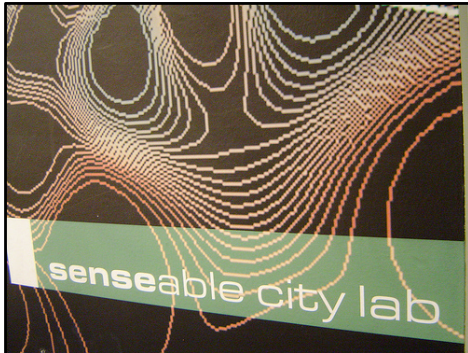


# From Sentient to Responsive Cities

Fabien Girardin, MIT SENSEable  
City Lab

# MIT SENSEable City Lab



- Department of Urban Studies and Planning, influences from the Media Lab
- Ubiquitous technologies, people, city
- Cross-disciplinary: urban studies and architecture, computer science and electric engineering, interaction design, social and communication studies
- Demo (stretch the mind), theory (data analysis) and interventions (urban context)
- Director Carlo Ratti

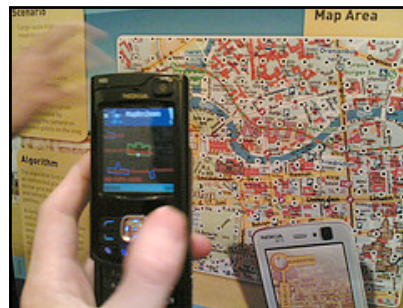
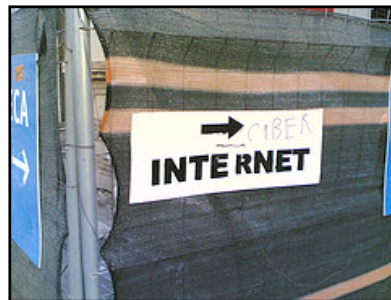
# New technologies and the city



- Not a techno-determinism approach that talks of new technologies in hyperbolic terms
- Technologies are not drivers of urban change, but are rather caught up in complex networks (or 'socio-technical assemblages')
- For instance, the success of the Internet did not lead to the end of space, neither the end the city
- The difference between solving a problem and contributing to the health of society

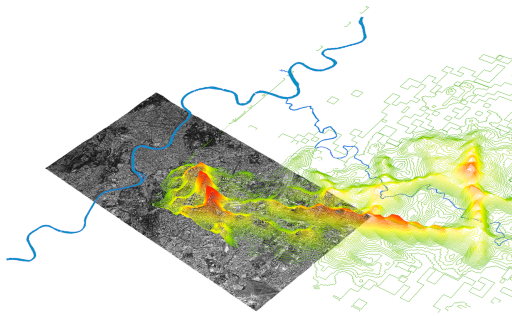
# New urban actors

Mobile phones, speed cameras, pollution sensors, infrared car number plate recognition, wireless networks, CCTV system, bike sharing system, nitrogen tanks, etc...





# Sentient cities



- The revolution in urban informatics that gets embedded in the fabric of our lives and giving us the ability to show previously invisible urban processes

*patterns of behavior*

*pulsing cloud of data*

*enhancement of our perception*

*observe and improve*

*reveal the city as we experience it*

*seamlessness integration*

*instantaneous information*

*empowerment of the citizens*

## From shoeboxes to digital footprints



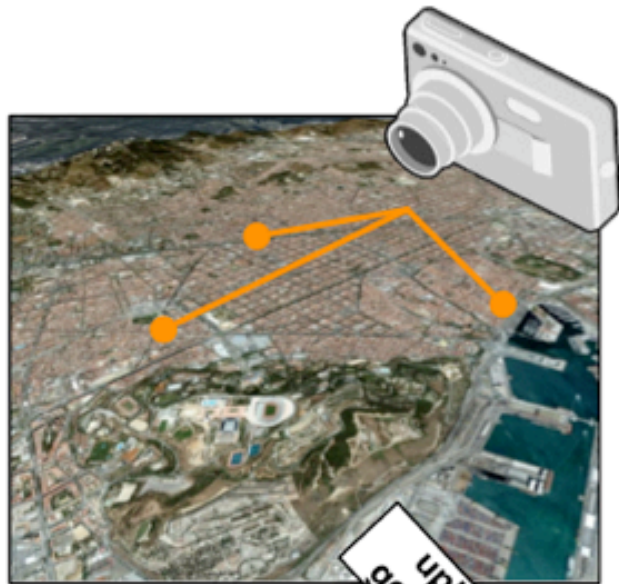
- Fall of prices to store data
- Raise of online social networks and ‘new cartography’ as ways to map and visualize the city through images and narrative descriptions
- Explicit pervasive user-generated content

