



3 June  
2013

# Smart Cities

Session 2: Lecture 3:  
Public Online Network Data: The Bikes Projects

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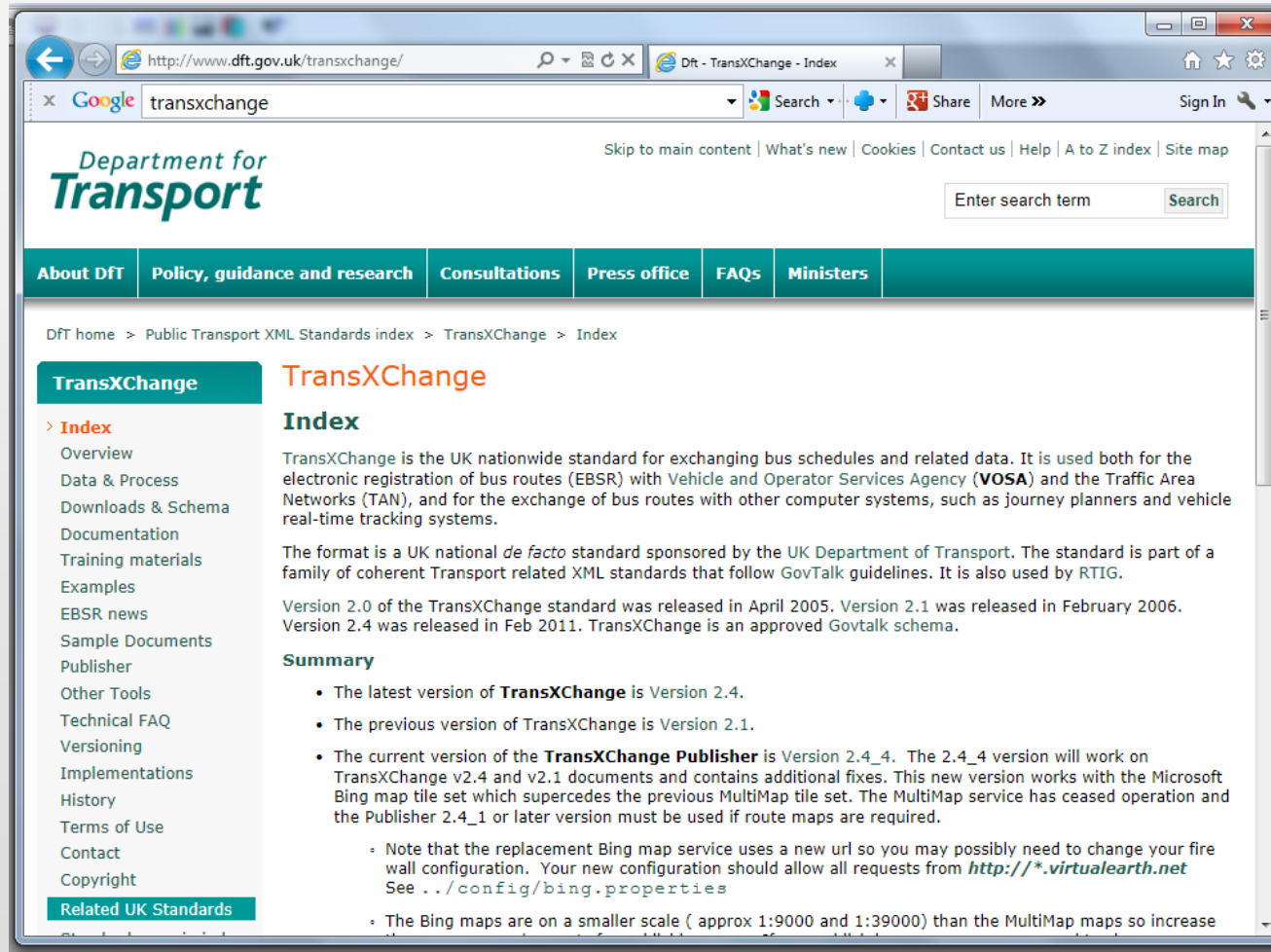
<http://www.spatialcomplexcity.info/>

