

University of Massachusetts Boston

From the Selected Works of Michael P. Johnson

March 21, 2014

Data, Analytics and Community-Based Organizations: ransforming Data to Decisions for Community Development

Michael P Johnson, Jr.



Available at: https://works.bepress.com/michael_johnson/52/

DATA, ANALYTICS AND COMMUNITY-BASED ORGANIZATIONS: TRANSFORMING DATA TO DECISIONS FOR COMMUNITY DEVELOPMENT

Michael P. Johnson

Department of Public Policy and Public Affairs

McCormack Graduate School of Policy and Global Studies

University of Massachusetts Boston

michael.johnson@umb.edu

Big Data Future, Ohio State University, Columbus, OH, March 21, 2014



McCORMACK GRADUATE SCHOOL OF POLICY
AND GLOBAL STUDIES
UNIVERSITY OF MASSACHUSETTS BOSTON

How can community-based organizations create information and make decisions to better fulfill their missions?

- How do CBOs access and use data for operations and strategy design?
- What challenges do CBOs face in making best use of data and analytics?
- How can data and analytics enable CBOs to identify and solve mission-aligned decision problems?

Presentation topics

- Unique characteristics of CBOs
- CBO-appropriate technologies and methods
- Alternative perspectives on big data/analytics research for CBOs
- Key propositions for CBO data and analytics
- Principles for research and practice in CBO data and analytics
- Research agenda

Community-based organizations are distinct within the nonprofit sector

- ‘Grassroots’ and ‘safety net’ organizations’ (The Boston Foundation 2007)
- Address needs of low-income and underserved populations
- Constituents often defined by explicit spatial or social boundaries
- Specialize in community development, human services and advocacy



CBOs understand 'big data' differently

Much of the literature on big data reflects the resource-rich corporate private sector

- “High volume, velocity, and variety information assets that demand cost-effective, innovative forms of information process for enhanced insight and decision making” (Gartner 2013)
- “Data unprecedented in its scale and scope in relation to a given phenomenon” (Schroeder, Meyer and Taylor 2013)

CBOs constraints limit use of 'big data':

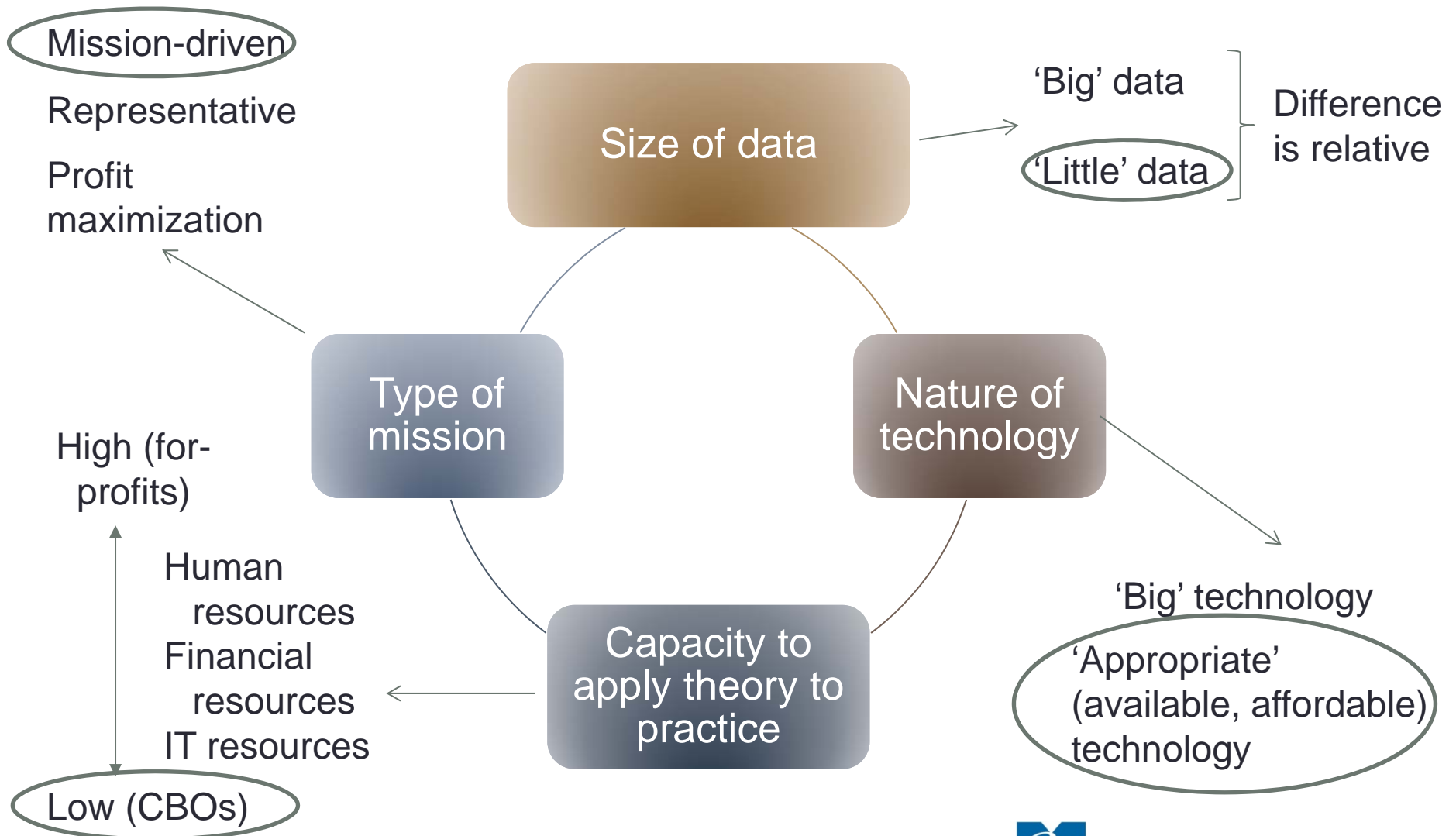
- Funders
- Multiple performance metrics
- Technological capacity

