The Urban Commons

LEARNING WITH AND FROM THE CITY OF BOSTON'S 311 SYSTEM

Boston Area Research Initiative

2011 City Service Requests
to Mayor's 24 Hour Service
REASON :
Housing Concerns
Code Enforcement
Building Inspections
Environmental Services
General Request
Tree Maintenance
Park Maintenance & Safety
Graffiti
Sanitation
Highway Maintenance
Street Lights
Recycling
Street Cleaning
Signs & Signals
Tree M.
4/21/11

ELECTRIC POLE SLANTING Due to hurricane IRENE. This may cause major power outage in area if not attended too!

tree branch blocking avondale street

tree fallen on car blocking side walk, two handicap persons could not pass!

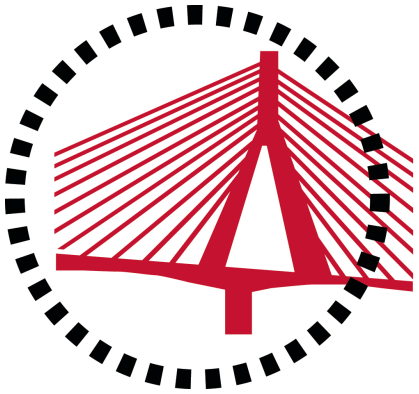
Neighbors moved a fallen tree to sidewalk it needs to be picked up.

The Urban Commons

- Custodianship
  - The collaborative maintenance of Boston
- The Boston Area Research Initiative
  - Data, research and policy
- Urban informatics
  - What makes a city “smart”?

Overview

- The Boston Area Research Initiative
- Custodianship in the Urban Commons
- Pathways from Research to Policy
- Future of Urban Informatics and Smart Cities



Boston
Area
Research
Initiative

The Boston Area Research Initiative

- An interuniversity partnership that pursues urban research that advances both scholarship and policy.
- With a primary focus on the opportunities presented by novel digital data and technologies.
  - www.bostonarearesearchinitiative.net

Boston Area Research Initiative

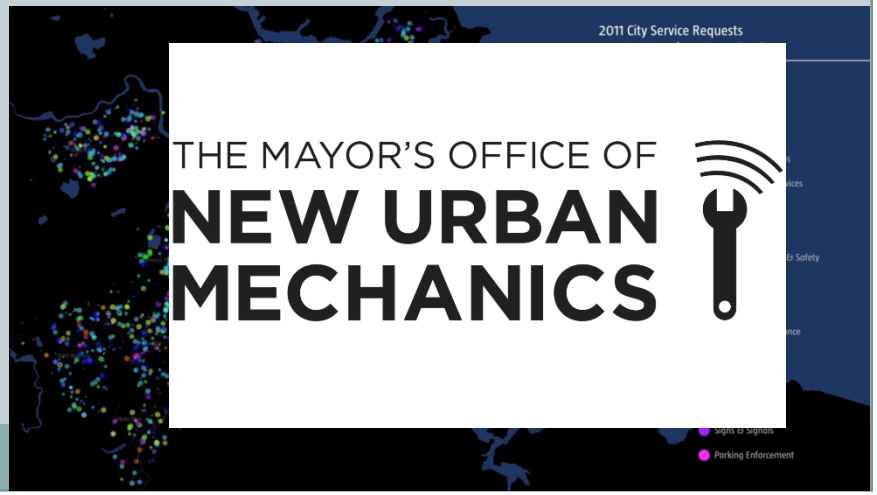
The Boston Area Research Initiative: Main Activities

1. Pursuing core research-policy partnerships
2. The Boston Data Portal, making emergent data sources accessible for research, policy, and practice
3. Convening and supporting a thriving civic data ecosy

Boston Area Research Initiative

BARI's Flagship Project: Collaboration around the 311 System

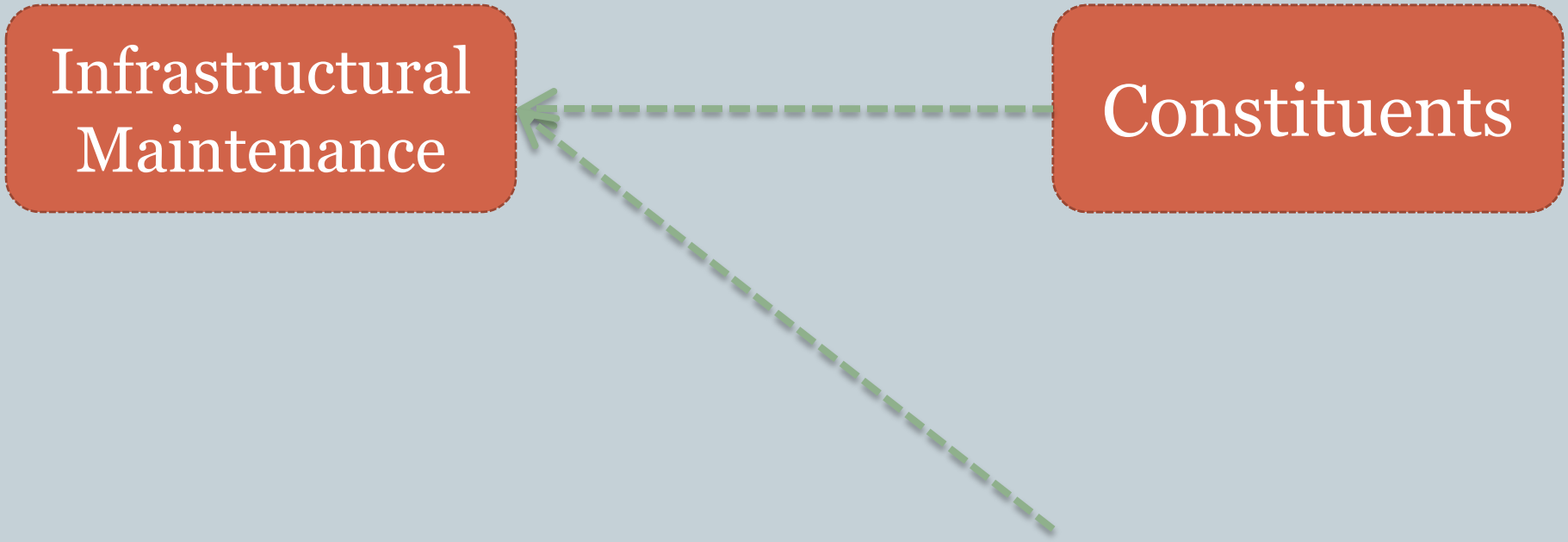
- 2008: Boston instated the Constituent Relationship Management System (i.e., 311).
- Now receives ~500 requests/ day.
- How do we leverage these data to inform both public policy and social science?



Custodianship in the Urban Commons

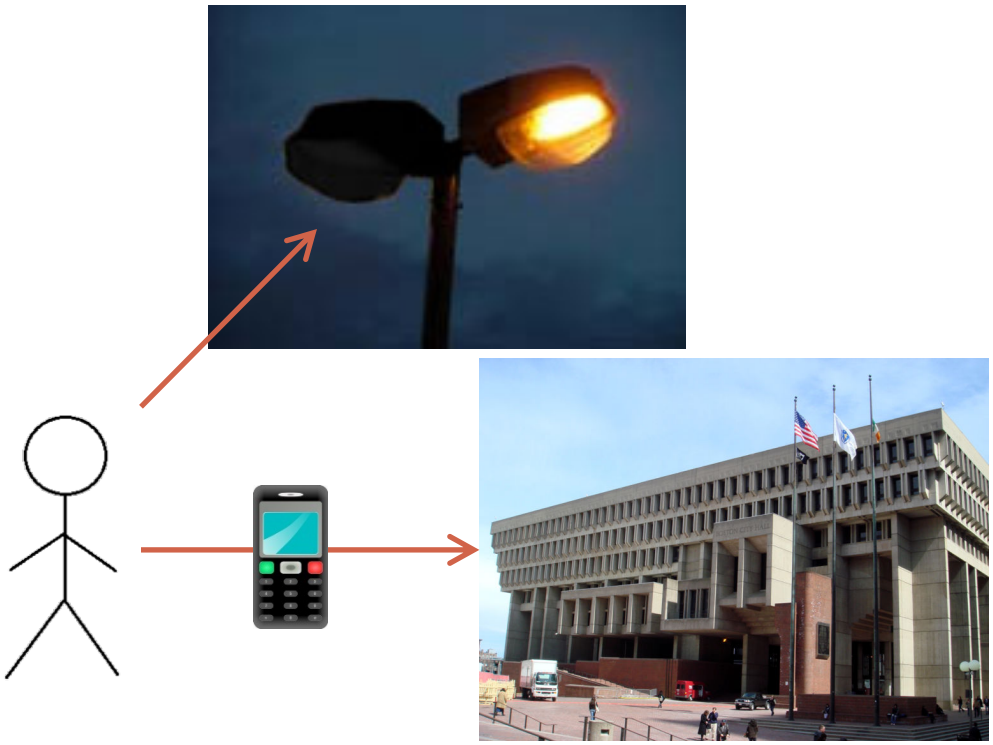
Maintaining the Urban Commons

Collaboratively Managing the Urban Commons



How Does Coproduction Work?

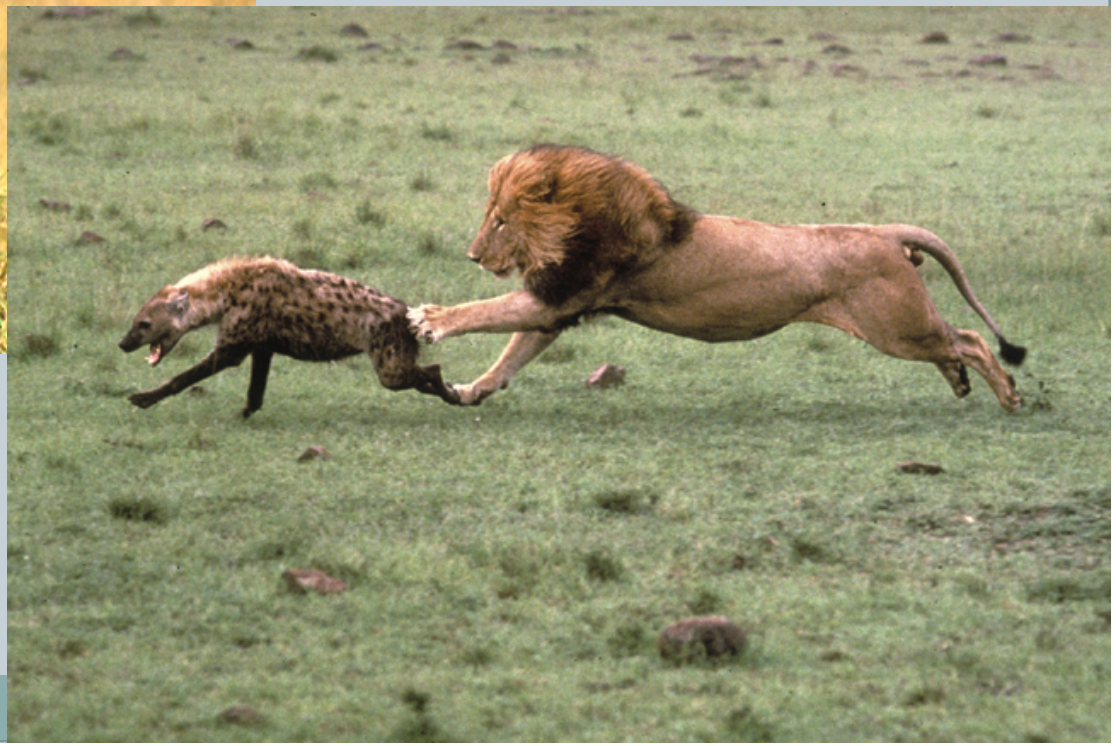
- The direct involvement of constituents in the design and delivery of services (Whitaker, 1980).
- "Coproduction is one way that synergy between what a governmen can occur"



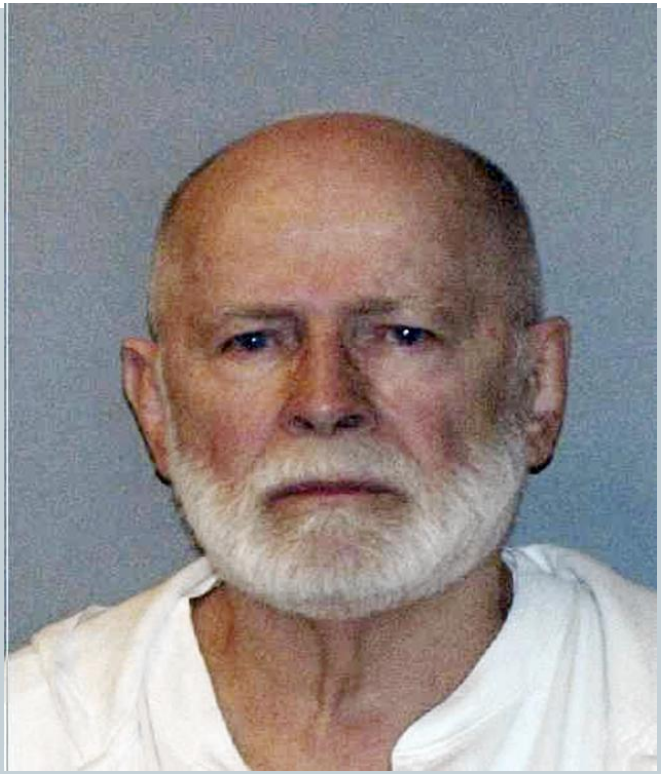
Why Act as a Custodian?

Political Participation	Territoriality
• People are motivated by a *civic disposition*. • Those who vote, volunteer, etc., are those who call 311.	• People are motivated by their concern for a given space. • Those who care about their neighborhood are those who call 311.

Custodianship:
A Form of Territoriality?



Custodianship:
A Form of Territoriality?



Custodianship: A Form of Territoriality?

- A suite of cognitions, attitudes, and behaviors that arise from a sense of ownership.
  - Manage social roles regarding objects and spaces.