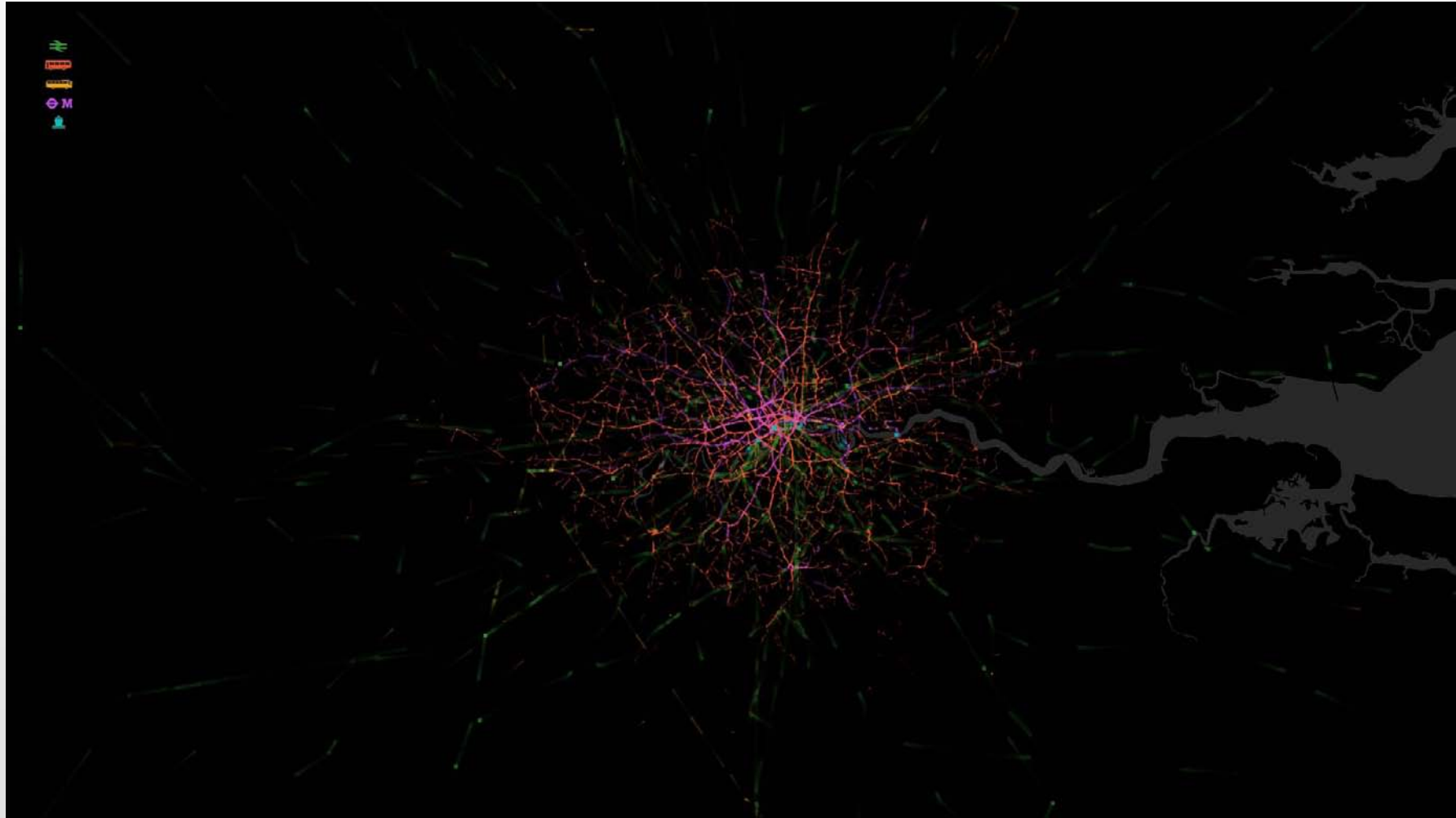
<http://www.casa.ucl.ac.uk/>

# Outline of the Lecture

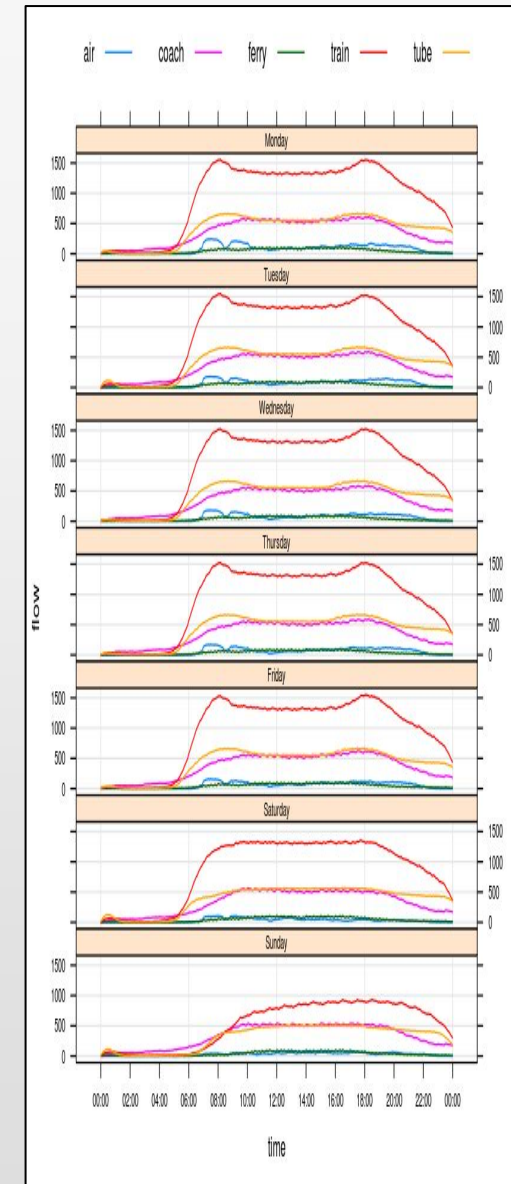
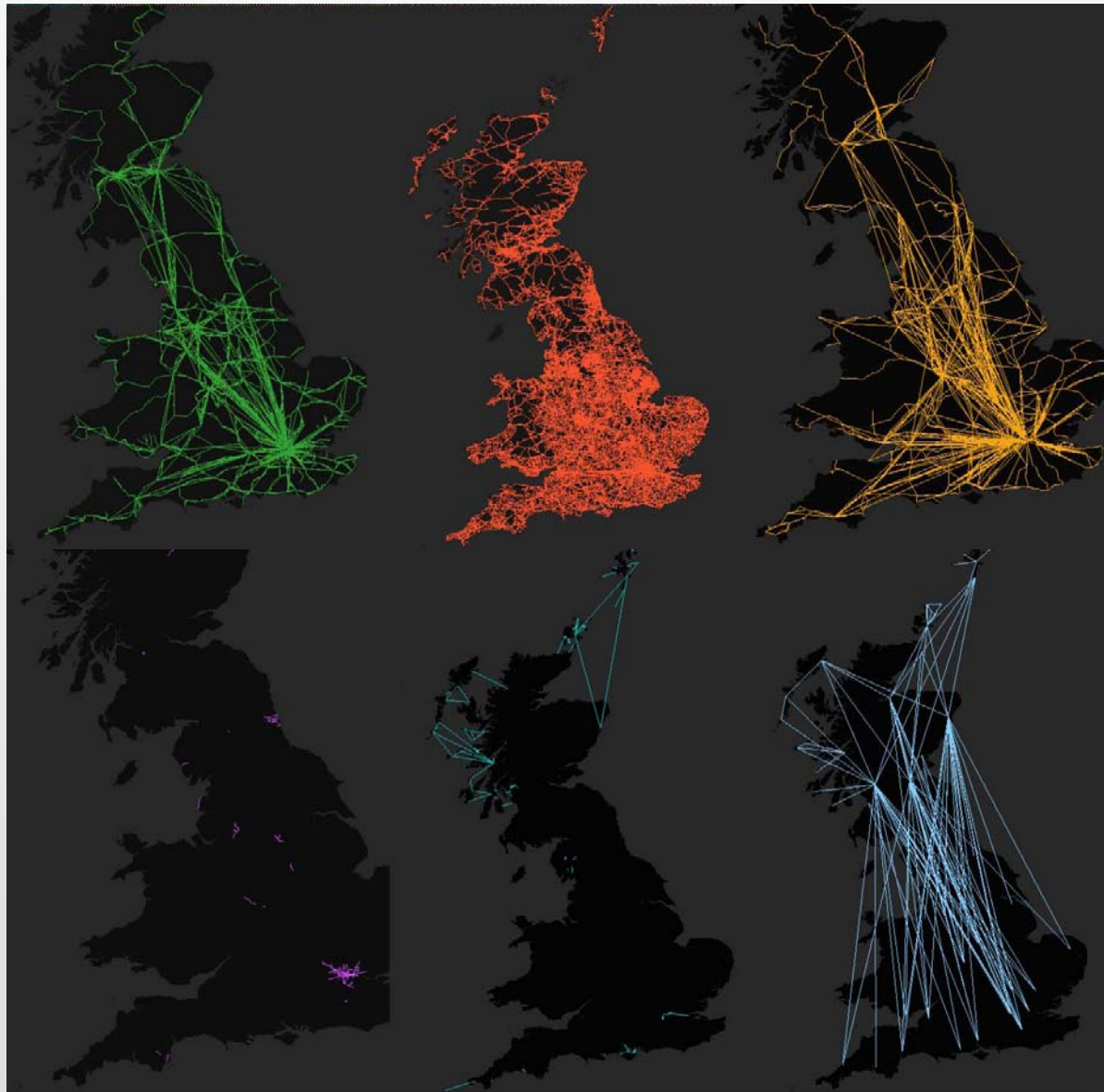
1. More Collections of Flow Data from the Public Domain and its Visualisation: National Patterns
2. The Bikes Projects: Online Data
3. The Barclays Cycle Hire London Project
4. The Website: Real Time Visualisation of Origins and Destinations Activity
5. Initial Analyses

# More Collections of Flow Data from the Public Domain & its Visualisation: from National Timetables





From Joan Serras work posted in Vimeo: <http://vimeo.com/21351764> and you can get all this from our Simulacra blog [www.simulacra.info](http://www.simulacra.info), I think

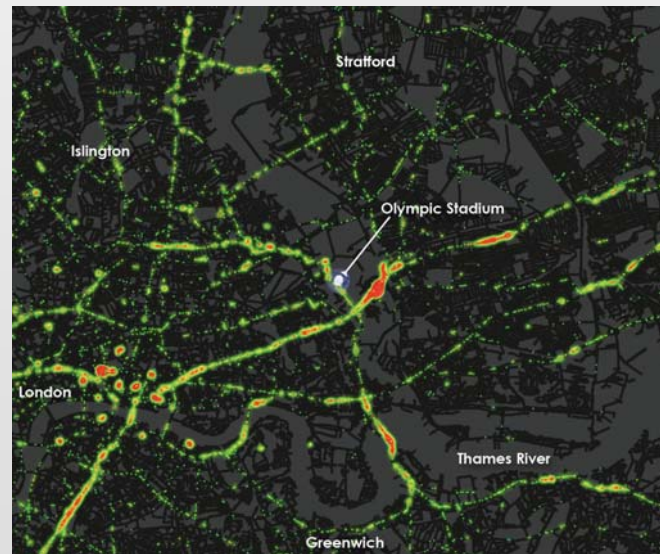




Best to show these animations from simulacra as this let me point you to related things

<http://simulacra.blogs.casa.ucl.ac.uk/>

And also worth noting that we are also working with electronic data and courier data all coded – from the courier data we have done some hypothetical simulations of disease spread



Some preliminary work at: Crowd and environmental management during mass gatherings  
Anders Johansson et al., (2012) **The Lancet Infectious Diseases**, Vol. 12No. 2 pp 150-156