How large is the CBO IT resource gap?

- 84% of nonprofits surveyed have a full-time staff person to provide tech support, however:
 - 86% of small organizations rely on volunteers
 - Only very large organizations have full-time IT support staff (Hackler & Saxton 2007)
- Nonprofits often face an IT ‘brain drain’:

“It’s been my experience that as soon as we trained someone in the GIS and they became fairly good at it, that person would be offered a salary three times higher by someone in the private sector” (Al-Kodmany, 2012).

Summary: CBO characteristics



Data and analytics can assist CBOs in particular ways

Analytic tools must be adapted to enable:

- Discussions among diverse stakeholders
- Consensus building
- Resident and community empowerment (Ferreira 1998)

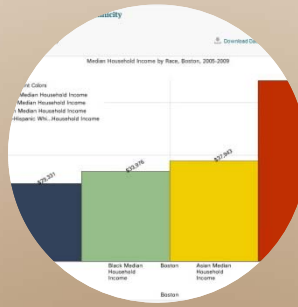
Data's greatest contribution to CBOs may not be in finding solutions, but better understanding:

- Missions
- Communities served
- Organization capabilities
- Stories they wish to tell to the world (Taylor, 2014)

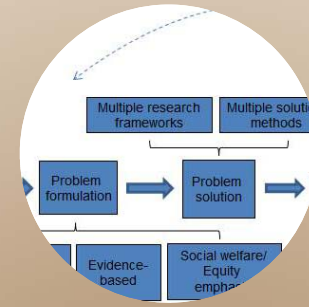
Multiple types of data and technologies can meet CBO needs



