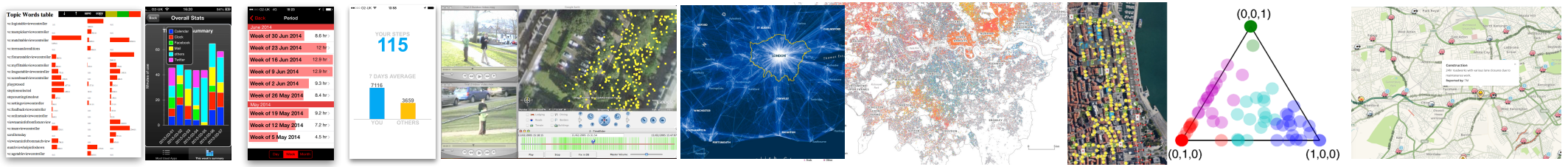
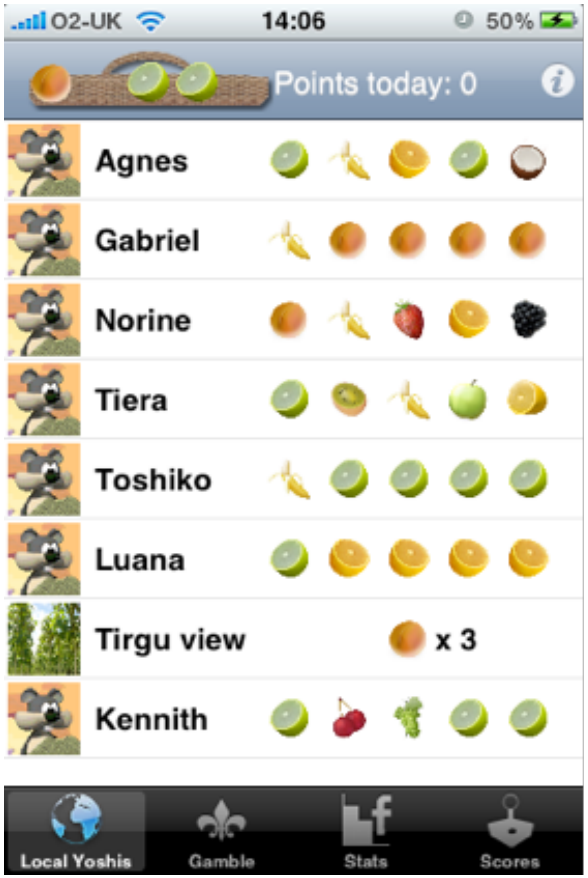


