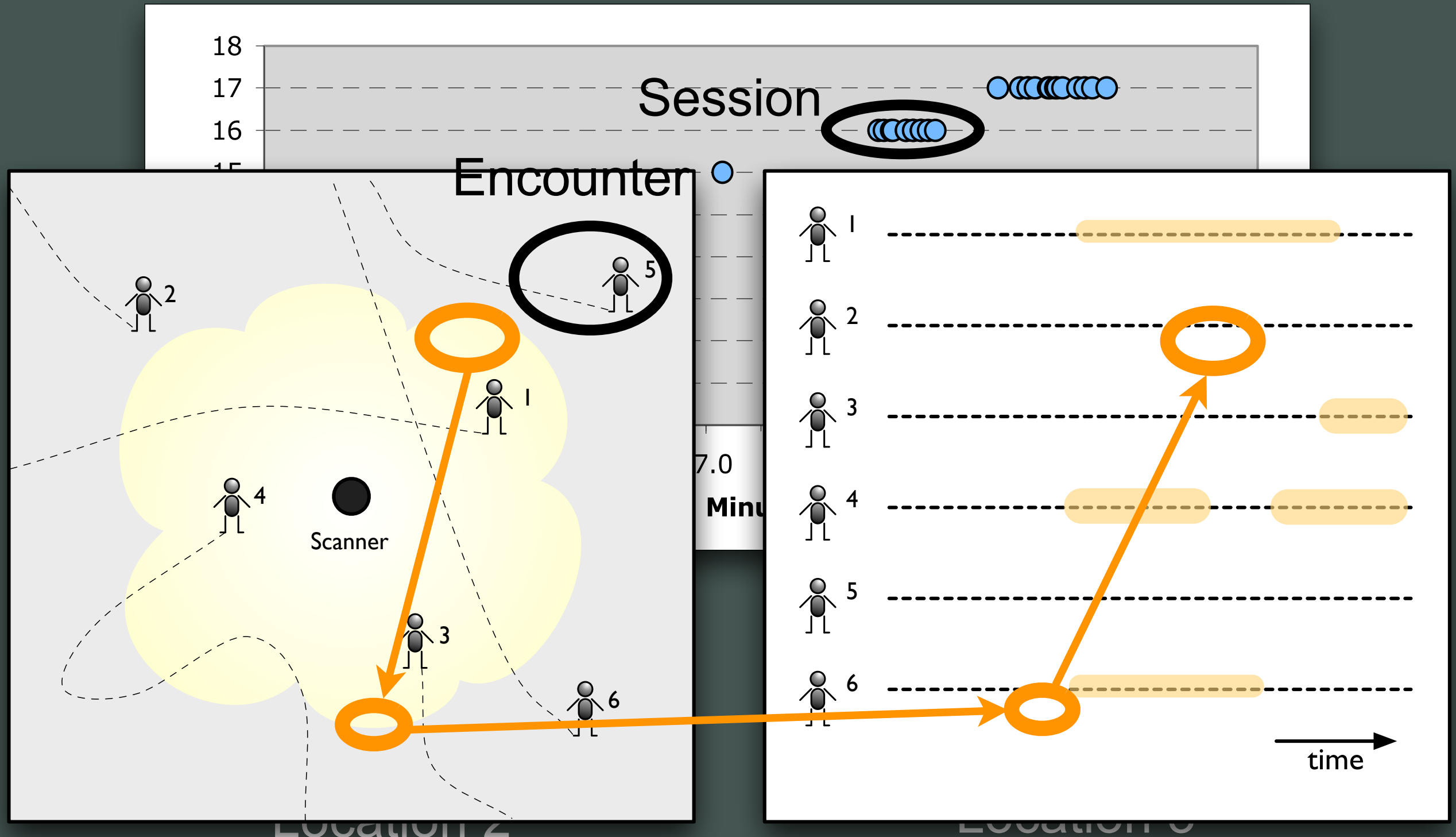
- 12 months
- 70 000 unique devices
- 3 000 000 unique data points