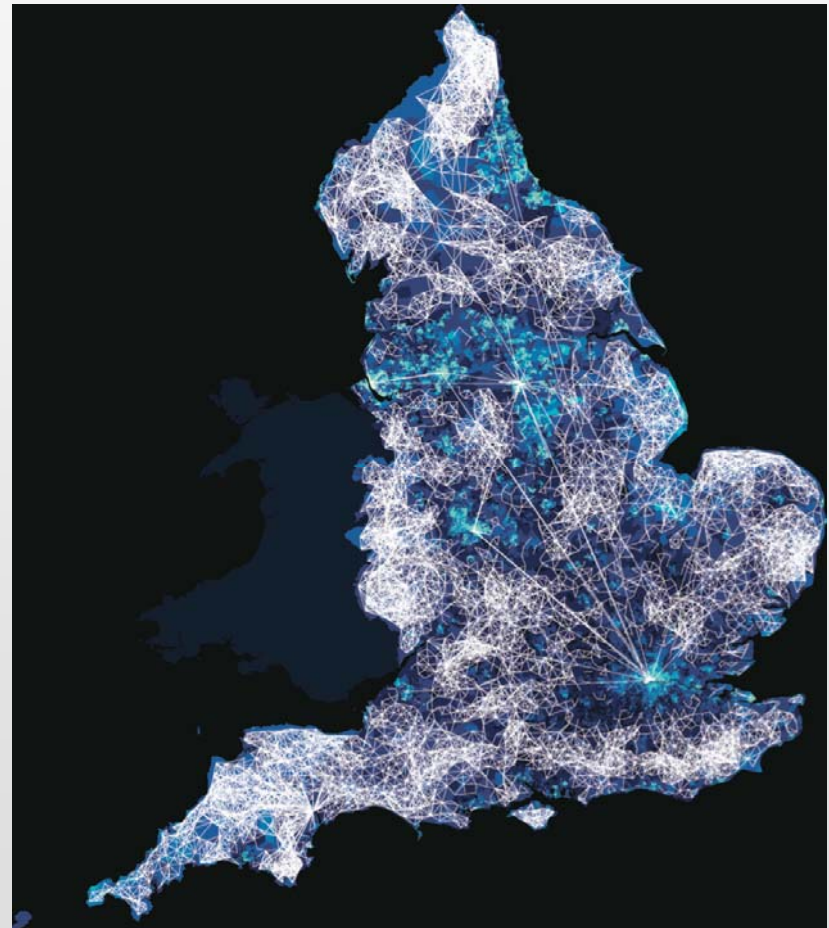
Greater London Authority (GLA) area : Road network







Telecoms – Jon Reades' work with a large UK telecoms provider and with Sensable City Lab at MIT; an article in PLoS One 2012



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RESEARCH ARTICLE

# Redrawing the Map of Great Britain from a Network of Human Interactions

Carlo Ratti, Stanislav Sobolevsky, Francesco Calabrese , Clio Andris, Jonathan Reades, Mauro Martino, Rob Claxton, Steven H. Strogatz

Article

About the Authors

Metrics

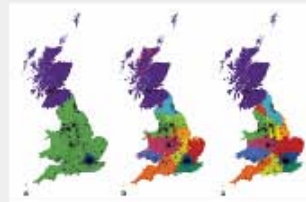
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Results and Discussion

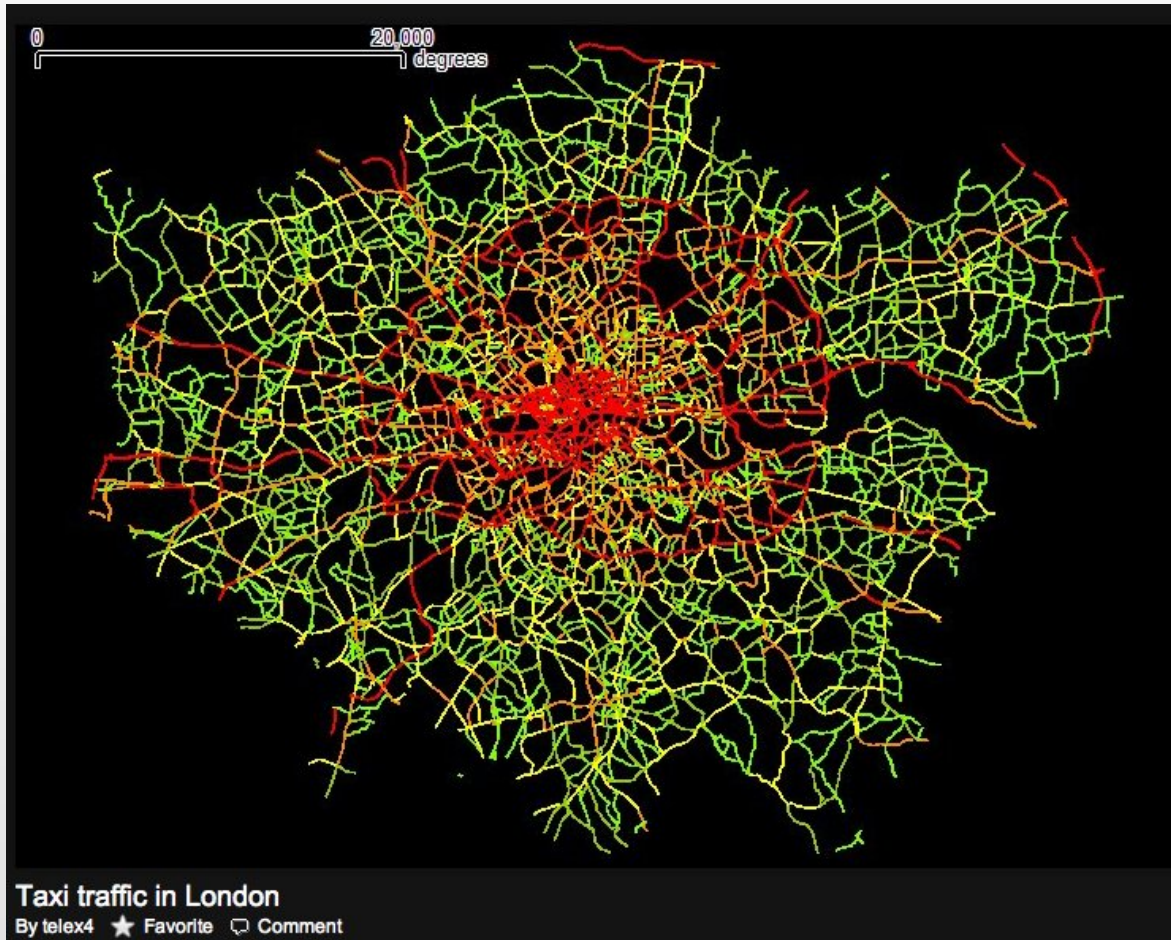
## Abstract

Do regional boundaries defined by governments respect the more natural ways that people

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And Ed Manley from Tao Cheng's group in UCL has a nice blog where he has lots of visualisations of his online limo service data for London – at <http://urbanmovements.posterous.com/>



# The Bikes Projects: Online Data

*“The number of cyclists in London is growing, especially during peak periods, and on significant cycle commuter routes often exceed 10% of total vehicle flow” (from TfL Traffic Modelling Guidelines, 2010)*

World-wide case study from Ollie O’Brien:

70 cities, 2 years of data

Docking station status

Journey records

Looking at cultural behaviour

Each docking station shown by a circle

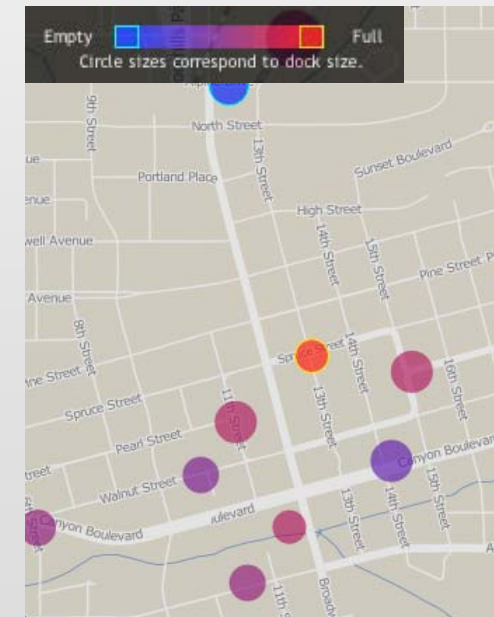
Blue = empty, Purple = ~50% full, Red = full

Normally two graphs

Weekday (normally Wednesday 6th June)

Weekend (normally Saturday 9th June)

Live versions at <http://bikes.oobrien.com/>



# The Barclays Cycle Hire London Project

BCH commenced operations in July 2010 with 5,000 bicycles and *315 docking stations* distributed across the City of London and parts of eight London boroughs.[10] The coverage zone spans approximately 17 square miles (44 km<sup>2</sup>), roughly matching the Zone 1 Travelcard area.