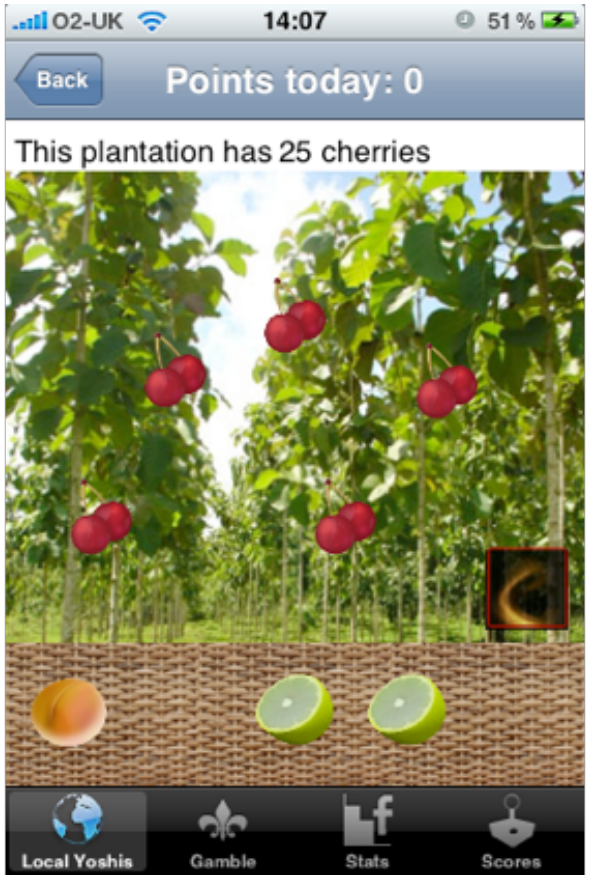
Future Cities and the Smart Campus

Matthew Chalmers
School of Computing Science

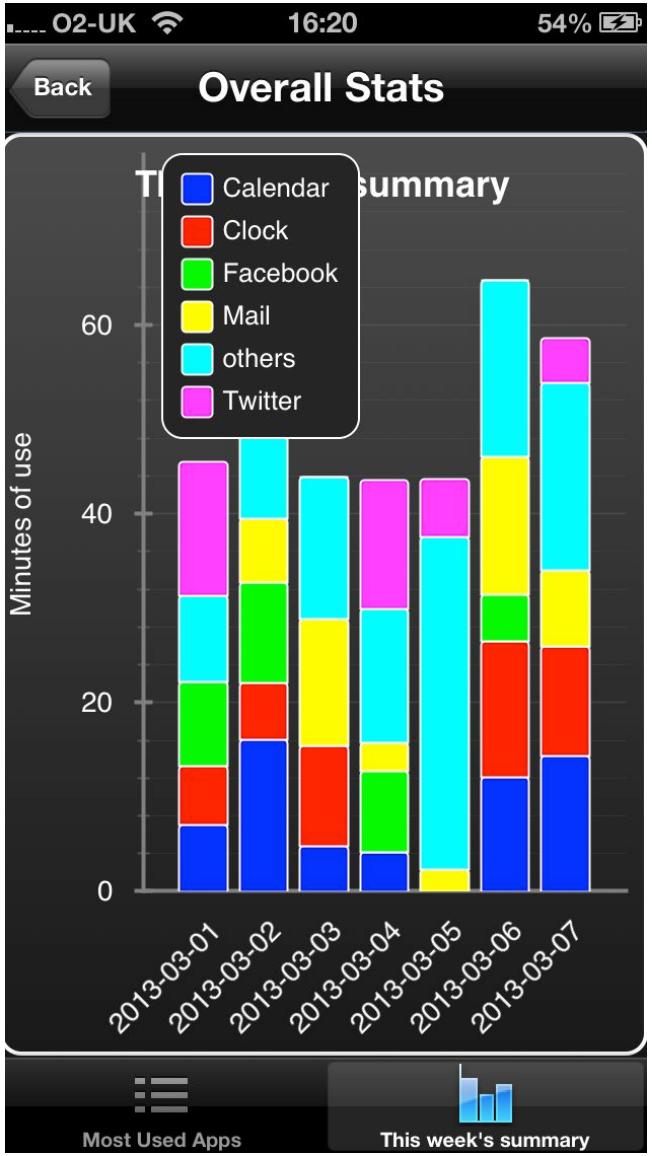
University of Glasgow
VIA VERITAS VITA

Urban infrastructure as a design resource: Yoshi





App Tracker: helping you (and us) track your app use

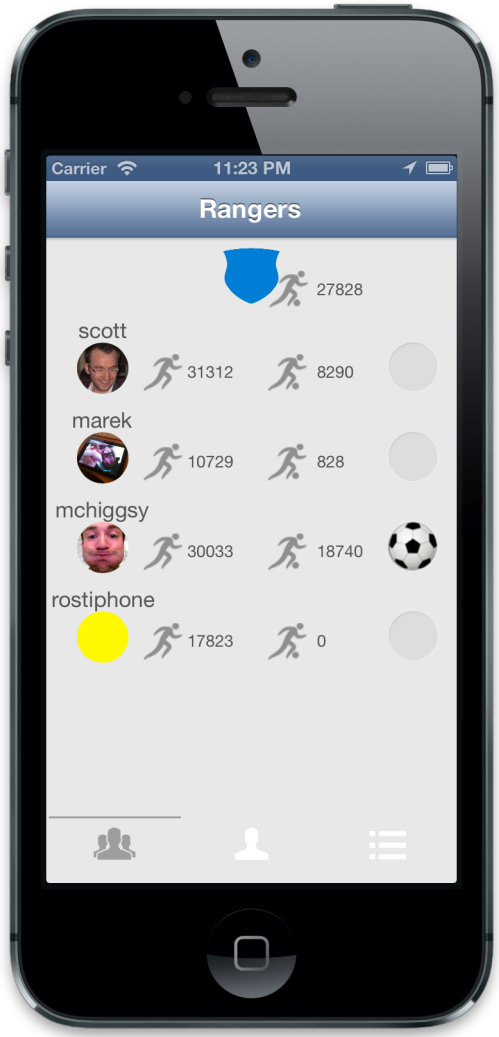


EuroFIT FP7: European Fans in Training

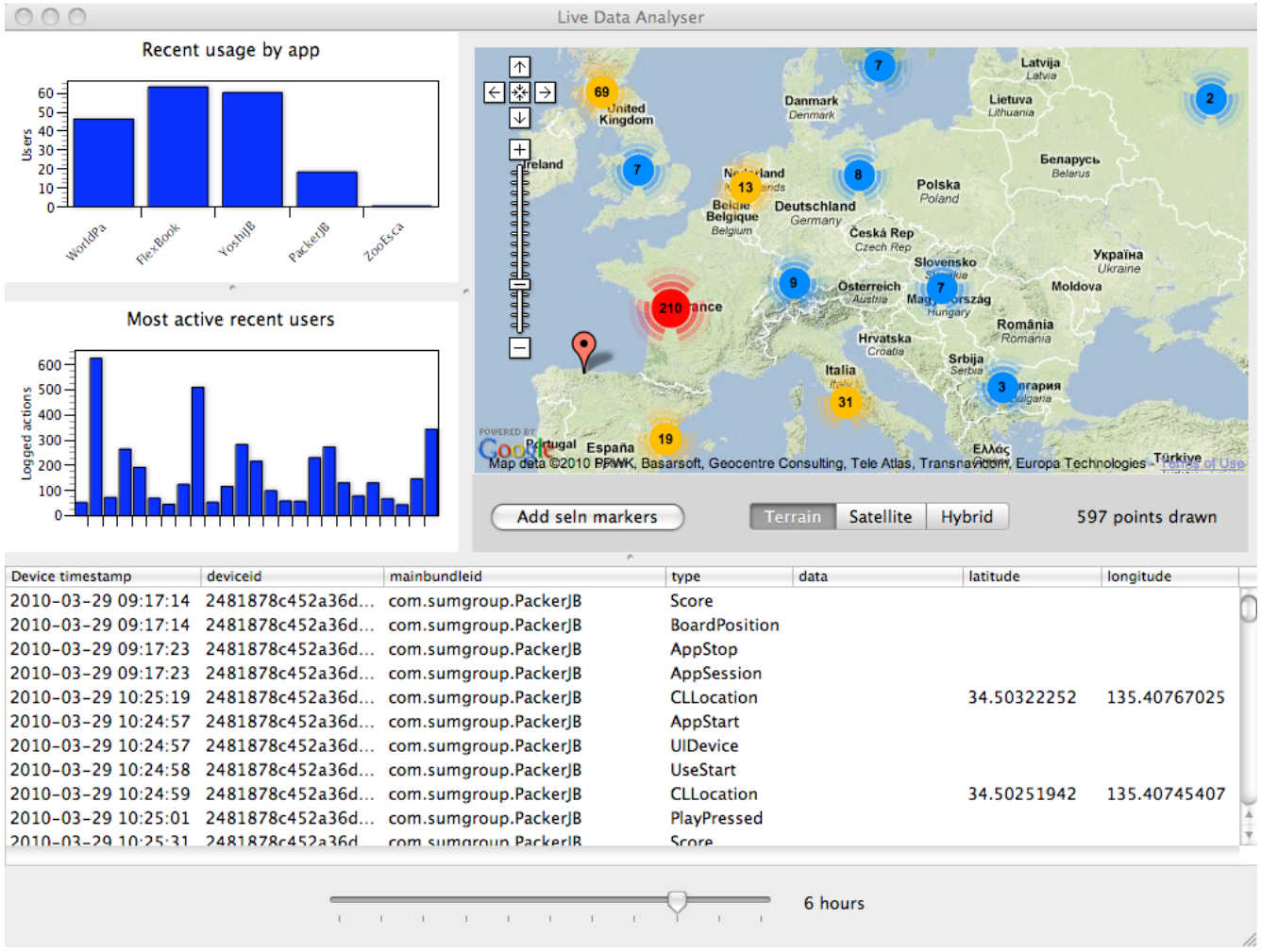
Using the football culture of working class men as a lever for behaviour change