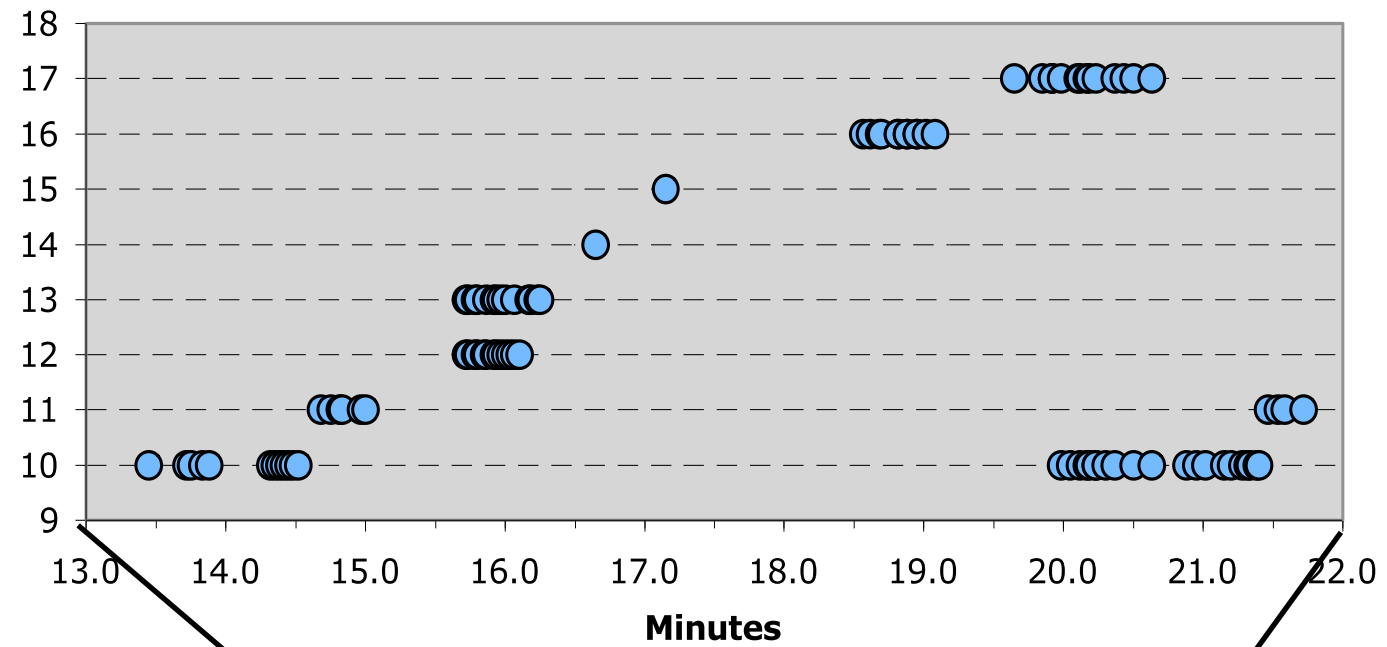
Analysis & Visualisation

Main concepts

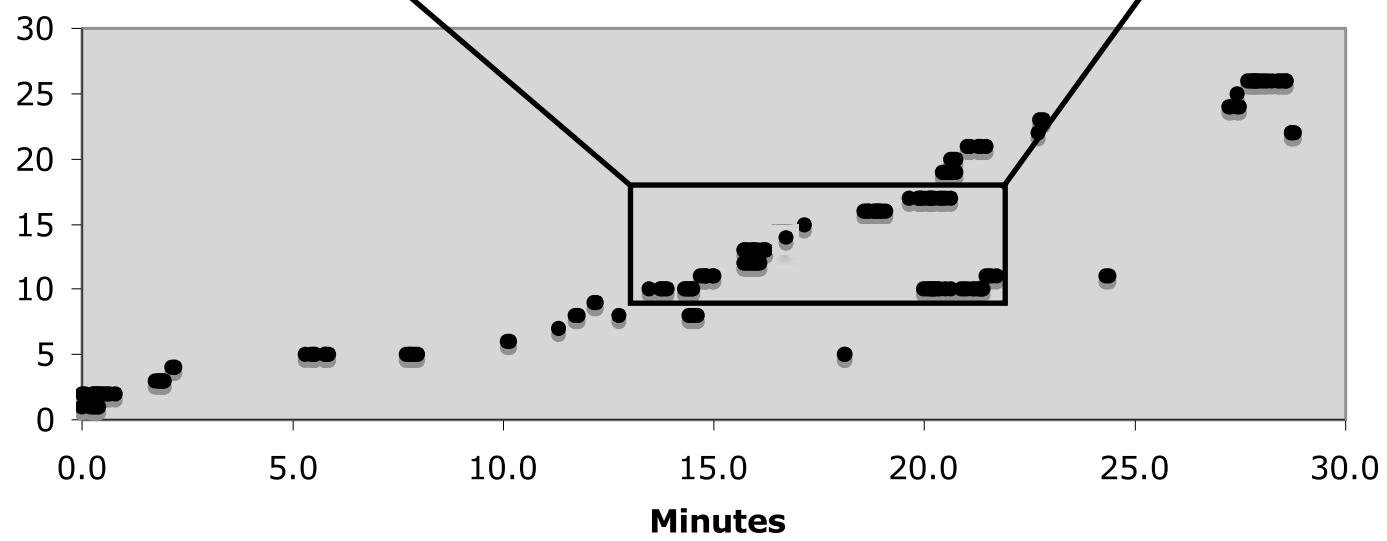
- Sessions
- Trails
- Encounters

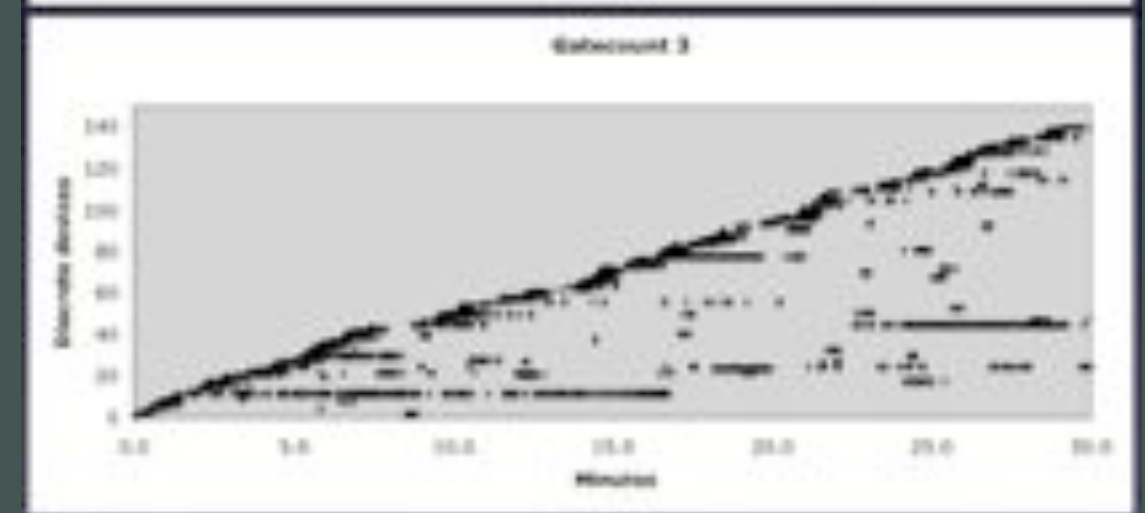
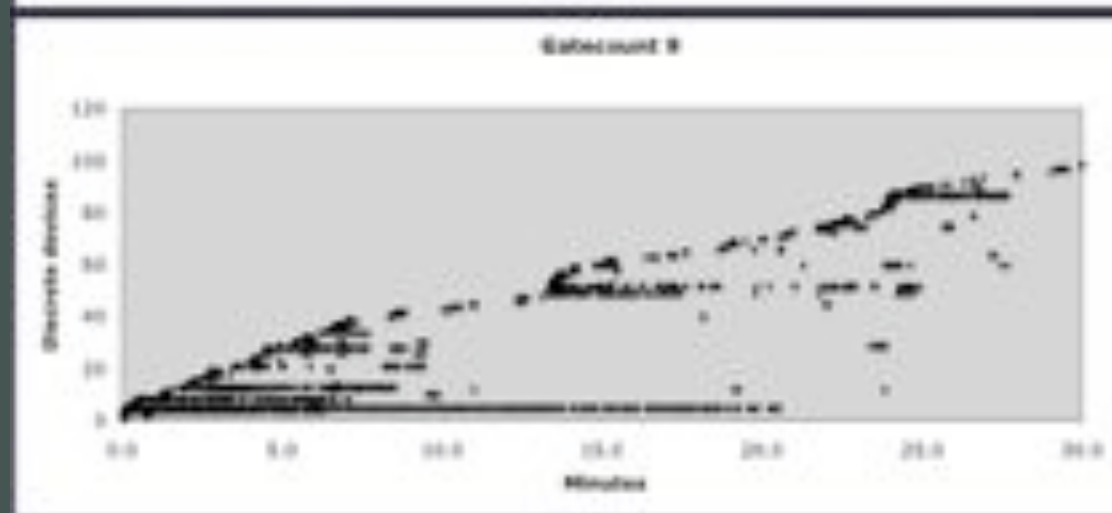
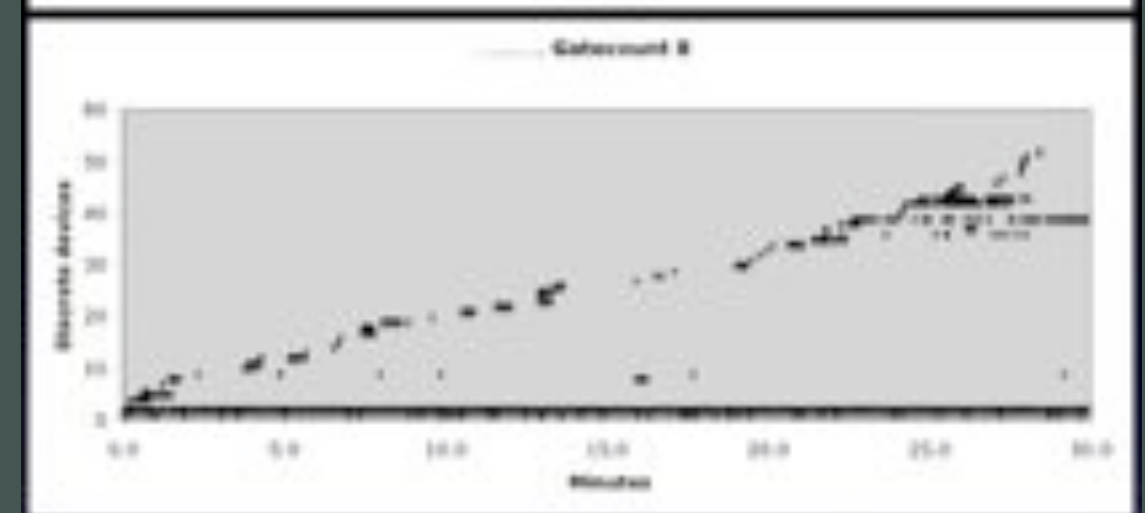
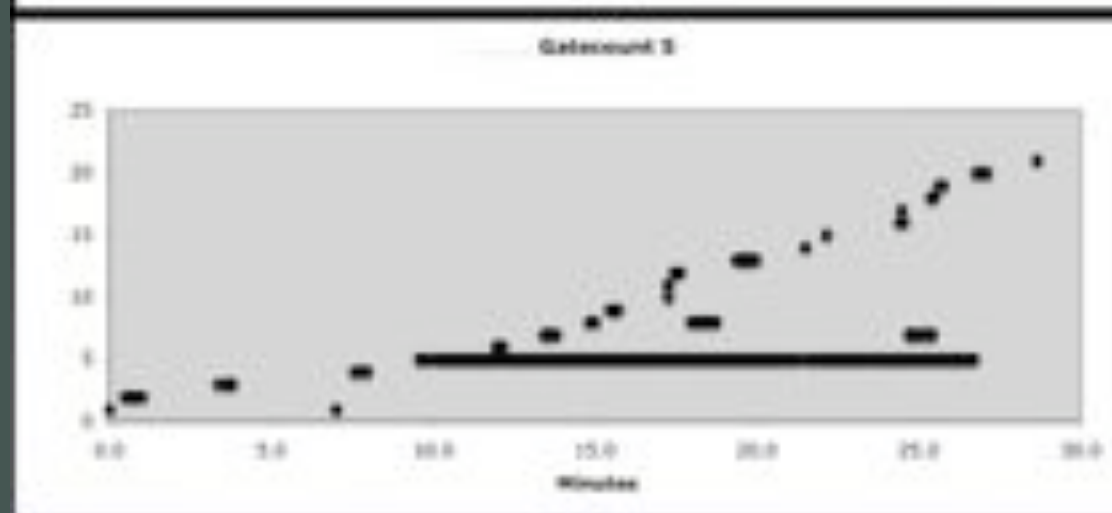
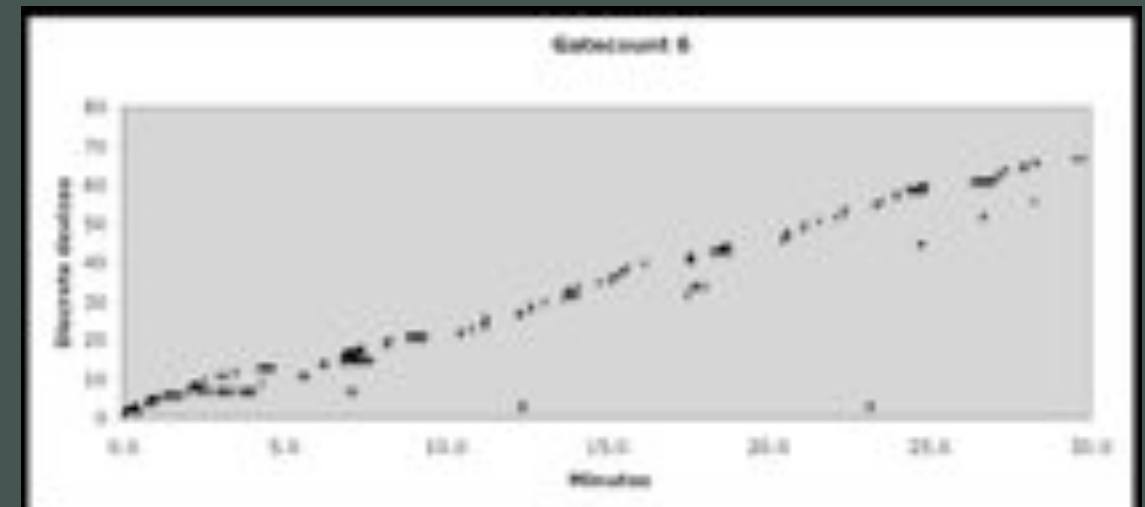
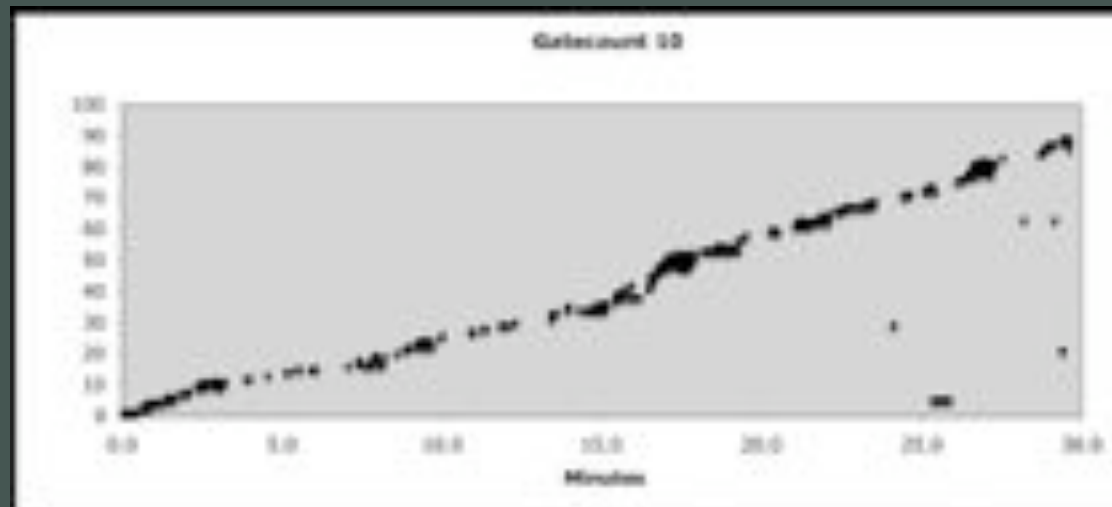
Location 1

