CURRENTCity

COLLECTIVE SENSING

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currentcity.org — R&D , business development

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
sense*able* city lab :.::

research partner: models, methods

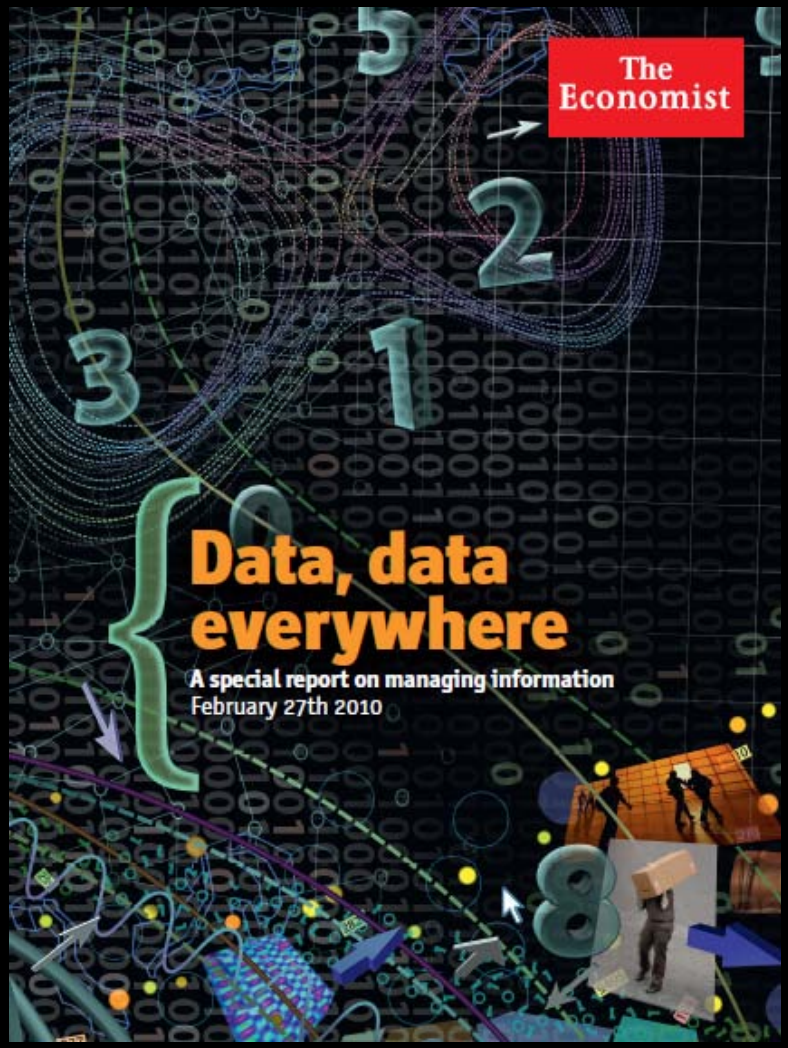
UNIVERSITÄT SALZBURG

research partner: GI

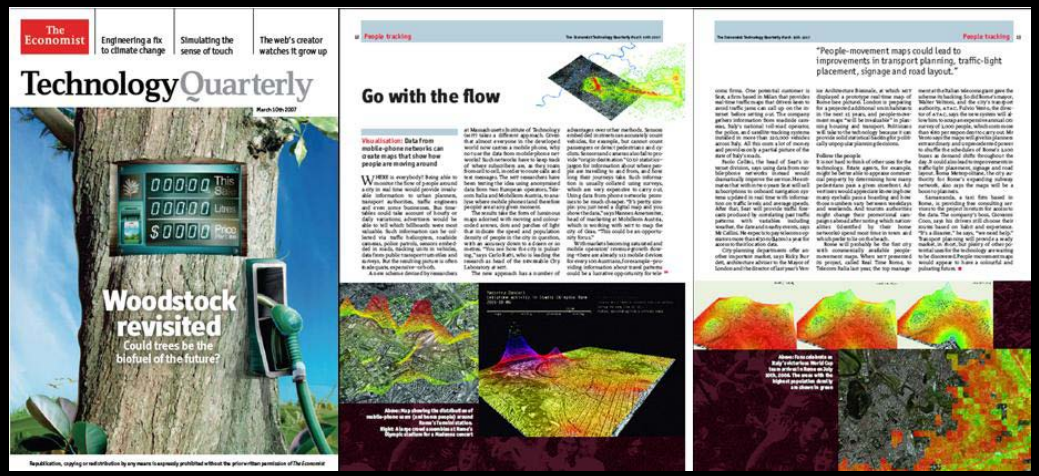
Model presence, flows and urban dynamics in near real-time, and explore the information potential of collective sensing

currentcities	nextcities	team
Amsterdam	San Francisco	~ 20 people
New York	Milano	Amsterdam-based + Boston,,Austria, Italy, Poland, Greece
Rome	Salzburg/Vienna	