Get them out of cars, buses and sofas, and into exercise

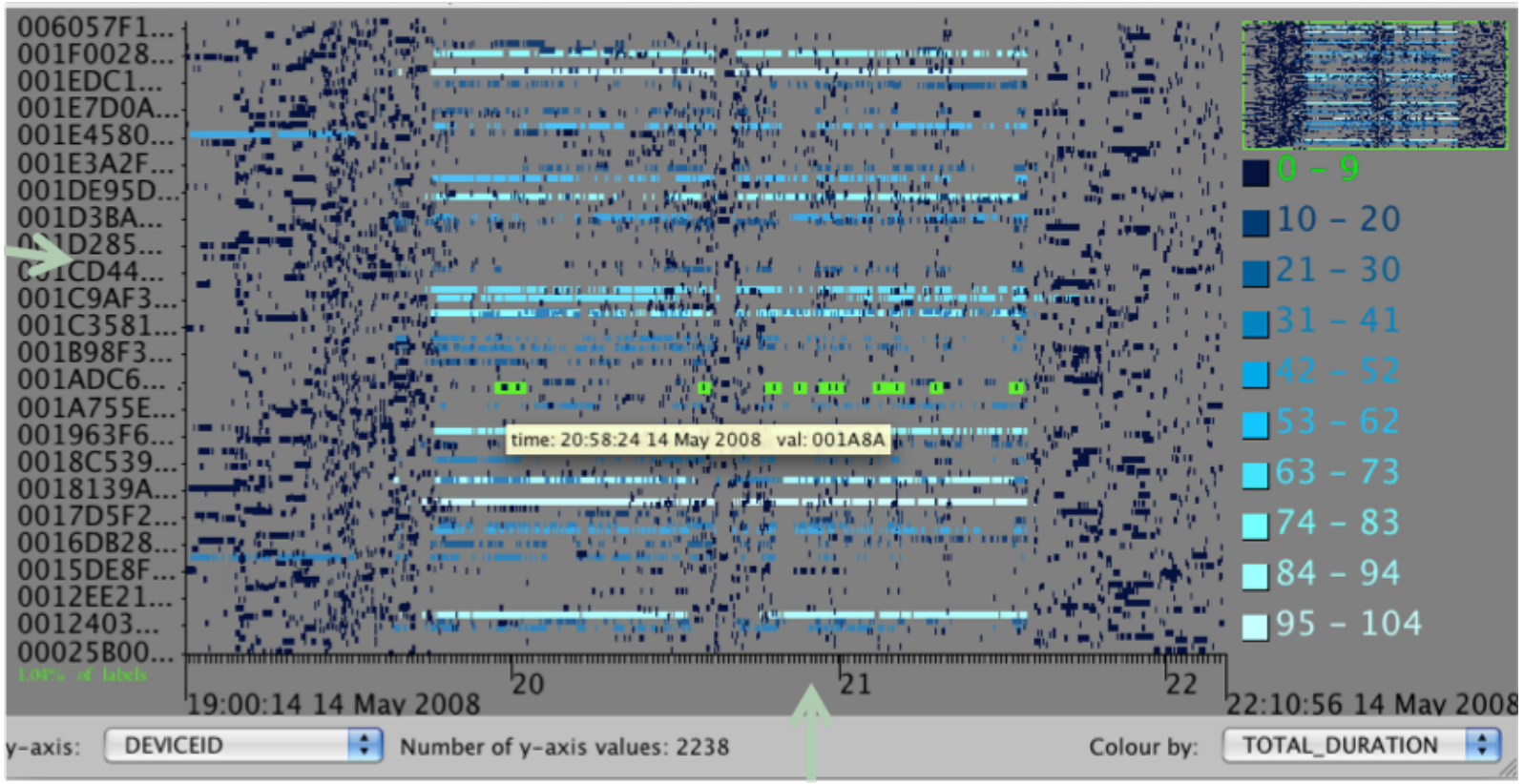
Collaboration with premier league football clubs in UK, Norway, Netherlands and Portugal



