

Visualizing Data in Smarter Cities

ICF Summit, June 12, 2015

Dr. Sara Diamond, OCAD University

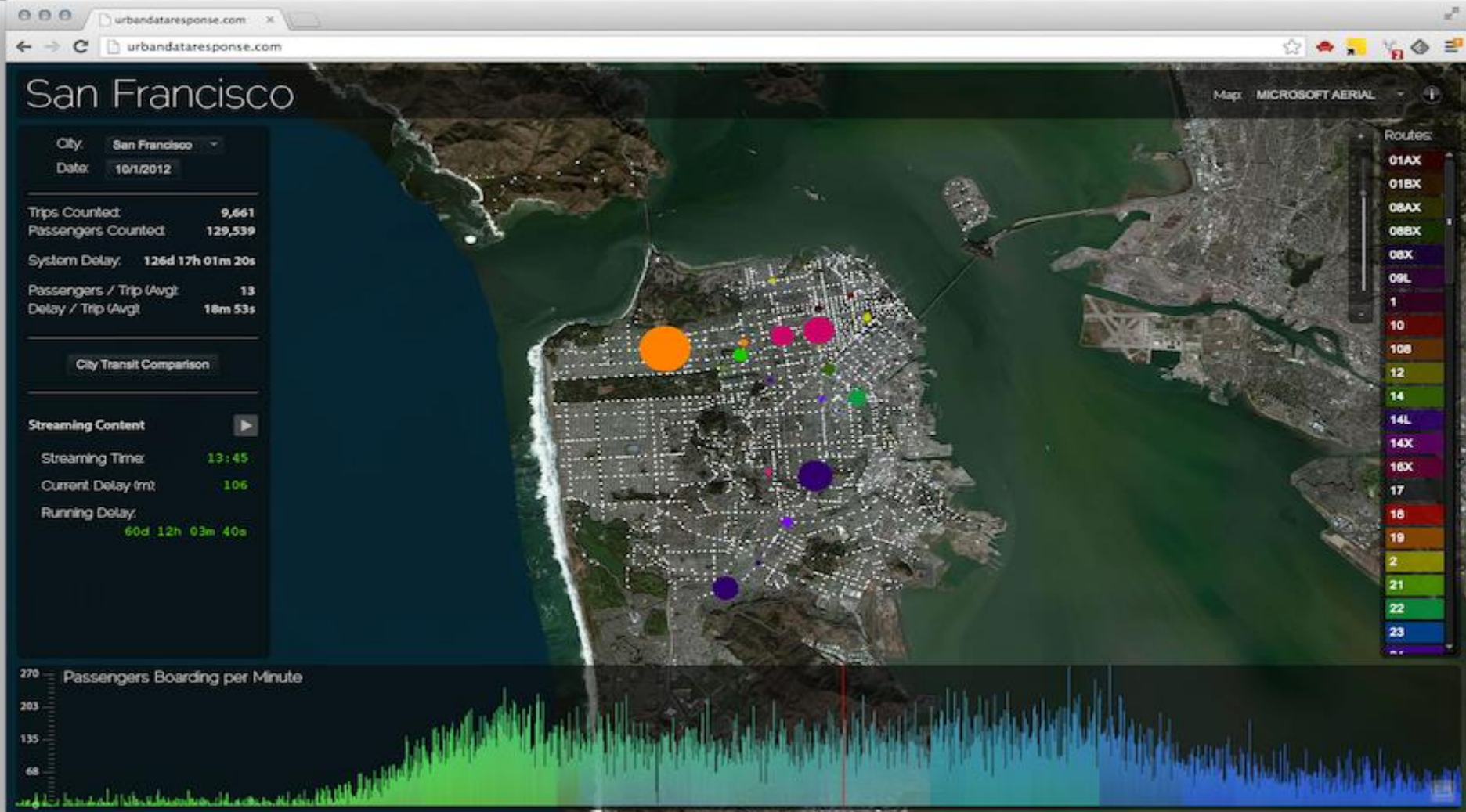
The Virtual City: Data Rich, Data Producing

- An invisible grid made up of networks, packets and data
- Surveillance technologies, interactions, connected devices
- Mobile internet, applications and devices
- Energy and carbon consumption
- Transportation and movement
- Development and planning
- A city of open data as a base for applications

Urban Prototyping Movement

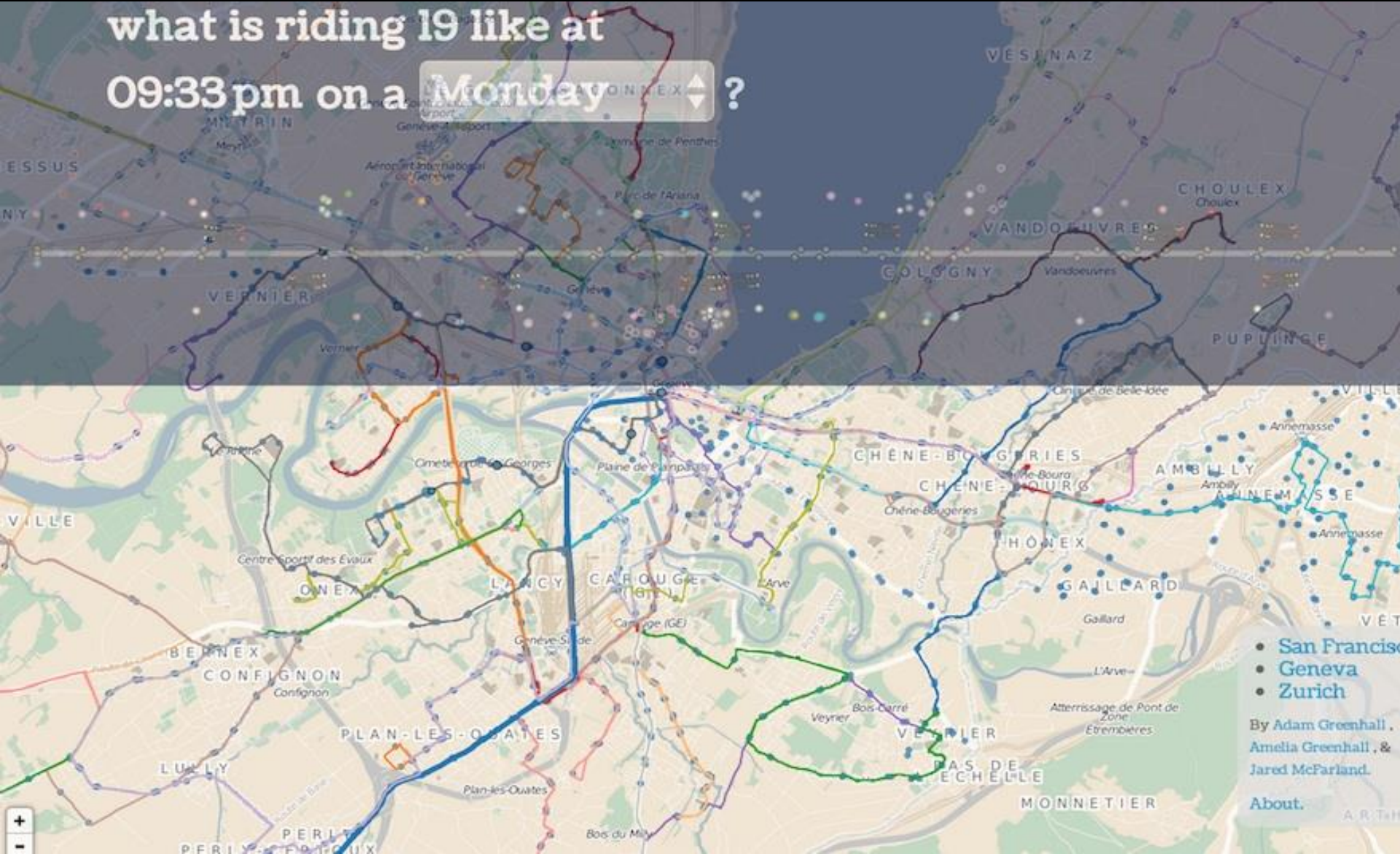
- Urban Data Challenge
- Merge and compare mobility data sets from three cities—San Francisco, Geneva, and Zurich—and draw meaningful insights.

Urban Data Response, Matt Hill



Dots on the Bus, Adam Greenhall, Amelia Greenhall, Jared McFarland

what is riding 19 like at
09:33 pm on a Monday ?