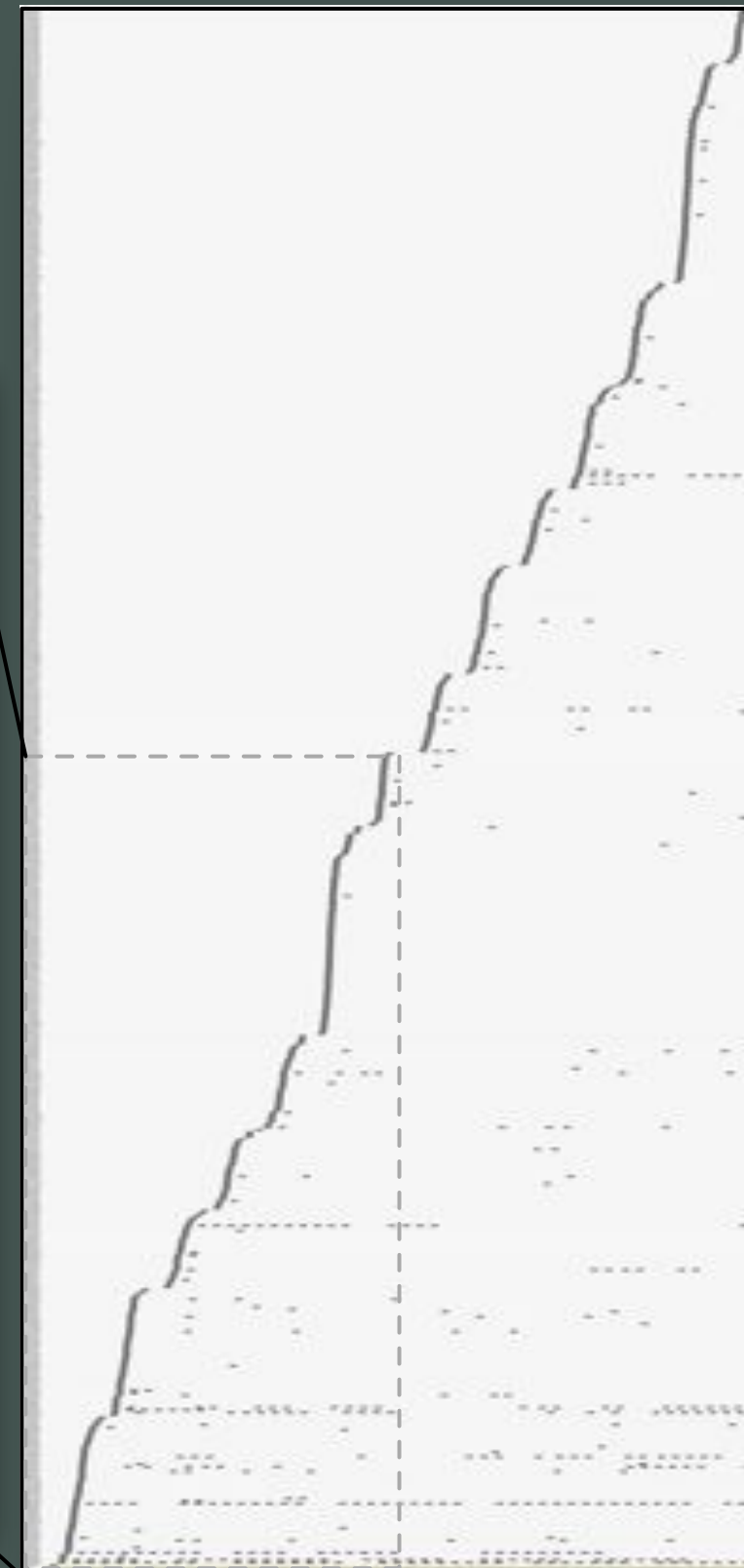
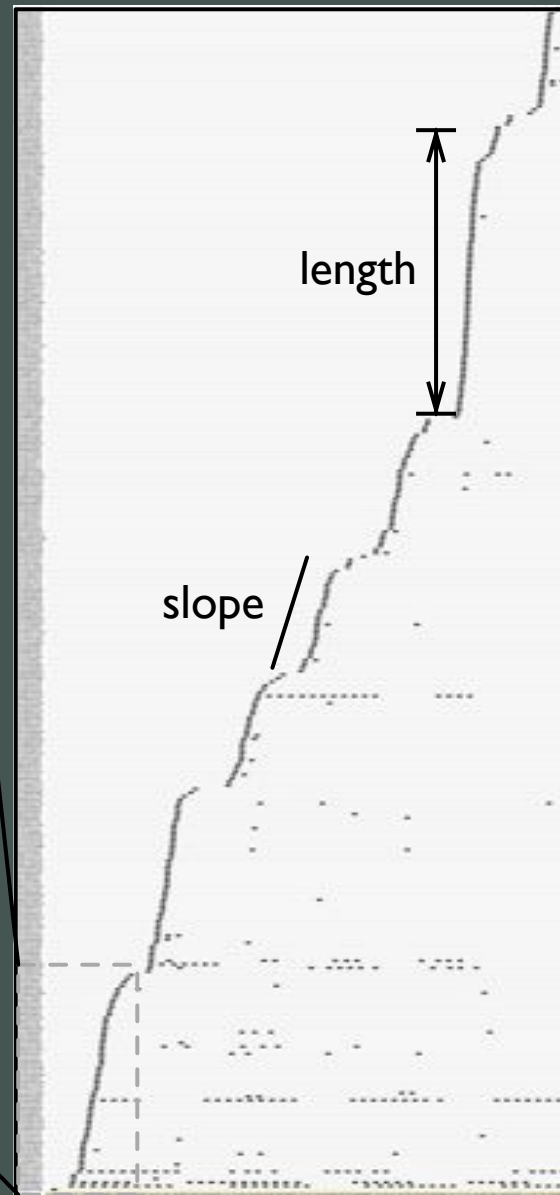
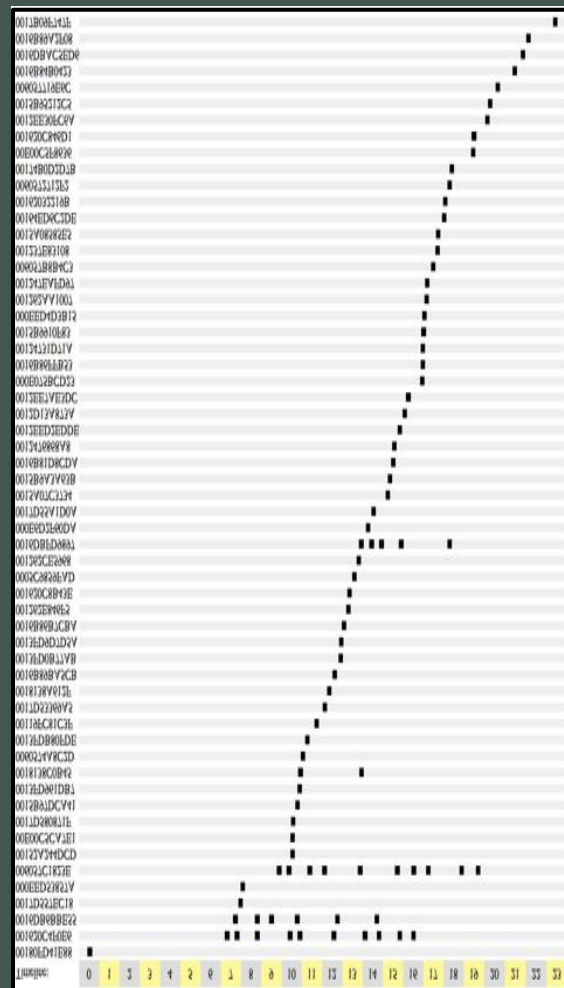