Currently there are some 8,000 'Boris Bikes' and 570 *docking stations* in the BCH scheme, which has been used for over *19 million journeys* to date



- **Docks** – The things which hold onto the bikes and release them
- **Stations** – groups of docks
- **Spaces** – docks which are empty

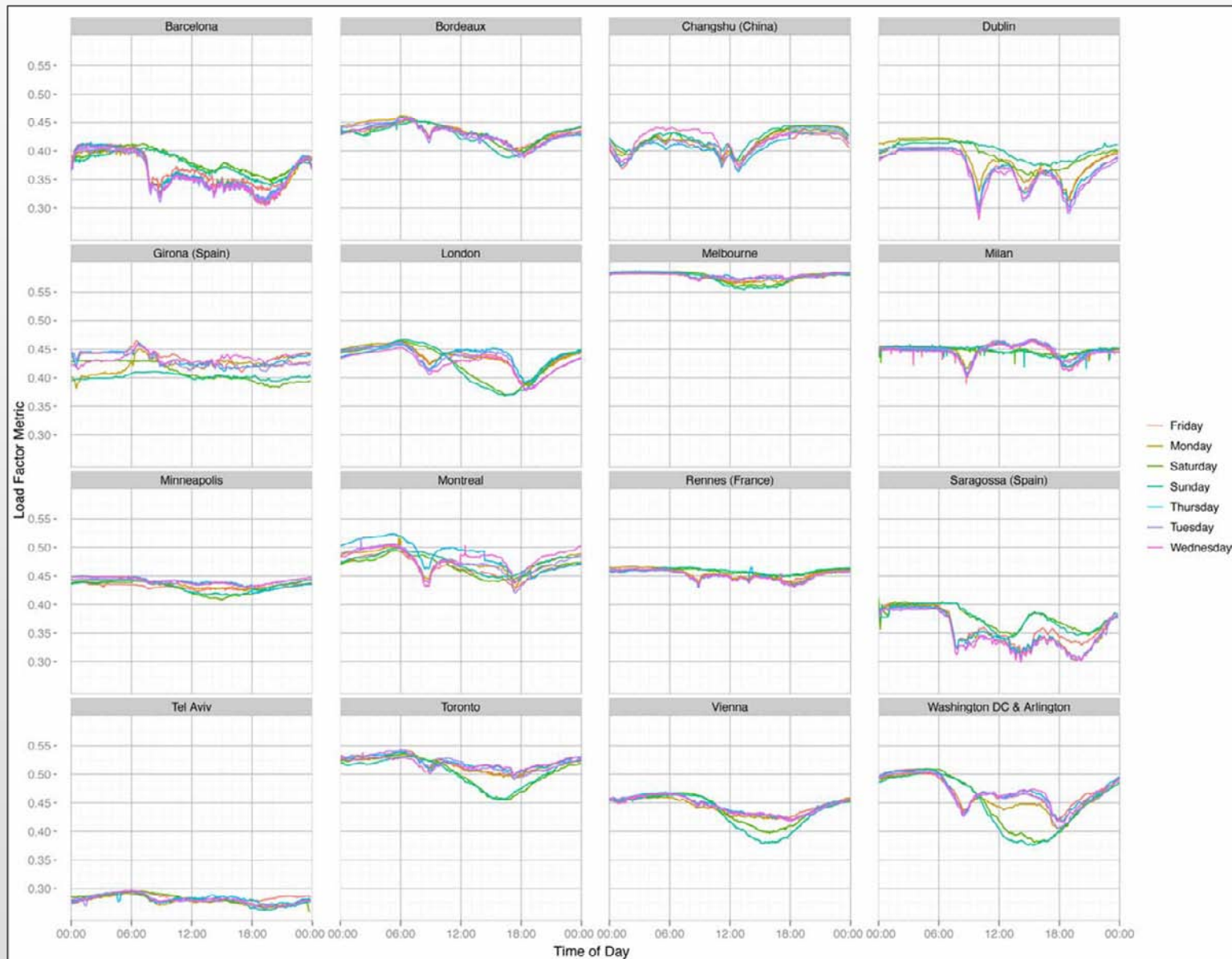
City	Official Name	Installed	System	# of Bikes
London	Barclays Cycle Hire	July 2010	Bixi	4,300
Barcelona	Bicing	March 2007	Bikemi	4,200
Milan	Bikemi	December 2008	Bicing	1,100
Saragossa	Bizi	May 2008	Bicing	800
Girona	Girocleta	September 2009	TNT	100
Washington DC and Arlington	Capital Bikeshare	September 2010	Bixi	650
Montreal	Bixi	May 2009	Bixi	4,200
Minneapolis	Nice Ride	June 2010	Bixi	600
Denver	B-cycle	April 2010	B-cycle	350
Melbourne	Bike Share	June 2010	Bixi	400



# Cycle Hire

Rank	City	Country	Bikes
1	Wuhan	China	70000
2	Hangzhou	China	60600
	Beijing	China	50000
3	Paris	France	18000
	New York	United States	10000
4	Taizhou	China	10000
5	<b>London</b>	<b>Great Britain</b>	<b>7200</b>
6	Yantai	China	6000
7	Shanghai	China	5700
	Chicago	United States	5000
8	Guangzhou	China	5000
9	Barcelona	Spain	4700
10	Kaohsiung	China	4500
11	Montreal	Canada	4220
12	Foshan	China	4000
13	Lyon	France	3400
14	Zhangjiagang	China	3200
15	Munich	Germany	3000
16	Wuham/Qinshan	China	3000
17	Toulouse	France	2500
18	Brussels	Belgium	2180
19	Seville	Spain	1950
20	Changshu	China	1700





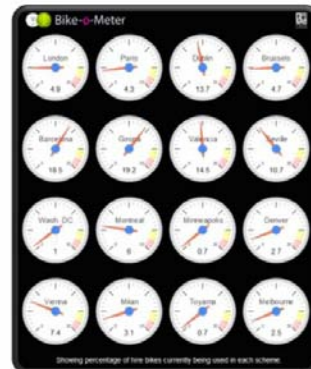
## Let's Visualise Them!

```
'id': '([0-9]+)', 'name': '(.+)', 'lat': '(.+)', 'long': '(.+)', 'nbBikes': '([0-9]+)', 'nbEmptyDocks': '([0-9]+)', 'installed': '(.+)', 'locked': '(.+)', 'temporary': '(.+)'
```

- Obtain the data from the operators' websites
  - Some provide XML/JSON/KML
  - Lots of Regex parsing
  - Velib-based systems require two stages
- Store it for analysis
- Stick it on a map
  - OpenLayers has some nice vector styling for points
  - OpenStreetMap-based background
  - Charts of historical trends via the Google Chart API

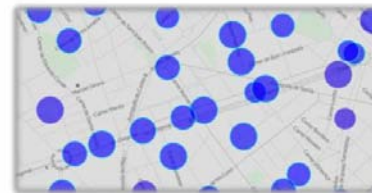
### Bike-o-Meter [casa.ucl.ac.uk/bom](http://casa.ucl.ac.uk/bom)

- Tweet-o-Meter for bikes
  - Steven Gray (@frogo)
  - Using Google Gauges
- See the real life Tweet-o-Meters at the new British Library "Growing Knowledge" exhibition
  - Should be easy to hack to show the Bike-o-Meters instead ☺