Transit Quality and Equity, Raymon Sutedjo-The, Sandra Lee



San Francisco

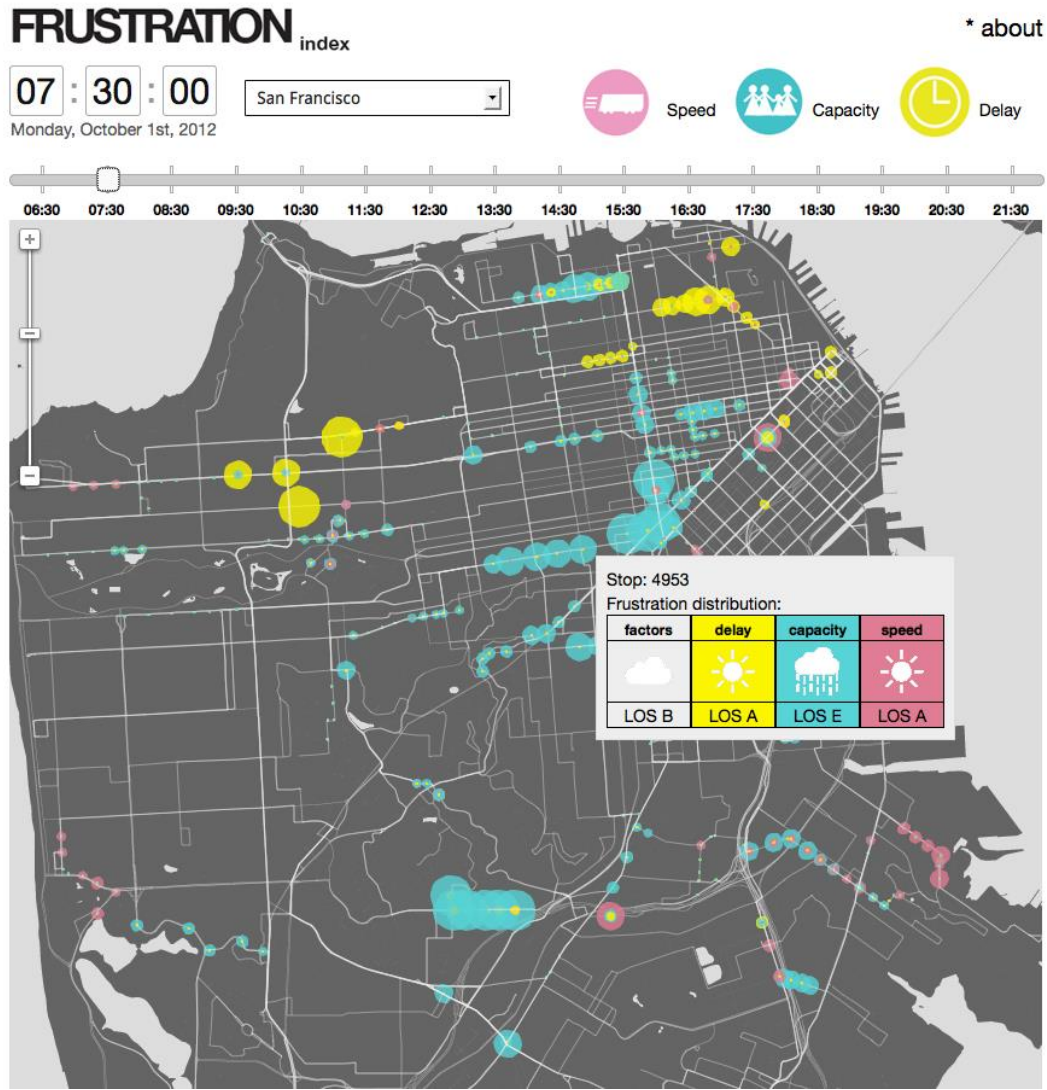
Economic Data

POVERTY LEVEL

Routes

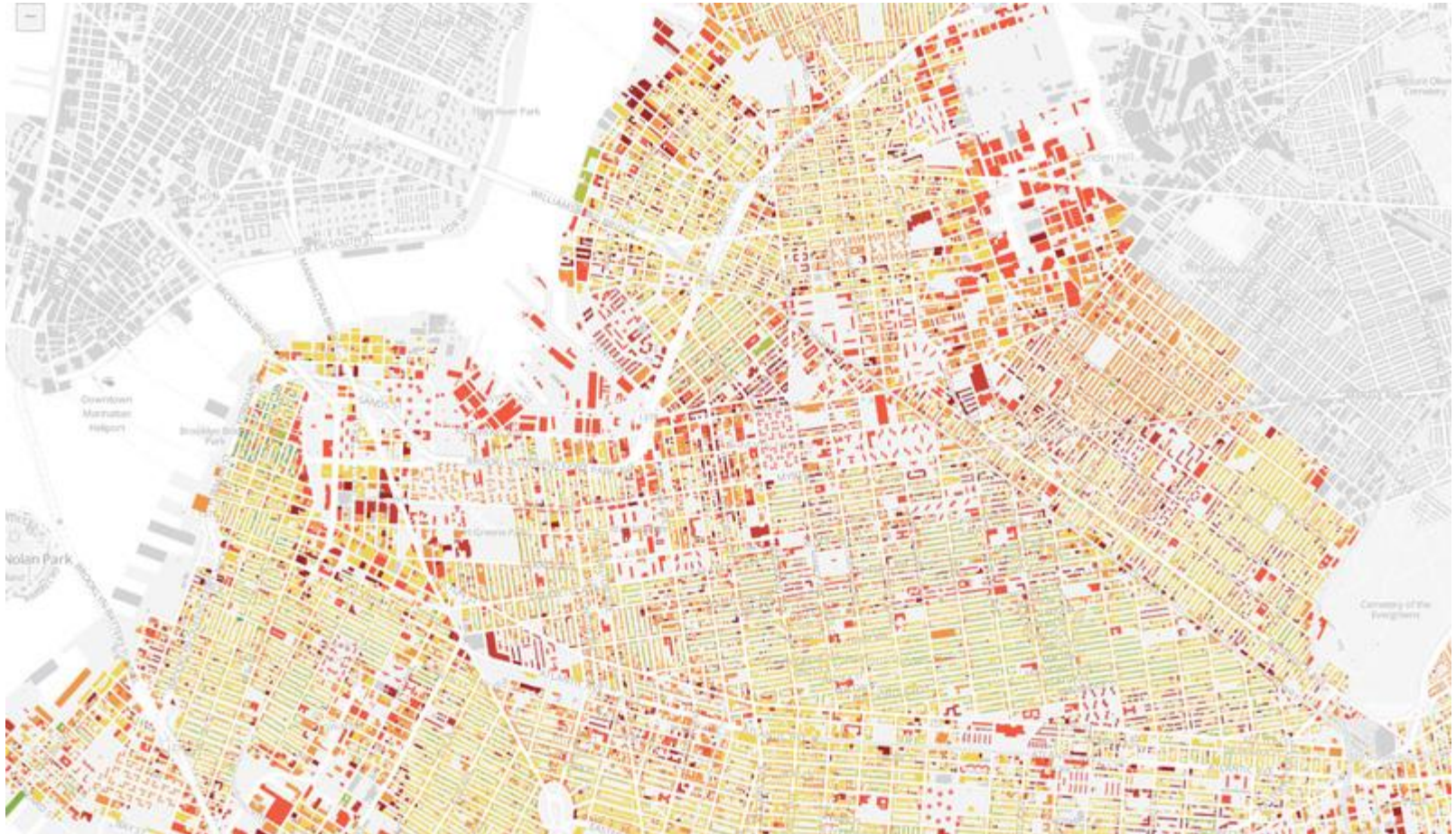
1	1X - 31X - 38X	2 - 3 - 4
5	6	8X
12	16X	19
28	14	14X/L
17	18	21
22	23	24
27	28	29
30	30X	31
33	35	36
37	38	39
41	43	44

Frustration Index, Srivinas Ashok, Daphne Dethier, Carmel Dudley, Steve Pepple



Block by Block Brooklyn

Buildings by Age, Thomas Rhiel

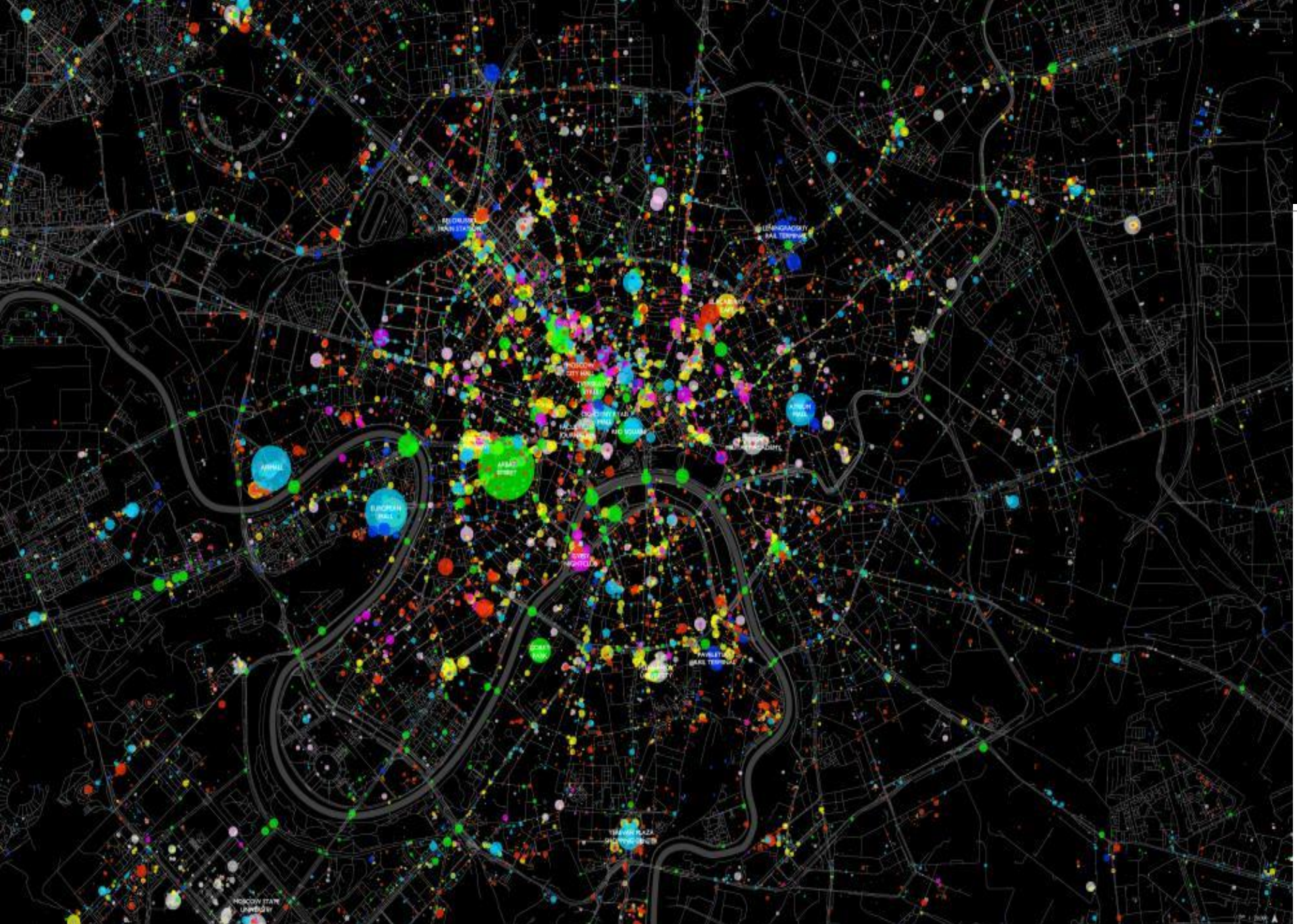


City as a Wealth of Data

- <http://flowingcity.com/>: Visualizing the City built of data, Urban Data Visualizations of the City, making the city smarter with data
- Data sources: Government records, corporate records, community-generated data, Cameras, car GPS, GPS, Census data, Location apps, Mobile apps, RFID, sensors, social media, Wi-Fi antenna, WWW, etc.