Background: Data deluge



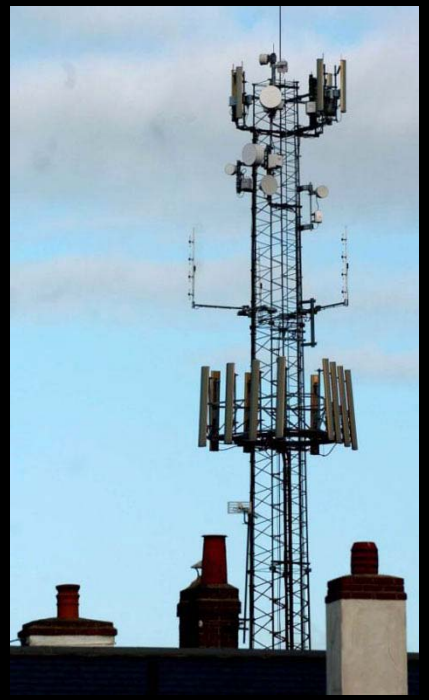
Economist, February 2010

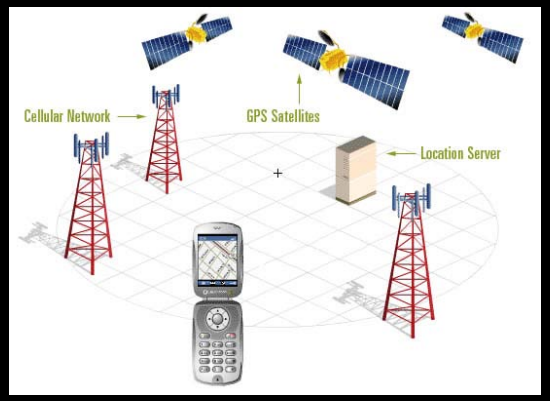


Economist, March 2007

Background: Collective sensing

Localized and anonymized data about mobile phone activities…

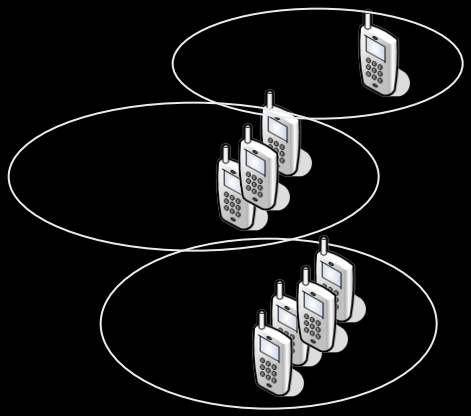




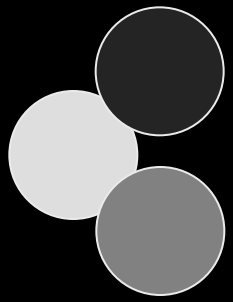
.. can be used to quantify human presence and flows, on an historical basis and in real-time.