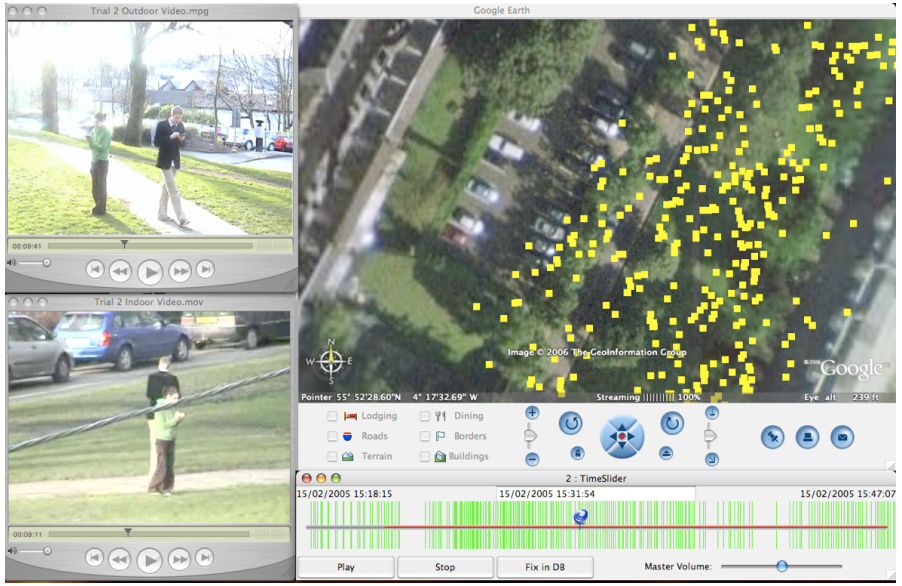
Initial tools for analysis

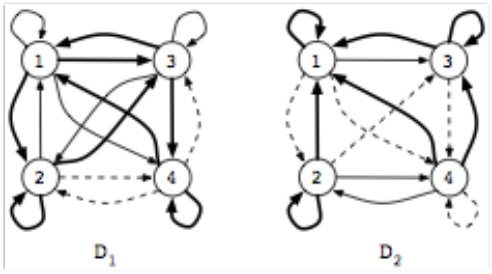


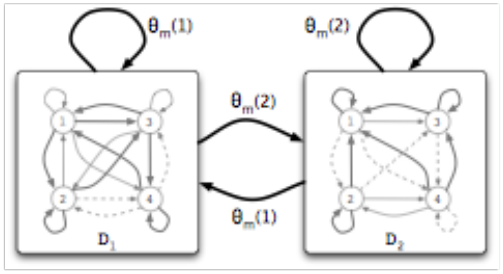
Detecting collective patterns among people

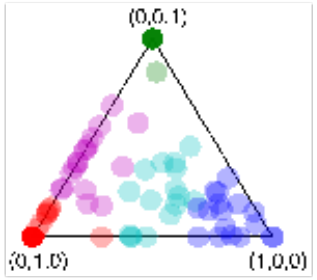


New analytics: hybrid, temporal, stochastic…









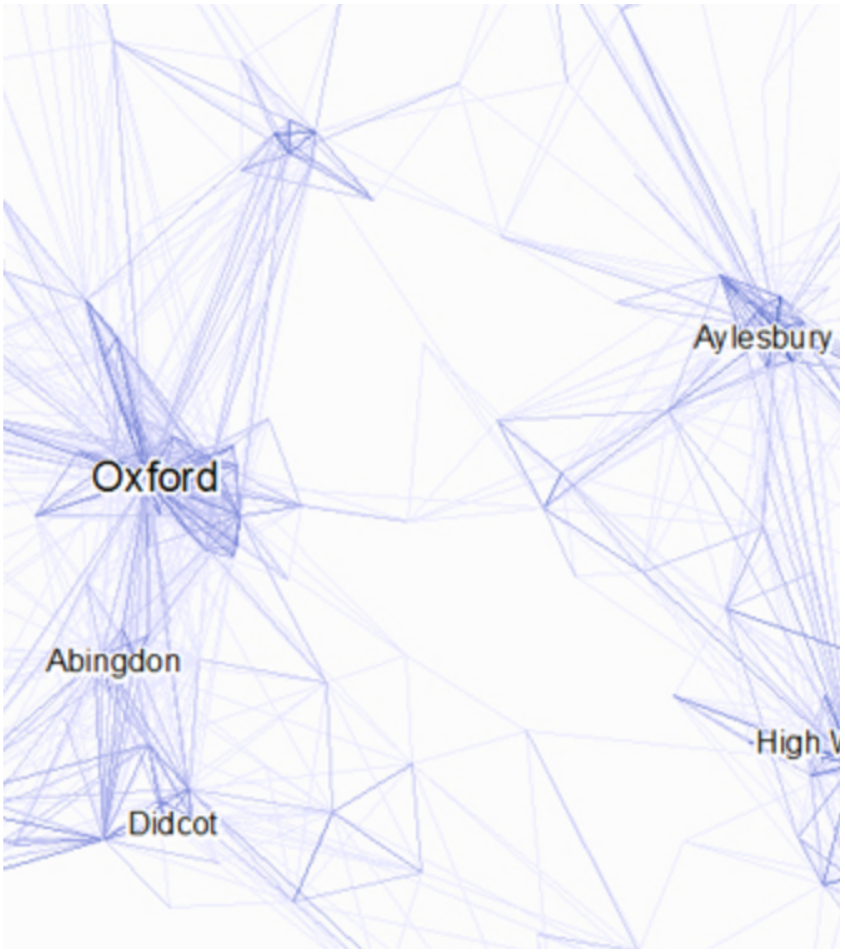
Urban analytics

Data-driven analysis/prediction of economics, transport, health, mobility patterns, resource usage…