Here and Now, Sarah Williams, Spatial Information Lab, Columbia





FOURSQUARE CHECK INS - MOSCOW

CHECK INS PER CATEGORY
FEBRUARY 24 - MARCH 2, 2012

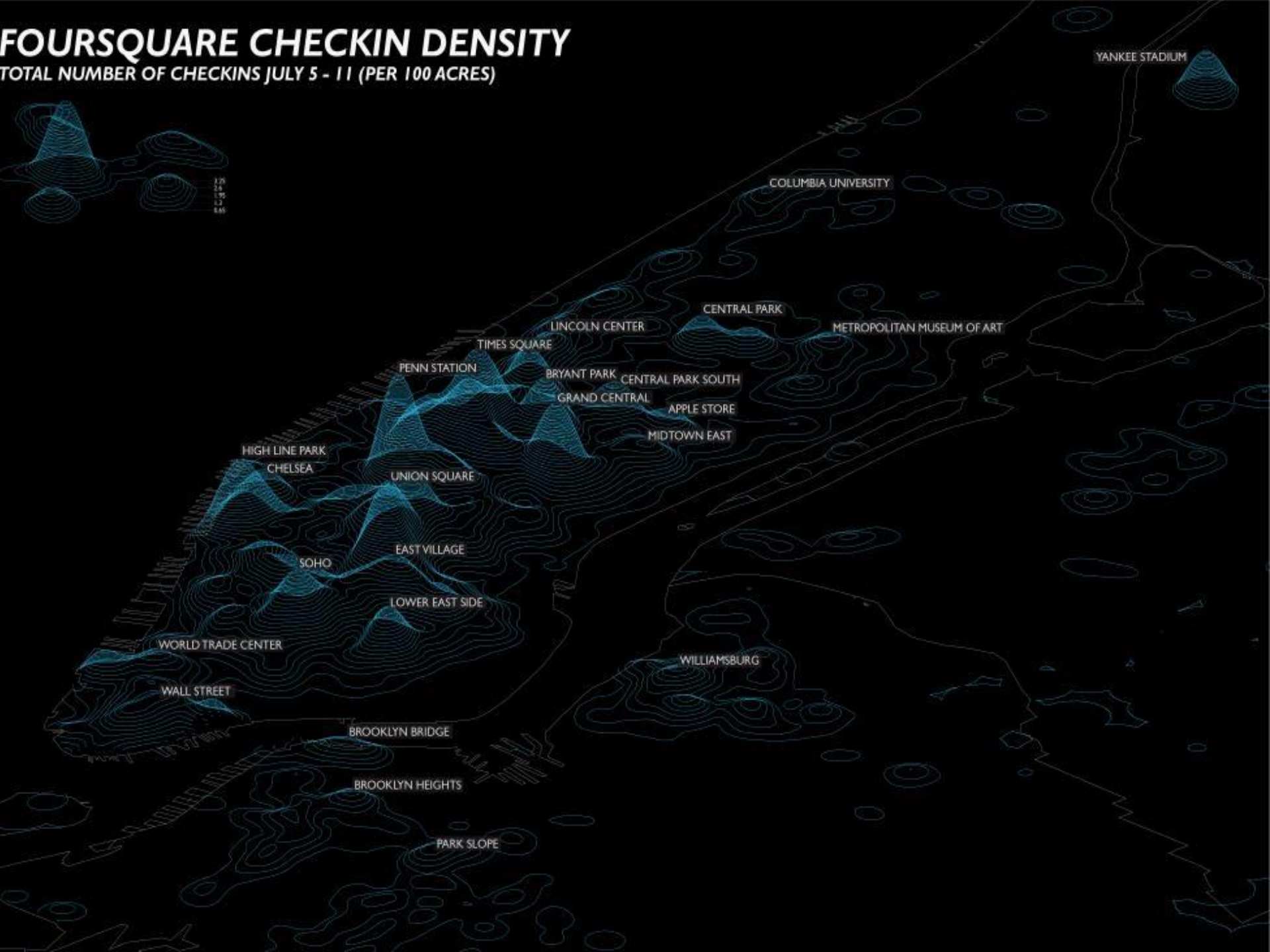


- SHOPPING
- ARTS / ENTERTAINMENT
- HOME / WORK
- COLLEGES / UNIVERSITIES
- FOOD
- NIGHTLIFE
- TRAVEL
- OUTDOORS

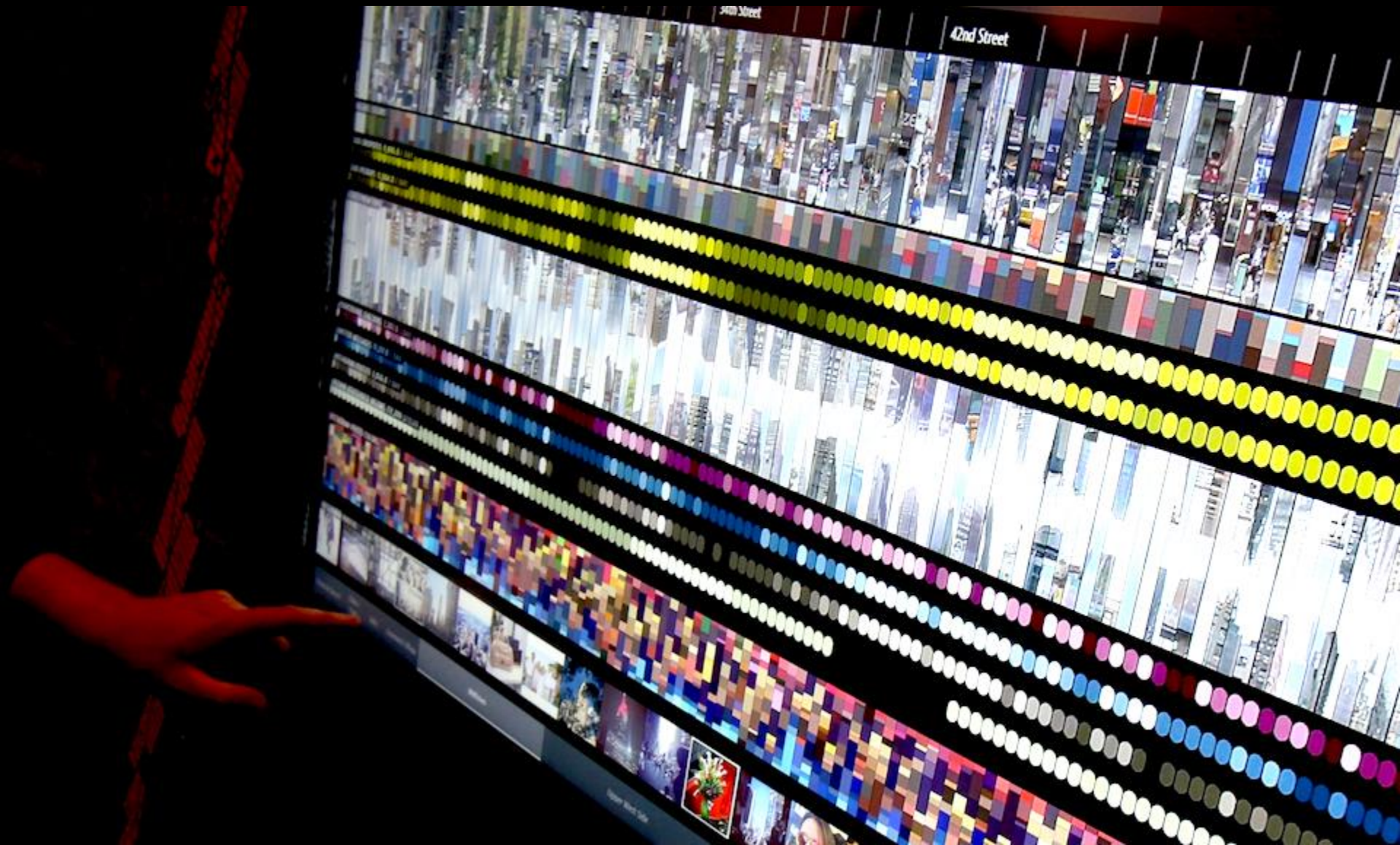
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© 2012

FOURSQUARE CHECKIN DENSITY

TOTAL NUMBER OF CHECKINS JULY 5 - 11 (PER 100 ACRES)



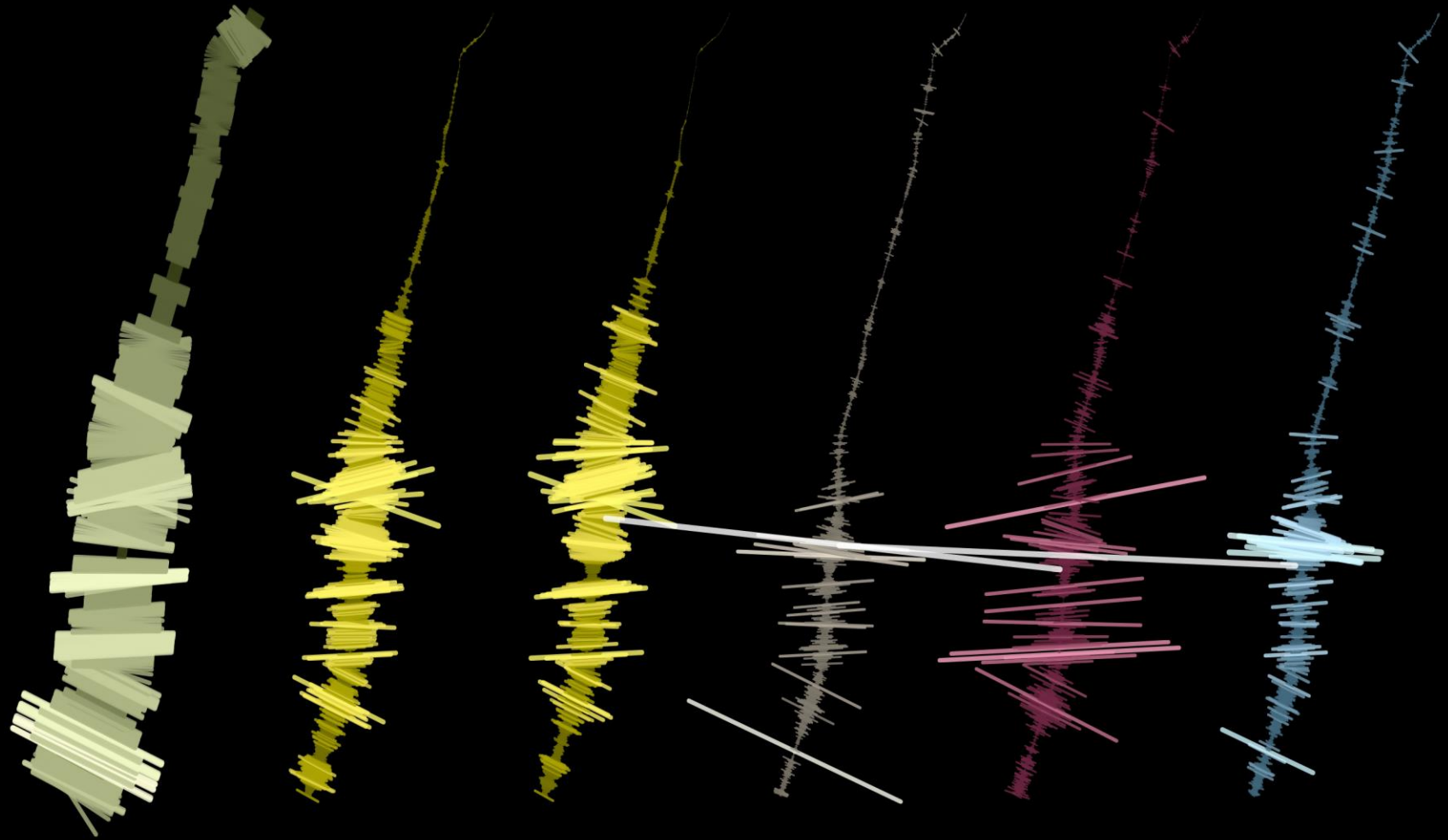
On Broadway, Manovich et al.