# Tracing the visitor's eye

- Nowadays tourists leave digital footprints behind them that reveal their presence







upload and  
geo-reference

### Data set

Photo	User
id	id
latitude	nationality
longitude	active_periods
taken_datetime	
accuracy	
owner_id	
poi_id	

POI
id
name
area_coordinates

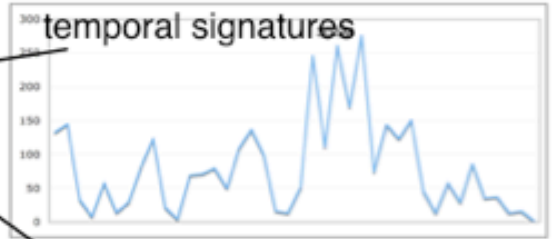
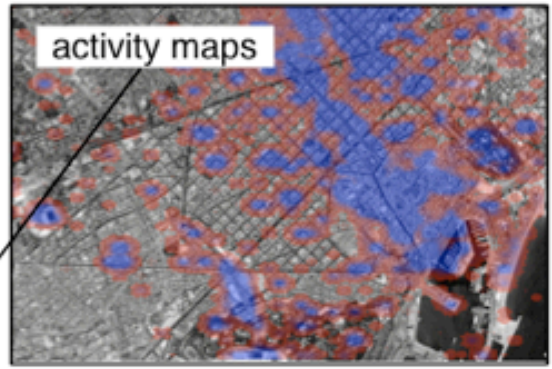
OD
id
origin_coord
dest_coord
photo_id



retrieve with  
Flickr API



### Urban Dynamics software

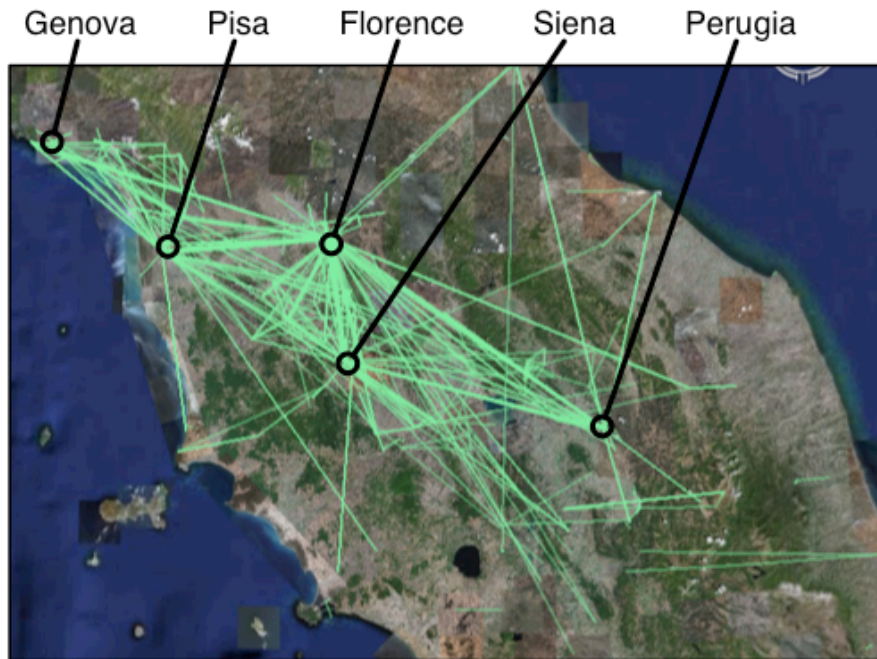








# Digital traces



# 3D geospatial visualization of tourist density and flows

- Video animation:

<http://www.girardin.org/fabien/tracing/flows/>



# Digital shadows



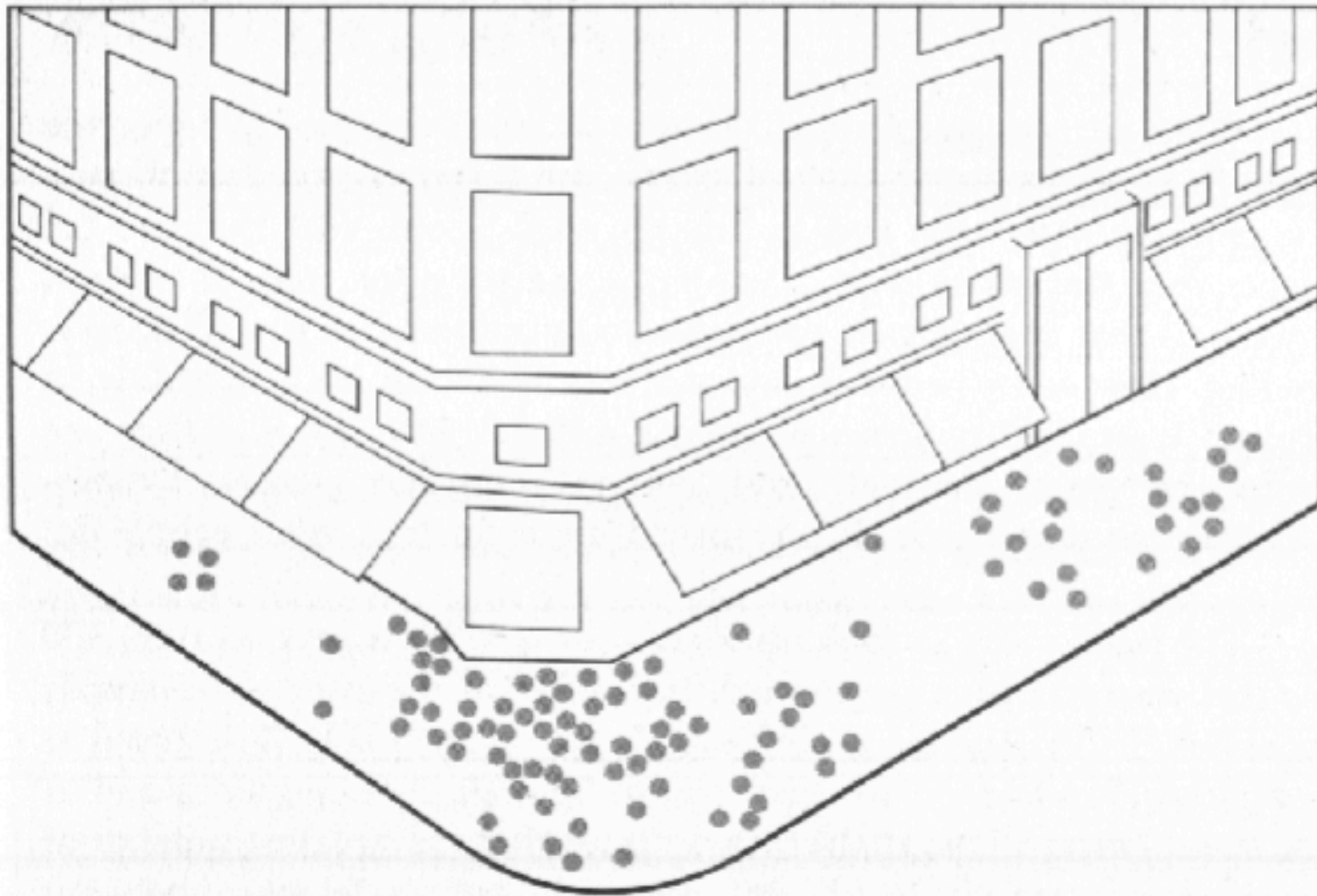
- Records of **implicit** interactions in the physical space with digital means
- Examples: RFID card (bike sharing, metro), tangible sensors, wireless networks (GSM, Wi-Fi), fidelity cards, credit cards, etc