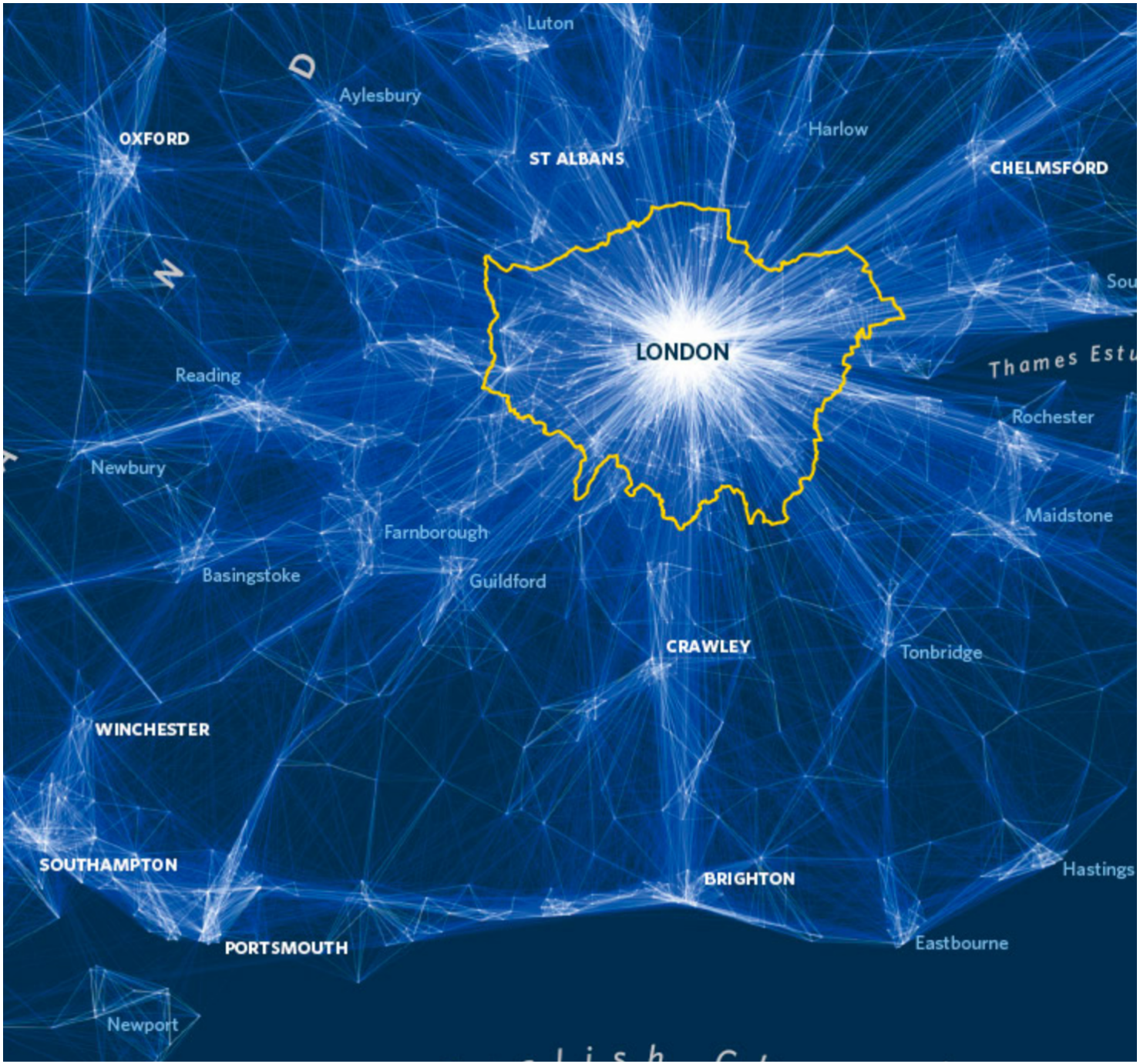
Drawing on complexity theory,, statistics and beyond