Technological workflow

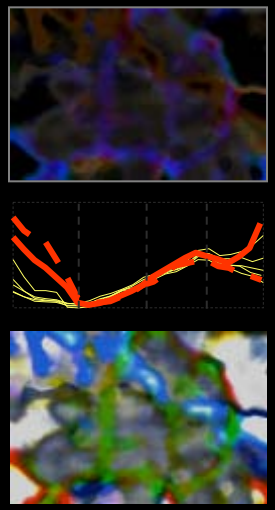
> anonymization
> aggregation



> interpretation
> processing
> modeling



> time patterns
> spatial signatures
> flows, presence



> operations
> data mining
> strategy

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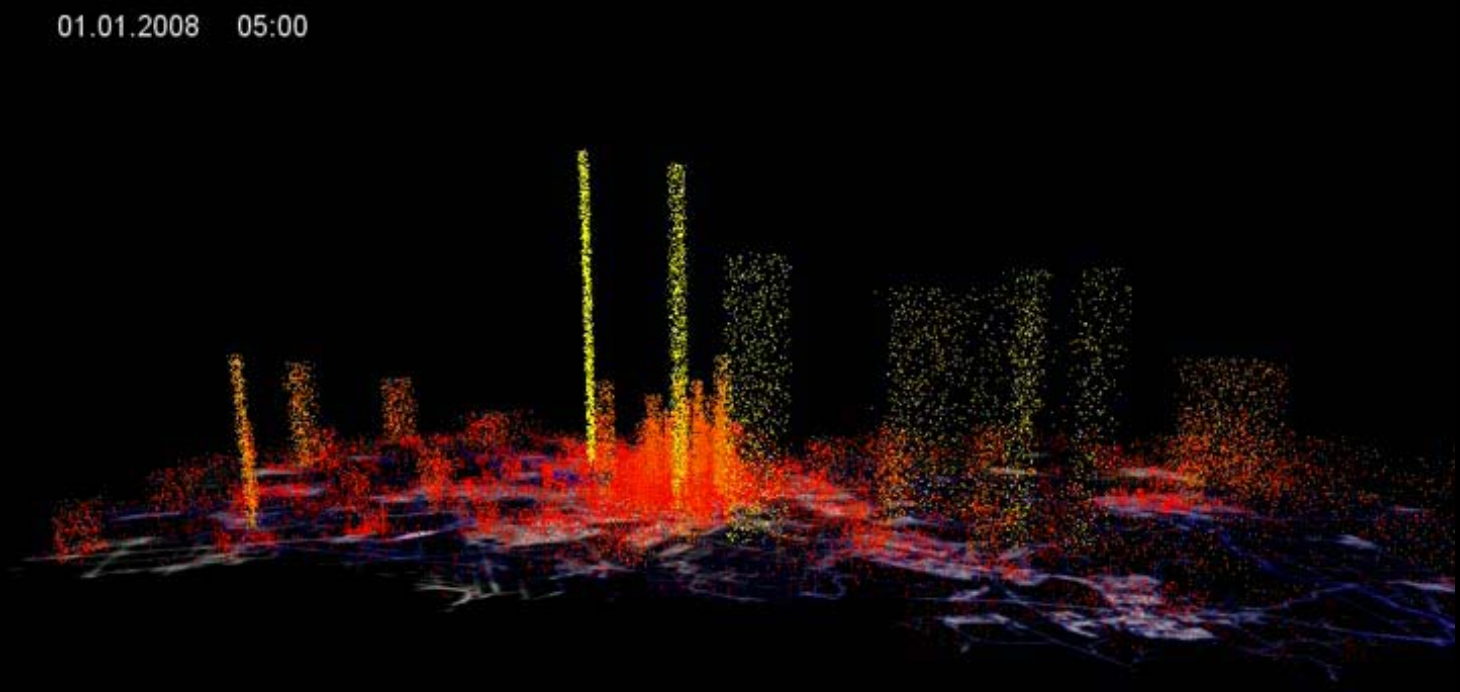
Explorative WORKS