On Broadway

ON BROADWAY

<http://on-broadway.nyc>



HOUSEHOLD INCOME

TAXI DROP-OFFS

TAXI PICK-UPS

INSTAGRAM IMAGES

FOURSQUARE CHECK-INS

TWITTER MESSAGES

Data Canvas – Media Network to promote public awareness

- DIY sensor network to measure pollution, dust, light, sound, temperature, and humidity.
- Created an interactive map, opened the data, and asked participants to use it to narrate a story about their city.

SELECT A CITY

- Temperature (C) 0.
- Light (Lux) 0.
- Pollution (mV) 0.
- Humidity (%) 0.
- Dust (pcs/238mL) 0.
- Noise (mV) 0.
- Speech

Info ■

sonic particles 2.0

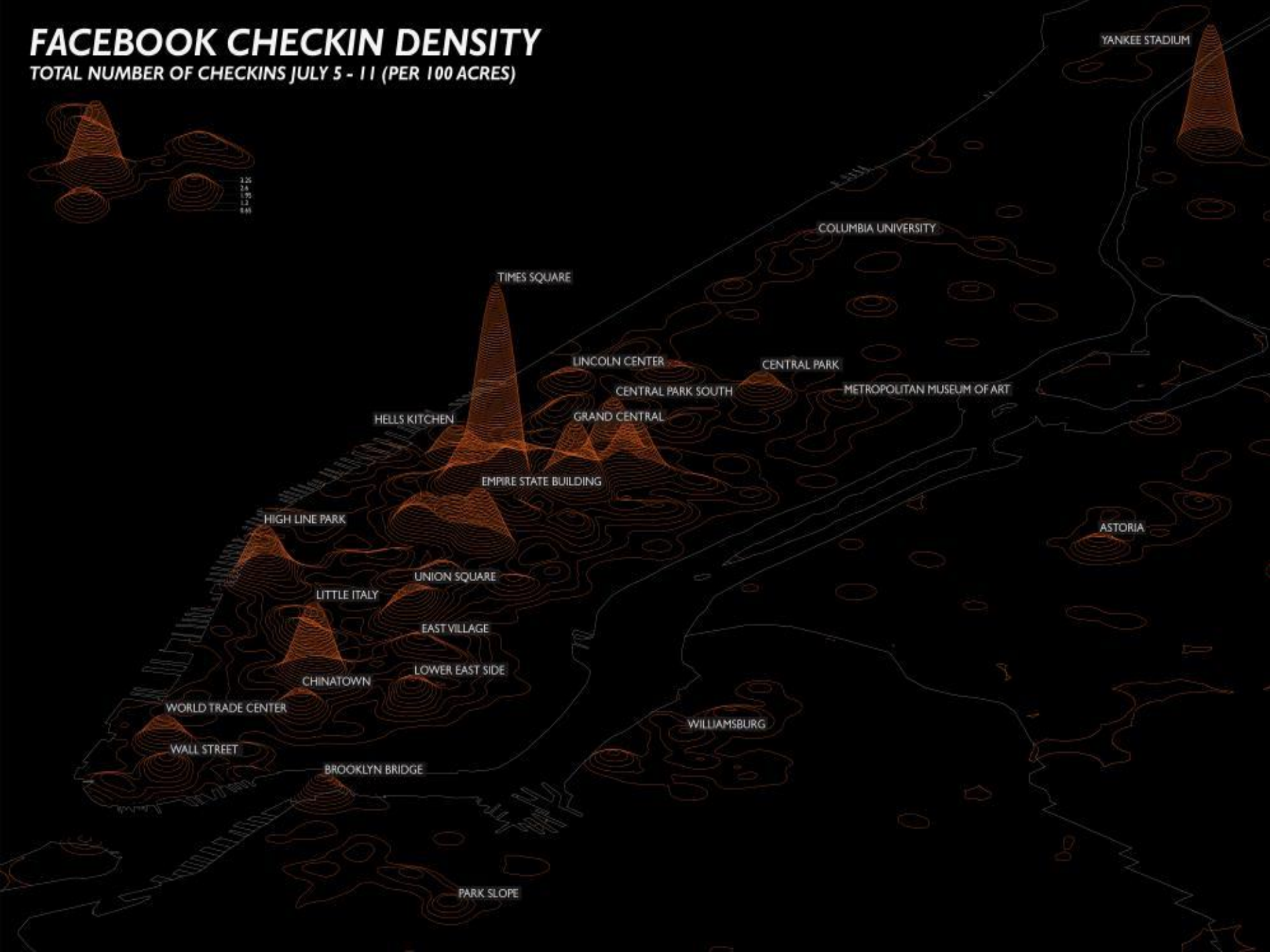
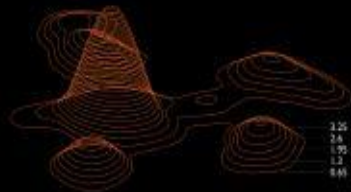
A sonification of real-time urban environmental data

Sonic Particles

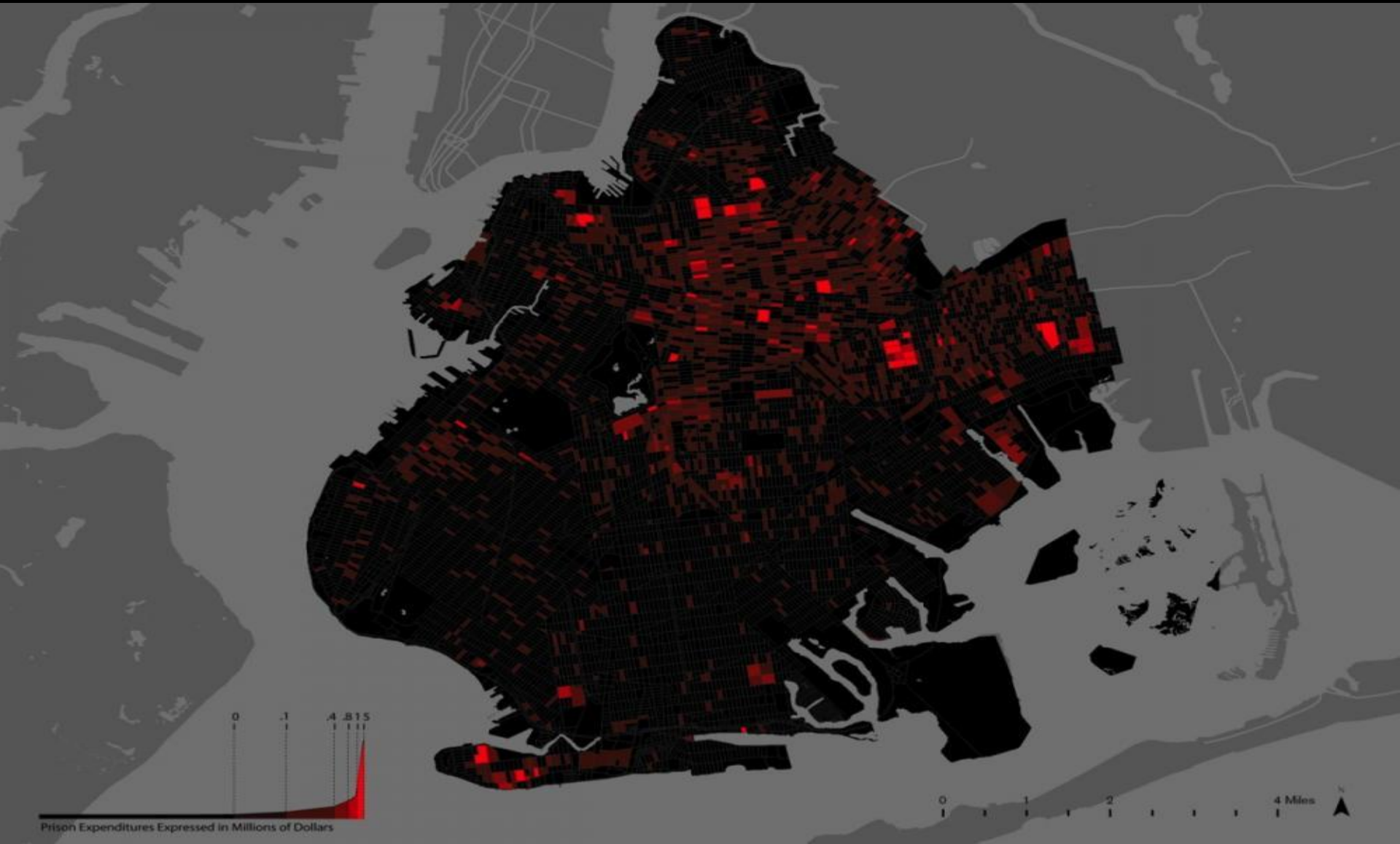
- <http://datacanvas.org/project/sonic-particles-2-0/>
- Sonic Particles 2.0 is a real-time sonification of urban environmental data: temperature, light, pollution, humidity, dust and noise measurements.
- Updated every 5 seconds.
- Each city can be differentiated.