Custodianship:
A Form of Territoriality?

The Territoriality Thesis

- If 311 reports are a manifestation of territoriality, then custodianship will be anchored by care for one's home and the surrounding neighborhood.
  - Reports will be made predominantly for issues nearby the home.
  - Those who express greater concern for their neighborhood will be more likely to act as custodians.

Using the 311 Database

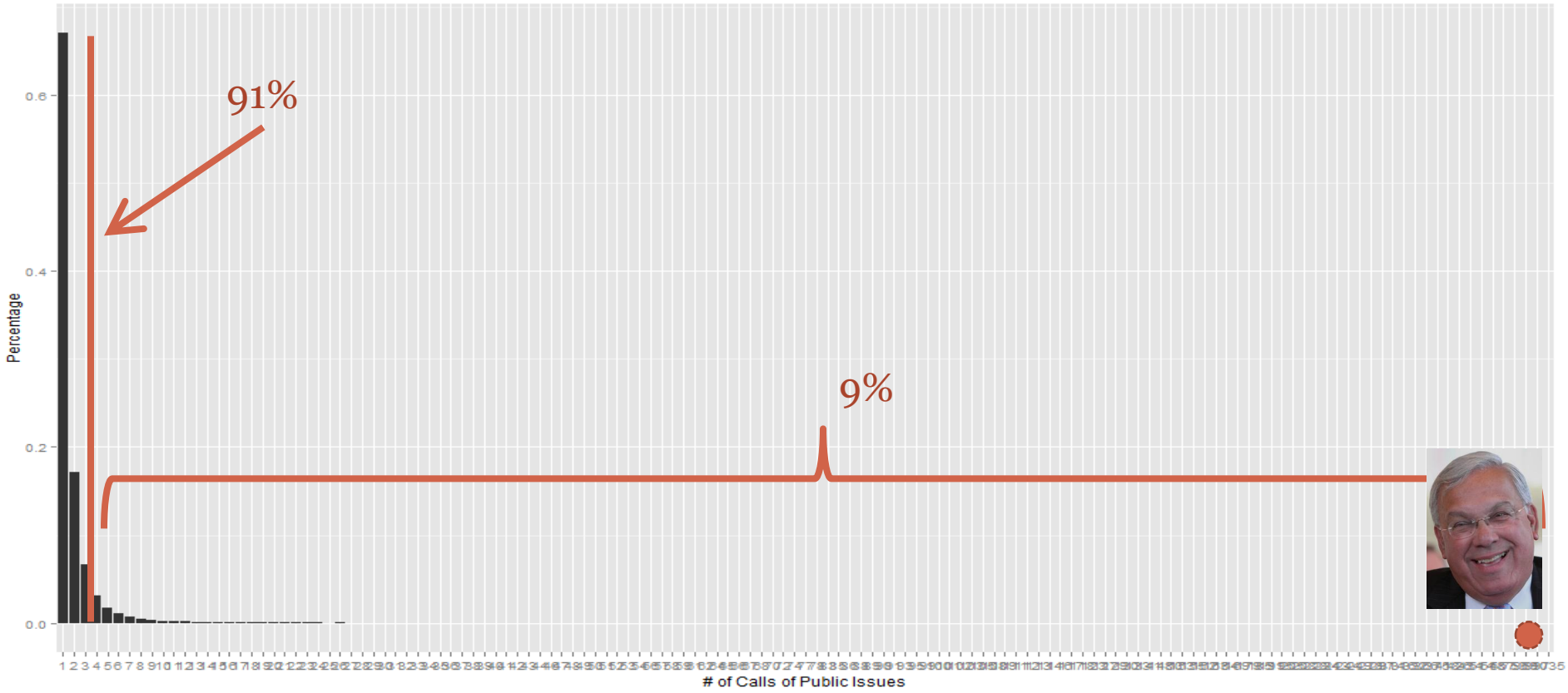
- Database from March 1, 2010-Dec 31, 2015.
  - 652,591 cases with geographical reference received by hotline and internet self-service.

- Each case includes:
  - Date and time.
  - Address or intersection.
  - Standardized case type (e.g., pothole, graffiti removal).
  - Anonymous caller identifier.

Using the 311 Database

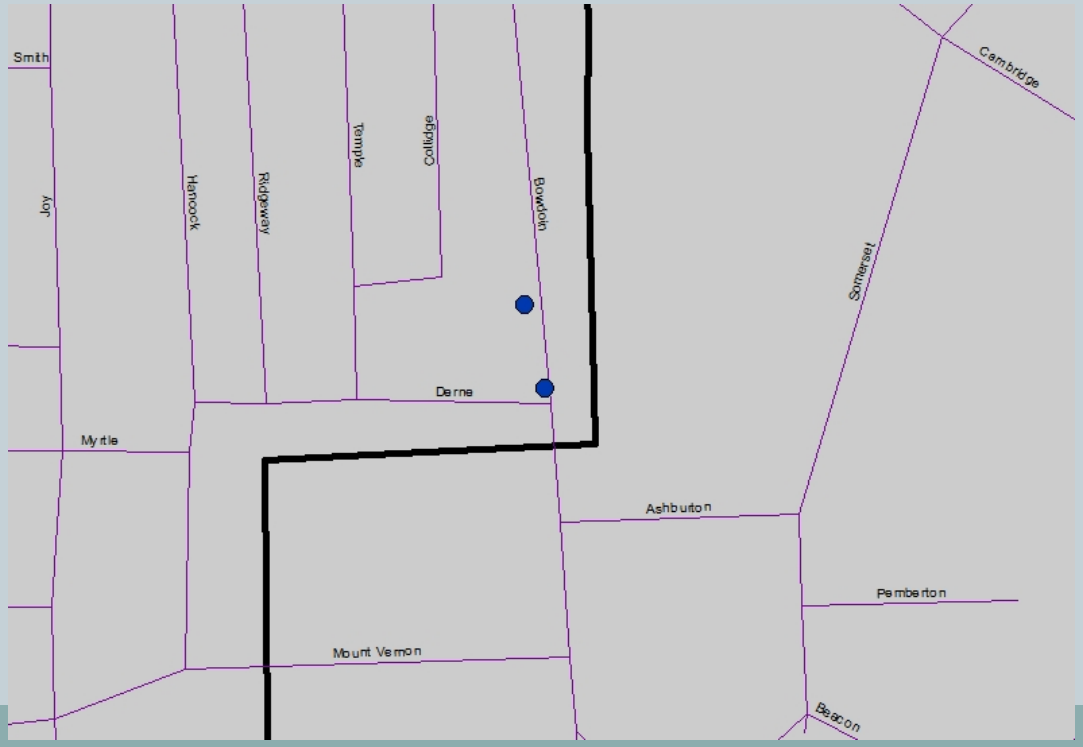
- Many calls reference issues in the public domain.
  - 77 case types (e.g., street light outage).
- Cases have an anonymous key code identifying caller, enabling a study of individual differences
  - *N* = 170,886 constituents (excluding employees)
  - Some have home address and/or e-mail contact on file.
  - ~50,000 users/yr. (~8% of population)
  - ~25,000 custodians/yr. (~4% of population)
- Can use this to measure individuals' custodianship patterns:
  - How often
  - Where
  - Types of calls

Individual Patterns of Custodianship: Frequency



Individual Patterns of Custodianship: Geographic Range

- Median distance from home was 7.3 m.
- 82% of individuals did not call beyond two blocks of their home (estimated as 150 m).



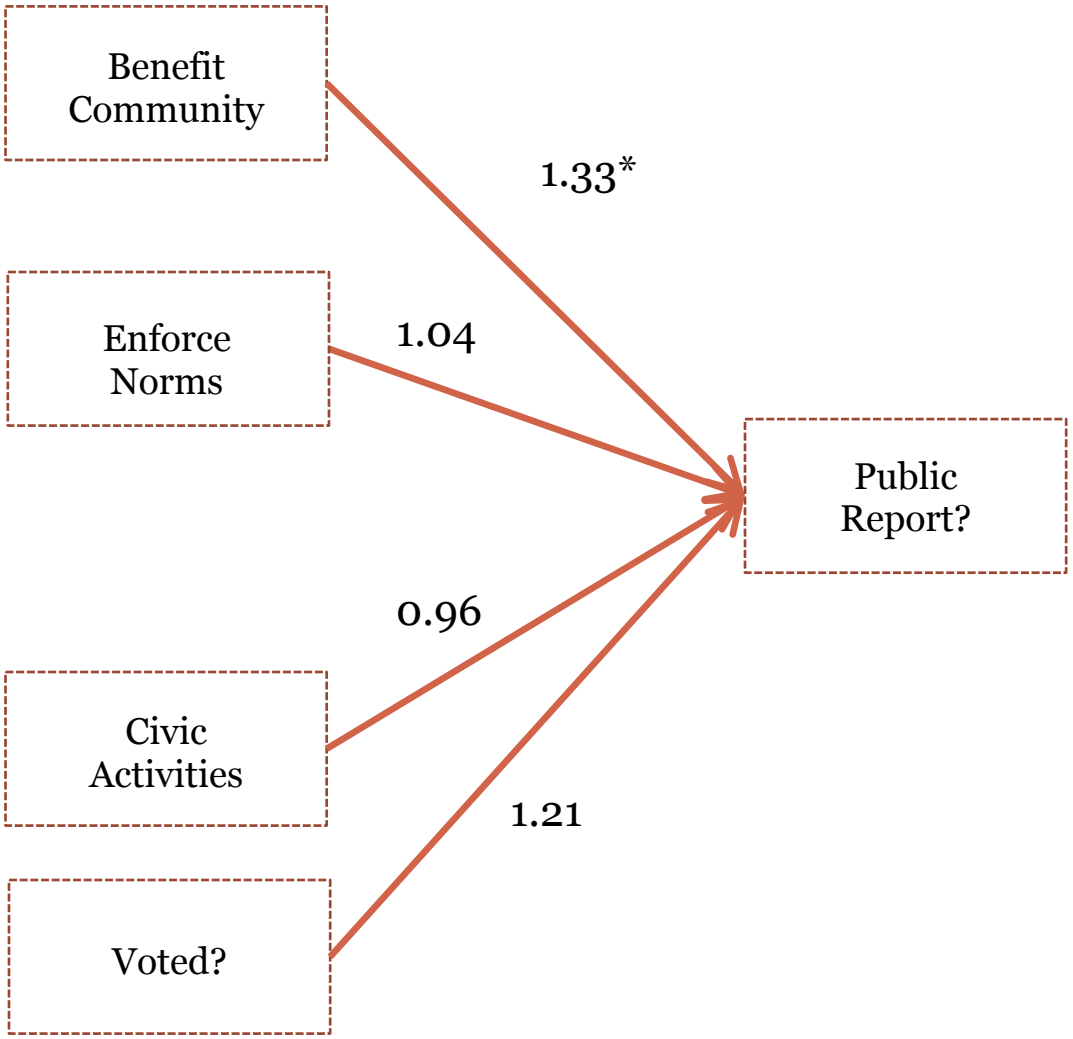
Evaluating Motivations

- Geographical ranges of reporting suggest a salient role for territoriality.
- *Have not* precluded the possibility that political participation also drives reporting.

A Survey of 311 Users

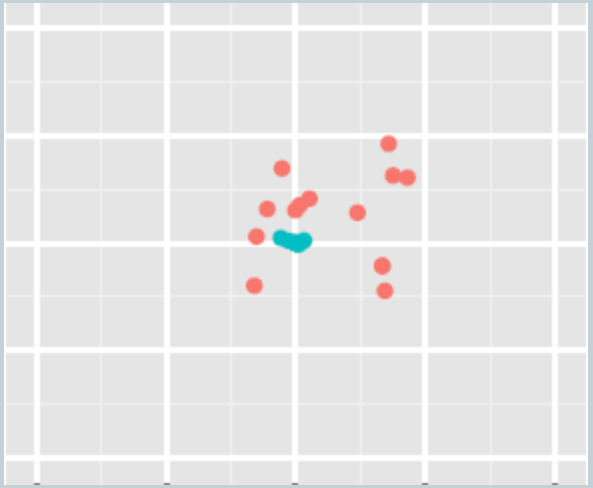
- Survey of 682 individuals who made at least one 311 report in 2012 (*N* = 489 hotline, 193 CC).
  - Assessed territoriality and civic engagement.
    - Two forms of territoriality: benefit the community, enforce norms.
    - Nine civic activities (e.g., volunteering)
  - Responses were linked to calling patterns.
  - Also linked to voter records by names, addresses.
  - Possible to compare custodians to non-custodians.
  - Conducted w/ Emerson College's Engagement Lab.