Major research sites include MIT and UCL

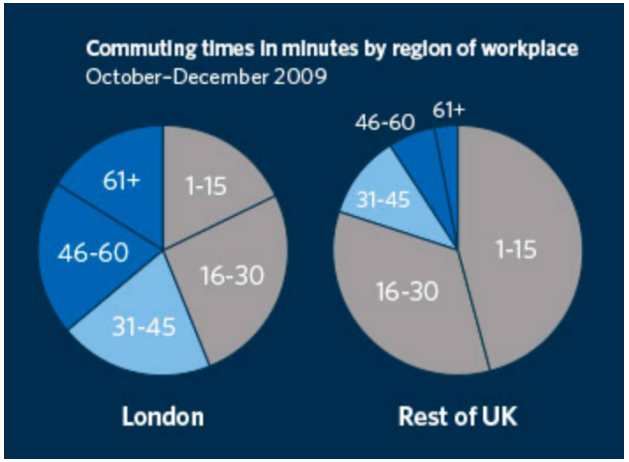
New core book by Mike Batty



Journey to work flows



Commuting times in minutes by region of workplace
October–December 2009

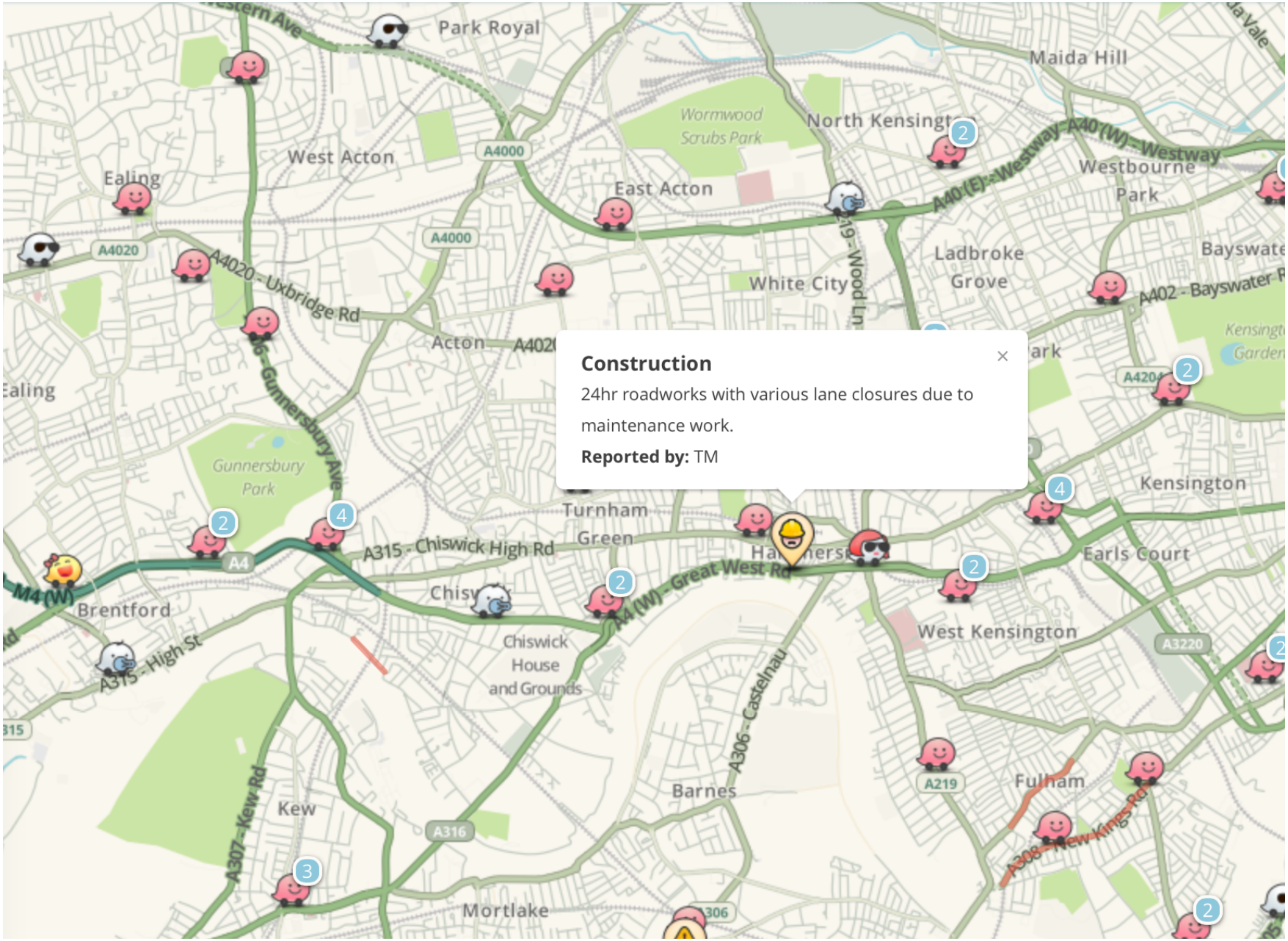


SMART FP7: searching for traffic and parking

2000 sensors in Santander's city centre, plus parking/traffic sensors, Facebook, Twitter...