**Primarily
visualization-
based**



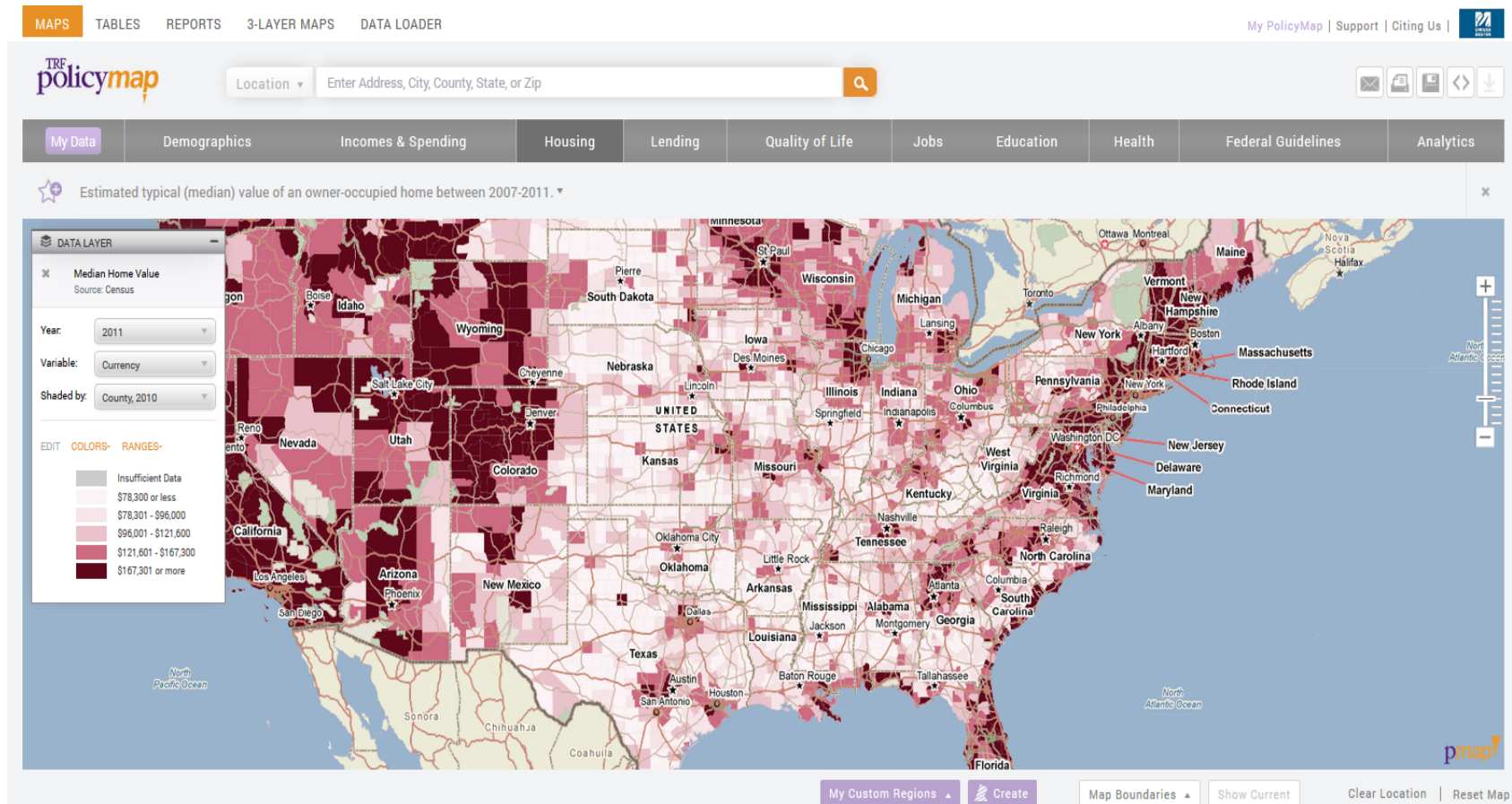
**Primarily
database-
driven**



**Primarily
model-driven**