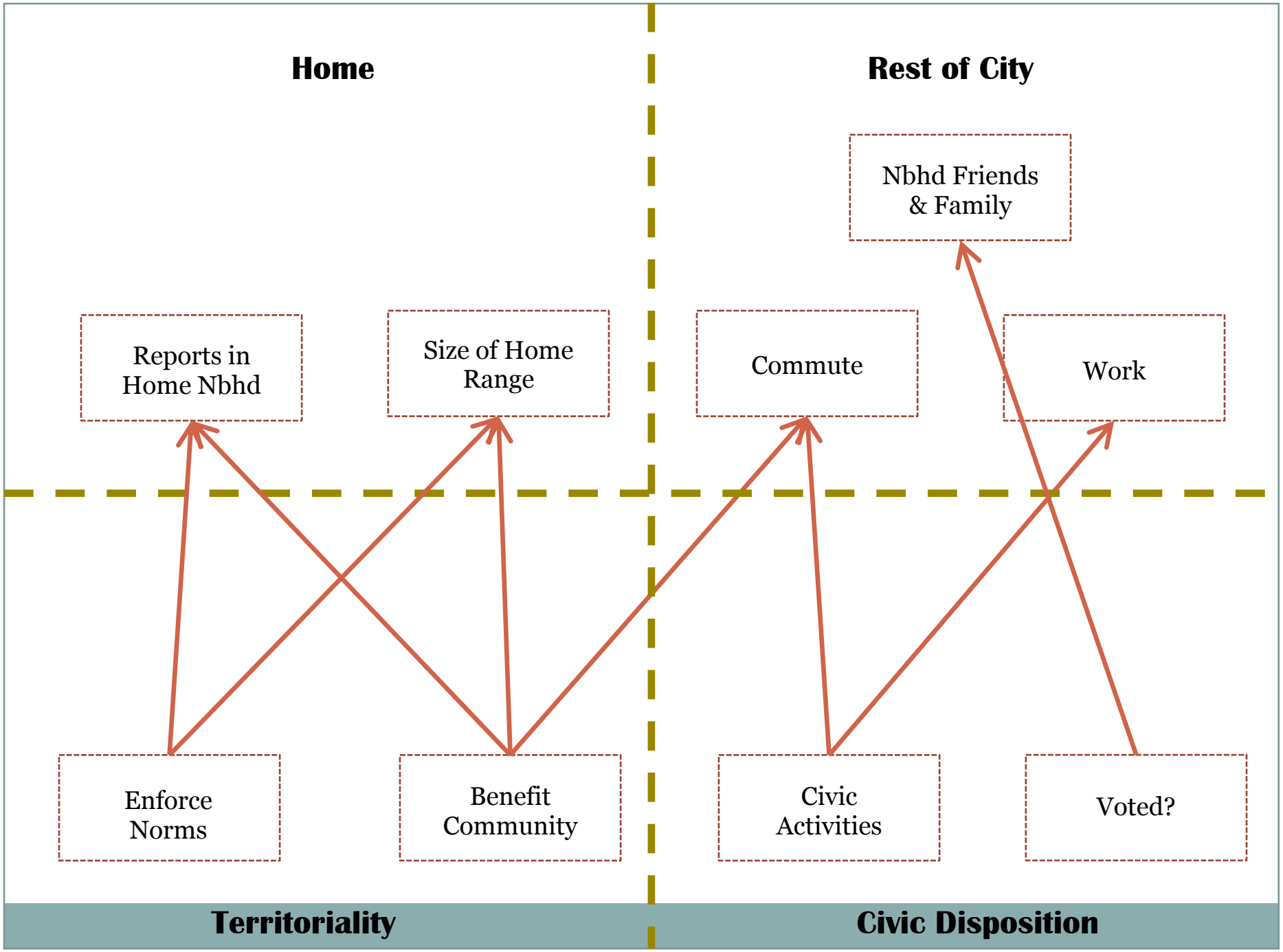
Attitudes/Behaviors **Calling Patterns**



Reporting and the Urban Landscape

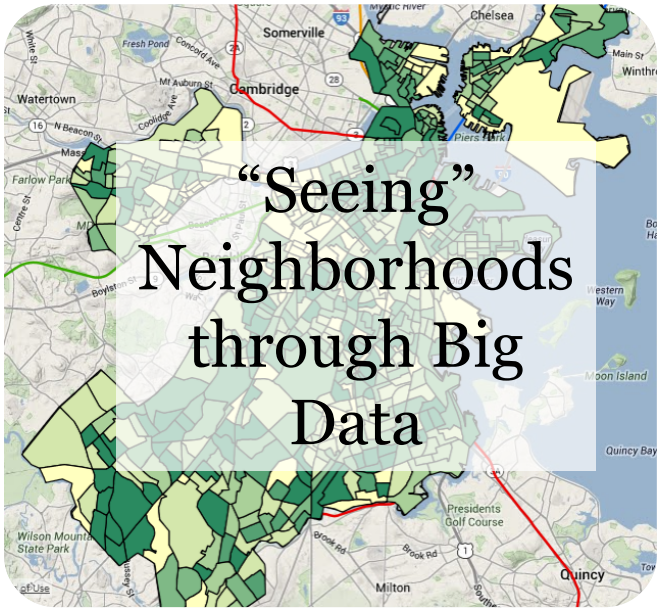
- How do these motivations interact with the varied geography of the city?
- Home
  - Reports in neighborhood
  - Size of home range
- Survey items: Do you report from…
  - Work?
  - Your commute?
  - Neighborhoods of friends and family?



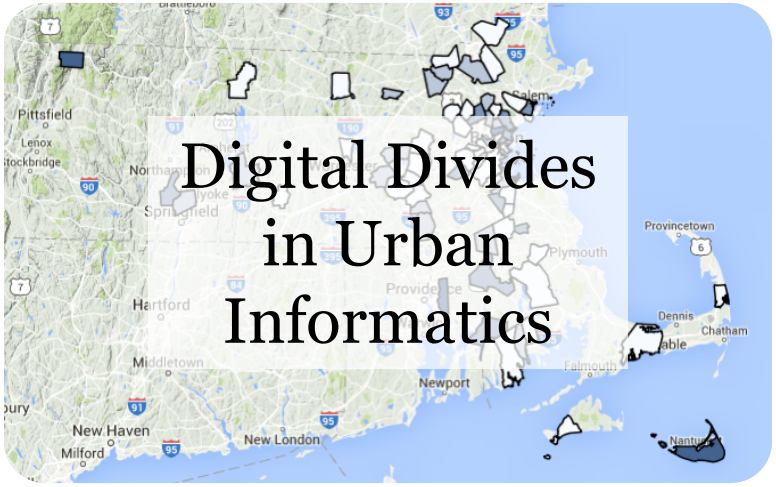

Home
Rest of City
Nbhd Friends & Family
Reports in Home Nbhd
Size of Home Range
Commute
Work
Enforce Norms
Benefit Community
Civic Activities
Voted?
Territoriality
Civic Disposition

Pathways from Research to Policy

Civic Technology & Coproduction



"Seeing" Neighborhoods through Big Data



Digital Divides in Urban Informatics

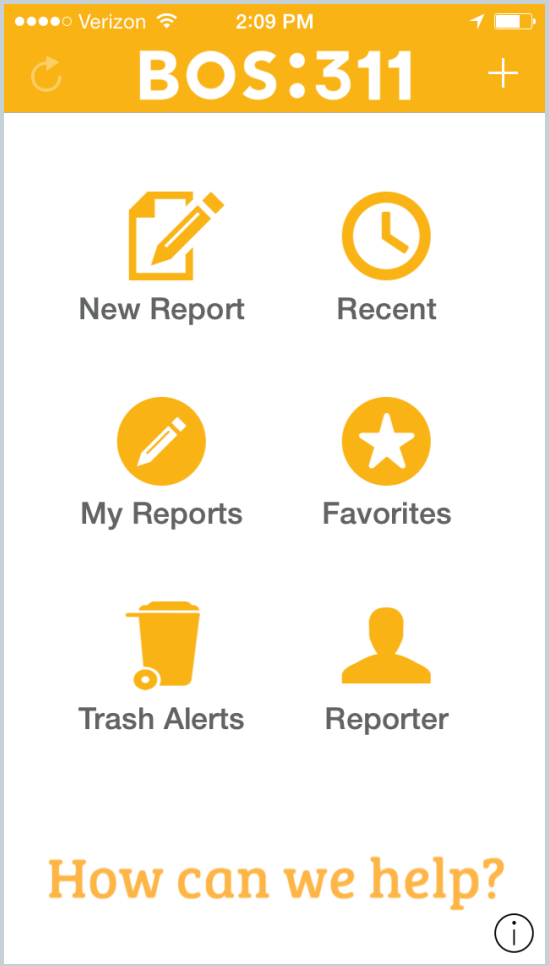
Civic Technology & Coproduction

What is Coproduction?

- Classic metaphor of “bridge to citizenship.”
- No existing evidence…
- …but could digital technology make it a reality?

Smart Phone App as Bridge to Citizenship?

- Could a smartphone expand reporting?
- A natural quasi-experiment to test
  - Citizens Connect / BOS:311, a smart phone application for reporting.



Bridge to Citizenship? Reporting by Traditional and App Users

Traditional	App Users
• One-time users: 67% • <=3 calls: 91% • Estimated calls*: 1.95 • Estimated range**: ~0 m	• One-time users: 54% • <=3 calls: 75% • Estimated calls*: 5.74 • Estimated range**: 295 m

*-Based on HLM

**-Based on HLM; Only those with 2+ reports

Bridge to Citizenship? Traditional vs. App Users

Bridge to Citizenship?
Attitudes of Traditional and App Users

- Territoriality
  - App users expressed higher levels of concern for the community.
  - But lower desire to enforce social norms.
  - Diminished the overall differences in expected reporting and range to ~1 report and ~200 m.
- Connection to community
  - App users expressed greater connection to Boston…
  - …but *less* connection to their local neighborhood.

Bridge to Citizenship? Closure Messages

- Boston sent messages of public works completing work to app users when requests were fulfilled.
- These messages *did* lead to increases in reporting.
  - For as much as 14 months following the message!
- It did not, however, expand geographical range.

Bridge to Citizenship? Mixed Reviews

- Apps and messaging can increase use of the system, but do not expand geographical ranges of reporting.
- The app may increase connection to Boston, but not to neighborhoods.

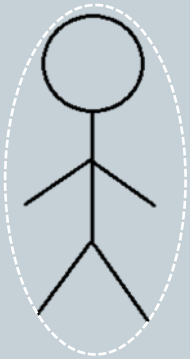
Bridge to Citizenship?
Mixed Reviews

- Has the app actually altered the basis of engagement, or just made it easier to participate within one's existing motivations?

- Do the messages highlight a collaboration or a consumer service?

Civic Tech & Coproduction

- A high-tech bridge to citizenship?...
- ...or a more powerful lever to civic impacts?



“Seeing” Neighborhoods through Big Data

The Problem of Naturally-Occurring Data: What's Missing?

1. *Content*: What is it we're trying to measure?

2. *Validity*: Do the cases measure "real" conditions?

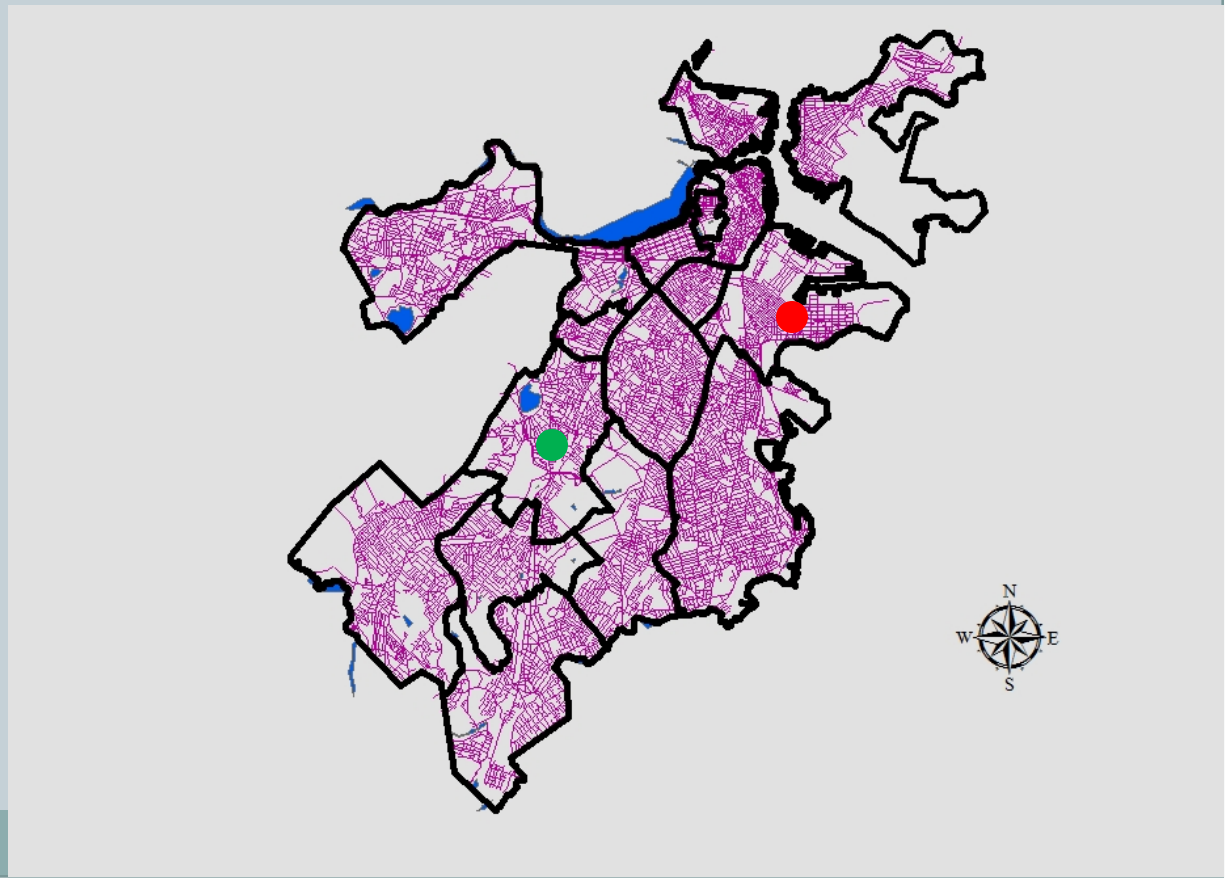
3. *Reliability*: How often and for what geographic scale can they be measured?

What 311 Reports Can Measure

"Broken Windows"	Custodianship
• Reports capture events and conditions reflection deterioration and denigration. • Assumes that the distribution of reports align with objective conditions.	• Reports reflect the impulse of individuals to care for public spaces. • Assumes that need is even across spaces.