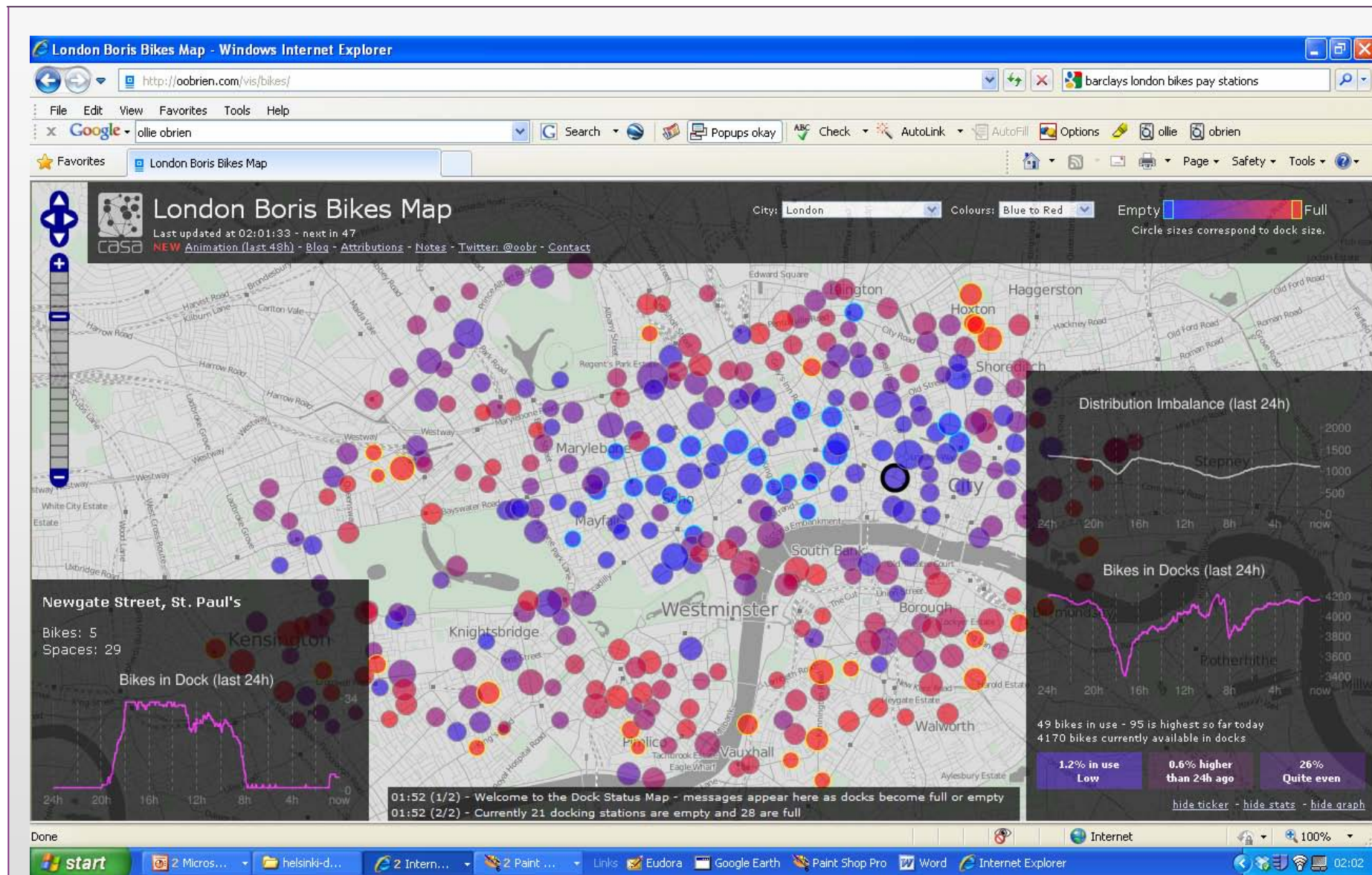
### Bike/Dock Ratio

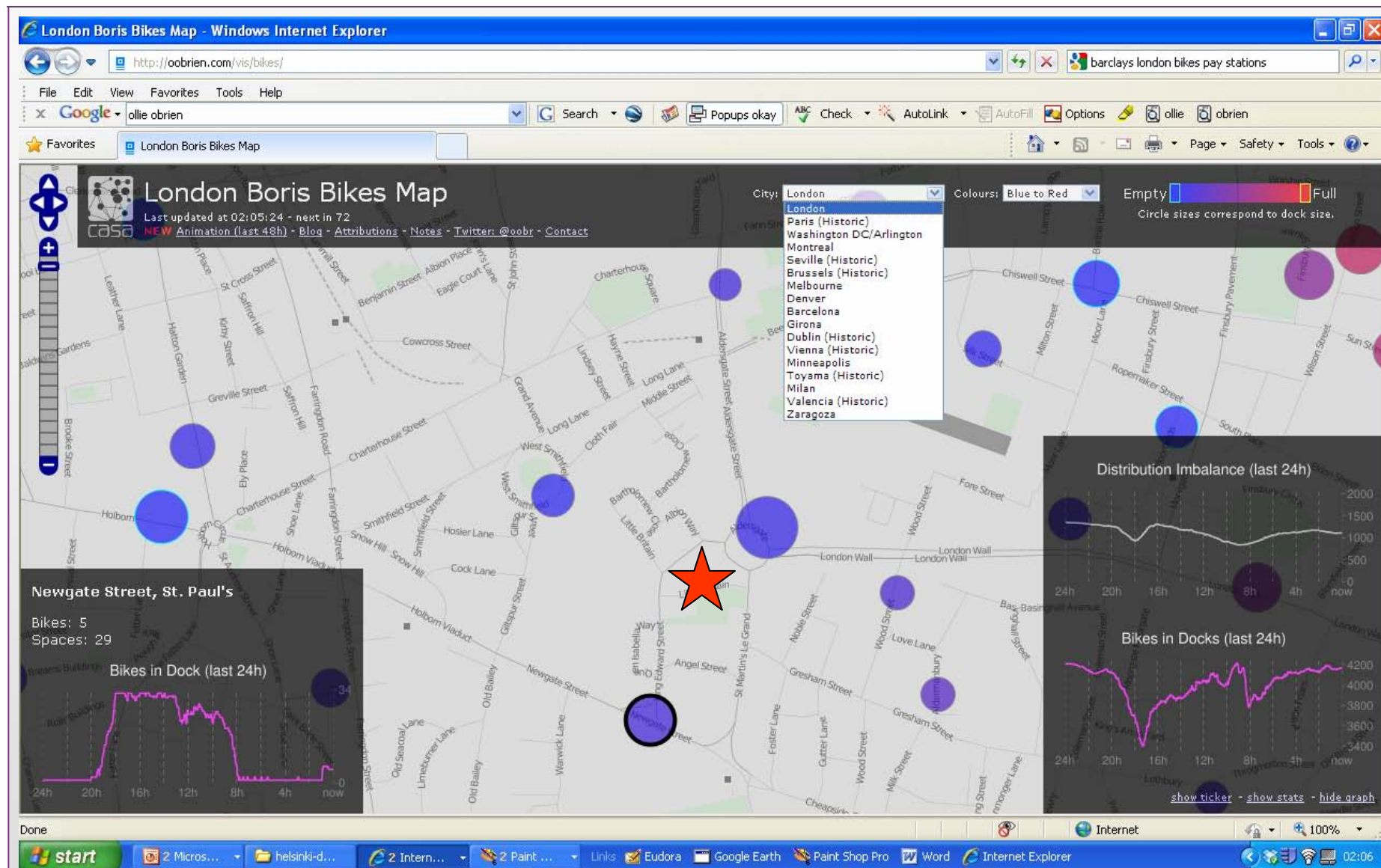
- No of bikes per 100 docks
  - Based on max availability at around 5am ("no" usage)
  - Averaged over a few weeks



City	Ratio/100
Melbourne	60
<b>London</b>	<b>56</b>
Montreal	56
Denver	54
Milan	52
Dublin	51
Minneapolis	50
Toyama	50
Barcelona	49
Washington DC	49
Girona	48
Paris	47
Vienna	47
Brussels	46
Seville	42
Valencia	39
<b>Average</b>	<b>50</b>