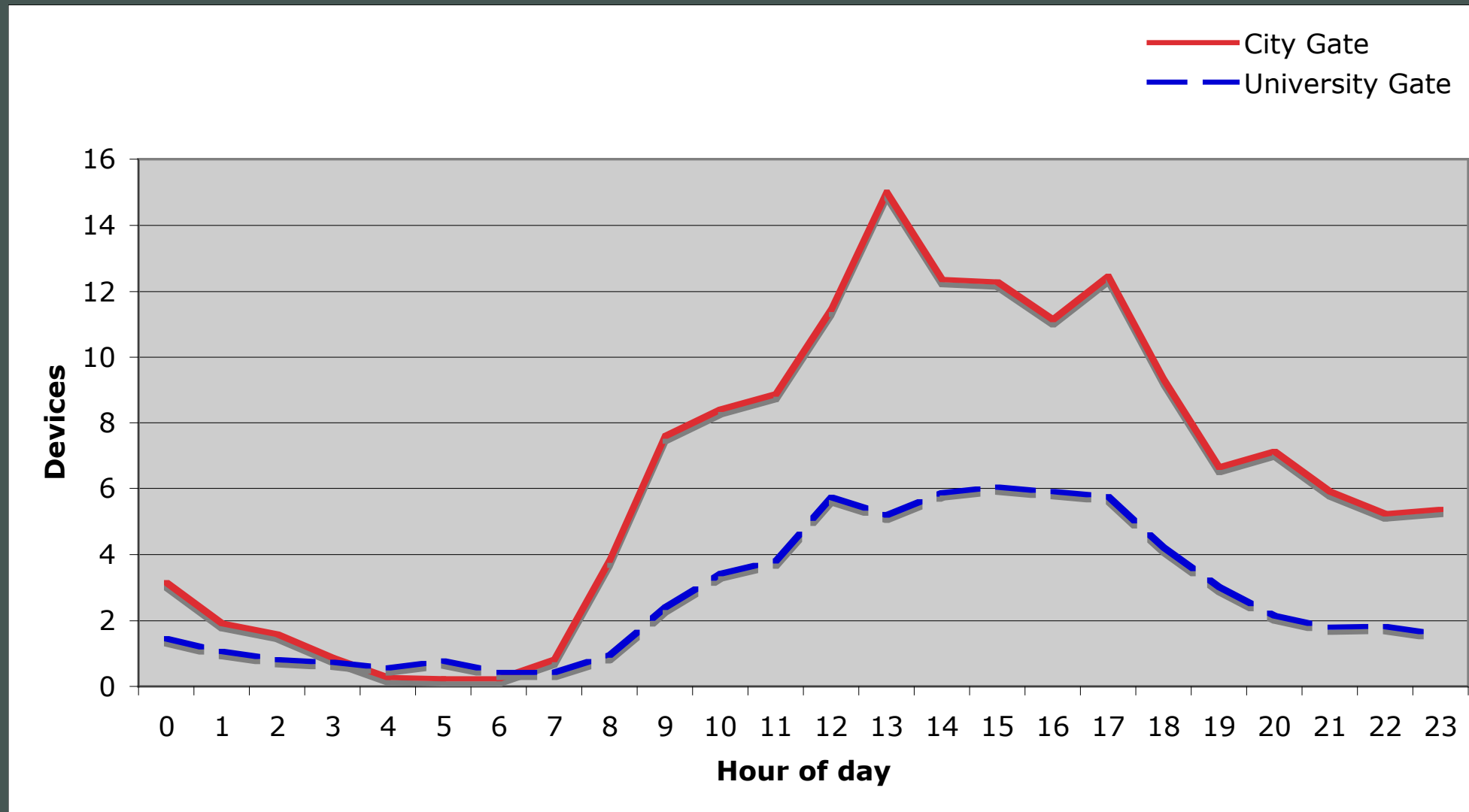
Mobile Gatecount 1



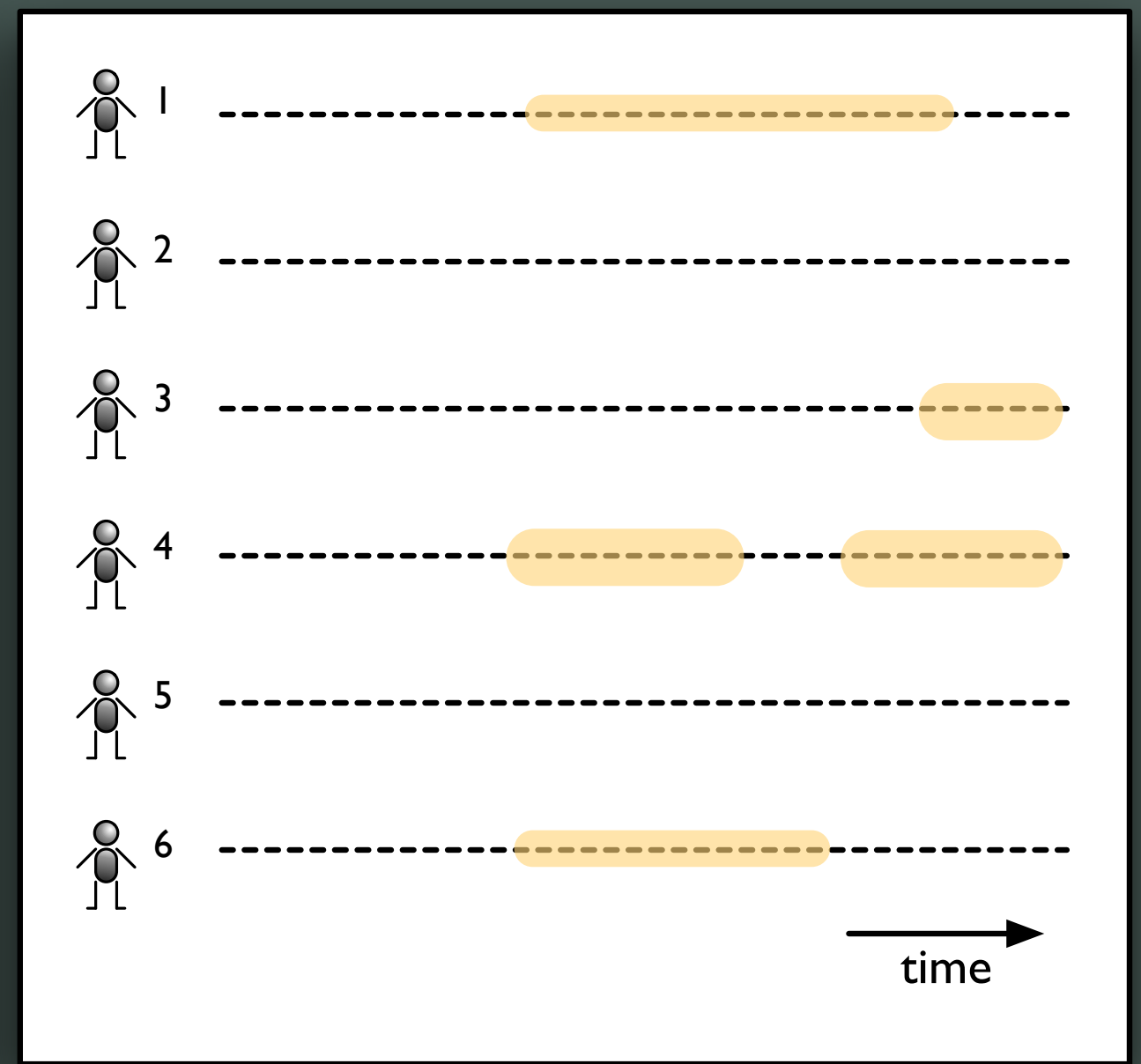
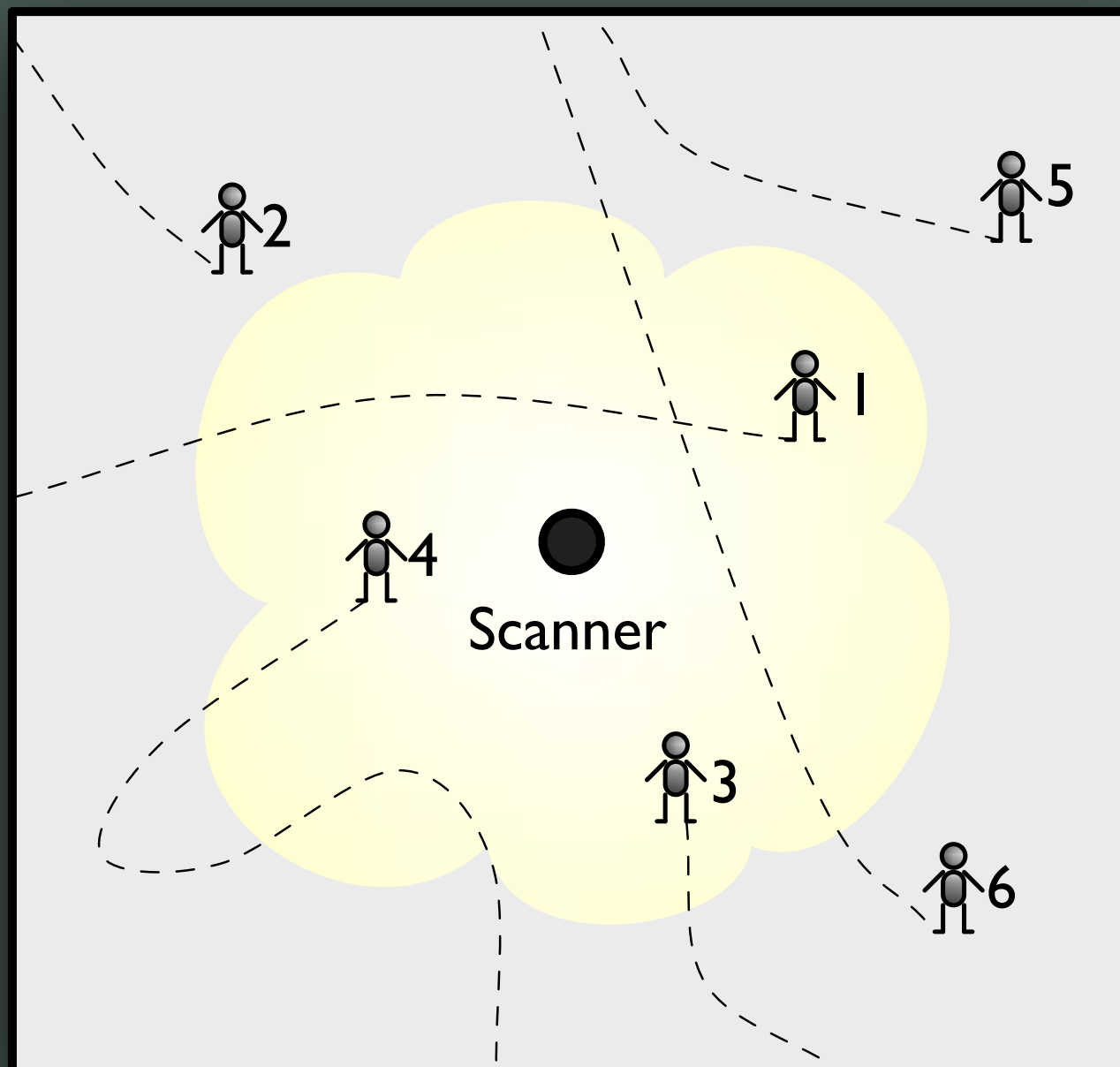