Addressing Validity in 311 Reports

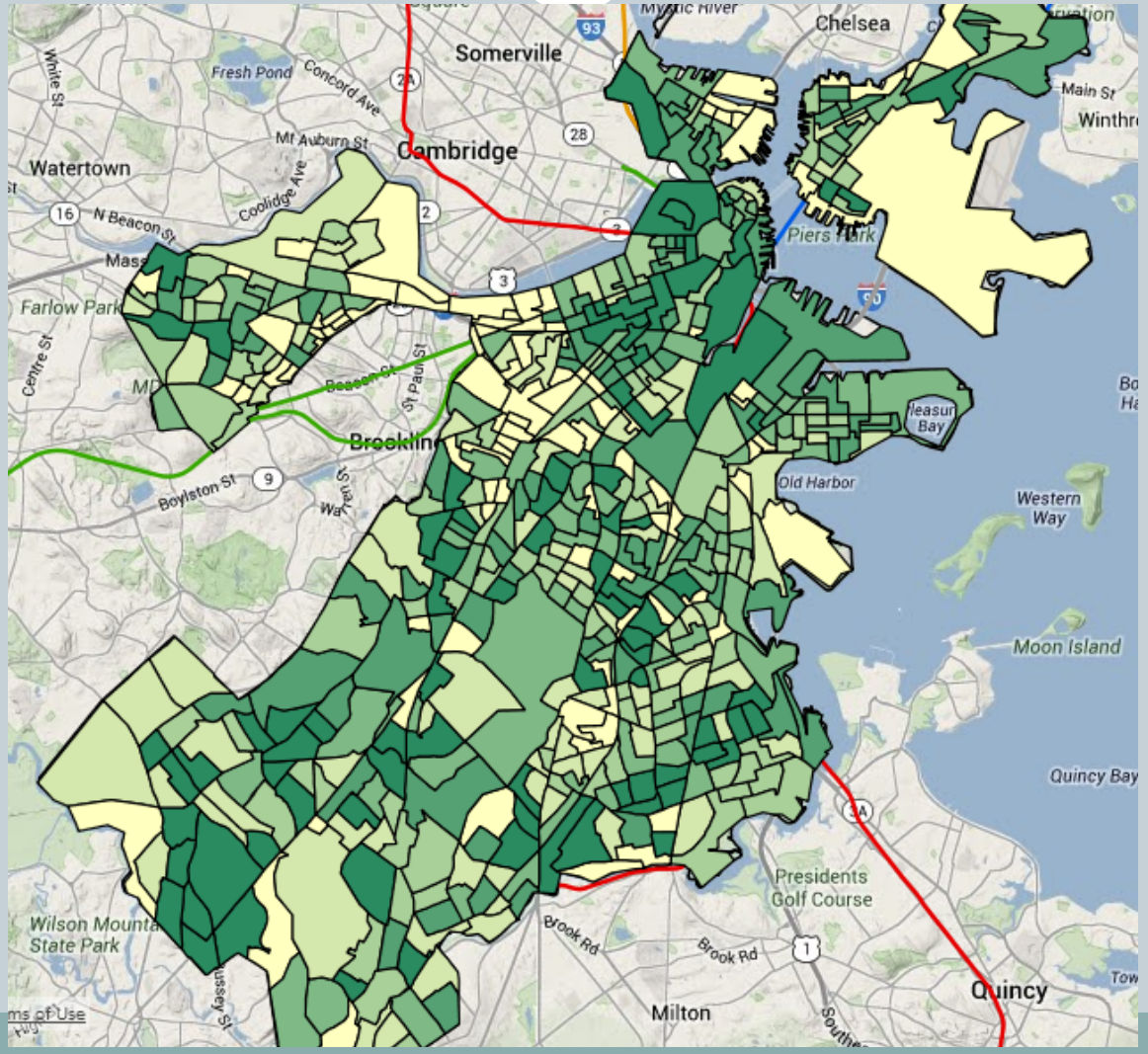
- How do we disentangle the signals of broken windows and custodianship in the data?



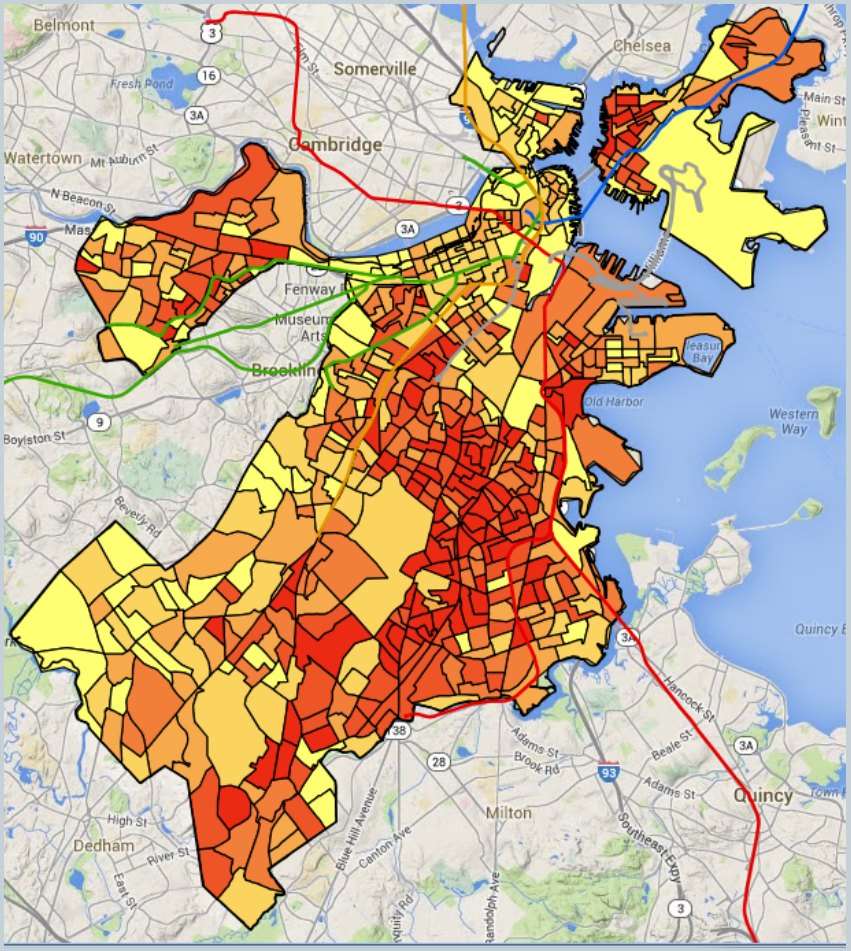
Separating Out Custodianship

- An objective measurement of custodianship.
  - Identified 244 street light outages across Boston.
  - Public Works assessed quality of all sidewalks.
- Additional measures from within the 311 database to estimate custodianship.
  - Registered users reporting “public” issues
  - Registered users reporting more than 2 “public” issues/year

Custodianship across Boston



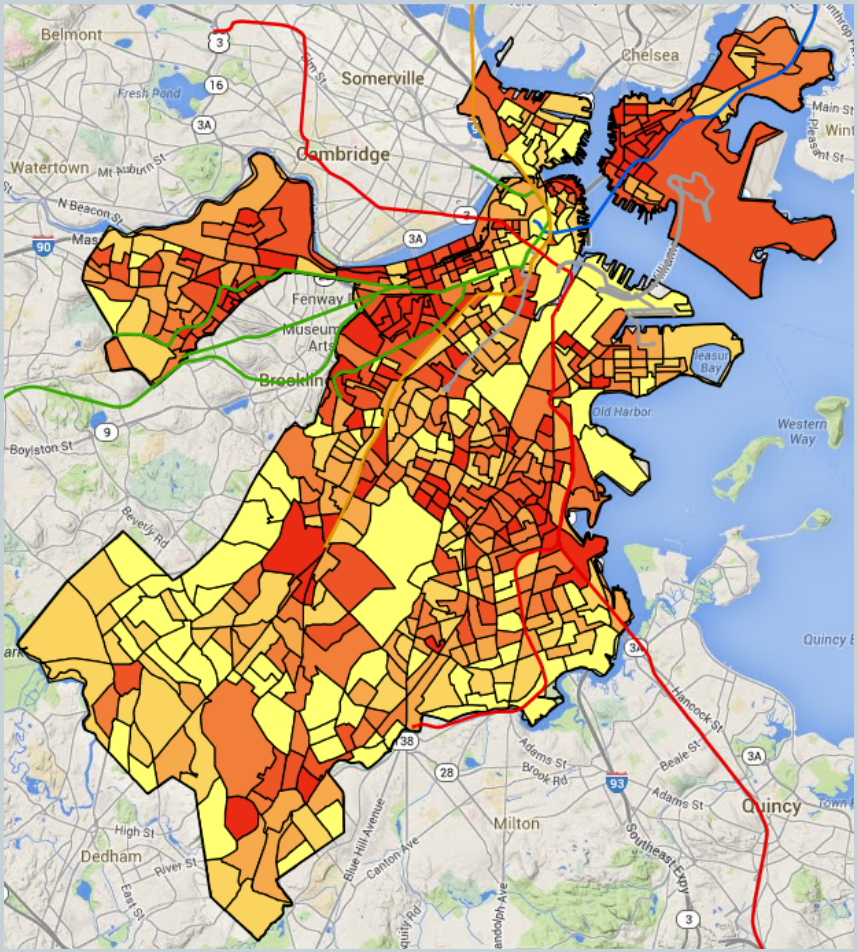
Broken Windows: Private Neglect



- Counts of:
  - Housing issues (12 case types; e.g., bedbugs)
  - Uncivil use of space (7 case types; e.g., illegal occupancy)
  - Big buildings (3 case types)
- Adjusted for local custodianship.

Broken Windows: Public Denigration

- Counts of:
  - Graffiti (2 case types)
  - Trash (5 case types; e.g., illegal dumping).
- Adjusted for local custodianship.

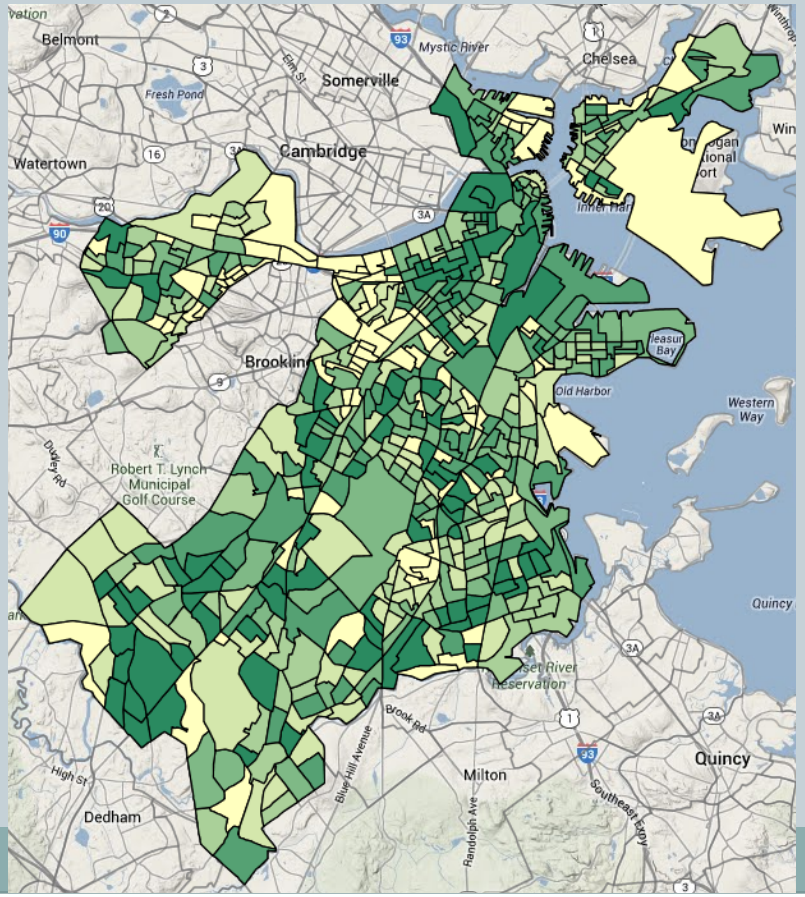


Final Measures of Physical Disorder

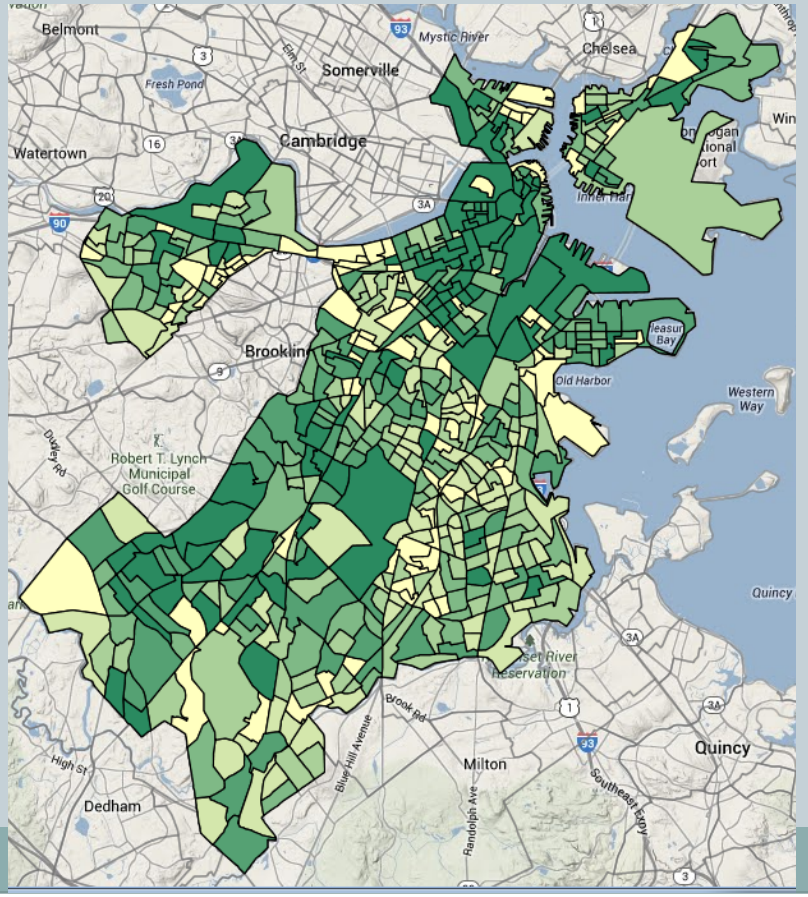
- Multi-dimensional
  - Five lower-order and two higher-order measures
- Nearly costless
- Continuous across time and space
  - Can be measured every two to six months.
- Numerous research and practical applications