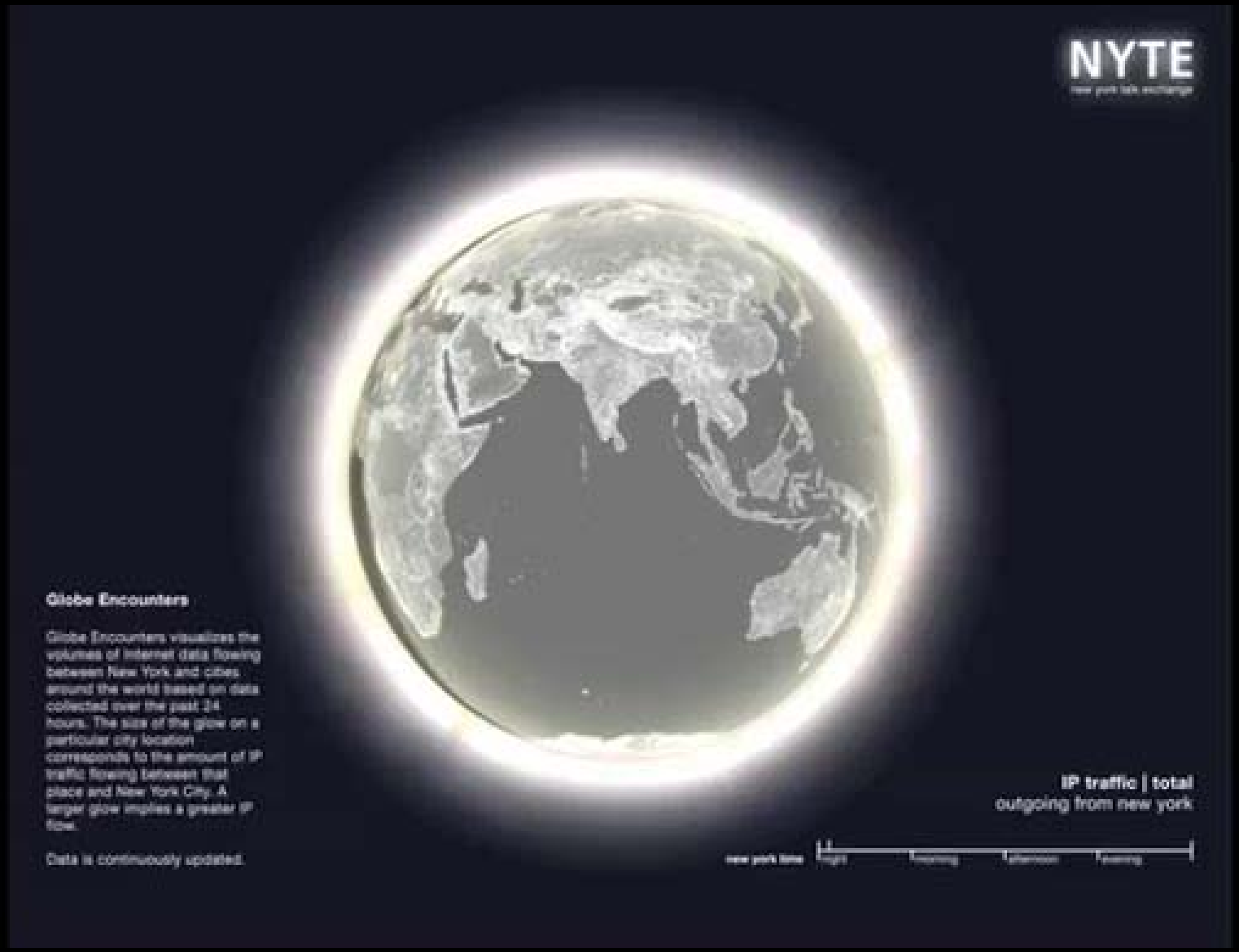
p.s.: showing the potential

Amsterdam SMScape

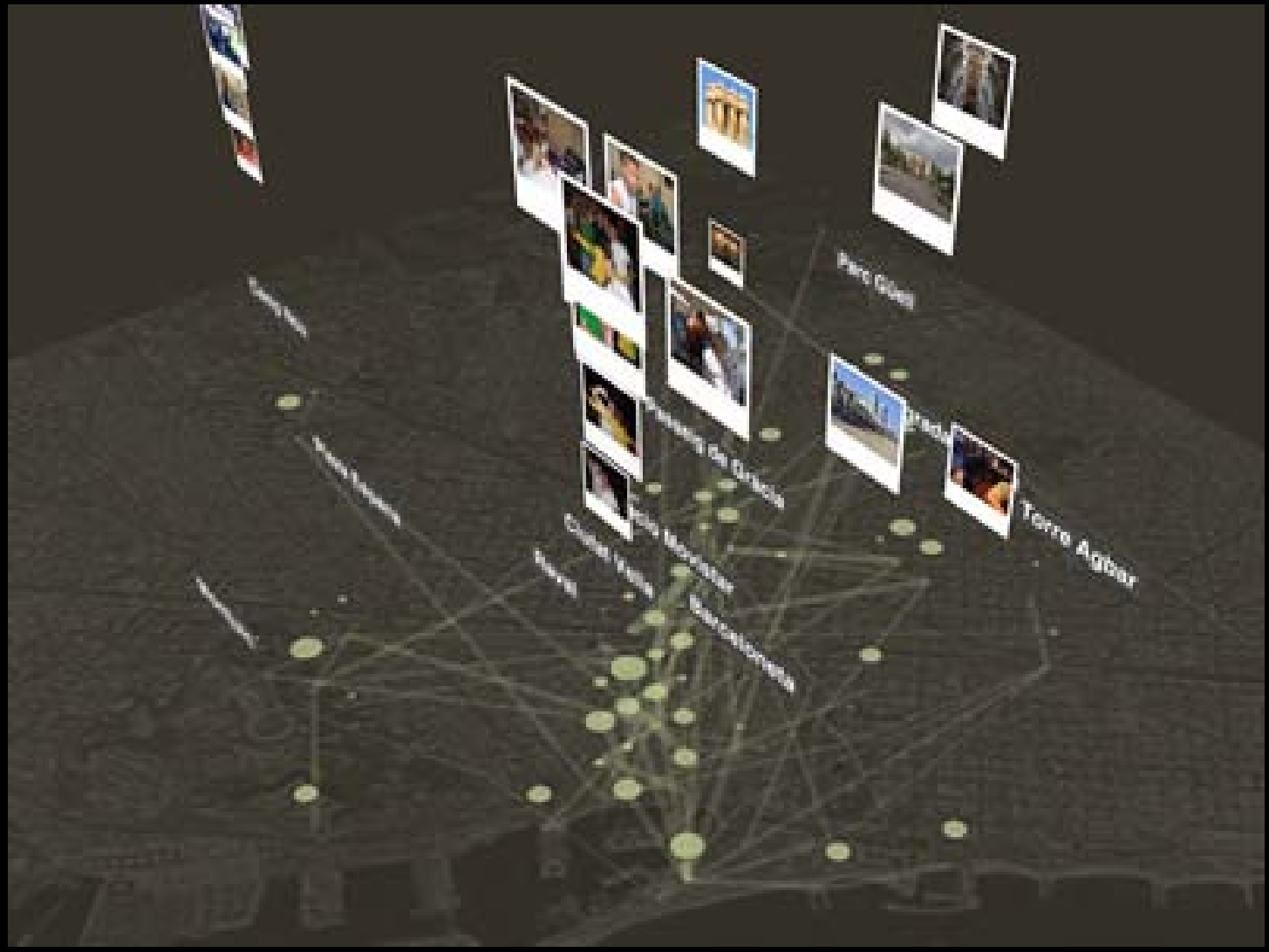


Amsterdam’s heart beat

The New York Talk Exchange



Los Ojos del Mundo



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ATLAS 2010

p.s. solving societal problems

Market opportunity

- Professionals in different sectors
  (1) emergency management
  (2) urban/environmental/tourism planning
  (3) commercial estate/investment

  are looking for real-time information and historical analyses on human presence and flows:

  → (1) to better monitor public safety and detect anomalous activities, particularly during big events or sudden crises (i.e. climate change or terrorism);
  → (2) to better understand human usage of the city and justify new investments.
  → (3) to support their decisions about where to locate new estates/investments and how to price them;



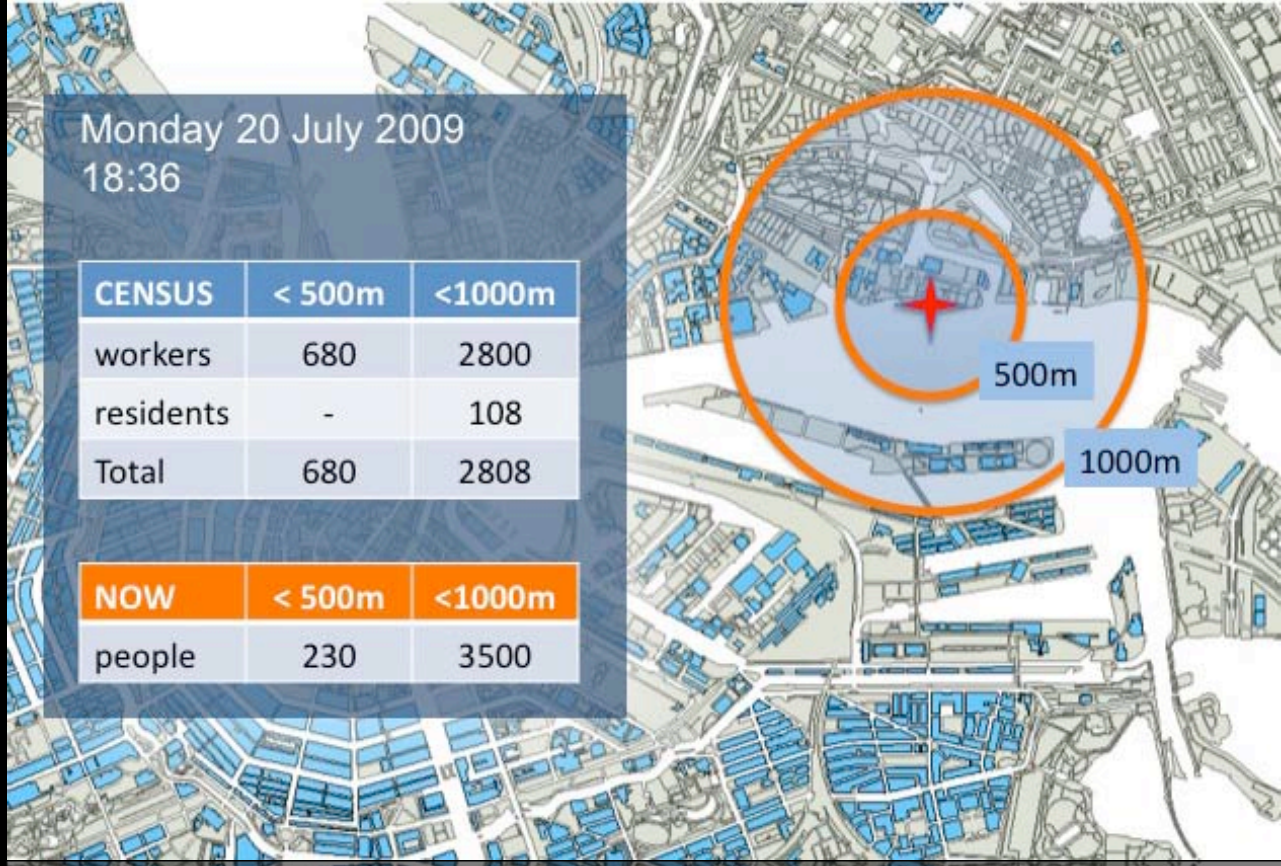
How many people are at the site ?

Responding to incidents that involve chemical or dangerous substances requires a high level of preparedness and the precise knowledge of how many people could be exposed in the incident area. Risk maps give a static picture of the risks, based on information from census or other regular surveys.

Emergency operations need more than this.

The current number of people affected, rather than the expected number of people affected, dictates the extend, size and organization of the rescue operations.