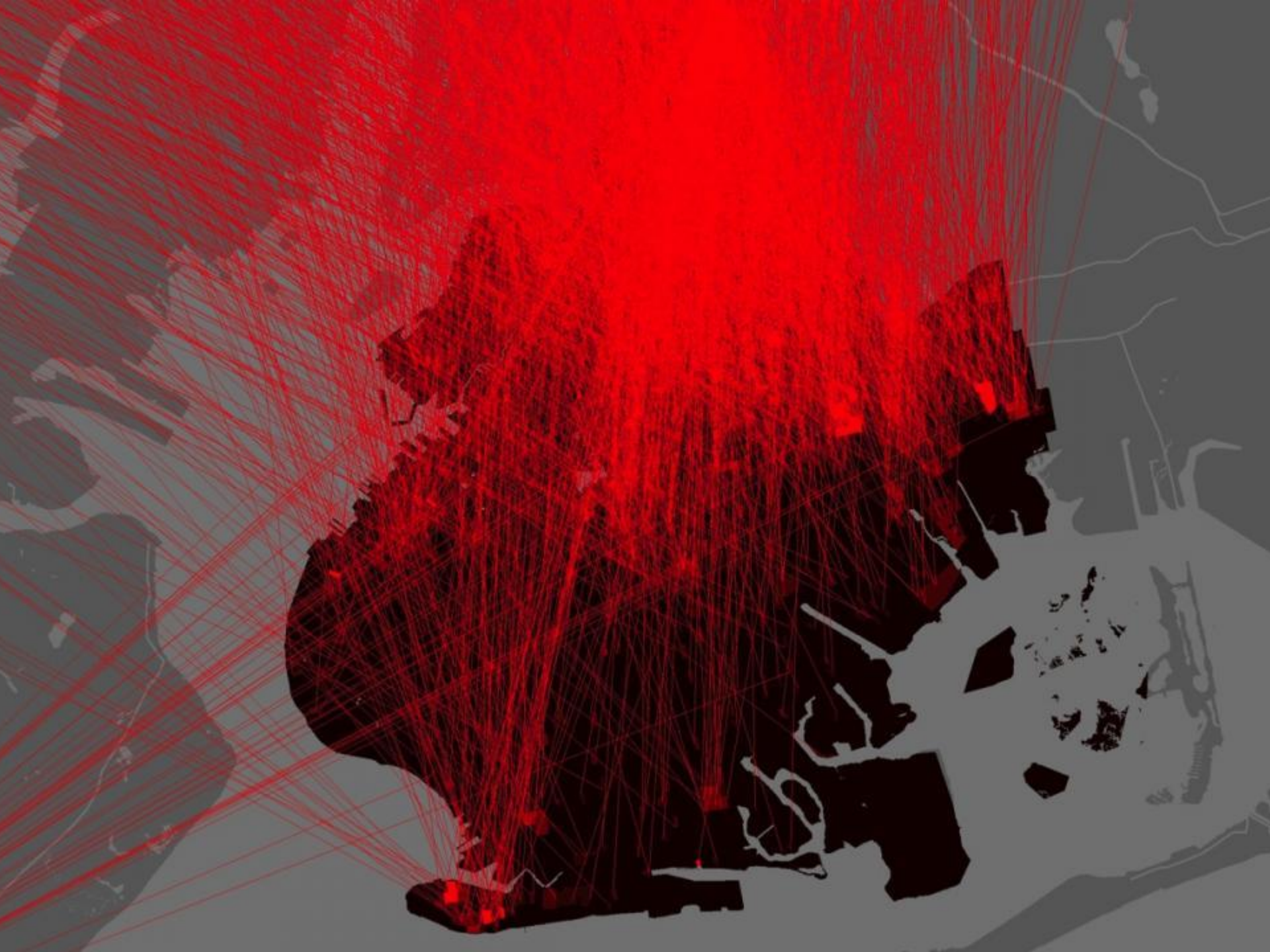
FACEBOOK CHECKIN DENSITY

TOTAL NUMBER OF CHECKINS JULY 5 - 11 (PER 100 ACRES)



Million Dollar Blocks, Laura Kurgin, Erc Cadora

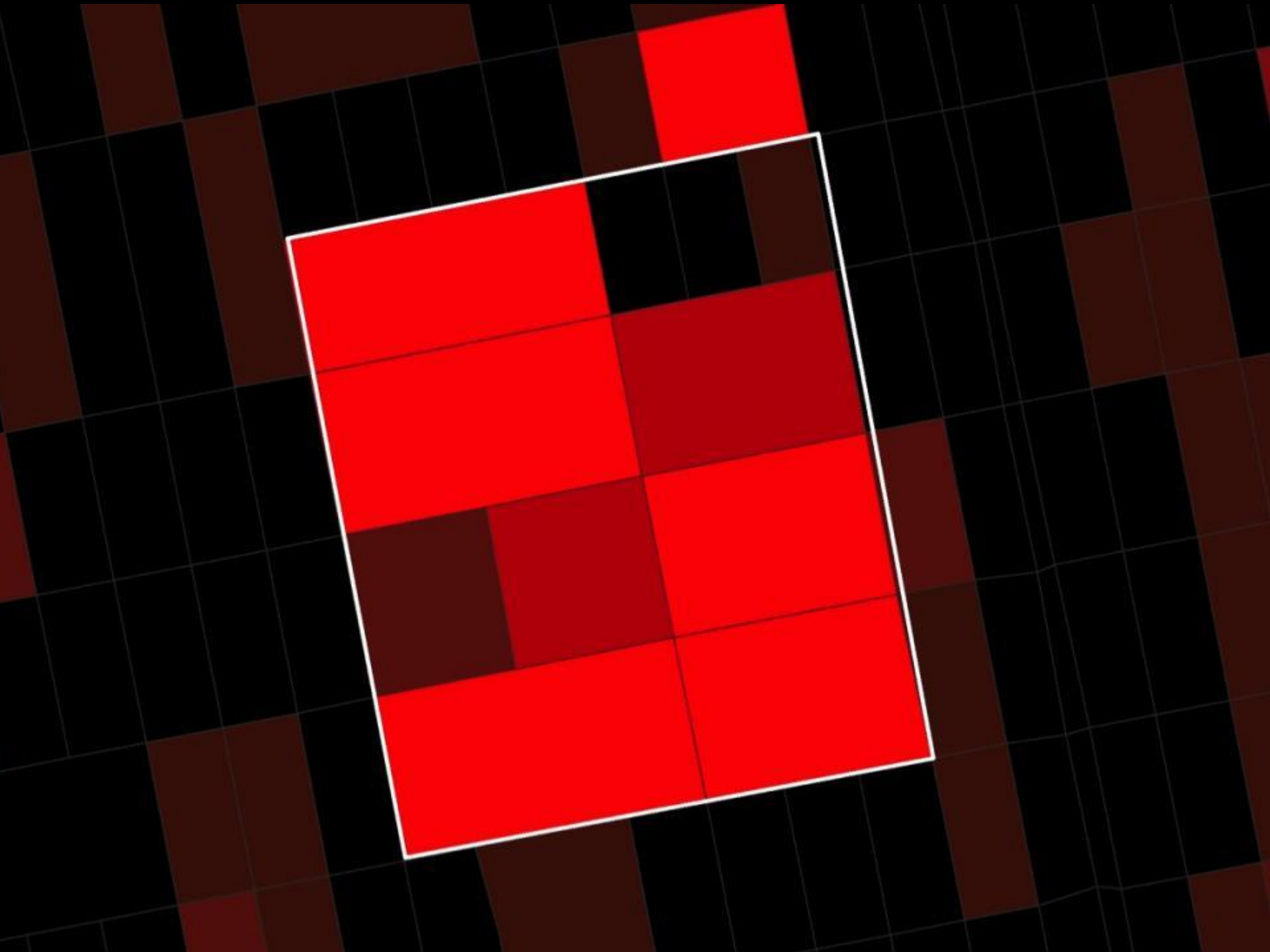


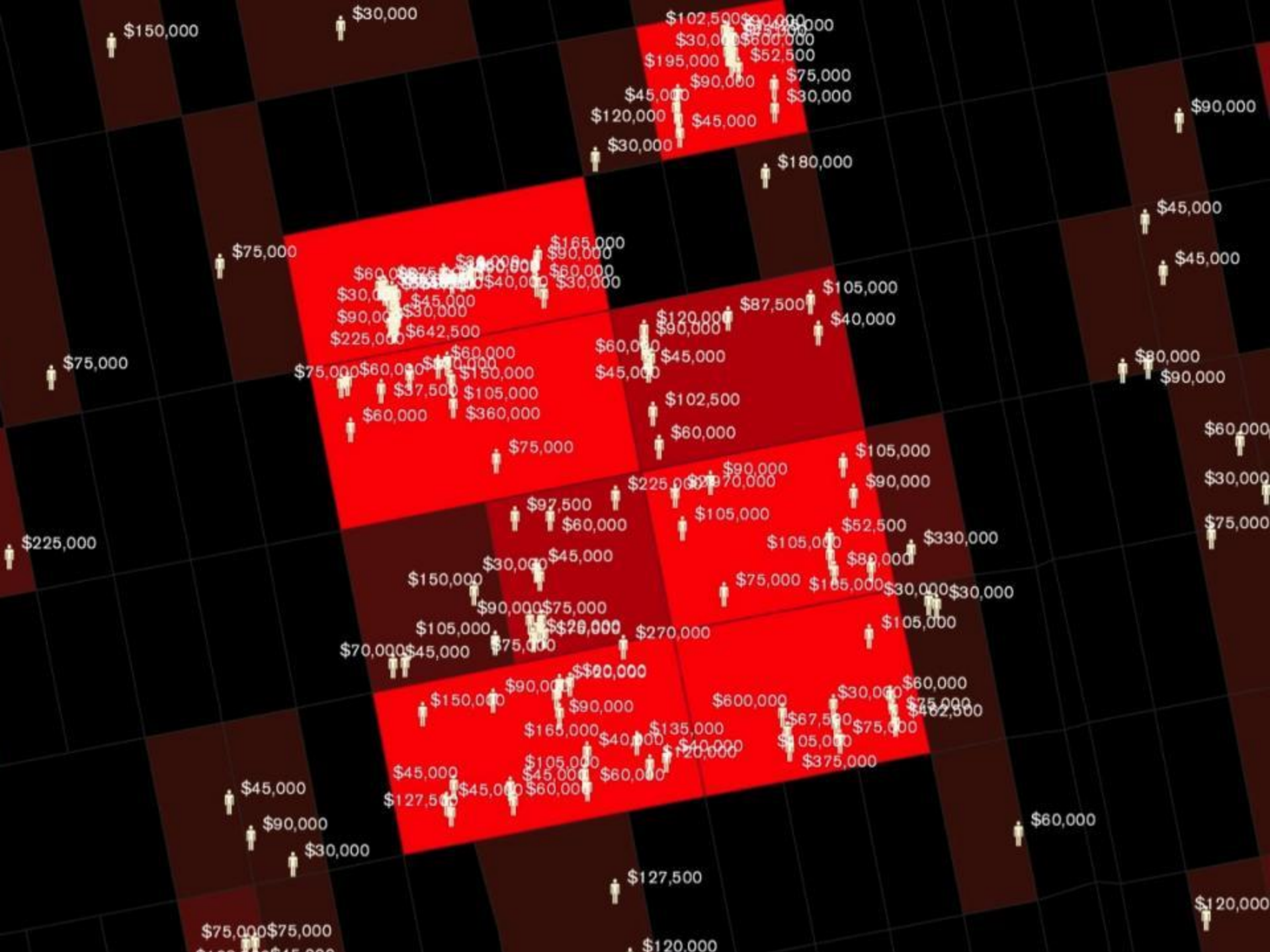




0 .1 4.815

0 1 2 4 Miles







Museum for the End of the World, curated by Janine Marchessault and Michael Prokopow, World Without Sun, Christine Davis