Additional Ecometrics: 311 Usage

Engagement



Custodianship



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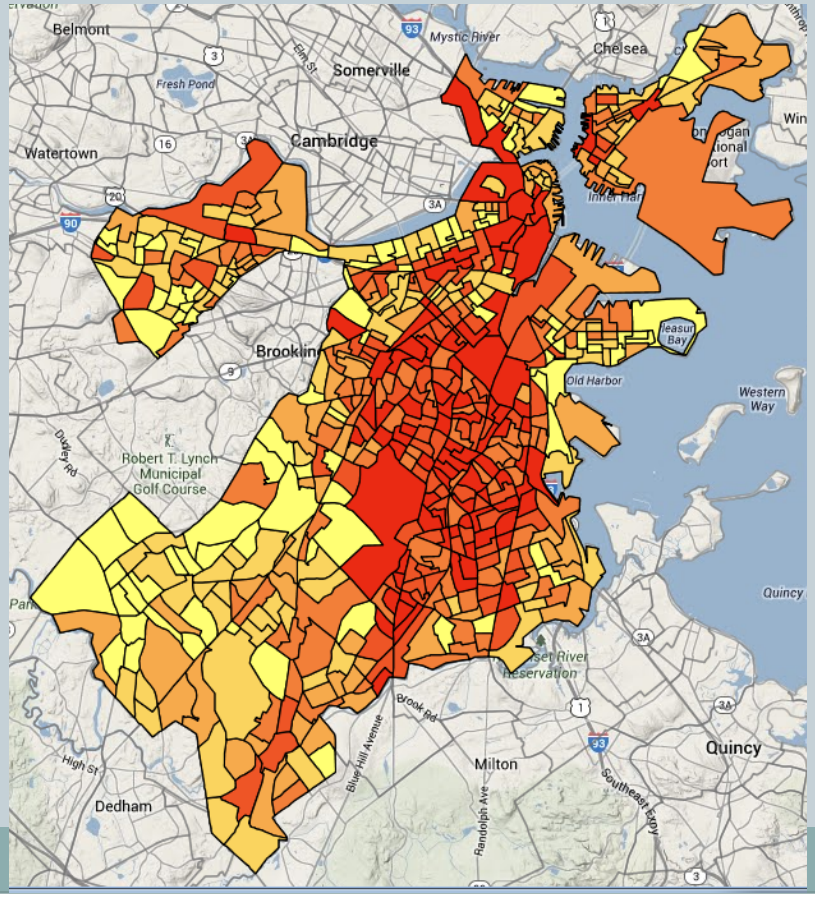
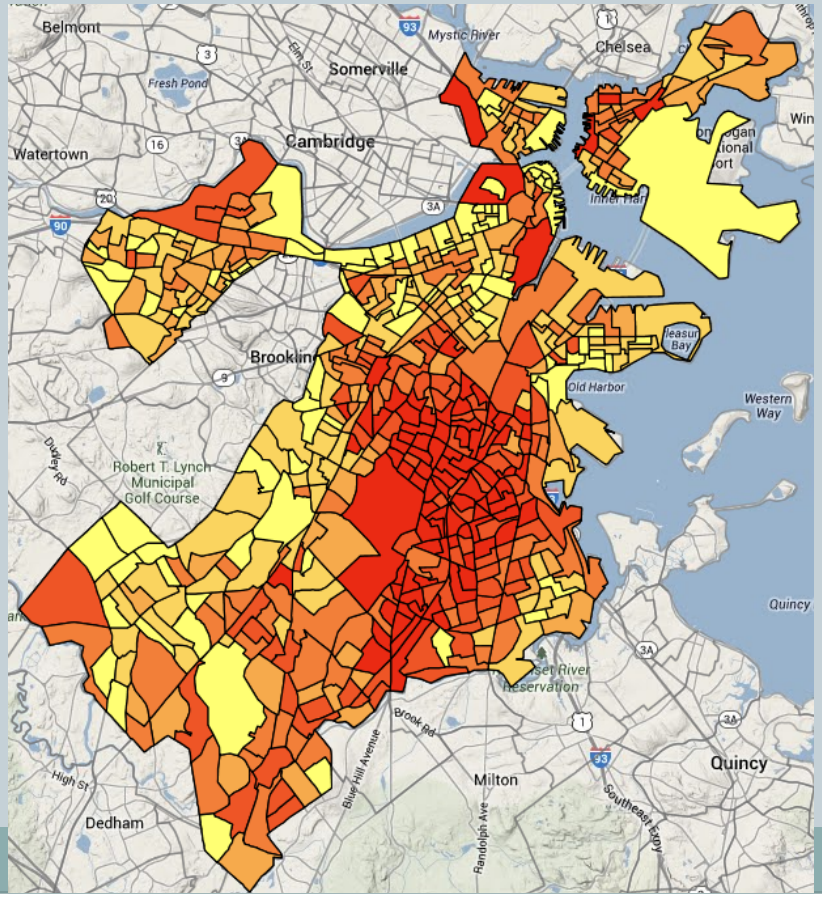
Additional Ecometrics: 911 Calls for Disorder and Crime