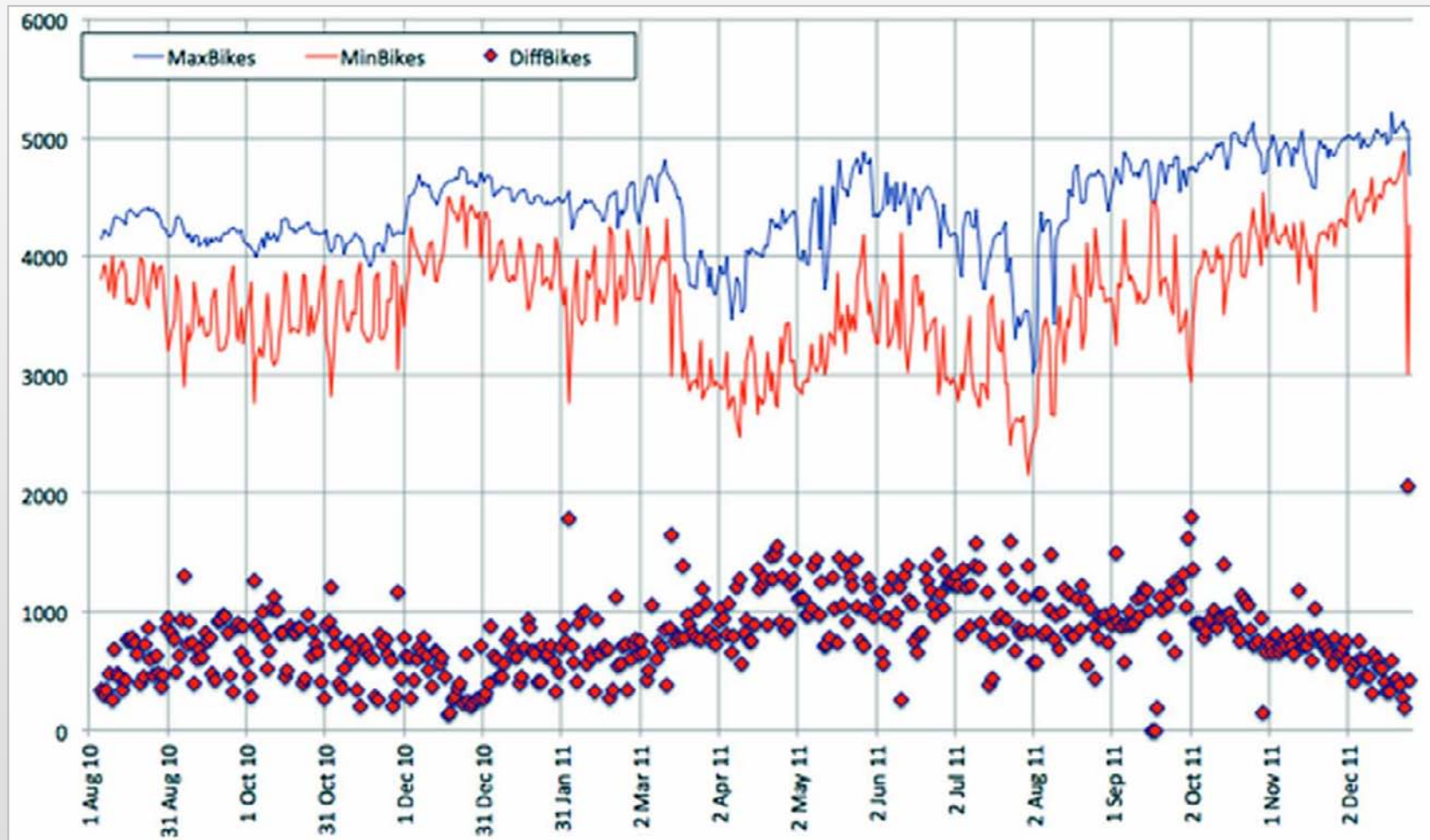




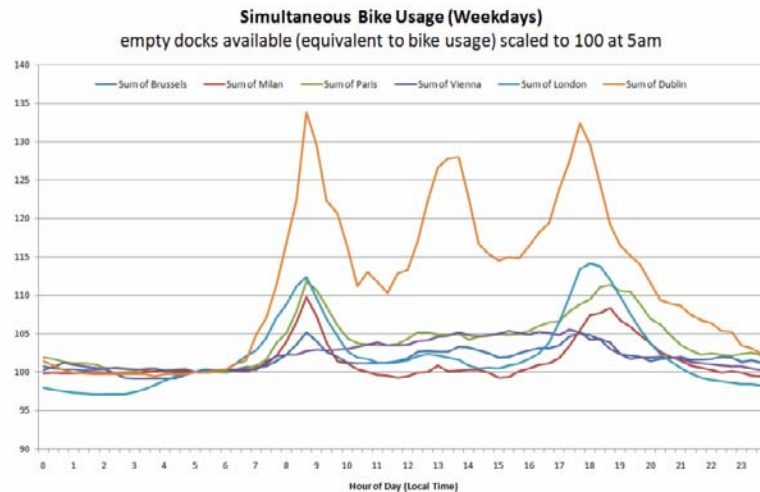


As yet no records of demand from people logging on, so no management capabilities, but could happen probably from an App based software but maybe from the server