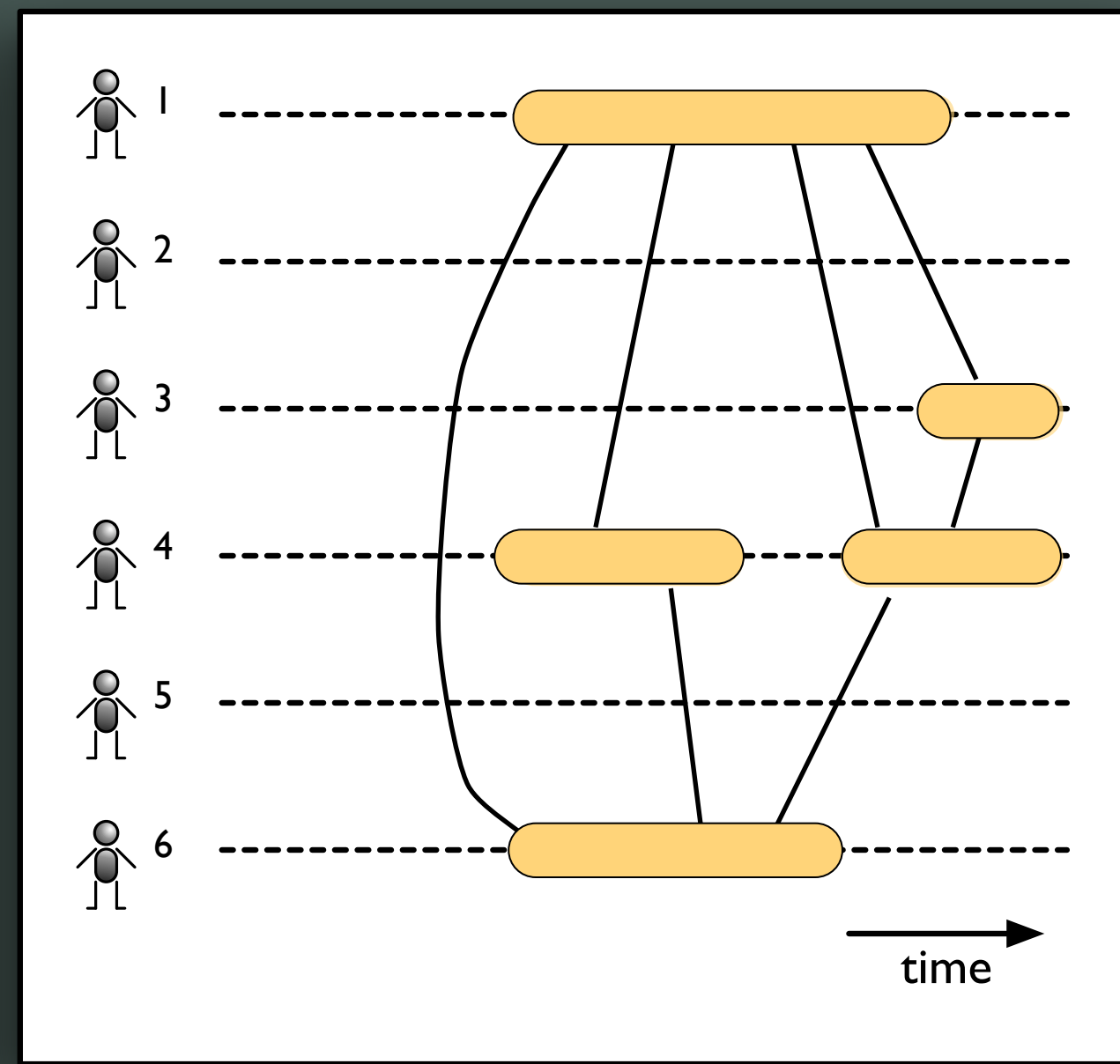
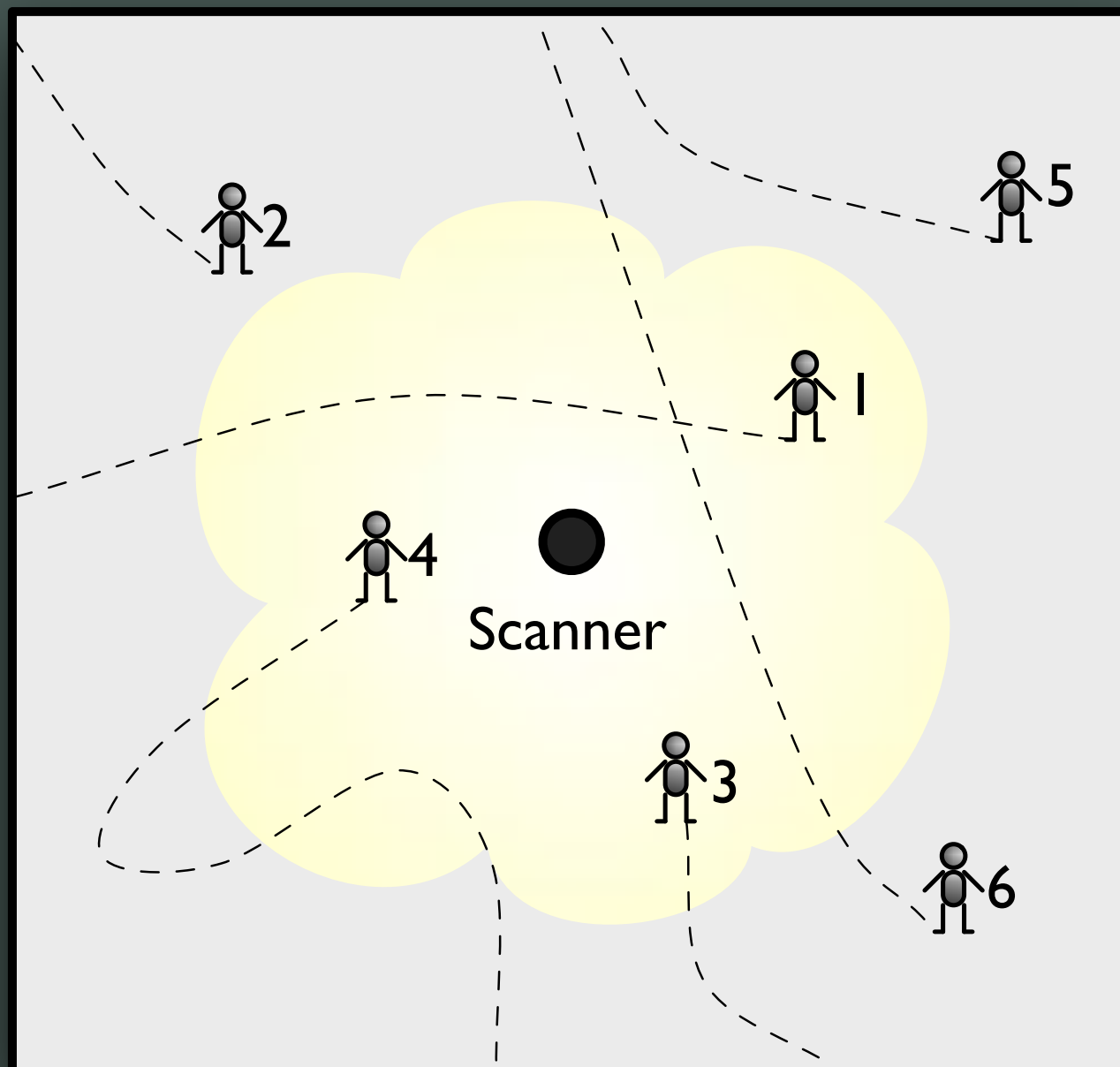