Public Violence

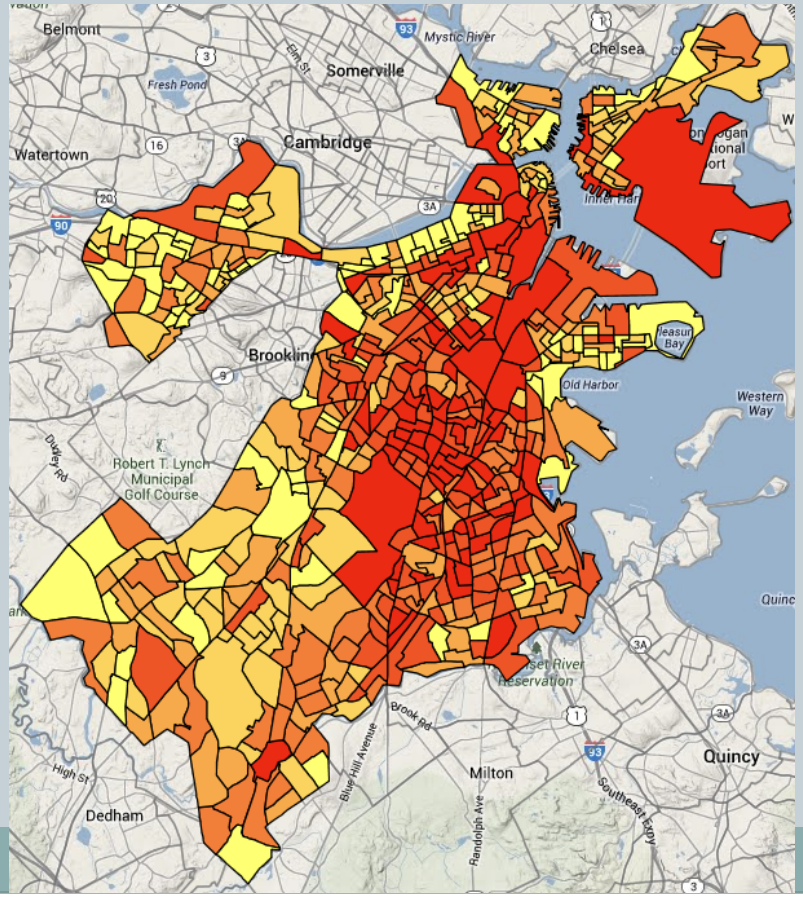


Private Conflict

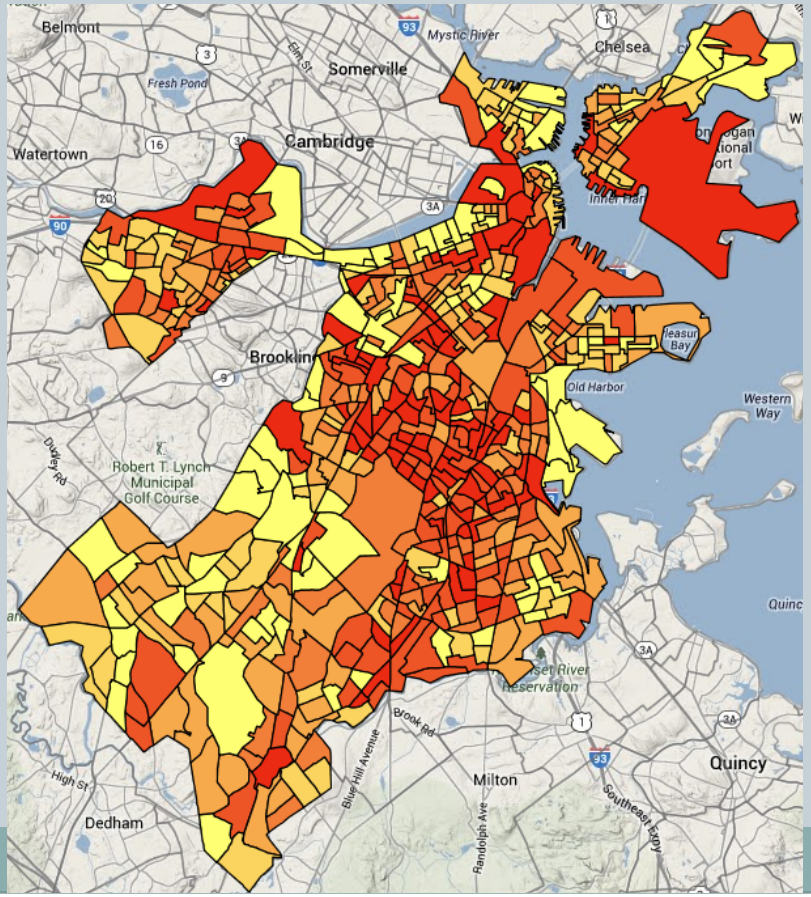


Additional Ecometrics: 911 Calls for Medical Emergencies

Late-Life Emergencies

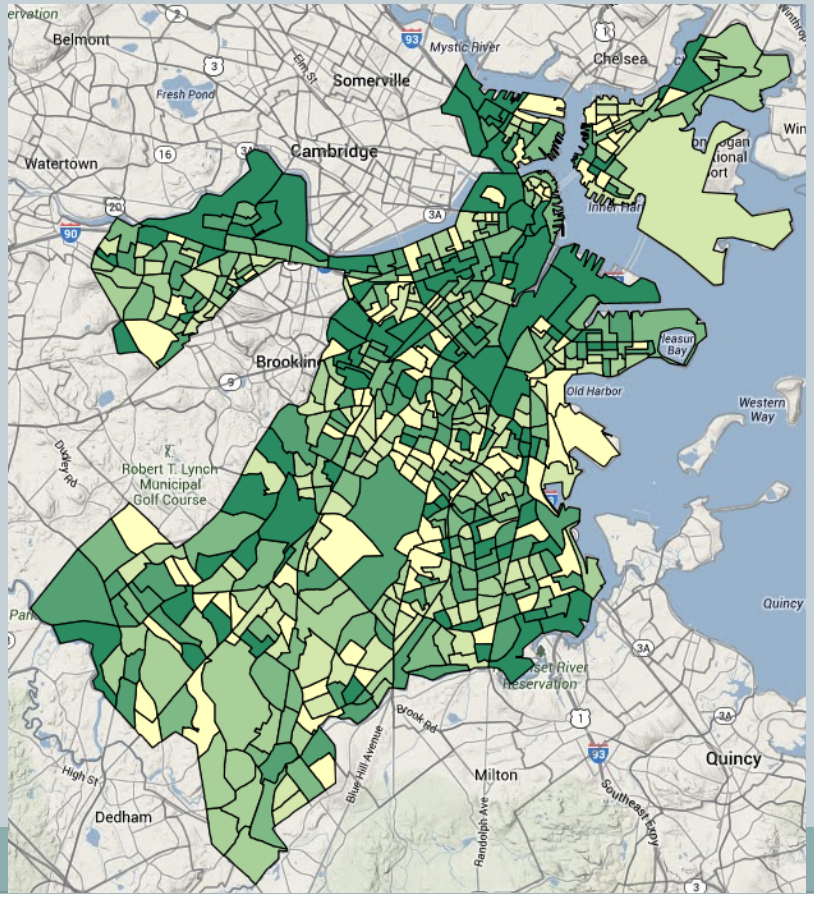


Youth and Reproductive

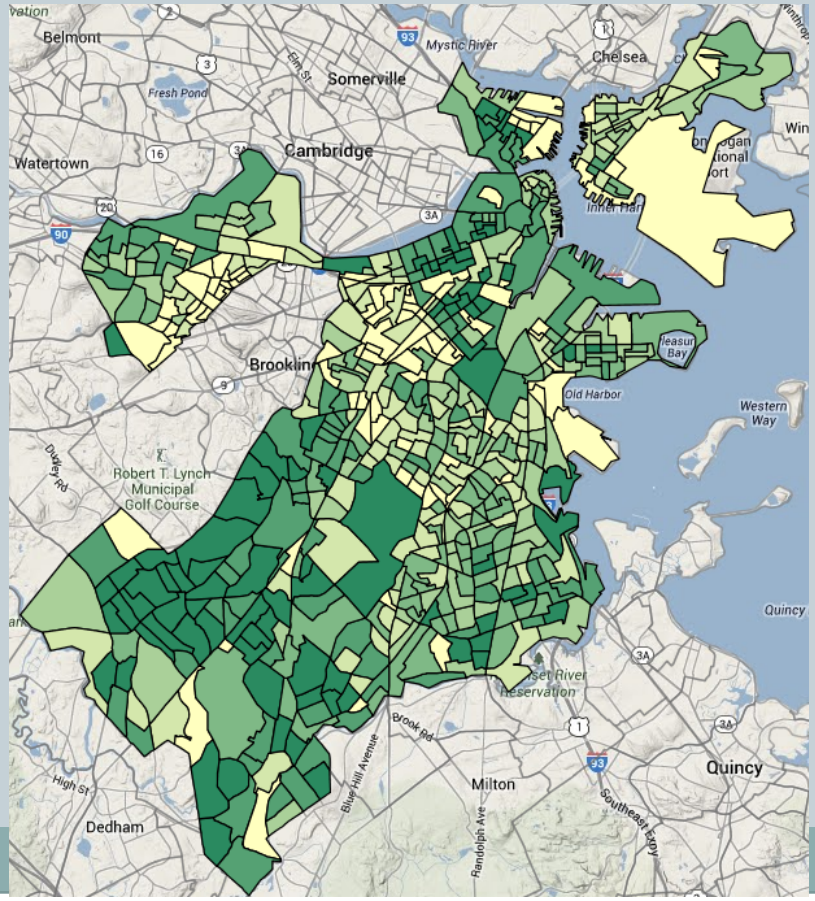


Additional Ecometrics: Building Permits

Major Developments

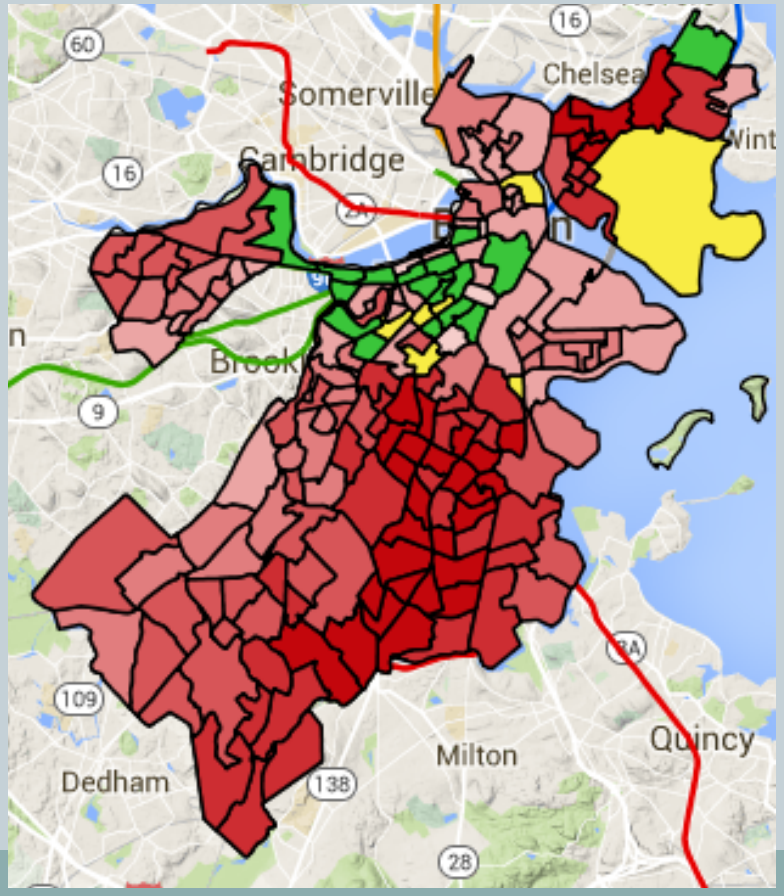


Local Investment & Growth

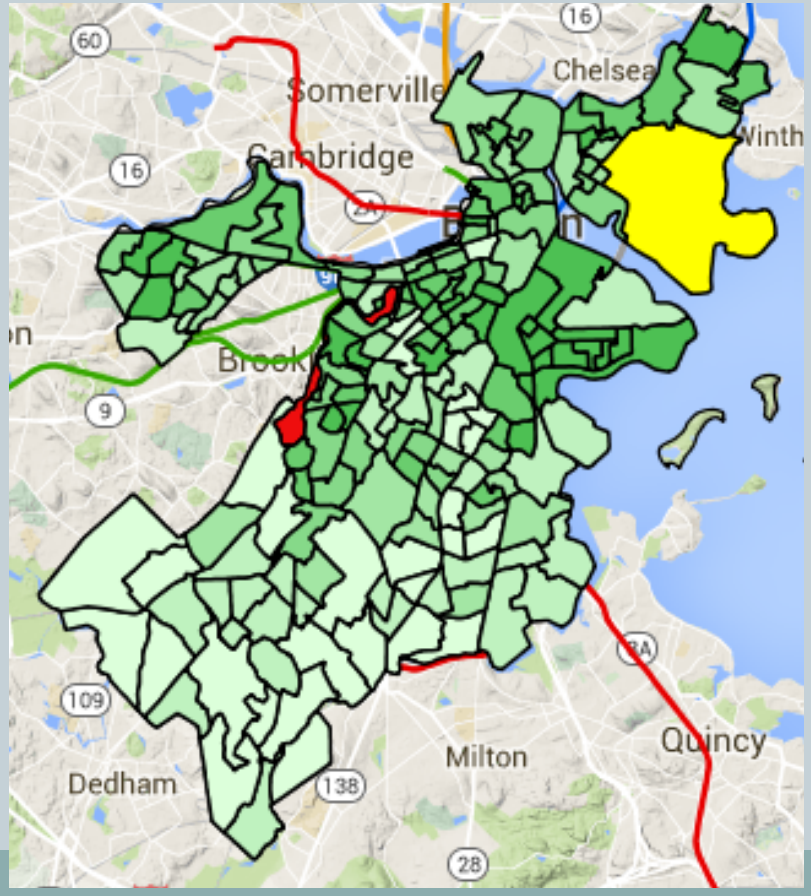


Additional Ecometrics: Property Value Trends

Loss during Recession



Growth during Recovery

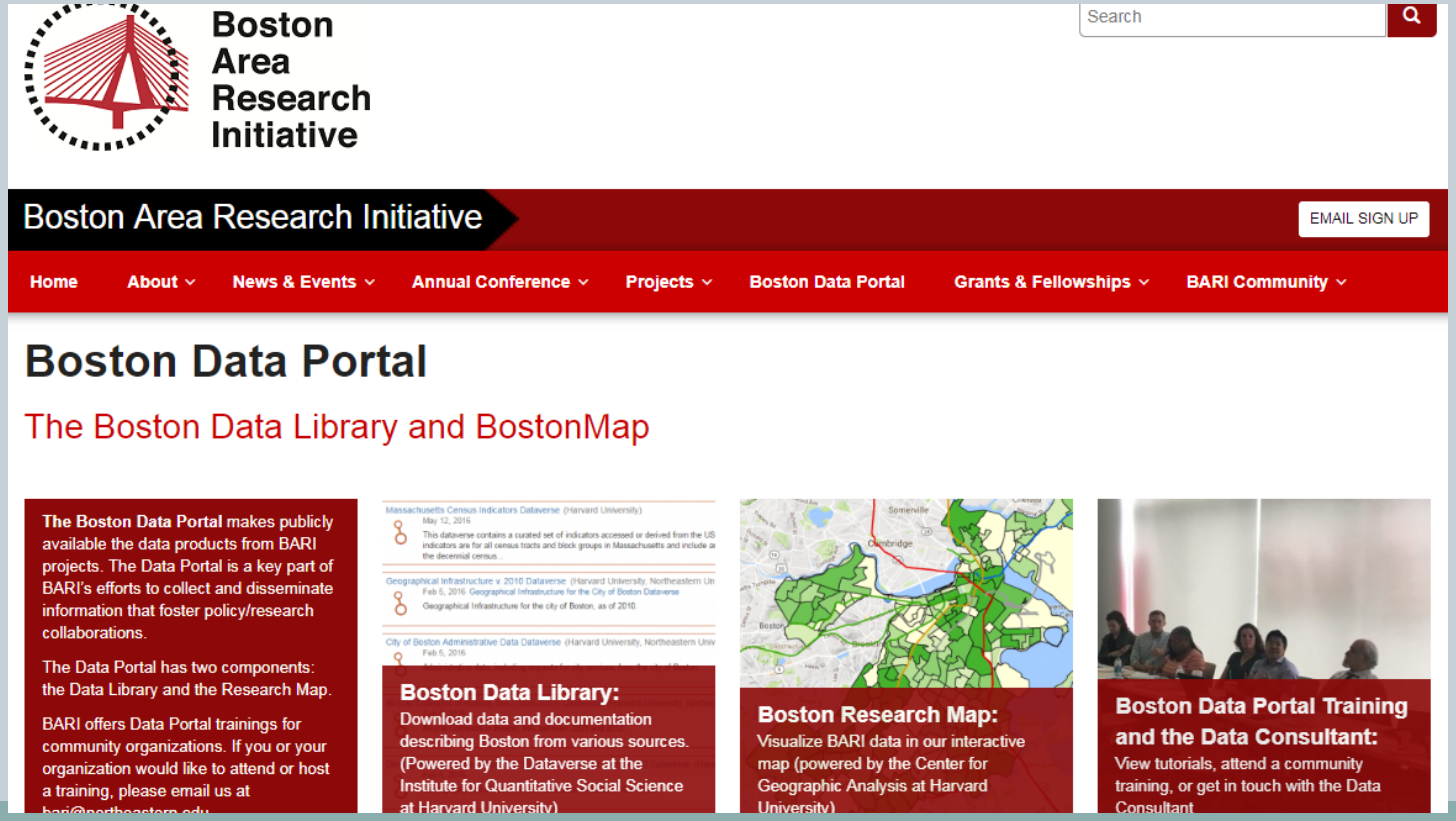


A Generalized Approach to Naturally-Occurring Data

- City of Boston administrative data
  - 311 requests
  - 911 calls
  - Business licenses
  - Tax assessments
  - Building permits
- Social media and internet posts
  - Twitter
  - CraigsList
  - OpenStreetMap
- Sensor readings
  - Atmosphere
  - Environment
  - Activity

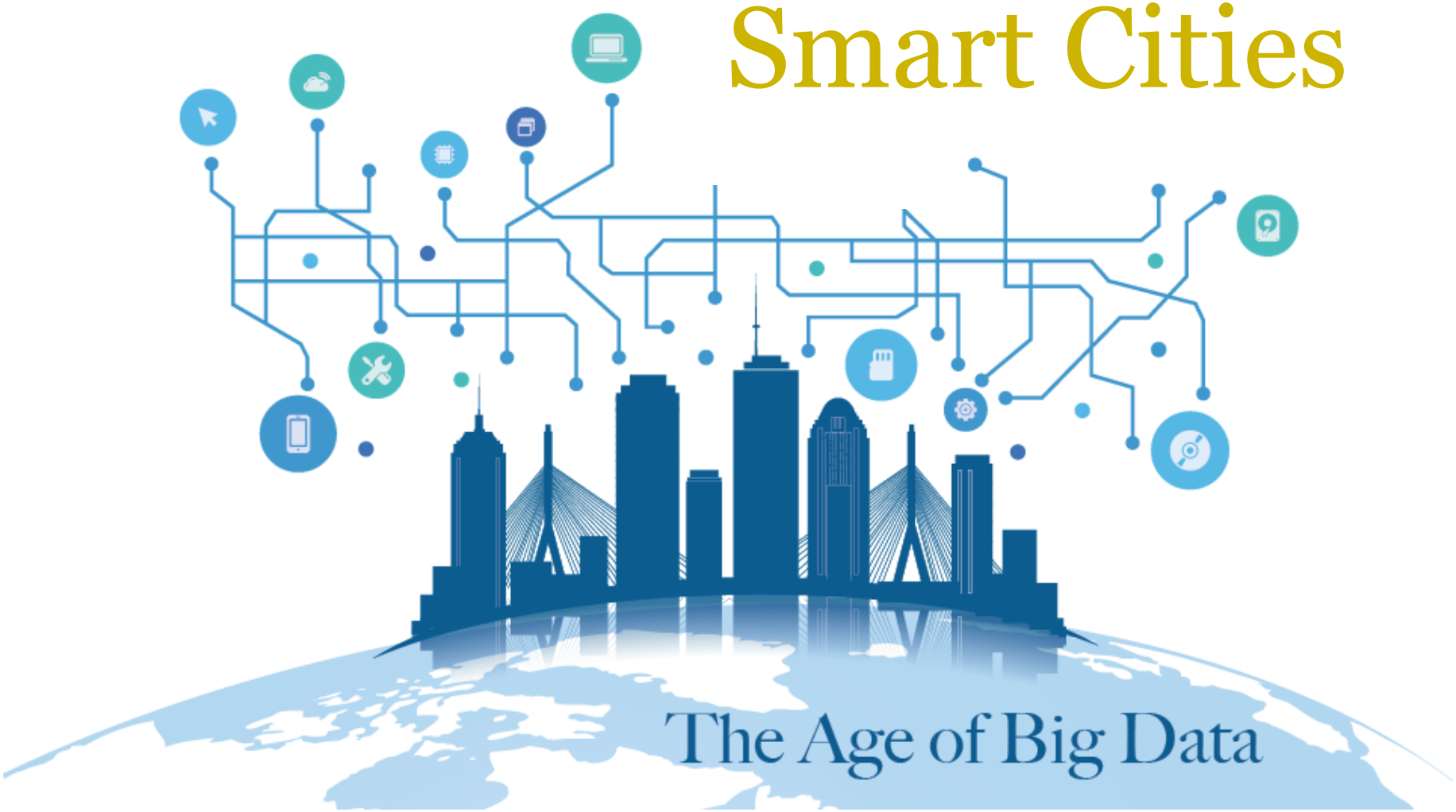
Boston Data Portal

- https://www.northeastern.edu/csshresearch/bostonarearesearchinitiative/boston-data-portal/