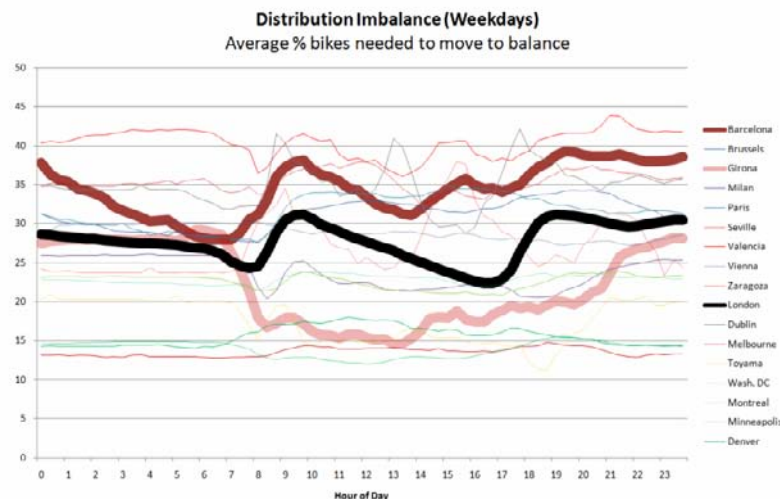




## Weekday Use – 1. Europe ex-Spain

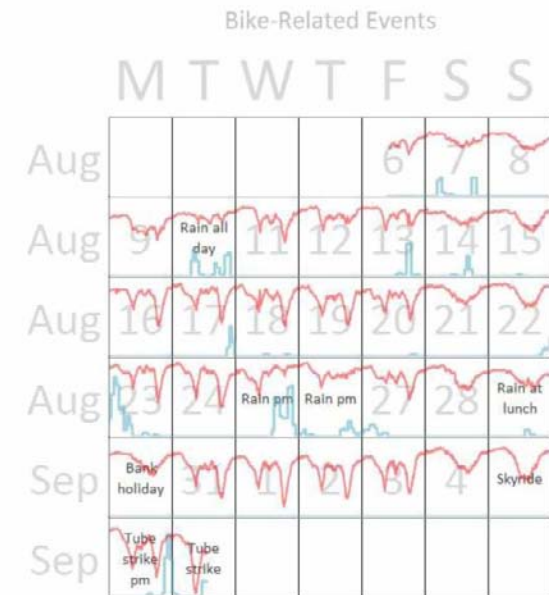


## Redistribution Effectiveness



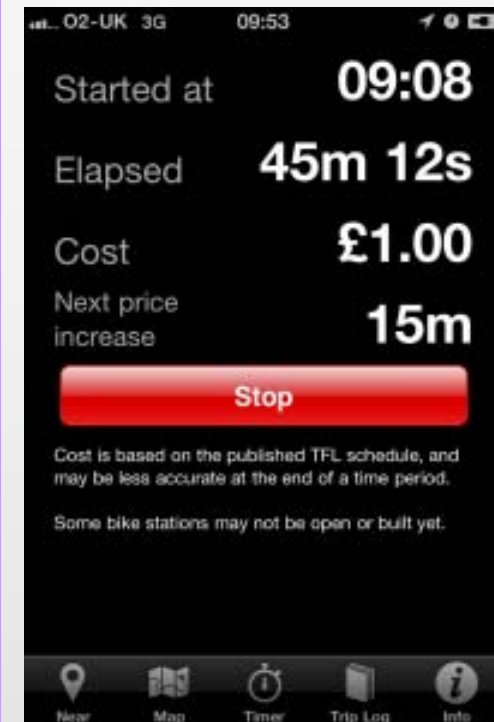
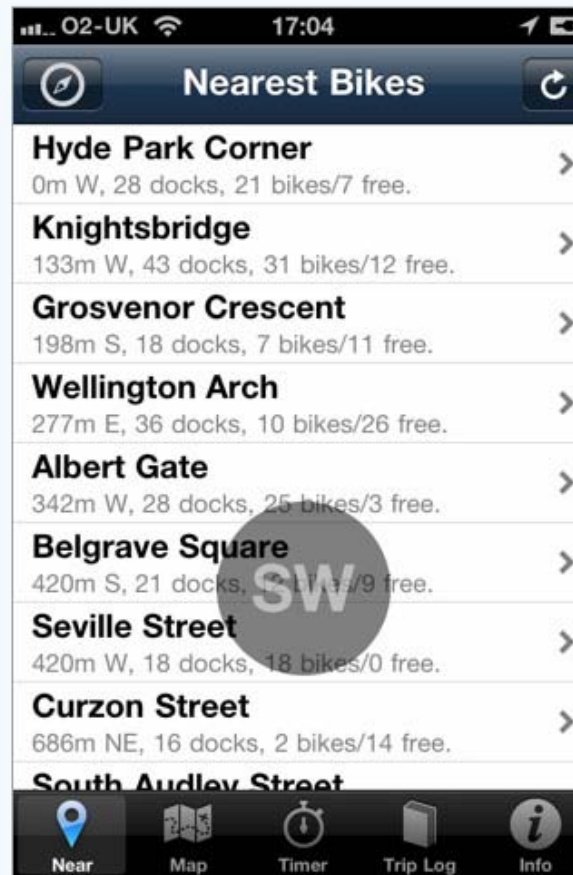
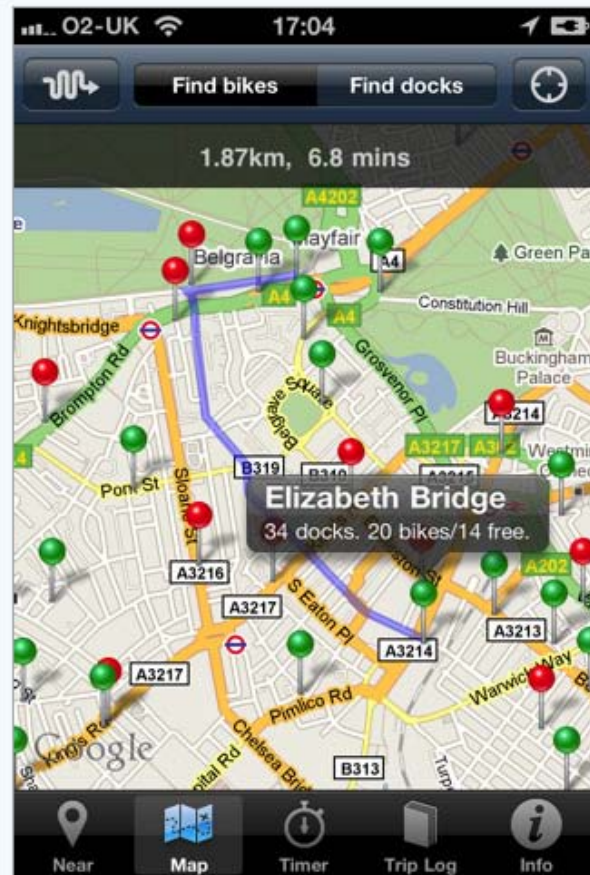
## More Analysis

- **London**
- Graph shows number of bikes available to hire
- Effect of rain
  - Using the CASA weather station
- Effect of the tube strikes