Life Cycles, Matthew Moore



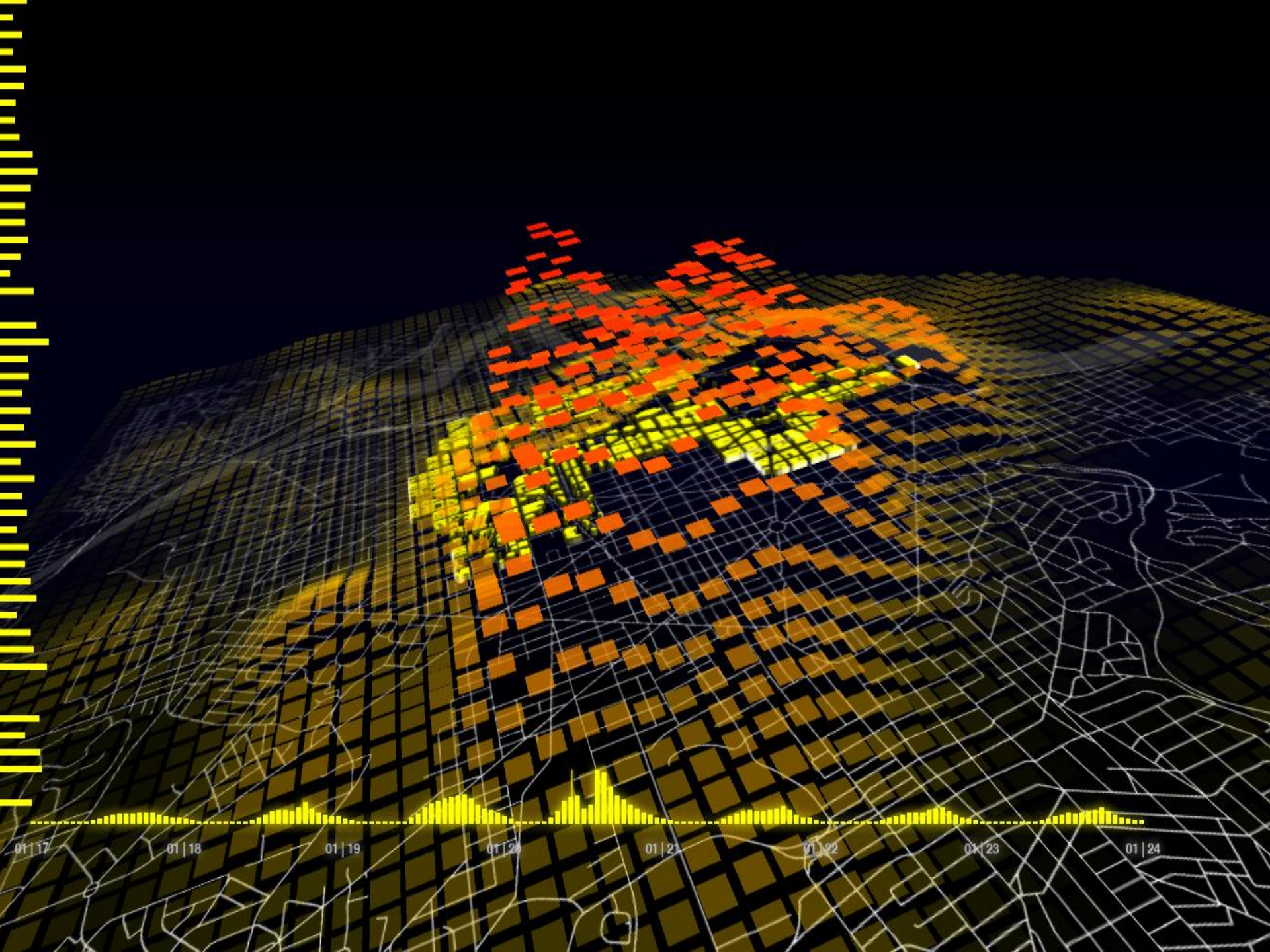
The Mobile City: A Fully Enabled Grid

- Mobility is about the individual, not the device.
- The urban experience of ubiquitous connectivity, personalized and context-aware services and content that link us to daily activities and interests, regardless of time and place.
- Continual discovery, enhancement



Liu Bolin,
Hiding in the
City





CitySourced : free, simple, and intuitive platform empowering residents to identify and report civic issues



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[US](#) > [California](#) > [Alameda County](#) > [City of Hayward](#) > 94541

Zip Code 94541, California

[Download Data](#)



- **Graffiti Removal**
Hayward, CA
01/11/2011 @ 08:37 PM PST
- **Graffiti Removal**
Hayward, CA
01/11/2011 @ 02:06 PM PST
- **Graffiti Removal**
Hayward, CA
10/27/2010 @ 12:31 PM PST
- **Graffiti Removal**
Hayward, CA
10/27/2010 @ 12:28 PM PST
- **Graffiti Removal**
Hayward, CA
10/27/2010 @ 12:28 PM PST

Hero Reports, Alysa Wright


HERO REPORTS

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SEARCH

the map

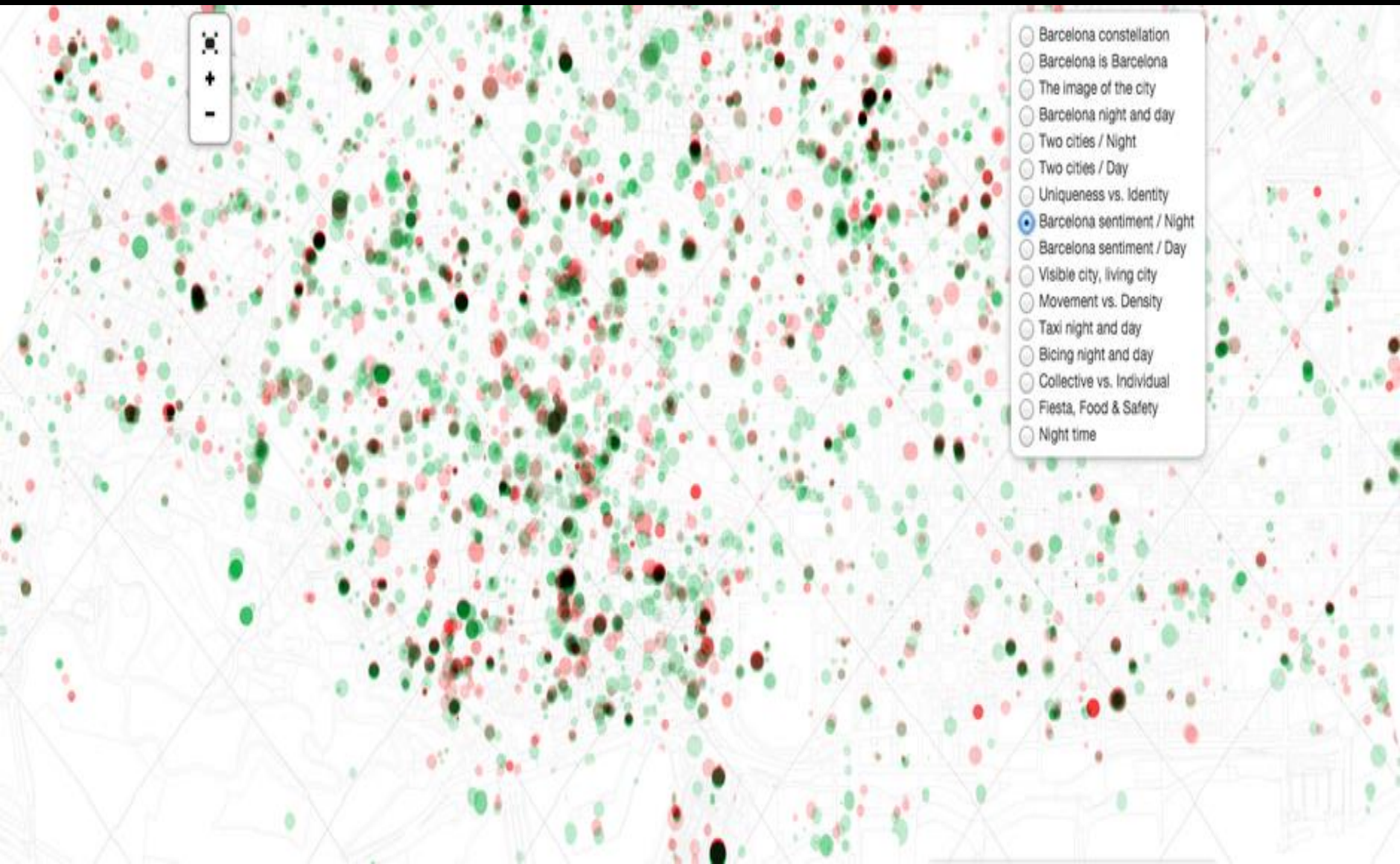
This way to say something 

Designing the City at Night, Barcelona (social media, open data, light), I -Varis, Diez & Corbero