① What if we knew the number of people in the incident area and its surrounding at the time of the incident?
② Imagine we knew how many people are affected by an incident and how many are in the surrounding area. How could this affect the organization of the emergency and of the support infrastructures such as hospitals?
③ How many lives could be saved by a more directed intervention ?



CENSUS	< 500m	<1000m
workers	680	2800
residents	-	108
Total	680	2808

NOW	< 500m	<1000m
people	230	3500

Q & A

Amsterdam

Industrial terrain - North

Source: currentcity simulation

The map shows the number of people estimated by available census sources (top) and the actual number of people present (bottom) in the surrounding of a hypothetical incident site.

While census estimates provide an administrative view of the people at risk, the real-time measurement based on telecom data provides the real view of how many people are at risk at that time.

Where do the visitors come from ?

City managers, event managers and transportation coordinators struggle to understand the demographics and origin of visitors in a certain area at a certain time. Traditional methods to assess origin-destination and transport mode are based on expensive and infrequent surveys. How can we provide near real-time information on where visitors come from and how they got here? This would provide essential information to organize transportation as well as facilities.

① What if we knew the number of people present in a certain area at a certain time?
② What if we could estimate where they come from without doing anything special and without interfering with the visitors plans ?
③ What if we could assess the parking or transportation needs for different times of the day ?
④ What if we could use this information to encourage different mobility or visit times ?

Q & A

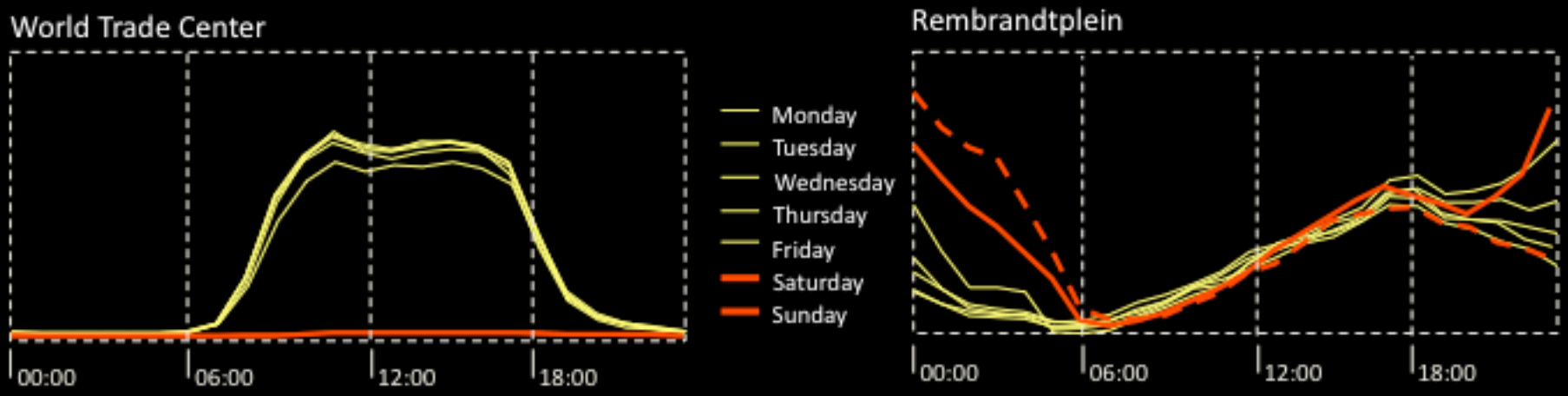
Amsterdam

Amstelpark

Source: currenticty simulation

The diagram illustrates the visitor statistics in the Amstelpark in Amsterdam on a summer day. The figures show - on a aggregate day basis - the distance traveled by visitors, the breakdown of Amsterdam and Dutch visitors as well as the estimated travel mode (Did they travel to the park by car, bike or public transport?)

Mono-use or multi-use ?



Urban developers struggle to design or achieve the right mix of urban uses. Areas dedicated to a single use – sports, business or shopping – may turn out unattractive and hard to redevelop.

① How can we measure the degree to which an area develops a mono or multifunctional use?

② How can we assess the impact of redevelopments gradually, as they take place?

What if we could measure the degree to which an urban area has a single or multiple use ?

What if we could measure this in time, and detect the success or otherwise of redevelopment initiatives?

What if we could use this to gradually trial redevelopment projects and single out what works and what does not?

Q & A

Amsterdam

January-June 2008

Source: currentcity

World Trade Center (WTC) in Amsterdam (left) and Rembrandtplein (right). The WTC shows a strict business signature with human activity strictly following business hours. The activity is virtually absent during the weekends. The Rembrandtplein shows a tourism-residential pattern during the day and a nightlife pattern after 6pm.

The data is the average of all telecom activity over a period of 6 months.