Digital Divides in Urban Informatics

Smart Cities



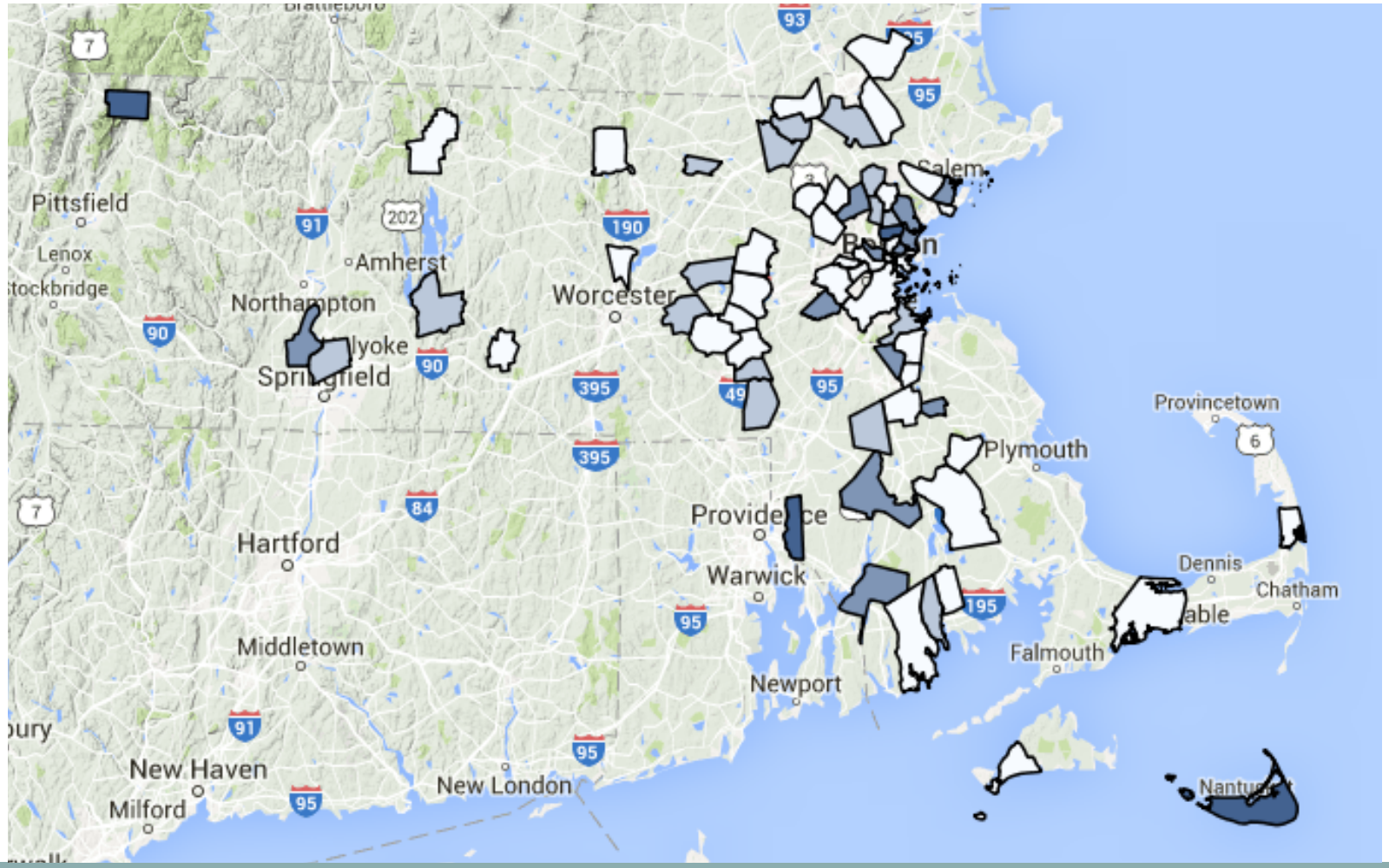
Discontents of the "Smart City": Emerging Digital Divides

- Between can- and can't-afford cities
- Between data savvy sectors and community-based organizations

Digital Divide #1: Extending 311 across Massachusetts

- What happens if the state subsidizes the adoption of a 311 app?
- Massachusetts paid for contracts with SeeClickFix under the guise of “Commonwealth Connect.”

Commonwealth Connect

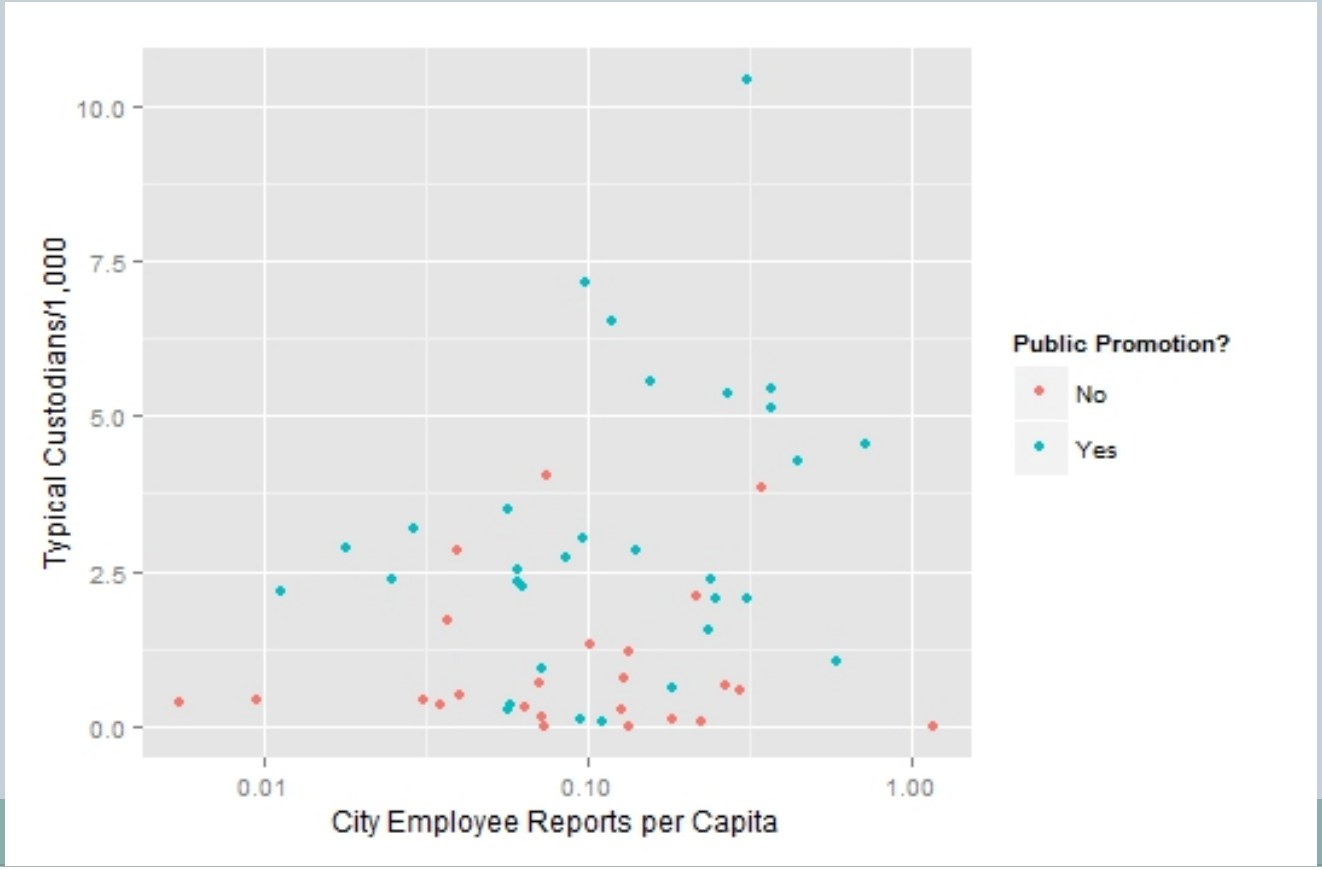


Explaining Differences in Uptake

- Tested the relationship between custodians per capita and:
  - Demographics
    - Homeownership
    - Median income
    - Ethnic composition
    - Median age
  - Government adoption
    - City employee usage
    - City promotion of CC (Yes/No)

Explaining Differences in Uptake

- Custodians per capita were also predicted by greater usage of CC by city employees.



Why Adopt Commonwealth Connect?

- Communities were more likely to adopt if…
  - They had a larger population
  - Neighboring municipalities had adopted
- No statistical explanations for using it effectively.
- Conducted interviews with representatives for 17 municipalities.

The Full Adopters: Buy-In and Success

It “tells the story” of the city and its services.

Using it to target impassable roads in a snowstorm was a big “win.”

Leadership made sure all departments participated

Partial Embrace: Lack of Follow-Through

Citizens did not pick it up.

When something is mandated there can be resistance.

I would like to see municipal staff take it more seriously.

No True Adoption: No Benefits

There was support at the top but not the implementation level.

Public Works did not come to the table.

Digital Divide #1: Conclusions

- Municipalities above a certain size all serve to gain from 311.
- Whether it is successful or not requires all parts of the bureaucracy to come together.
- Took time to realize benefits other than as a work-order system.

Digital Divide #2: Data-Based Community Outreach

- Most community-based organizations have limited if any capacity to utilize data.
- Yet they could probably benefit from it for advocacy, planning, and justification of their work.
- How do we help them?

Digital Divide #2: Data-Based Community Outreach

- Community-based trainings in the Boston Data Portal
  - ~4 per year
  - 1 in a public campus that integrates community members and students
  - Newer efforts at local libraries and in conjunction with high school curricula

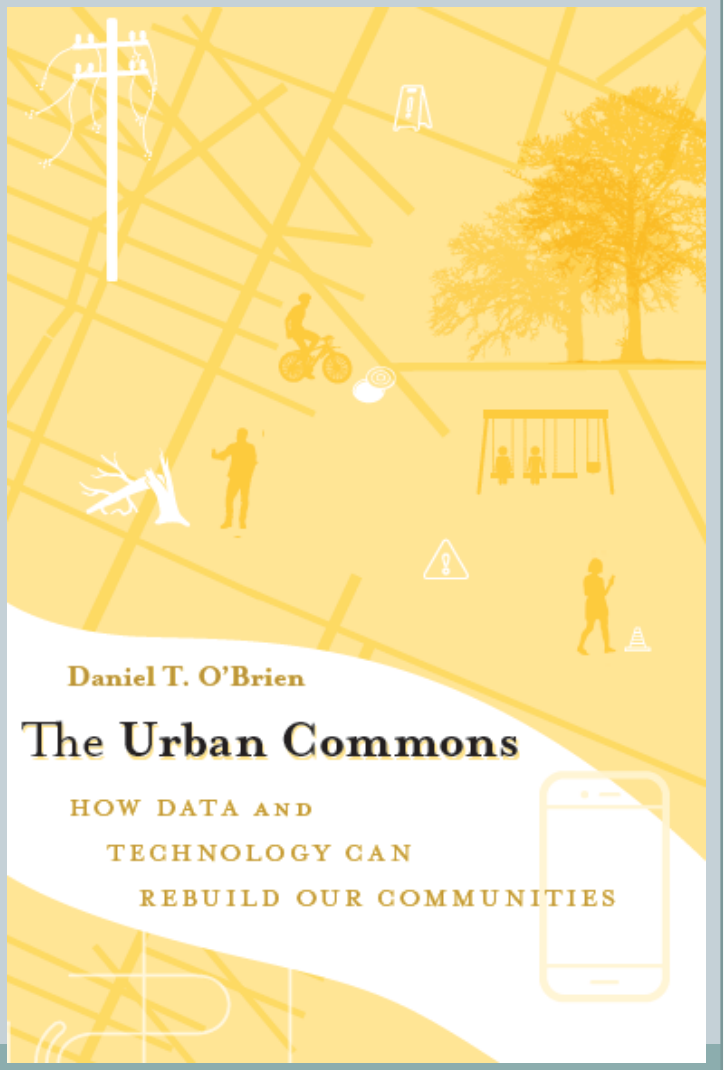
Digital Divide #2: Data-Based Community Outreach

- Community-based trainings in the Boston Data Portal
- Data Consultant
  - PhD student versed in data science.
  - Meets with community groups and other local organizations to help them identify ways they might leverage data in their work.
  - ~20-25 consultations a year.