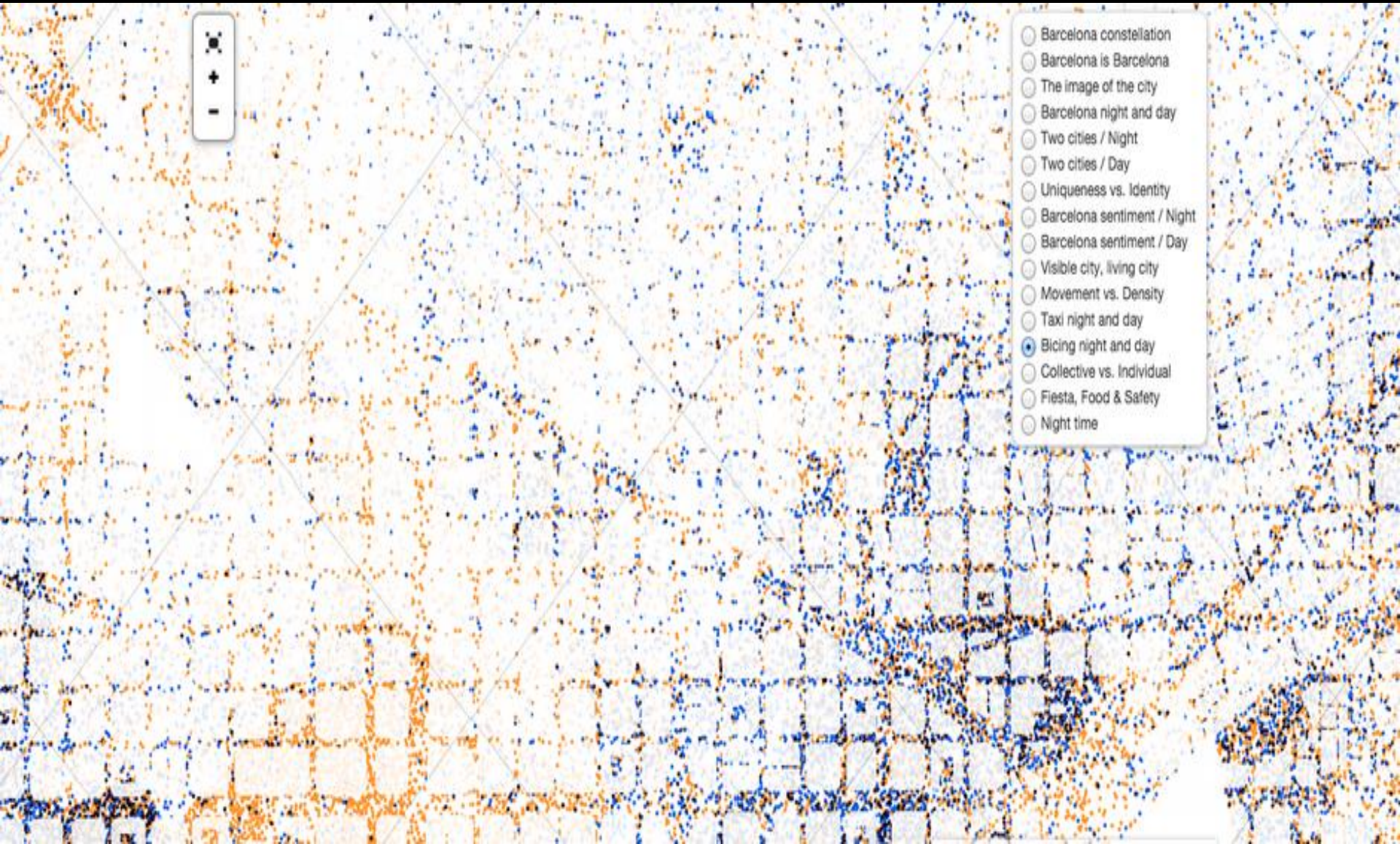


Designing the City, Tone of Social Media

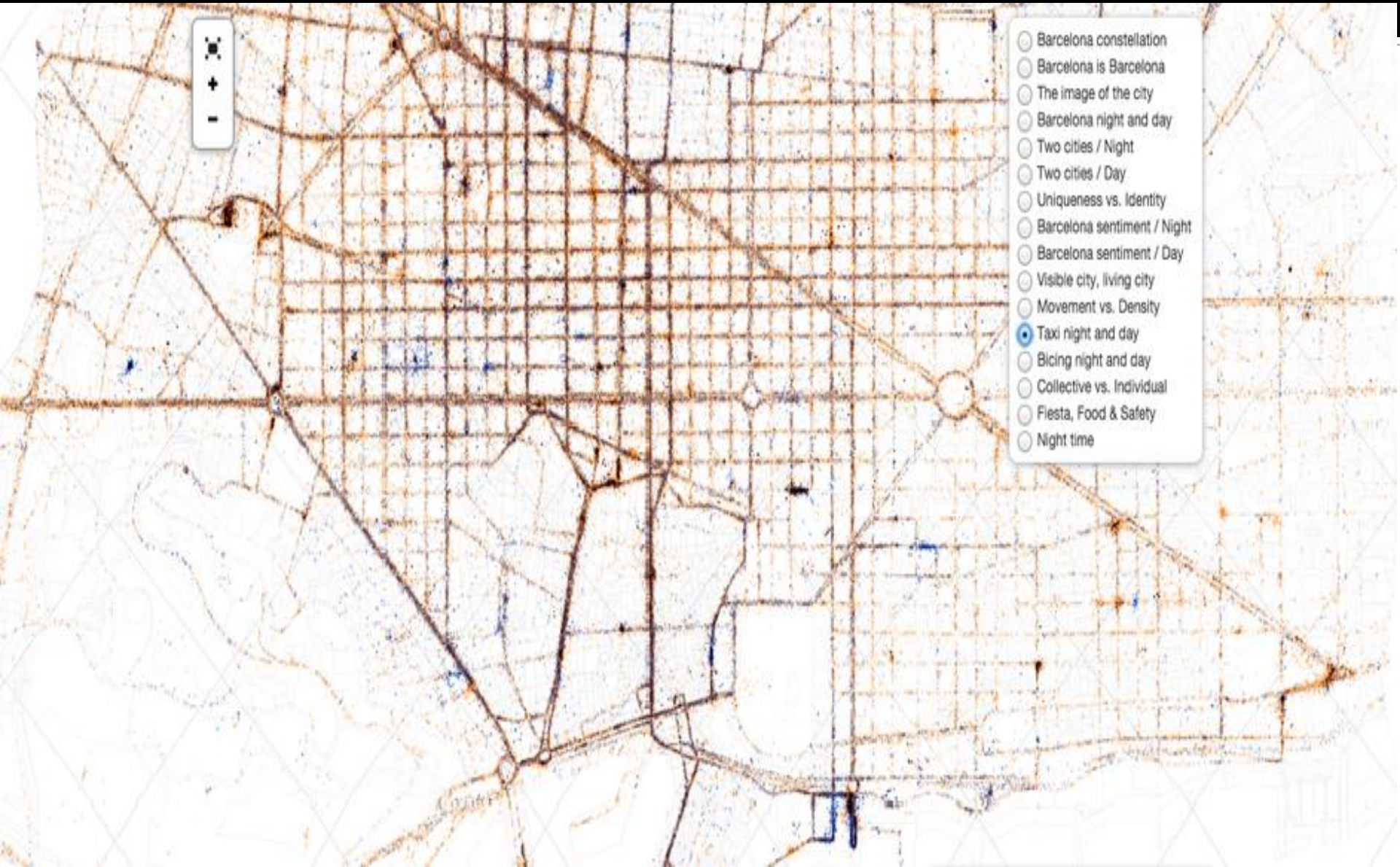
<http://www.atnight.ws/>



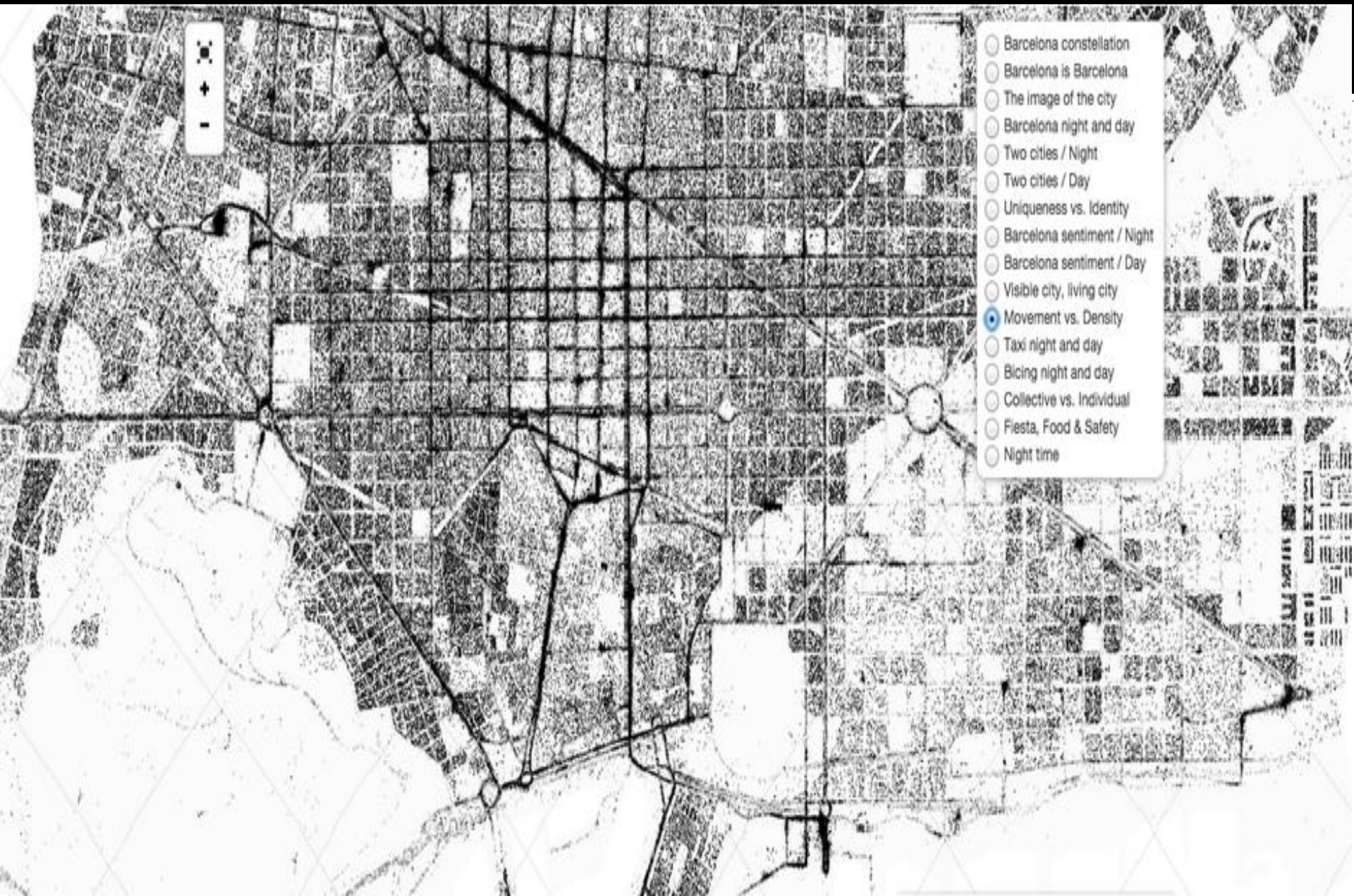
Bike storage data



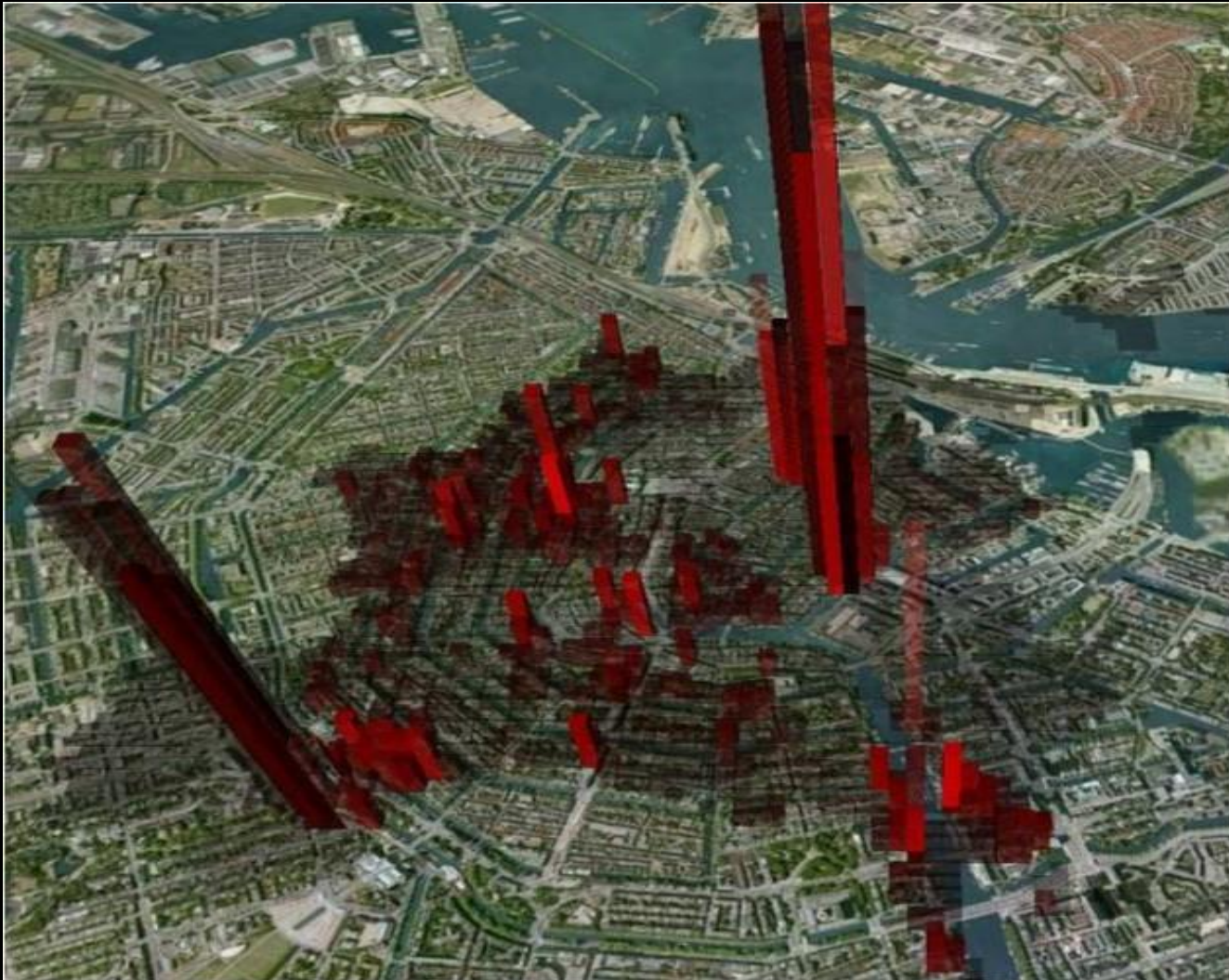
Taxis



Taxis vs Density



Visible Amsterdam (movement of crowds), Euro Beinat

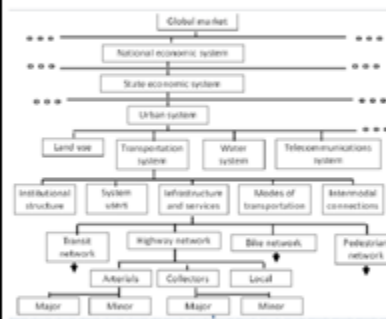


Urban Visualization Themes

Civic engagement, Communication,
Demographics, Emotions, Energy
Consumption, Food and Beverage, Housing
Prices, Influence, Movement of Crowds, Places
Popularity, Politics, Public Services, Quality of
Life, Service Access, Service Quality,
Transportation...

iCity concept of city systems as nested structures

Figure 2: Hierarchical Approach to Urban Systems



Meyer & Miller (2013)