Visualization-based technologies: PolicyMap

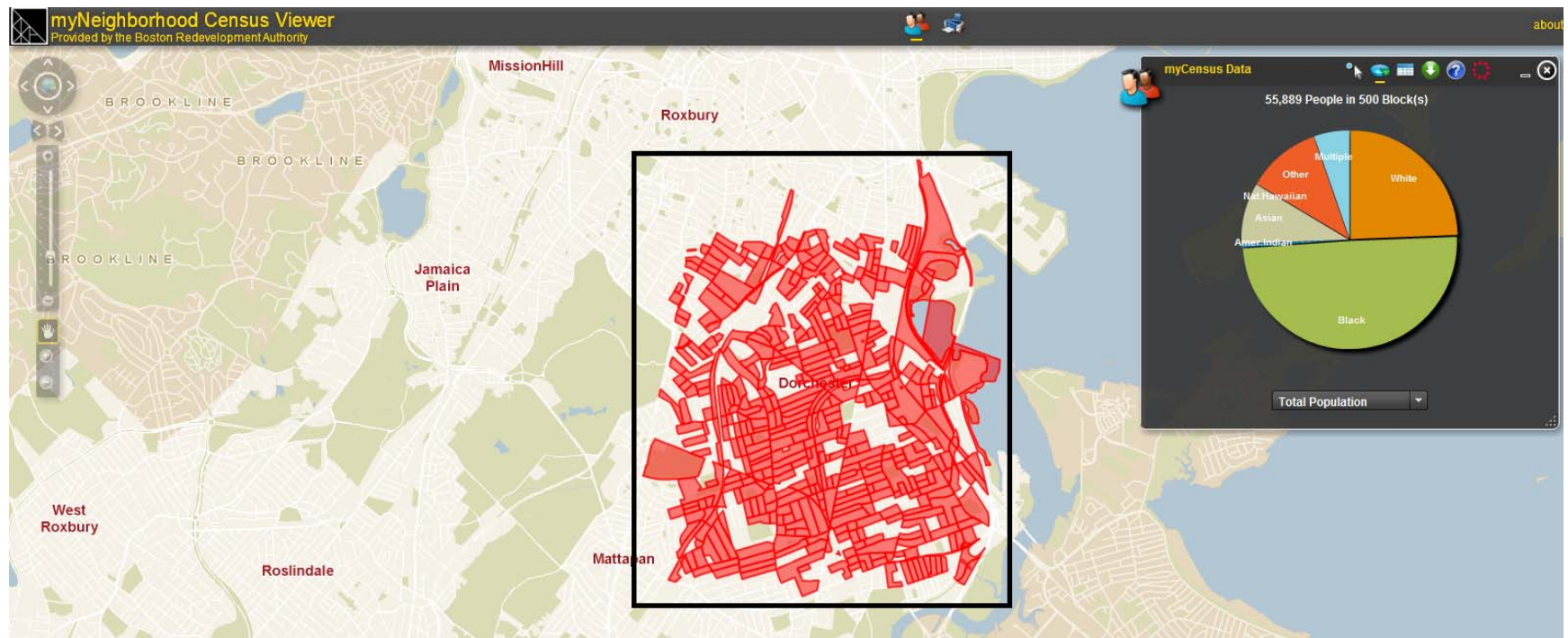


Source: <http://www.policymap.com/>