What is the impact of a new city project ?

When assessing the success of a new urban initiative, public authorities often miss the right tools.

How to quantify the "Return On Investment" of a city regeneration project?

Currentcity allow to quantify human activities in proximity of a new urban infrastructure, before and after this is in place.

- What's the social impact of a new park on the surrounding neighborhoods?
- What's the impact of a new bridge or a new commercial estate?
- How much has a public art installation been viewed?
- What if we could assess the best location of a new infrastructure by quantifying human activities that will be affected in different time frames?

Q & A

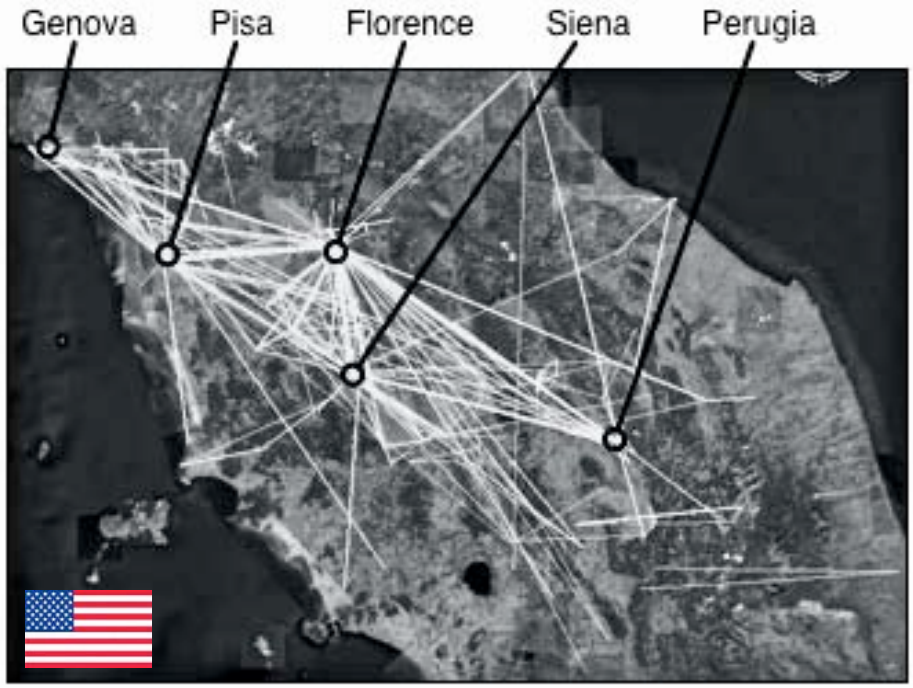
New York

Manhattan – October 2008

Source: MIT Senseable City Lab, Andrea Vaccari

The image describes the total telecom activity in two neighborhoods of New York. Data refer to the period when the art installation "Waterfalls" by O. Eliasson) - funded by the Municipality of New York – was installed beneath the Brookline bridge. Visualizations reveal that during weekends both New Yorkers and foreign visitors frequent places alongside the Hudson river, from which the installation is visible. A 33% increase of traffic in these areas can be attributed to the installation.

Where are the tourists ?



In the age of low-cost flights, tourist and local authorities can never be certain about the quantity and nationalities of tourists in town.
Their trip routes are difficult to predict, as well as the length of their stay and the actual places visited. Knowing more about the behavior of "transiting populations" is the starting point for a more targeted city and tourism planning.

- Where do tourists and visitors come from?
- How much time do they spend where ?
- Do Americans and Chinese move about differently ?
- Which are their former and next destinations ?
- How do they behave in different seasons, as well as days of the week and times of the day?
- Which are their most recurrent travel paths?

Q & A

Tuscany, Italy

Main cities and surroundings

Source: MIT Senseable City Lab, Fabien Girardin

The image describes the density of Flickr activities in Tuscany during 2008, i.e. the number of digital photos posted on the online repository "Flickr" with a geo-tag on that particular place by American and Italian tourists. The visualization shows the most photographed places and the sequence of pictures and delivers an important indication about the major touristy routes.

Where is the shopping action ?

Business investors, real-estate managers but also city planners and shoppers are interested in a simple fact: which shopping street is more active ?

① Investors use this information to decide where to put their money.
② Real-estate managers use this information to assess real-estate prices.
③ City planners want to understand how different accessibility or facilities can regenerate an area.
④ And shoppers? Shopping can be fun, and fun is where the action is.

What if we could see which sections of the city are more active during shopping hours?

What if we could measure the level of activity of different shopping areas or centers and compared them over time?

What if we could measure the real-time impact of sales initiatives, city regeneration plans or transportation measures?

Q & A

Amsterdam

Kalverstraat - May 2008

Source: currenticty analysis

Total telecom activity in two sections of Kalverstraat, central Amsterdam. The A-B section shows a regular activity during shopping hours with a slow Saturday-Sunday. The B-C section shows a later start during the week, but more active weekends and peaks on Thursday evening and Friday afternoons.