Each system decomposes into sub-systems; E.g., “the” transportation system consists of:

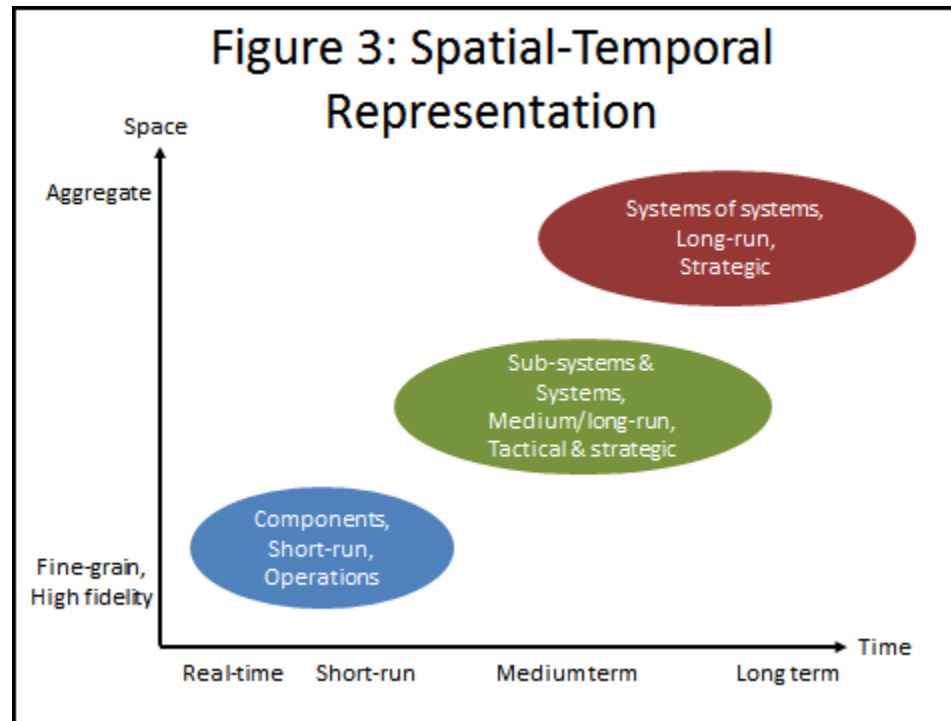
- The road system
- Transit system
- Active transportation system
- Operating agencies
-

Each “system” interconnects & interacts with other systems

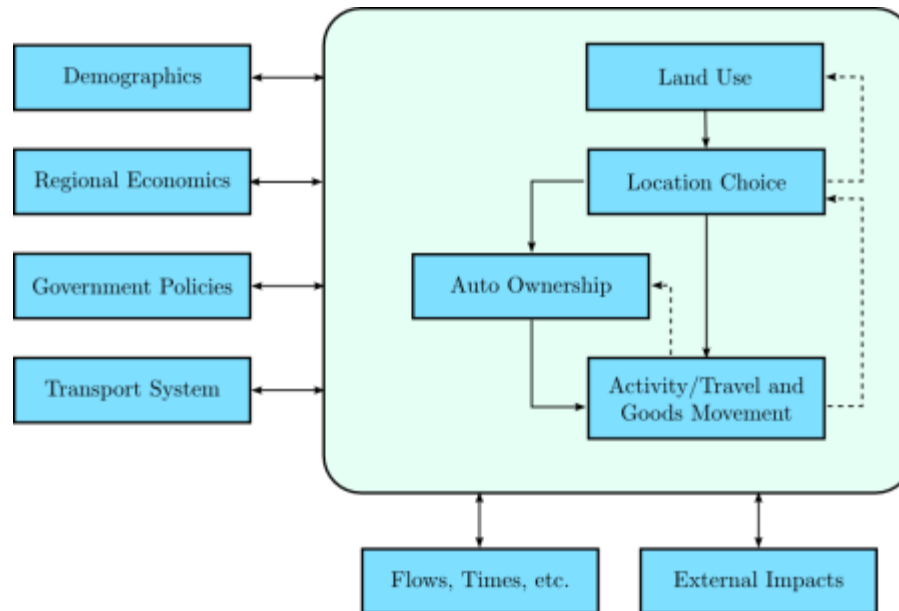


Cities (urban regions) are “systems of systems”.

Modeling systems relationships



Eric Miller, ILUTE



Imagine the City

As sustainable, networked, inclusive, reciprocal and interdependent experience; as test-bed for new forms of exchange economy; as the site of research integration; as start-up and social innovation exchange; publically integrated campuses; inclusive conveners and curators of expression; as a fully enabled inclusive mobile grid; as data producing, data rich, data dependent and data curating; inclusively designed.