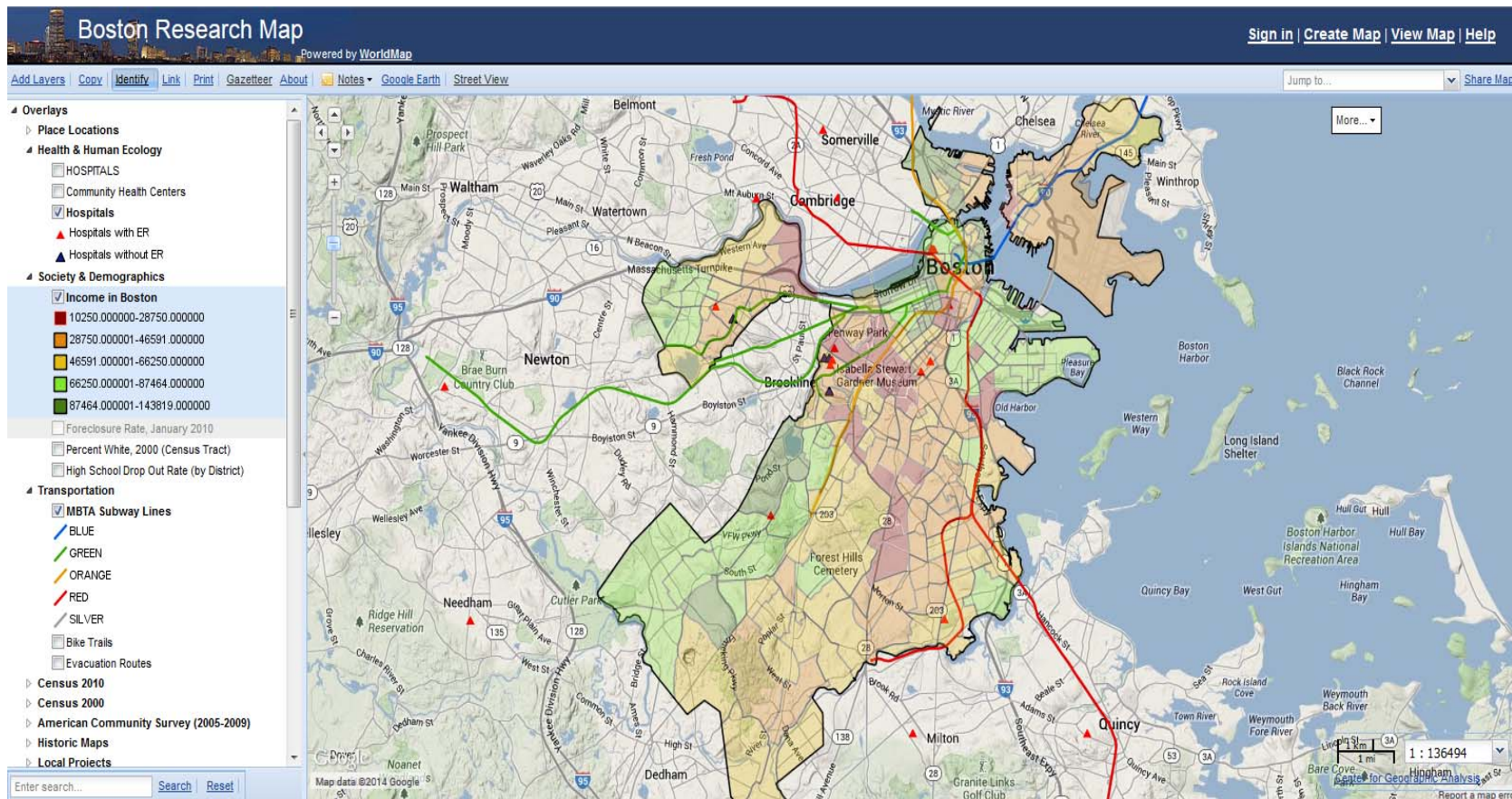
**MCCORMACK GRADUATE SCHOOL OF POLICY
AND GLOBAL STUDIES**
UNIVERSITY OF MASSACHUSETTS BOSTON