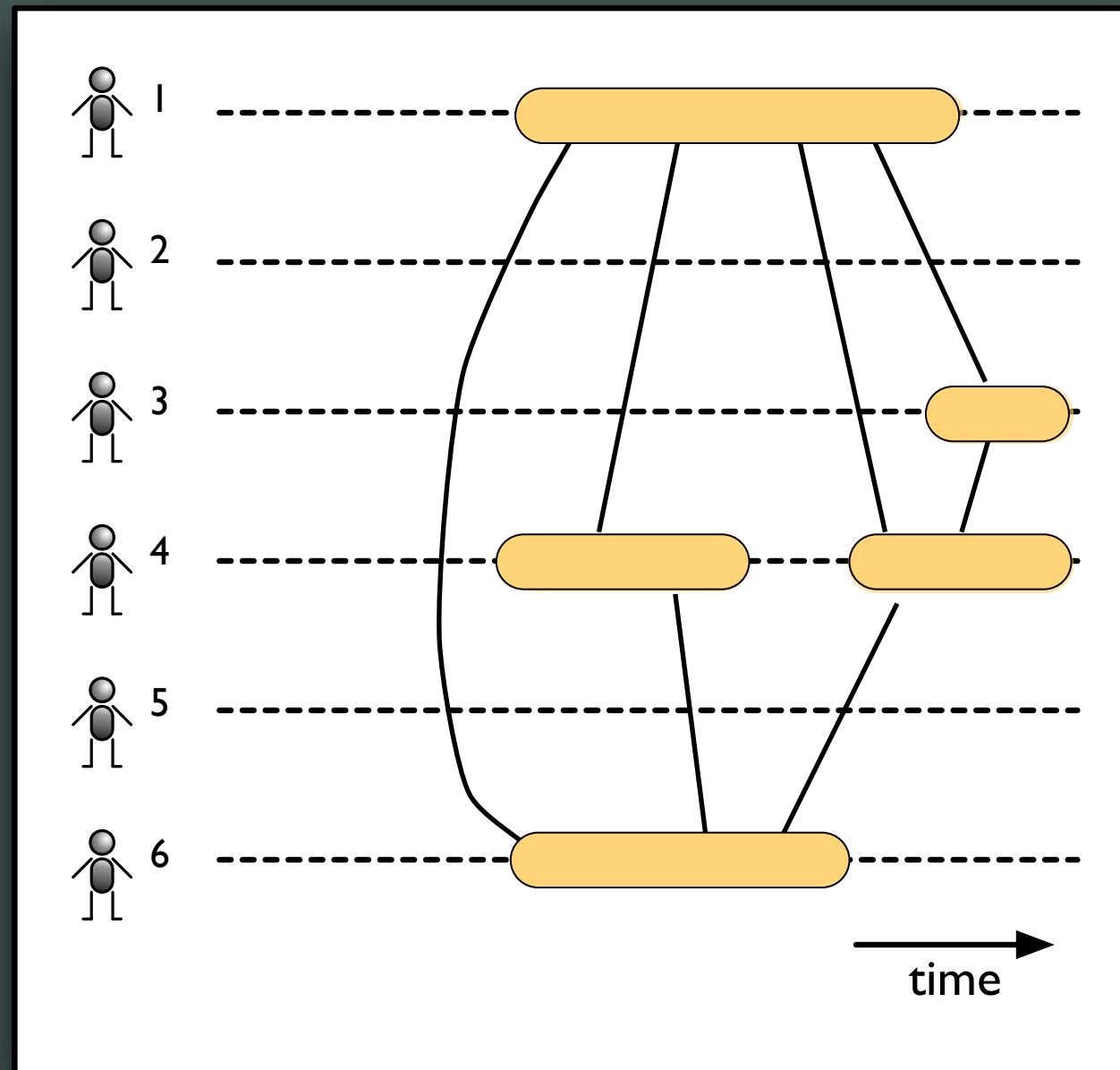
Flow of people

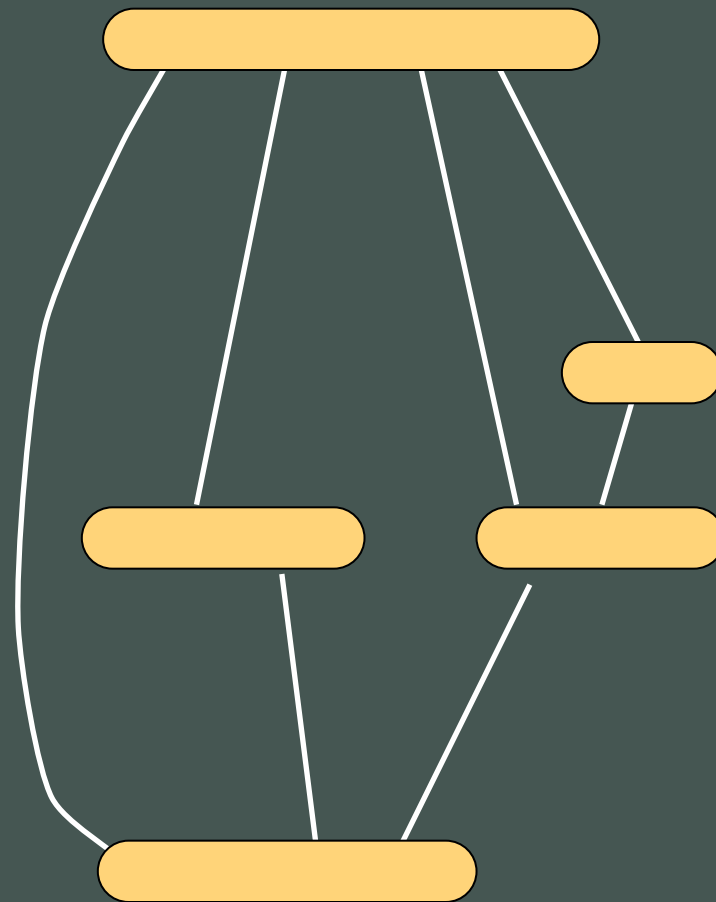


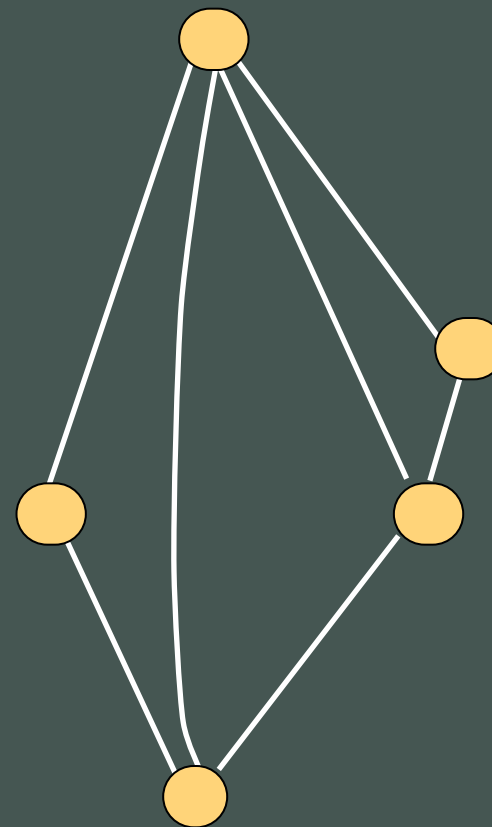


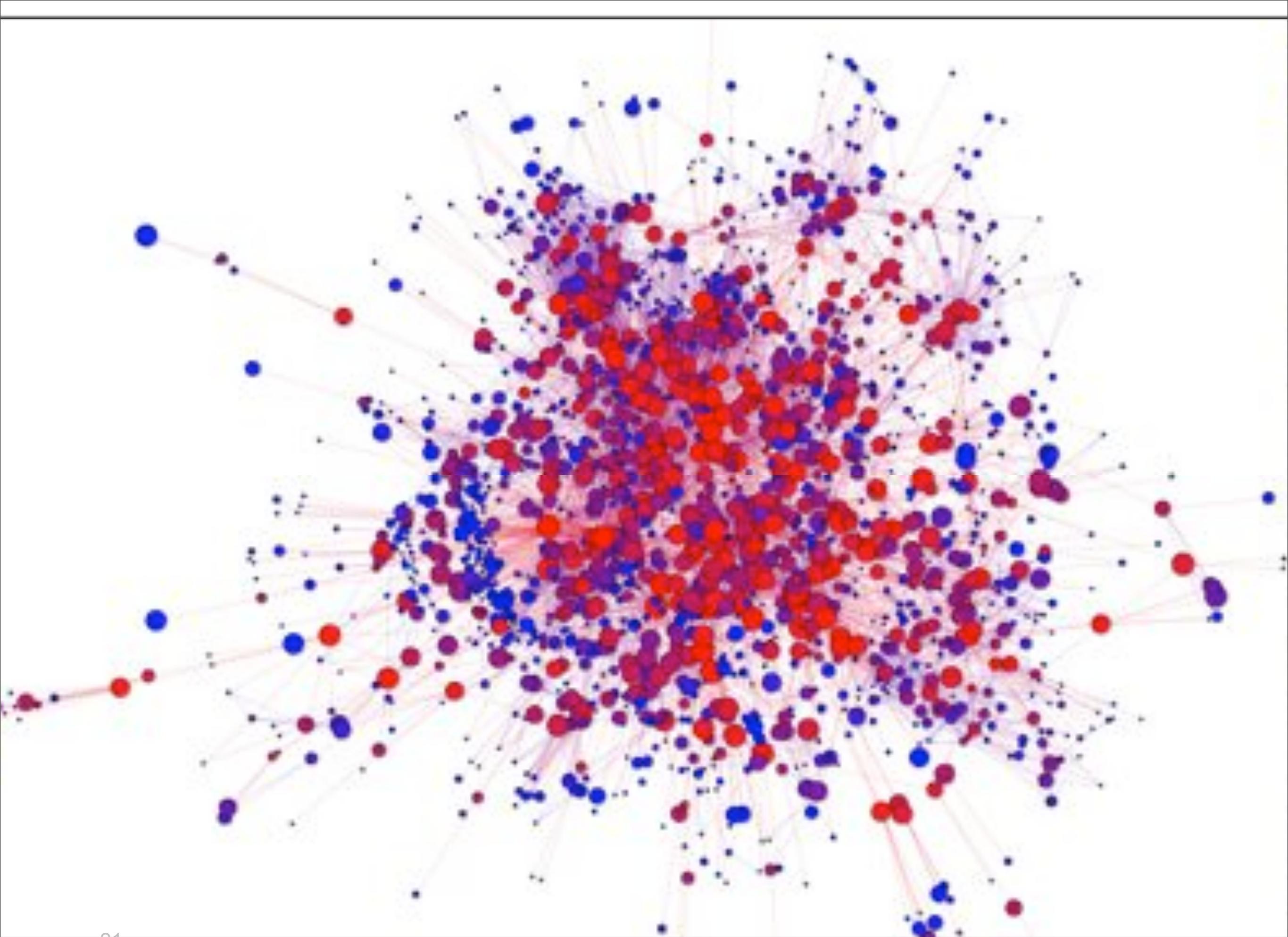






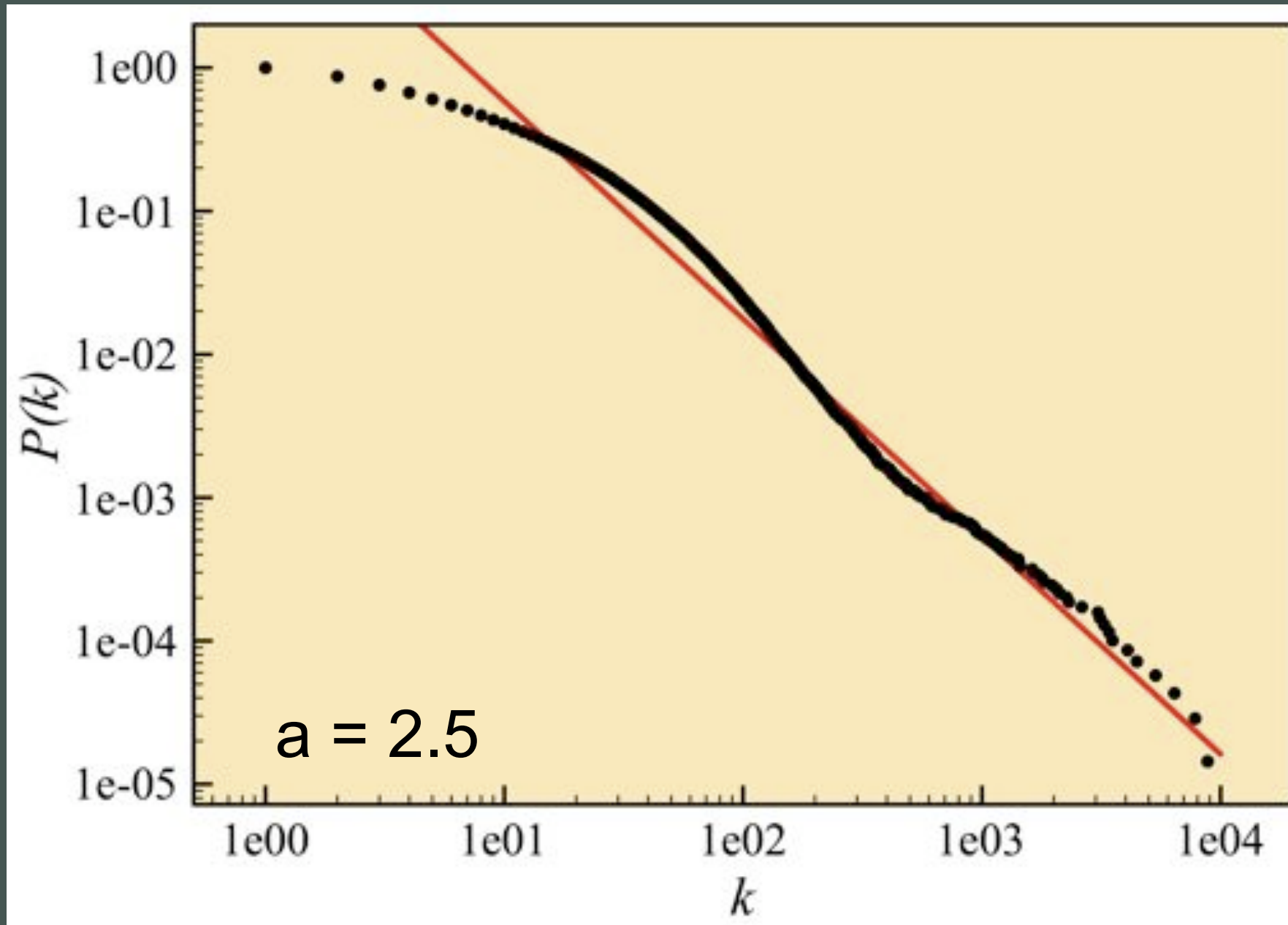








Results



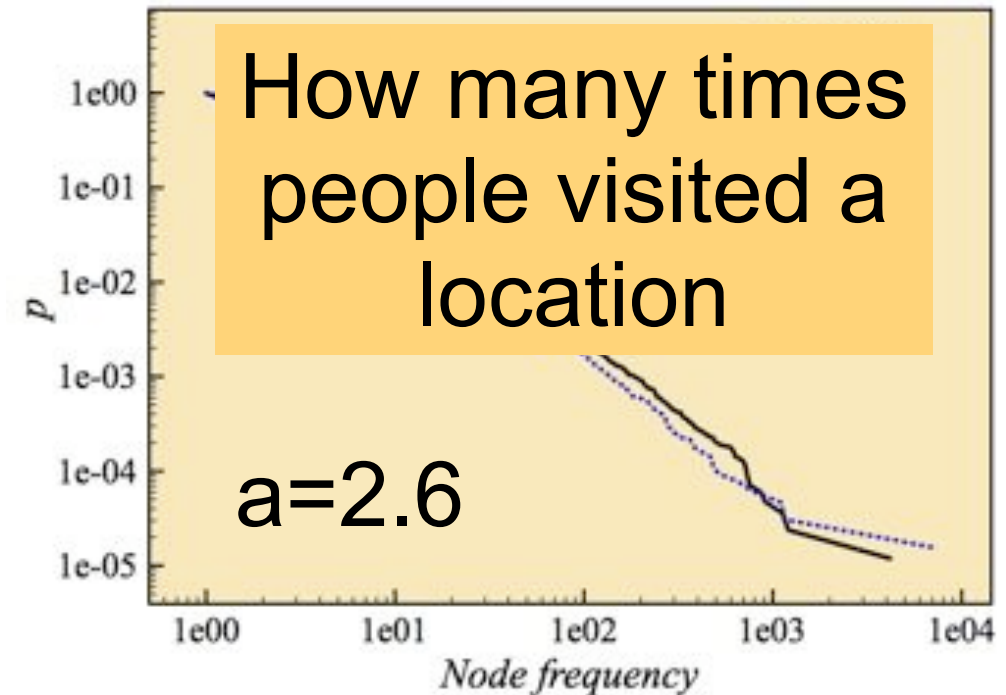
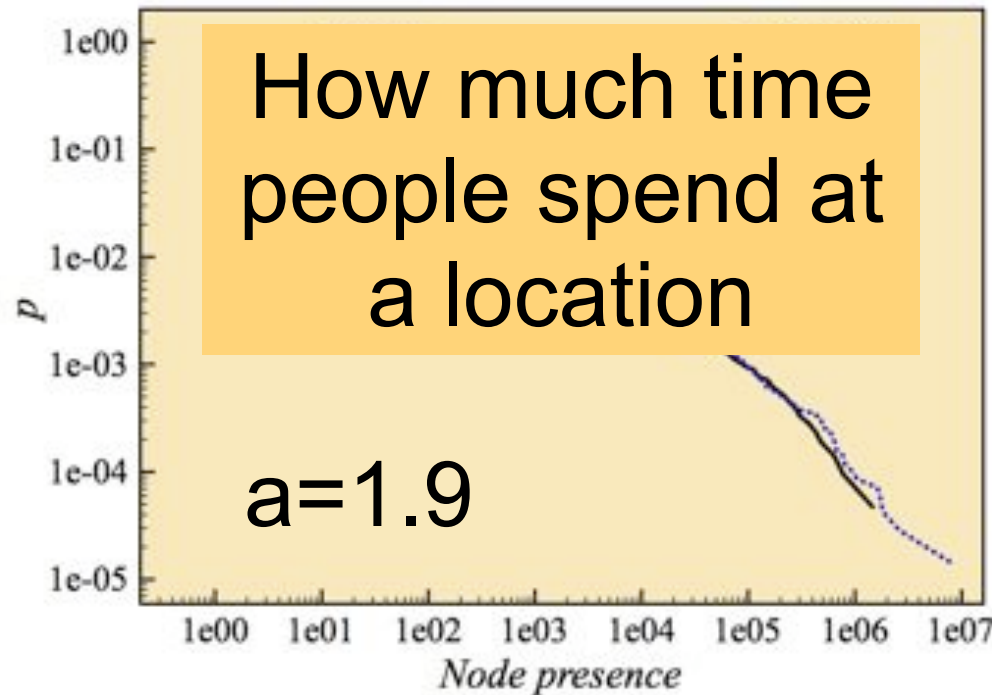
$$y = x^{-a}$$