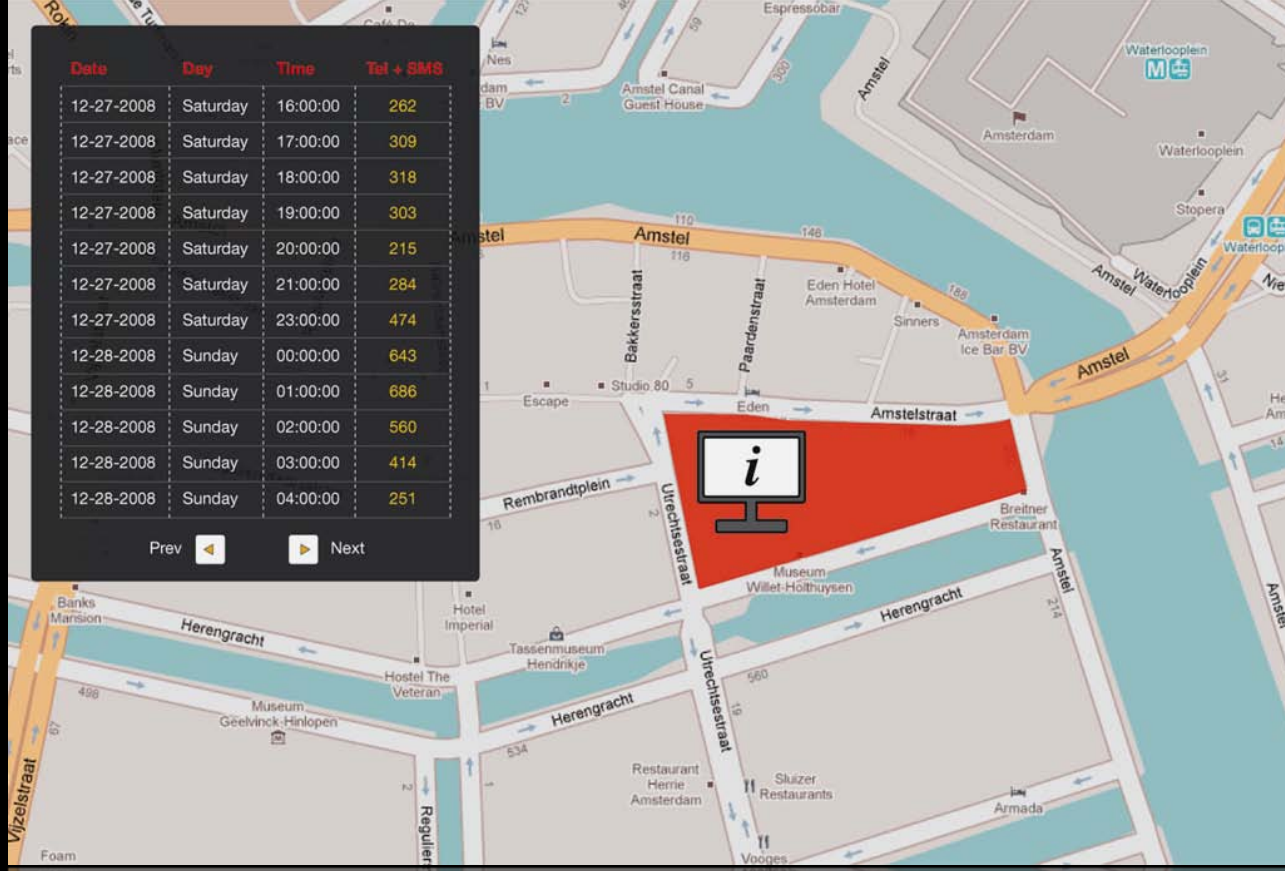
Activity includes initiated calls, received calls and SMS.

Where are the eyeballs ?

In a 24/7 culture, residents and visitors roam through metropolitan areas at all times and for different reasons.

Knowing where people clusters for social activities and at what times allows business and cultural institutions to better target and price their outdoor advertising, as well as to maximize their opening times and schedule of events.

- How many people have been exposed to a given outdoor advertising campaign?
- What are the best times to promote my business to people on the street?
- What's the most recommendable time and day schedule for museums, cinemas and other cultural and entertainment venues?
- What's the best place to go out now?
- When is a given place the most and the less crowded?



Q & A

Amsterdam

Rembrandtplein – 27/12/2008

Source: currentcity

This image describes the total telecom activity in the entertainment area of Rembrandplein, in the hearth of Amsterdam, where a urban size screen is placed.

The quantity of social activities considerably vary hour by hour on a Saturday night: we can detect the times when the square is most crowded and larger number of people is likely to watch the ads on the screen.

www.currentcity.org