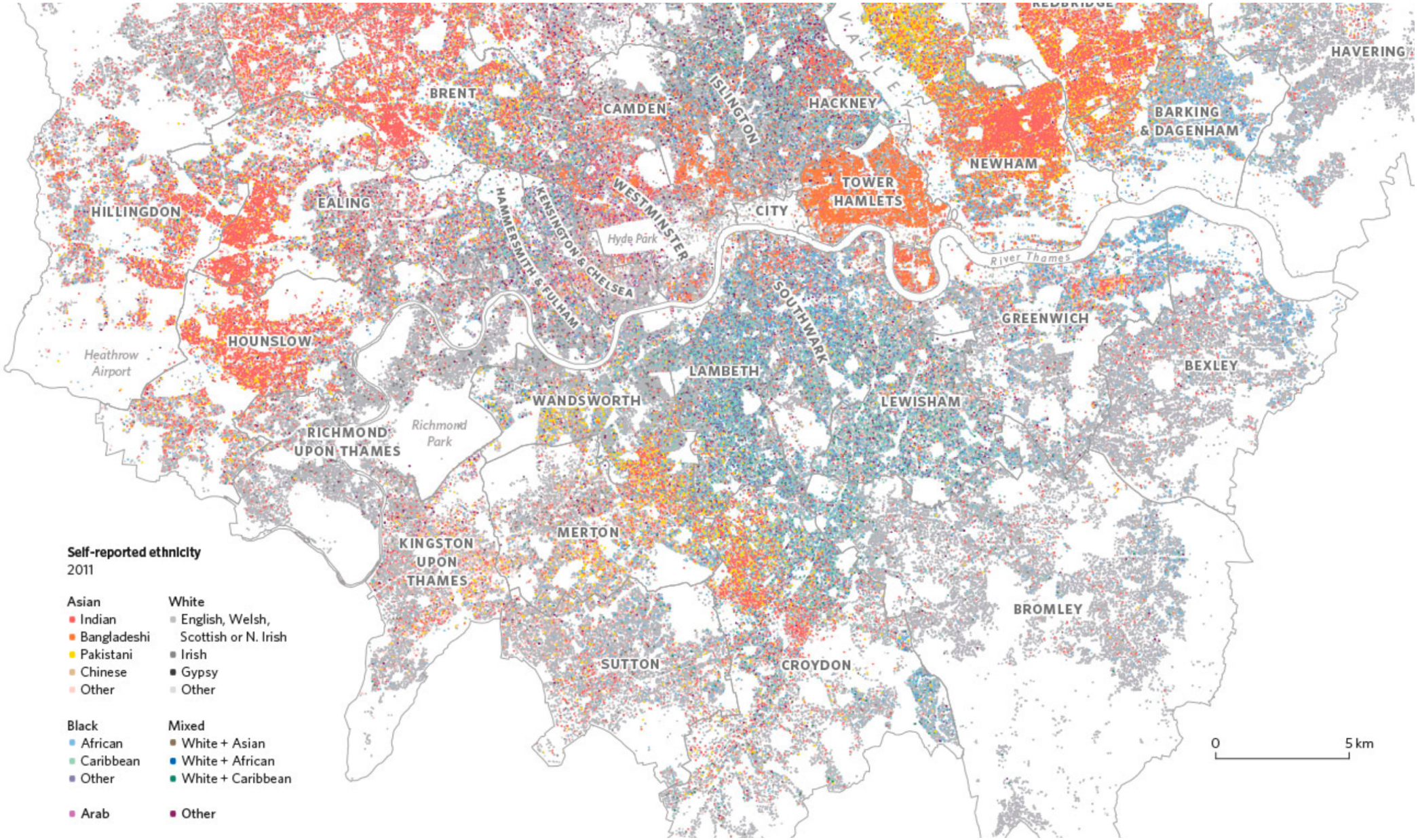
Do a web search for free parking spaces on your route to work…

Waze: people sharing phone positions



Self-Reported Ethnicity

from *London: The Information Capital*, James Cheshire and Oliver Uberti



A touchstone project: StudentLife (U. Dartmouth)

30 undergrads (and 18 grads) ran app on phones 24/7 for 10 weeks

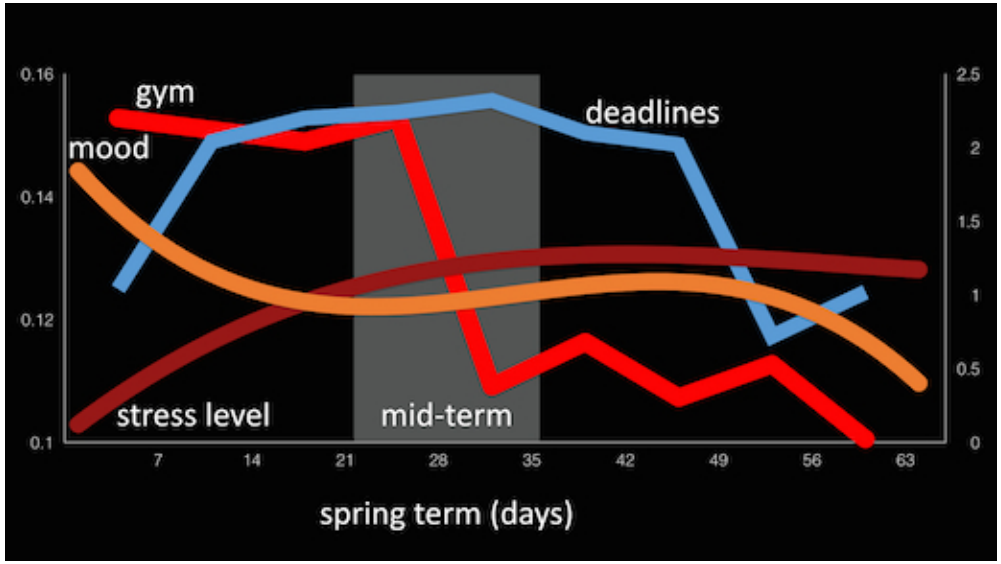
Bed time, wake up time and sleep duration, number of conversations and duration of each conversation per day, physical activity (walking, sitting, running, standing), where they were located and who long they stayed there (i.e., dorm, class, party, gym), the number of people around a student through the day, outdoor and indoor (in campus buildings) mobility, stress level through the day, across the week and term, positive affect (how good they felt about themselves), eating habits (where and when they ate), app usage, in-situ comments on campus and national events…

A touchstone project: StudentLife (U. Dartmouth)

Campbell et al. could predict a student's GPA to within ±0.18

And…

No correlation of grades and class attendance, conversation positively correlated, movement negatively…



A note on ‘future cities’ in Glasgow

The new UoG campus development could be… many things

A hub for future cities research, expertise and commerce

A living lab that is the common ground for many disciplines’ research

A means to engender new forms of education, work and community

Odd that we were in the UK’s largest future cities ‘experiment’

Centred on a £24M future cities demonstrator run by the city council

Constrained w.r.t. time, topics, infrastructure, protocols, politics…

Are there lessons to learn from such city-scale projects?