Conclusions

Conclusions

- Understanding behavior helps us to offer more effective services



Conclusions

- Understanding behavior helps us to offer more effective services

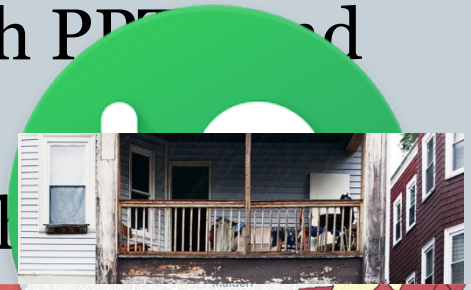
- The power of research-policy partnerships

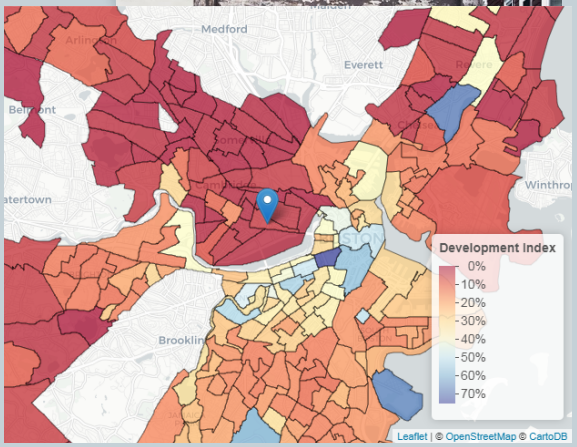
Boston Area Research Initiative

Example BARI Projects

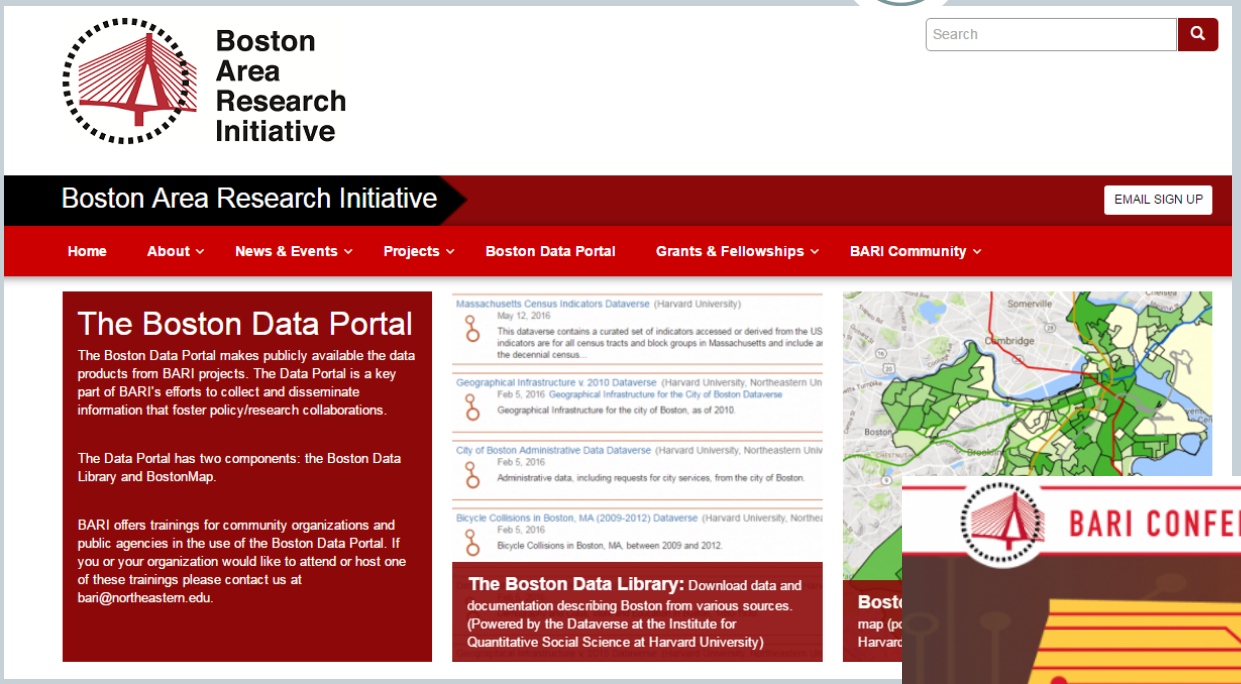
- Equity in Boston Public Schools
- Mobility and segregation with MBTA
- Understanding problem properties with PR[illegible]d BPD
- Development across municipalities witl[illegible]

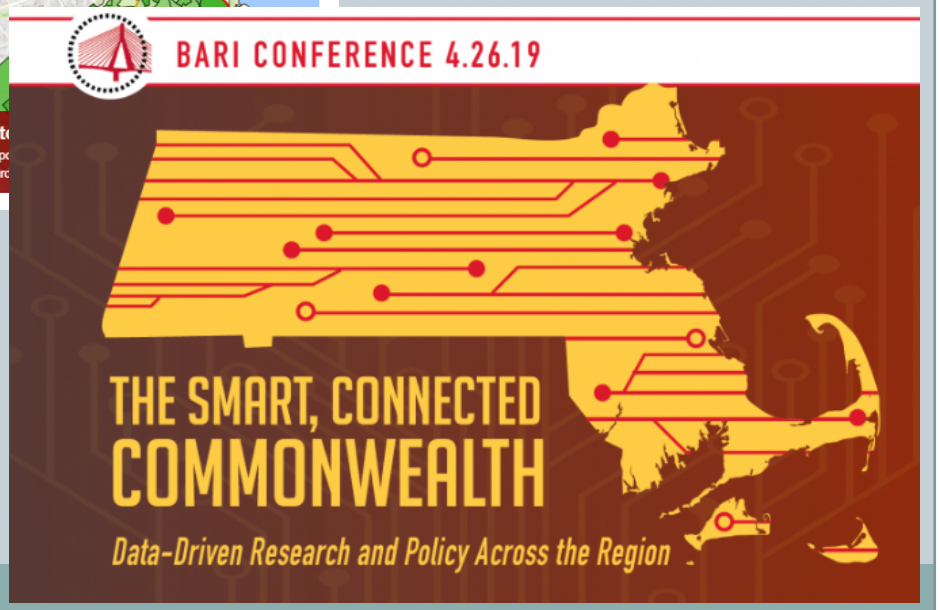
BOSTON Public Schools





The Boston Area Research Initiative: Supporting a Thriving Civic Data Ecosystem



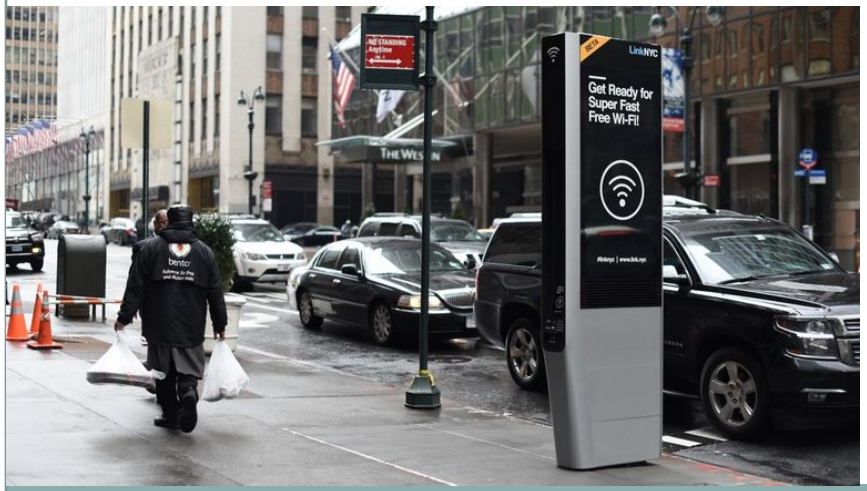


Conclusions

- Understanding behavior helps us to offer more effective services
- The power of research-policy partnerships
- What it really means for a city to be “smart”

nuTonomy

ARRAY of THINGS
Computation Institute /


LinkNYC
Get Ready for Super Fast Free Wi-Fi!

Discontents of the “Smart City”

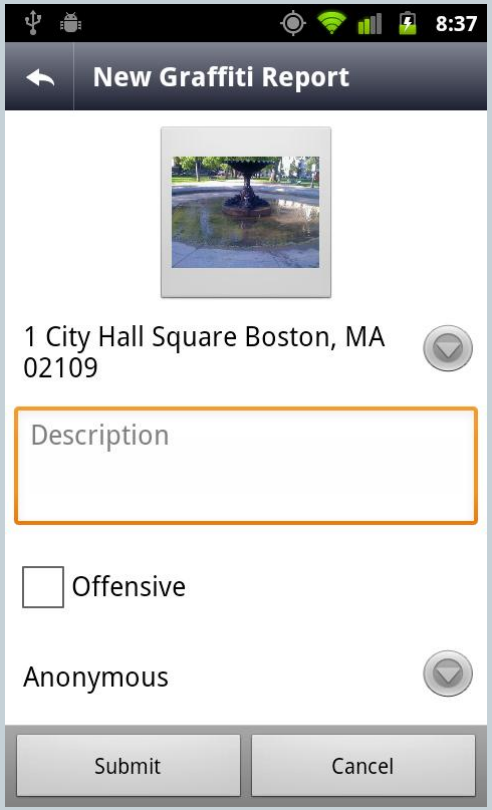
- Technology is the answer, what was the question?
- How extensible are these solutions across cities?
  - Digital divide #1
- Are we addressing the real needs of communities?
  - Digital divide #2

Transformation in the Mundane

Naturally-Occurring Data

parcel_num	ST_NUM	ST_NAME	LU	OWN_OC	YR_BUILT
100001000	104 A 104	PUTNAM	R3	Y	1900
100002000	197	LEXINGTON	R3	N	1920
100003000	199	LEXINGTON	R3	N	1905
100004000	201	LEXINGTON	R3	N	1900
100005000	203	LEXINGTON	R2	Y	1900
100006000	205 207	LEXINGTON	R3	Y	1900
100007000	209 211	LEXINGTON	R3	N	1900
100008000	213	LEXINGTON	R3	Y	1900
100009000	215	LEXINGTON	R3	Y	1900
100010000	217	LEXINGTON	R3	Y	1900
100011000	219	LEXINGTON	R2	N	1900
100012000	221	LEXINGTON	R3	Y	1900
100013000	223	LEXINGTON	R3	N	1900
100014000	225	LEXINGTON	R3	Y	1900
100015000	227	LEXINGTON	R2	Y	1900
100016000	235	LEXINGTON	R2	Y	1899
100017000	237	LEXINGTON	R3	N	1900
100018000	239	LEXINGTON	R3	N	1900
100019000	241	LEXINGTON	R3	N	1900
100020000	243	LEXINGTON	R3	Y	1900

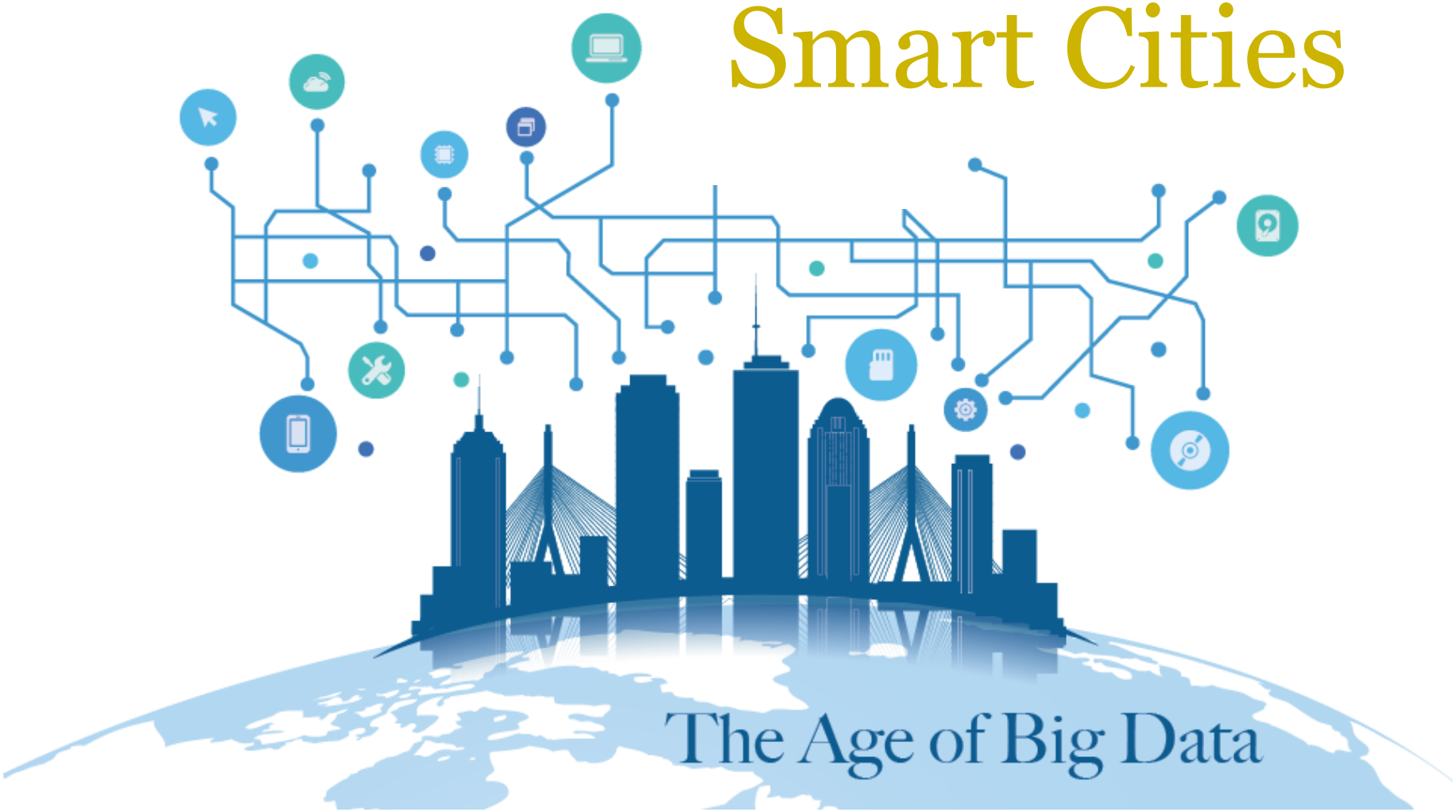
Smart Phones



Transformation in the Mundane

- Vast array of applications
- Accessible to all cities and institutions (or, at least, more so)
- The future is now

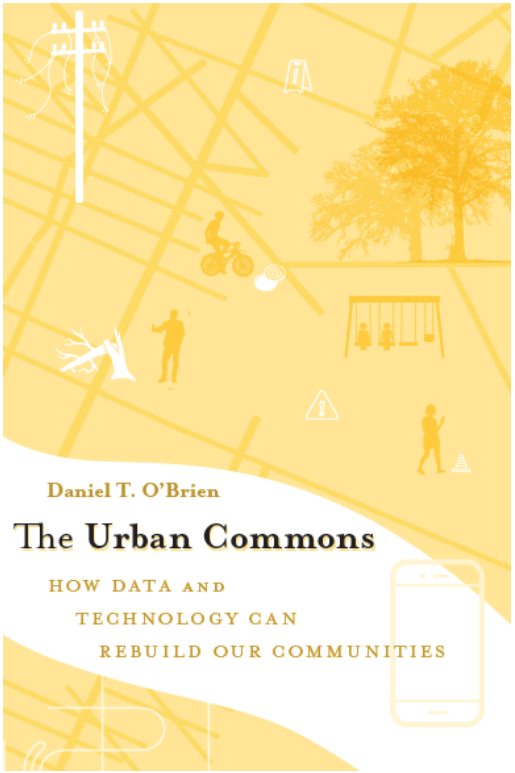
Smart Cities



Urban Informatics

Thank You

Boston Area Research Initiative



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Or contact me at d.obrien@neu.edu

Also, learn more about the book at Amazon or Harvard University Press