Probability of encountering
more than 10 people is $10^{-2.5}$

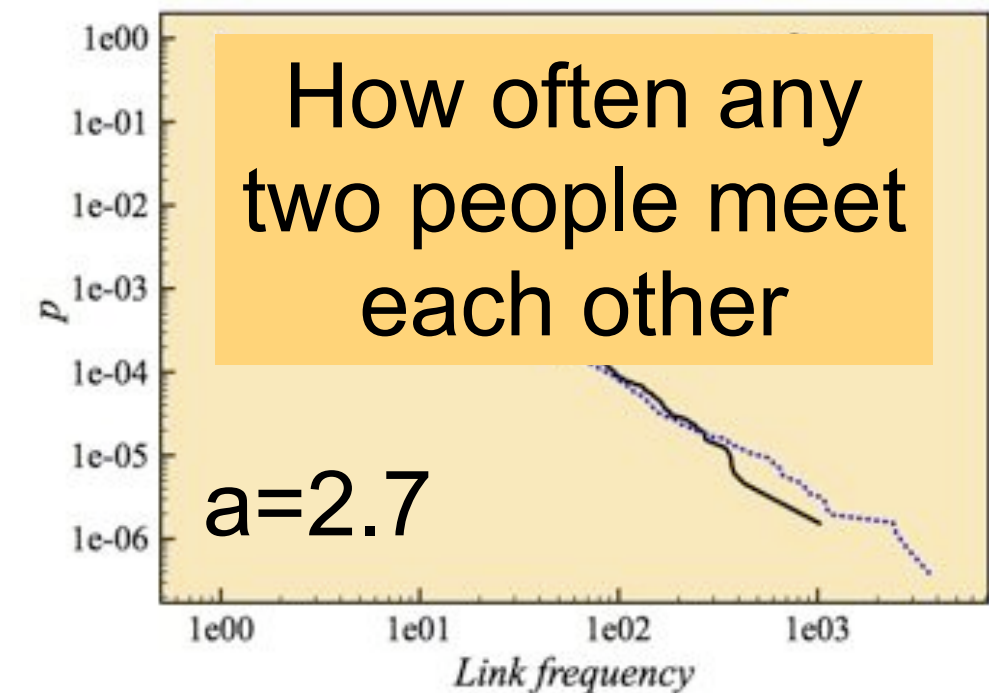
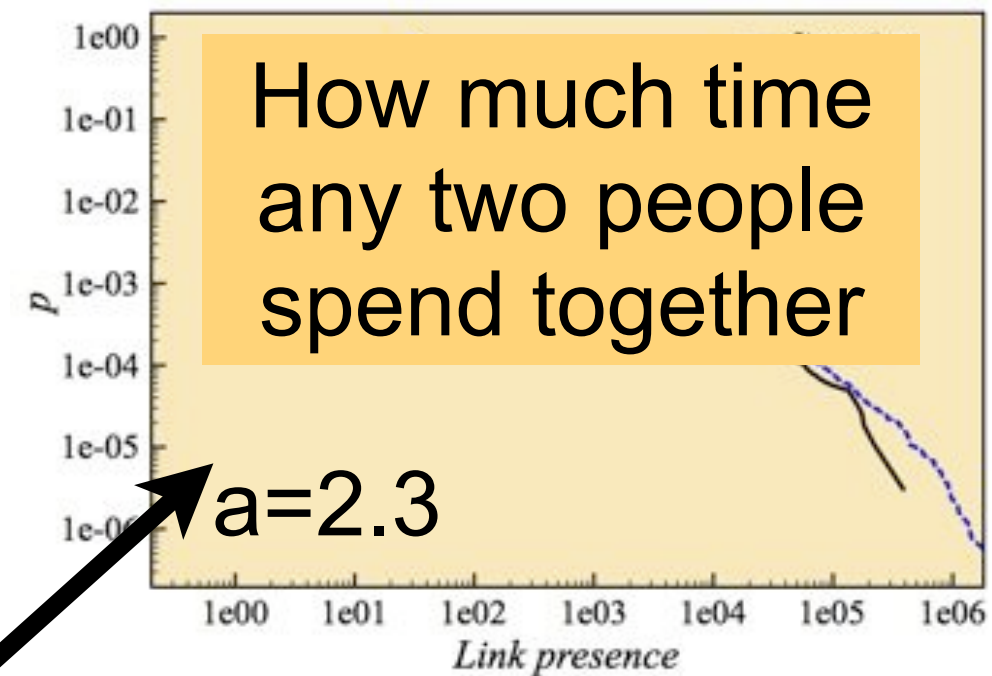
Duration

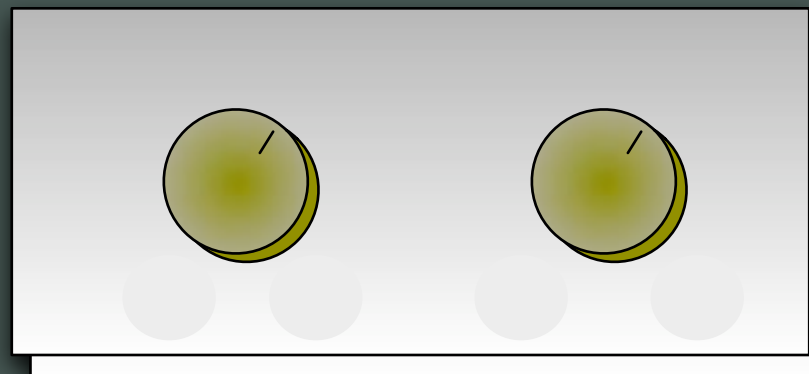
Frequency

Sessions



Encounters

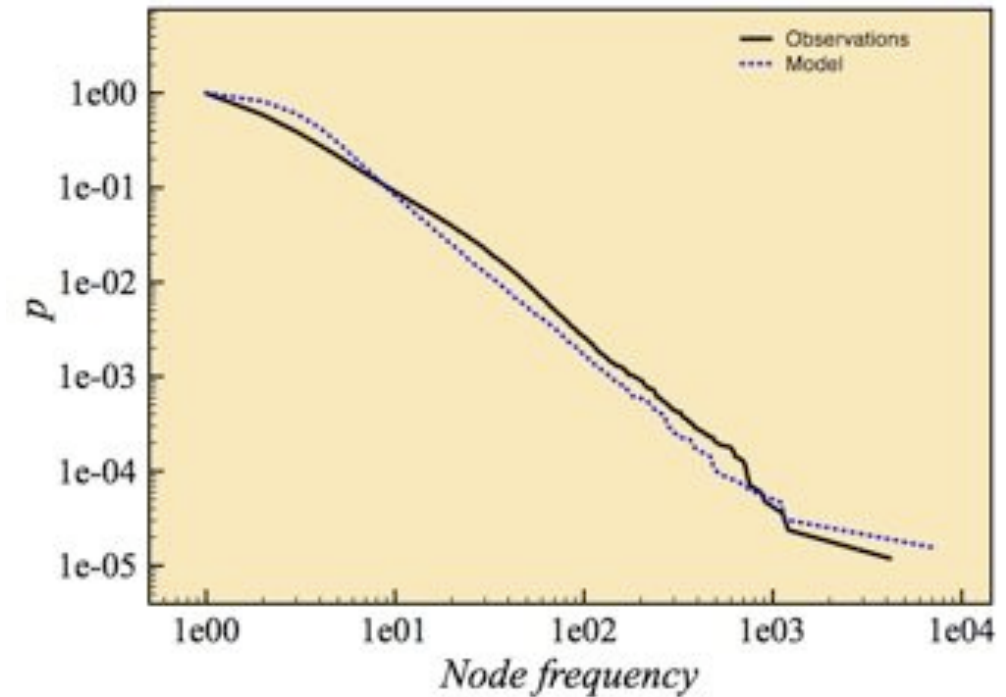
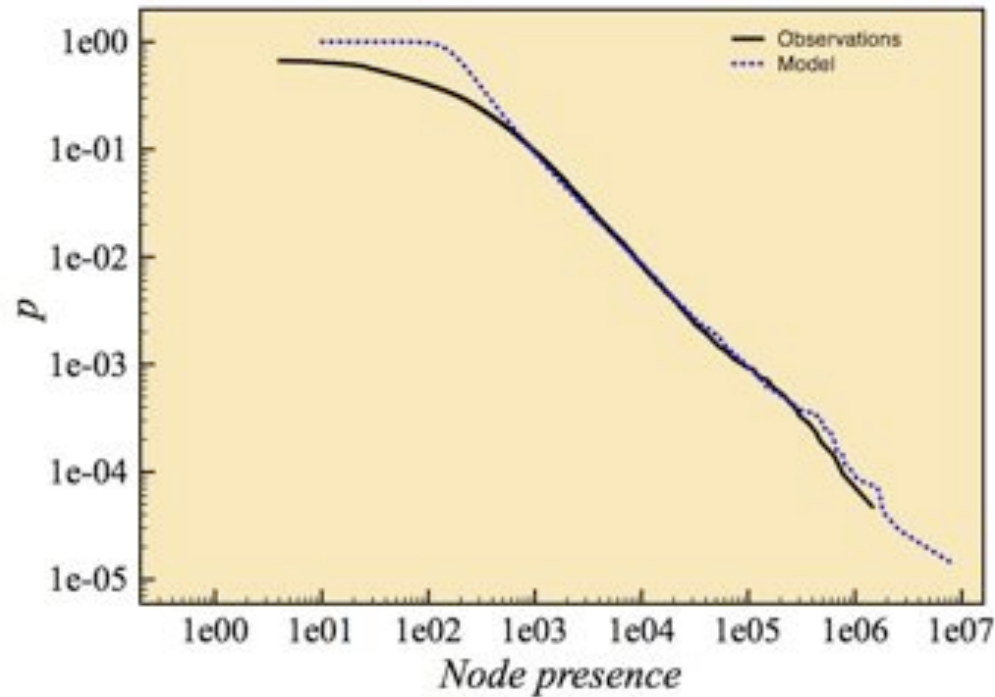