Early concepts: 'top down' urban design

Songdo, Korea

Fast comms for 'concierges', CCTV..
Cycle lanes, electric vehicles, subways…
Energy efficient lighting, pumps, motors…
Centralised pneumatic waste collection
Lots of recycling

Cisco *heavily* involved

Still developing and/or empty

Early concepts: 'top down' urban design

Masdar City, Abu Dhabi

Efficient buildings shaped to draw air through

Big solar energy and renewables plan

Emphasis on clean transport (public transportation, cycling, walking)

Siemens *heavily* involved

Again, still developing (or empty)

Early concepts: 'top down' urban design

Rio de Janeiro, Brazil

Central video 'control room' for traffic, emergency/disaster management (80 46" screens)

Custom weather radar for rain/ landslide prediction

IBM *heavily* involved

Criticism for focus on public control rather than safety

Criticism of early future city projects

Focus on central authorities and big business

Control and management of citizens and common services

Very little consultation, engagement, utility… w.r.t. individuals

Bias in system design towards wealthier people?

iPhone apps for reporting street damage/litter used mostly in wealthier neighbourhoods, so those areas get the benefit

Metrics of quality far from citizens' priorities

What does optimising overall traffic flow mean to the average guy?

See books by Adam Greenfield and Anthony Townsend

Glasgow Future City Demonstrator

An 18 month £24M project to advance and display city scale innovations

Also three other smaller UK projects in Bristol, Peterborough and East End of London

The usual topics: health, safety, transport, energy…

…and supporting new forms of business and citizen engagement

Long term services but also short term events

Data repositories, apps, open APIs, hackathons, public demos…

Data, data everywhere…

ACTIVE TRAVEL

DEMOGRAPHICS

ECONOMY

EDUCATION

ENERGY

ENVIRONMENT

GEOGRAPHY

HEALTH

LIVING

PUBLIC SAFETY

TOURISM

TRANSPORTATION

Glasgow FCD: main projects

City technology platform

Data sets, maps and 'dashboard' visualisations

Operations centre

Rio-style 'wall of video' CCTV/traffic control centre

Active travel

Apps encouraging/supporting cycling and walking

Glasgow FCD: other projects

Energy efficiency

District heating systems: work with buildings to smooth power demand

Better home insulation and metering: led to people turning up the heaters!

Intelligent street lighting

A few streets' lampposts with pollution/noise sensors, dynamically adjusting LEDs to noise levels

Social transport

15% of city's transport involves moving 'vulnerable' people around

Drivers objected to tracking, poured Coke on location trackers 'accidentally'

A more inclusive ‘bottom up’ approach?

Open data, open software… and open skills?

Helping more people have the skills use of new tech in their own ways in their own cities

Contrast with the ‘quantified self’ movement

Quantifying oneself

Physical activity/exercise but also diet, sedentary time, sleep patterns…

Rising trend… especially among the ‘wealthy worried well’

Link to public health initiatives?

Requirements of low cost and appeal to poorer unhealthier people

From one city to many citizens

City: can this new data be used to improve public services?

Optimising traffic flow via road sensors and the timing of traffic lights

Using footfall data to inform plans for urban regeneration

Finding environmental factors that can be used to preempt pest outbreaks

Citizen: can I improve my commute/job/community…?

Which route should I take into work, starting in 10 minutes' time?

Is there a safe place to lock my bike up near a shop I'm visiting at 3pm?

Where might I buy a house, in a place I'll feel safe in?

What future for ‘Future Cities’ on campus?

New forms of infrastructure, industry, community & design

Problems of scale, choice, interoperability, openness, security & inclusivity

How to advance social engagement and campus development/governance?

What control should one retain over one’s data…

…or should it be given away to IT Services or to commercial firms?

A starting point: get ‘big data’ but give something back

Design uses and services that touch people’s lives in coherent ways

A broad socio-technical challenge grounded in real world activity

A smart campus demonstrator project

Where do people go? What do they do there?

Sharing of indoor+outdoor location, and (maybe) in-phone+net activity

What can we do with data on these things? What can *they* do with it?

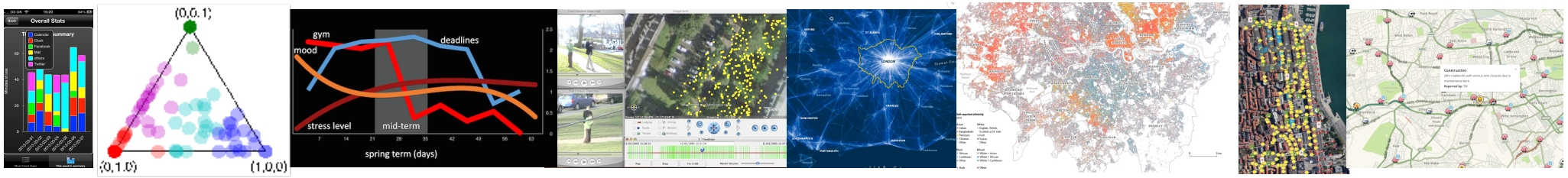
Sharing of indoor+outdoor location, and (maybe) in-phone+net activity

Patterns of occupancy/use of campus spaces

Individual paths not just aggregate volumes

Engagement in the campus development process?

Educational modelling/support?



Thanks.

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