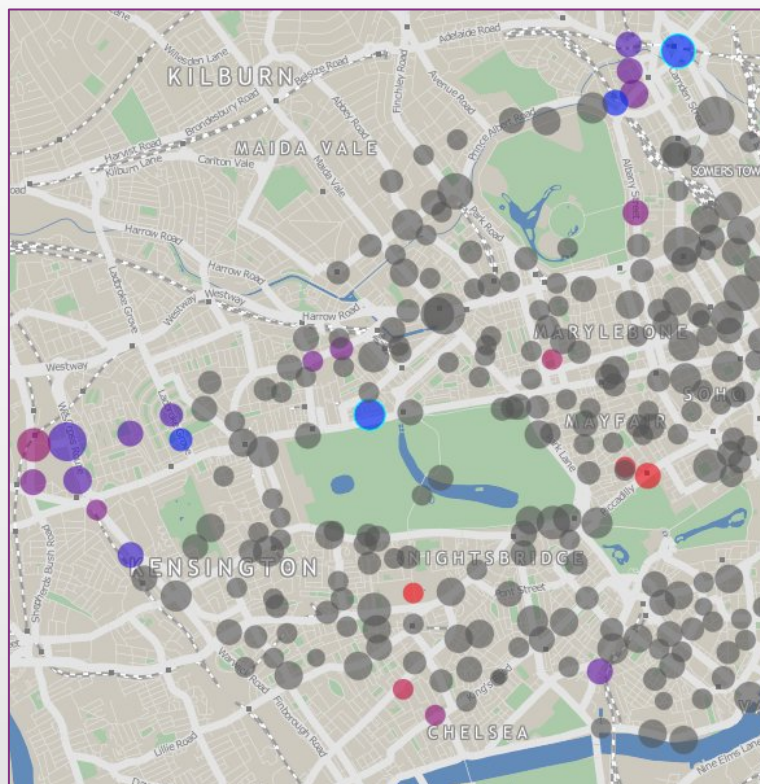




## iPhone Screenshots



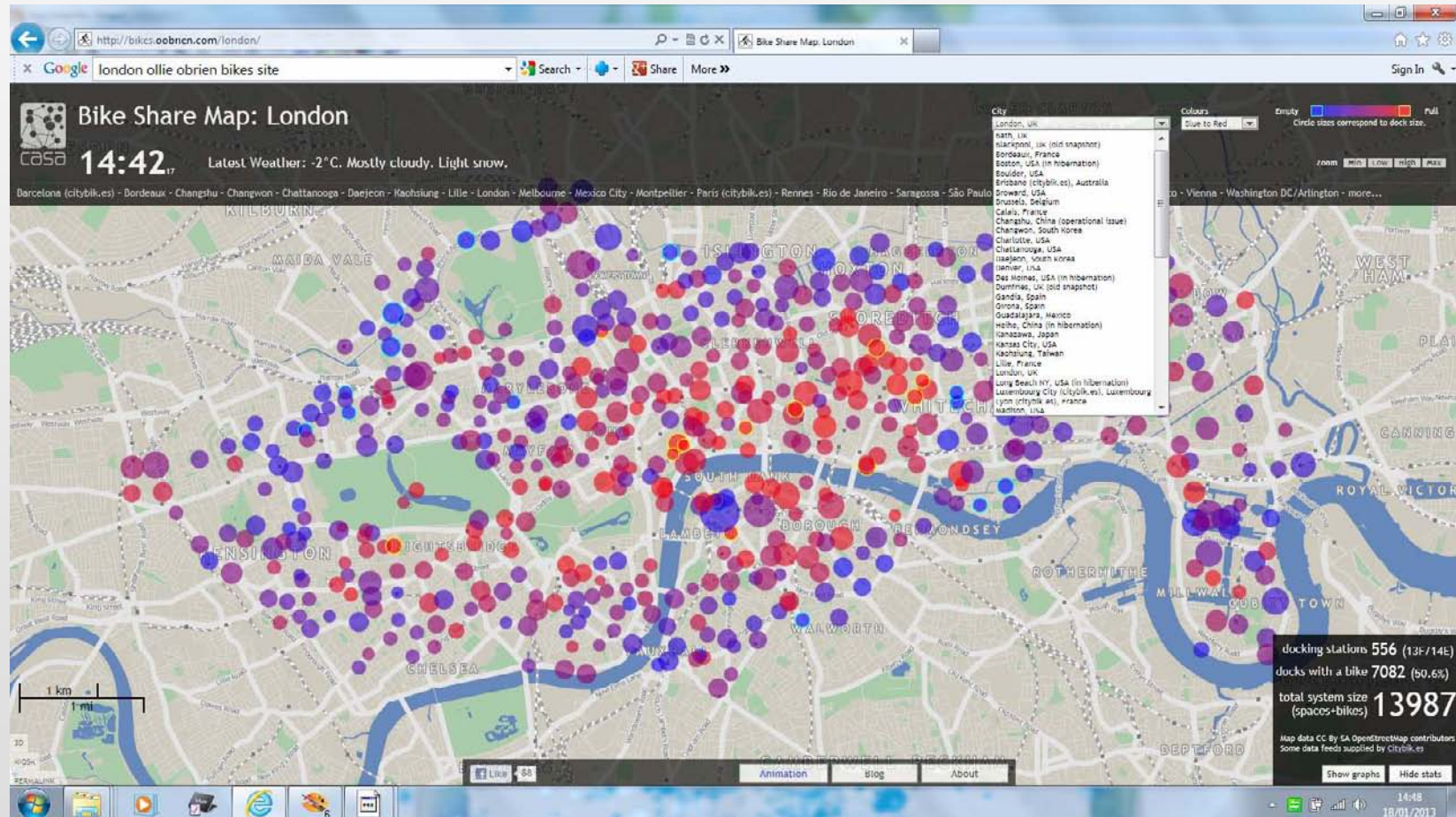
<http://oobrien.com/vis/bikes/>





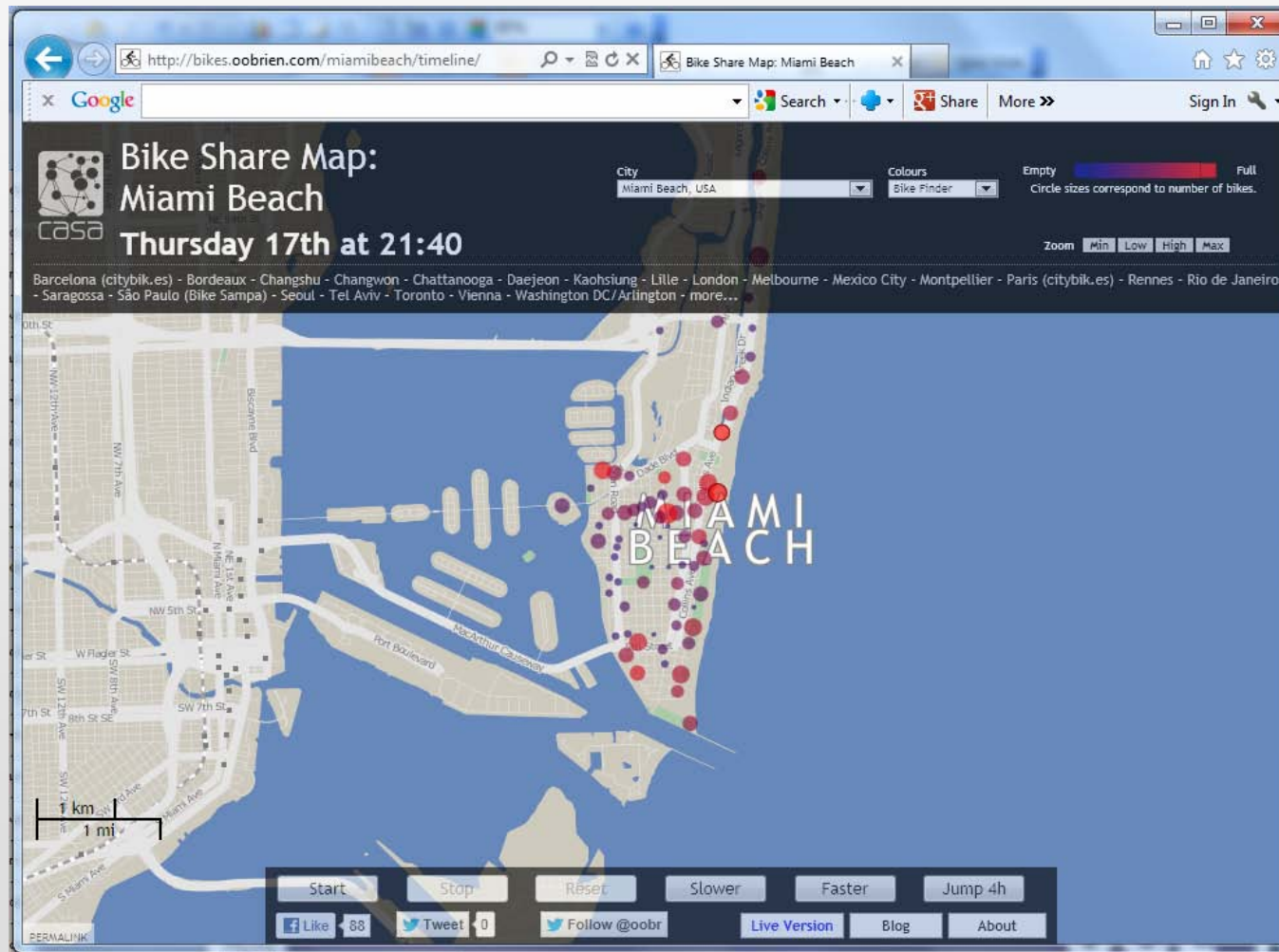
# The Website: Real Time Visualisation of Origins and Destinations Activity

<http://bikes.oobrien.com/london/>



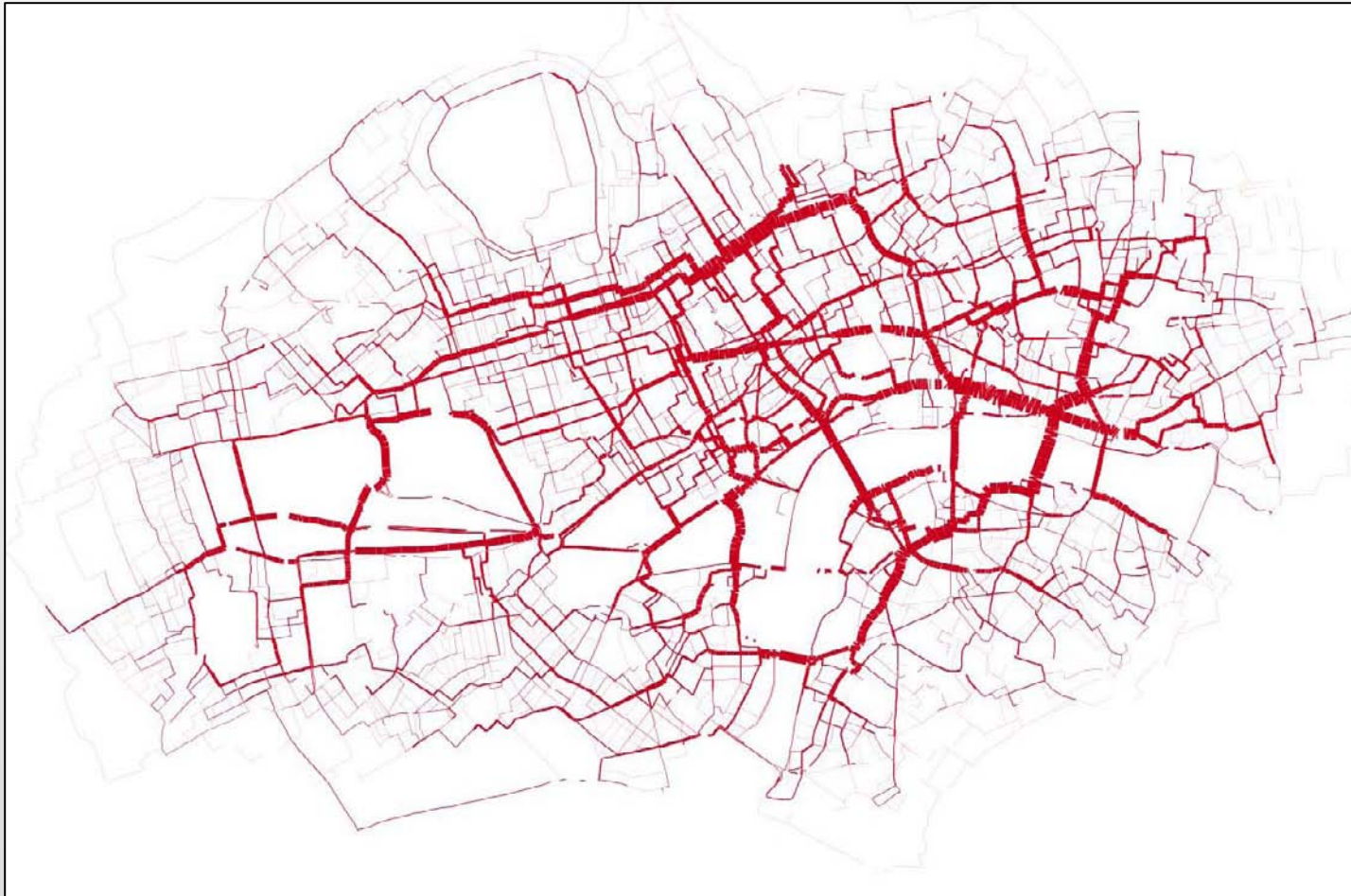


You can play back the last couple of days from the animator for many of the cities where the data is captured online



# Initial Analyses

## Flows – Origins and Destinations





# London Cycle Hire Journeys and Pollution

Thicker lines are more journeys

Redder lines are more polluted (PM10 2008 mean)





There are quite a few visualisations on Vimeo which have been developed by James Cheshire and Martin Austwick where they have used shortest routes methods to figure out bike paths



<http://vimeo.com/19982736> And one from Jo Wood at City University <http://vimeo.com/33712288>