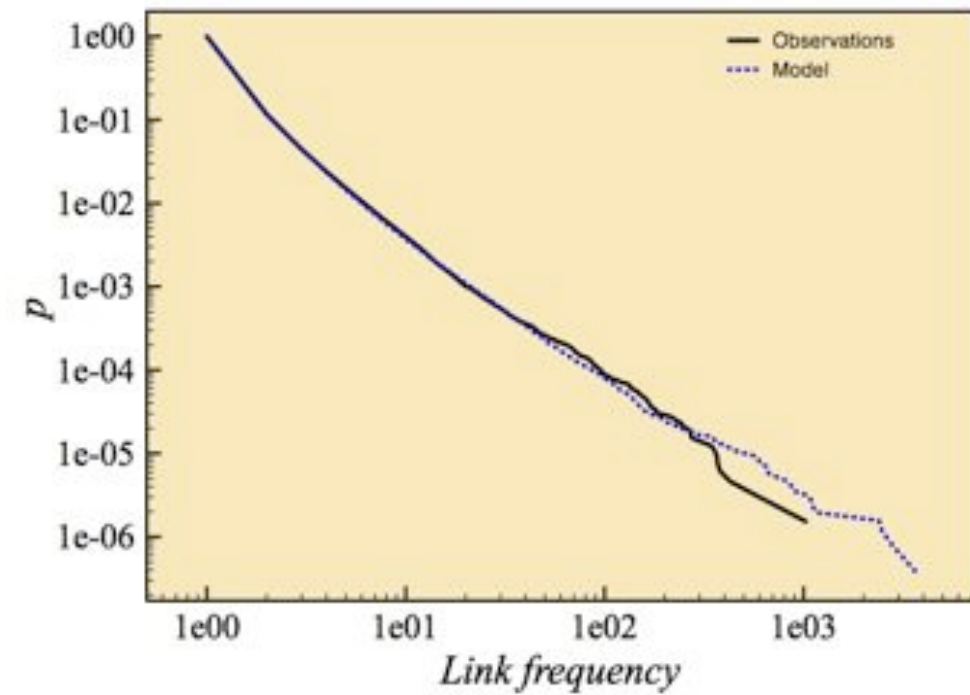
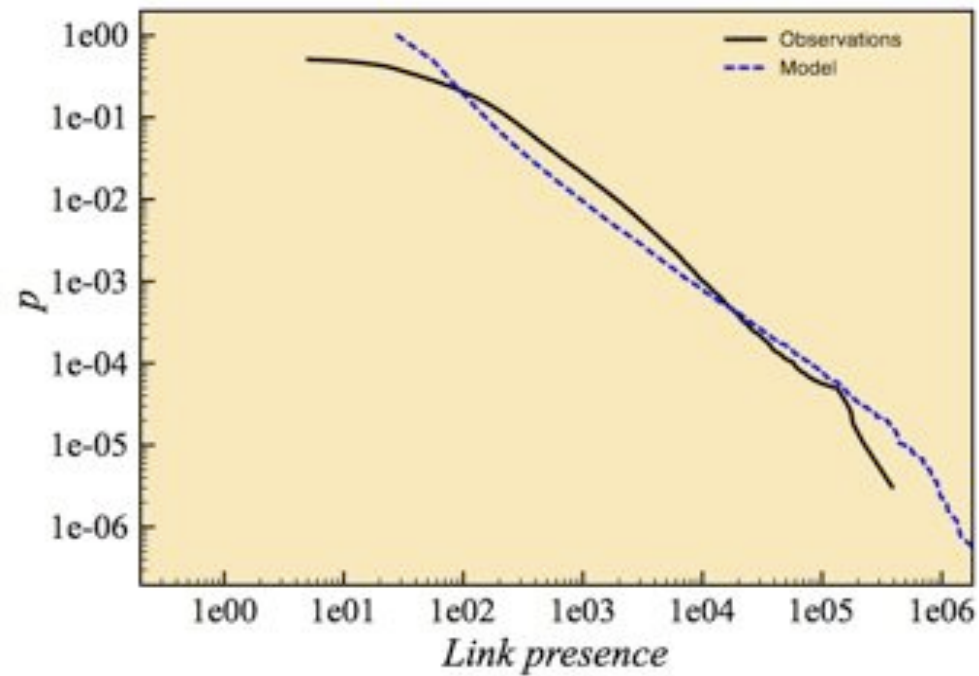
Duration

Frequency

Sessions



Encounters



Implications

- From a **static observer's perspective**, people's movement and encounter patterns are highly regular
–but different across locations
- A static observer may be a public display, a location-based service, a bus stop, a shop
- Our model can be tuned to reflect different locations and cities

Using theory...

- Stress-test a design by considering
 - the frequency of people's visits
 - the duration of their visits
- Quantify the differences between two locations
 - Funchal vs. Atlanta?

Using the tools...

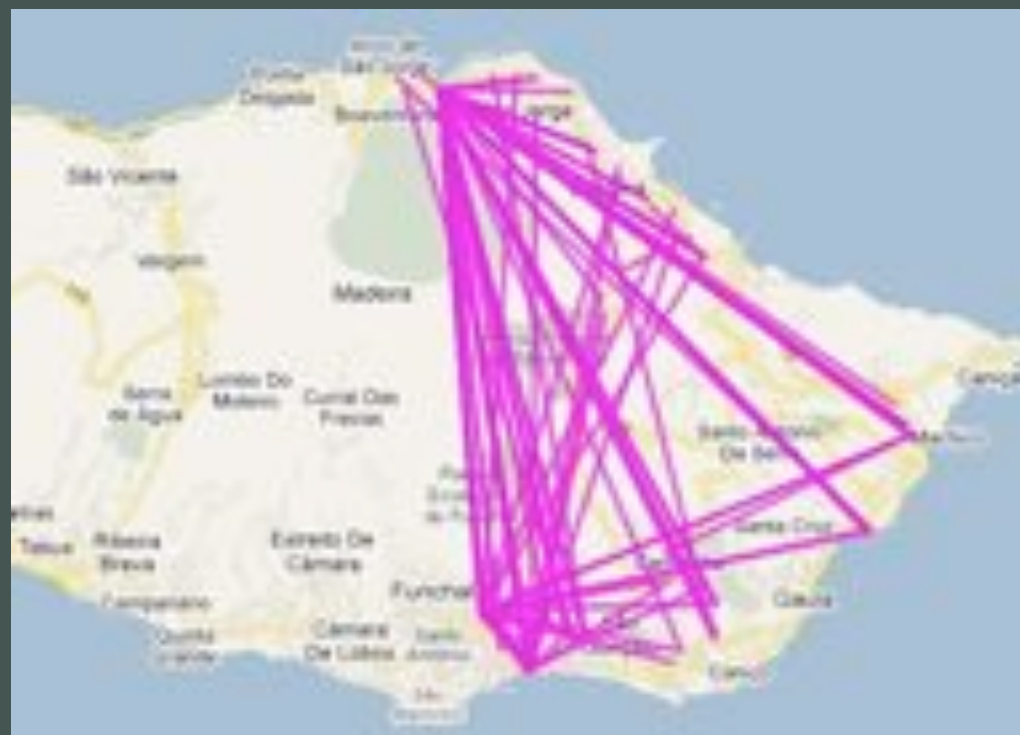
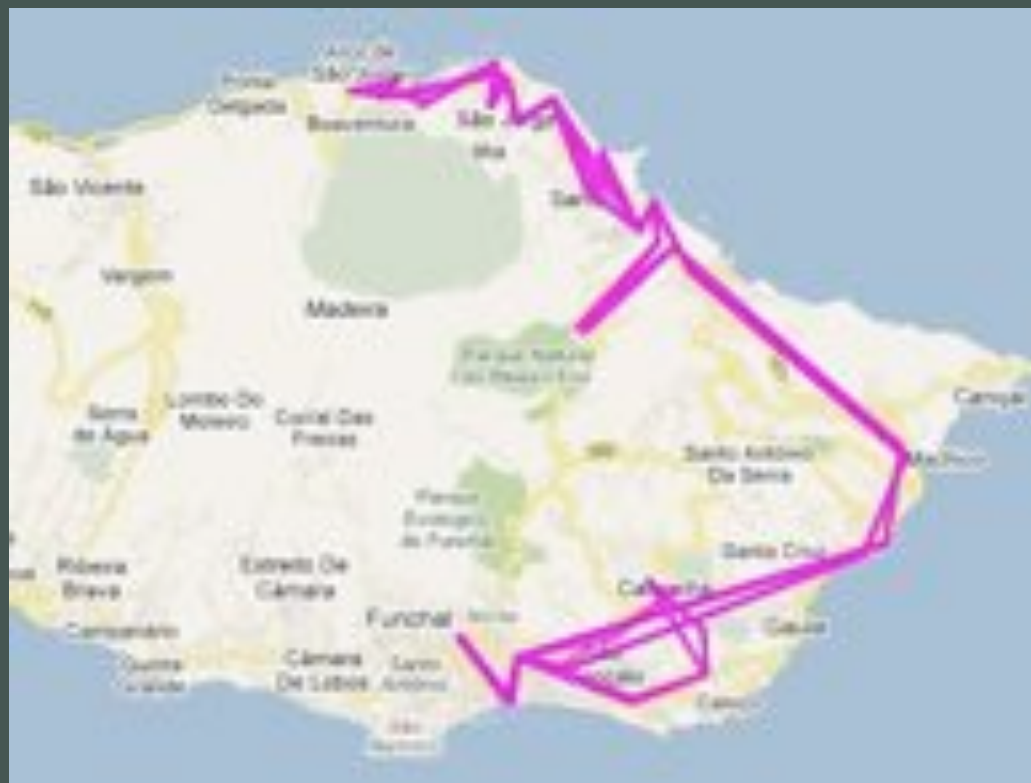
- Automate observations in the wild
- Explore people's trails in the city
 - What trails do couples “leave” on a Friday night?
 - or groups of friends?
- Develop “attention span interfaces”
 - posters, displays, speakers, and mobile devices
 - adapt presentation based on visitors' patterns

The end

- Questions?
- Vassilis Kostakos
vk@uma.pt

Privacy

- Bluetooth can be turned off
 - Should be turned on if there exist potential benefits
 - Build systems that provide such benefits
- Each Bluetooth device has a unique hexadecimal ID
 - Associate this ID with a person's identity
 - VISA, RFID ticket, IMEI : stored in a database
 - Bluetooth: not stored centrally



Avenida - Recovery