# Revealing Paris Through Velib' Data

- Video animation:  
<http://www.girardin.org/fabien/tracing/velib/>



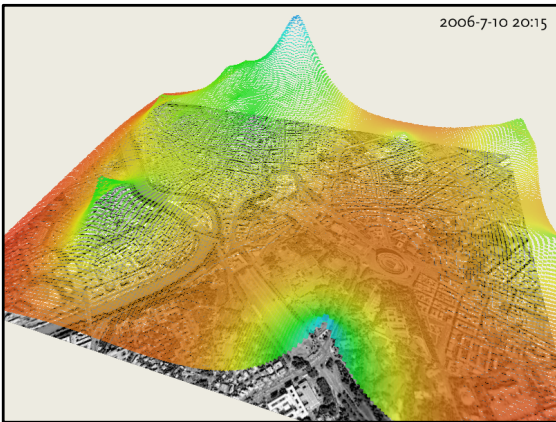


*Location of street conversations lasting two minutes or more at Saks Fifth Avenue and Fiftieth Street. Cumulative for five days in June. Note main concentration at corner, secondary one outside entrance.*

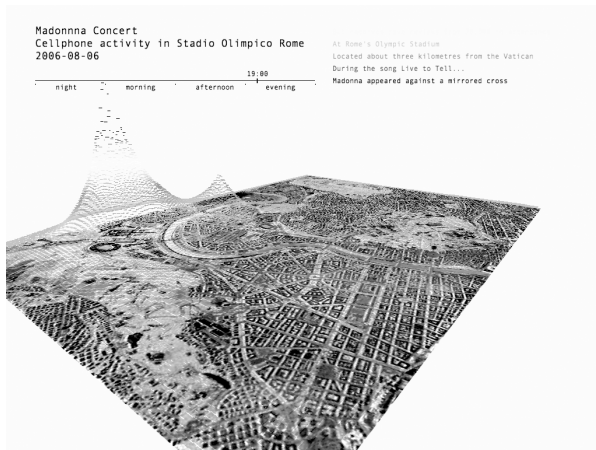
# Real-time Rome

- Video animation:

<http://senseable.mit.edu/realtimerome/sketches/movies/wmv/s6.wmv>



# Opportunities for urban and social studies



- Access to masses of data that are of the same order of magnitude as that of the natural sciences
- Evidence-based urbanism
- Remote-control urbanism
- Post-occupancy evaluation

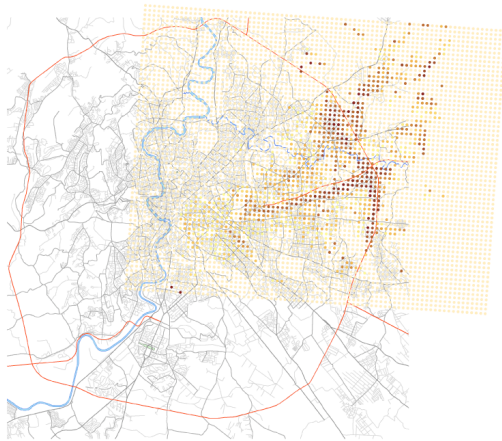


## Current limitations



- Provide a glimpse to reality. Sense what is cheap to sense, plus lack of data interoperability
- Reveal phenomena. But does not explain them. Need to study the practice that create these digital footprints
- Need to prove that these data bring at least the same amount of knowledge than their “manual” data (e.g. surveys).
- Need of skills and knowledge to analyze and grasp the significance of these data

# Responsive city



- Planning was about predict and accommodate and it becomes more observe and improve
- Citizen empowerment (humans as sensors, volunteer generated information)
- Feedback loop (provide immediate information that can be acted upon)



# From seamless to seamful urban services



- Techno-determinism: commercial fantasies of ‘friction-free’ urban consumption
- Reveal the imperfections to promote the appropriation
- *“If you're late, the public will forgive you if you can tell them how much and why”*



# Privacy



- Issues: gathering data from people without their knowledge and the risk to reveal individuals from anonymized and aggregated sensor data.
- We become a “world of witnesses” with a the production of myriads of little stories – a messy infinity of ‘Little Sisters’ rather than one omniscient ‘Big Brother’
- How much are people willing to give to get a service in return?

## Take-aways



- New urban actors
- Part of a complex co-evolution
- Use of digital footprints and digital shadows to reveal the invisible (with still many obscurities)
- Complete traditional (qualitative) techniques
- Real-time availability of information to act upon
- Design services beyond the mythologies of a perfect, uniform informational landscape