Visualization-based technologies: MyNeighborhood Census Viewer



Source: <http://hubmaps.cityofboston.gov/myneighborhood/>

Visualization-based technologies: Boston Research Map

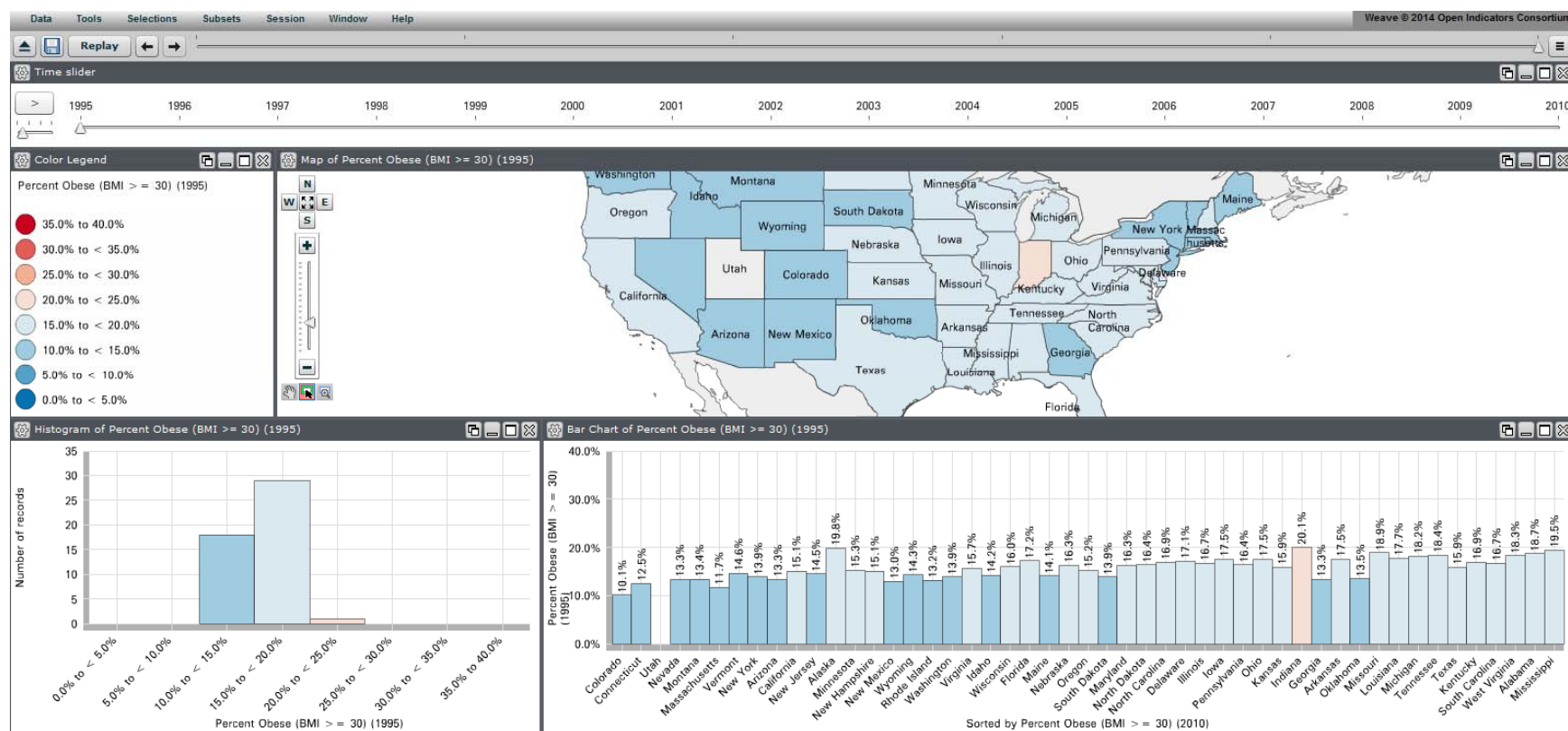


Source: <http://worldmap.harvard.edu/boston/>



McCORMACK GRADUATE SCHOOL OF POLICY
AND GLOBAL STUDIES
UNIVERSITY OF MASSACHUSETTS BOSTON

Visualization-based technologies: Weave



Source: <http://oicweave.org/>

Database-driven technologies: Boston Indicators Project



Source: <http://www.bostonindicators.org/>



McCORMACK GRADUATE SCHOOL OF POLICY
AND GLOBAL STUDIES
UNIVERSITY OF MASSACHUSETTS BOSTON

Database-driven technologies: American FactFinder

U.S. Department of Commerce
United States Census Bureau

AMERICAN FactFinder

Feedback FAQs Glossary Help

MAIN COMMUNITY FACTS GUIDED SEARCH ADVANCED SEARCH DOWNLOAD OPTIONS

Guided Search - Step-by-step access to Census Information Dataset - guided search

1 Start 2 Dataset 3 Topics 4 Geographies 5 Race/Ethnic Groups 6 Industry Codes 7 Search Results 8 Table Viewer

B25004 VACANCY STATUS
Universe: Vacant housing units
2008-2012 American Community Survey 5-Year Estimates

Table View Map View BACK TO SEARCH RESULTS

Actions: Modify Table Bookmark Print Download Remove Map

View Geography Notes View Table Notes

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

1 - 18 of 28 1 - 8 of 8

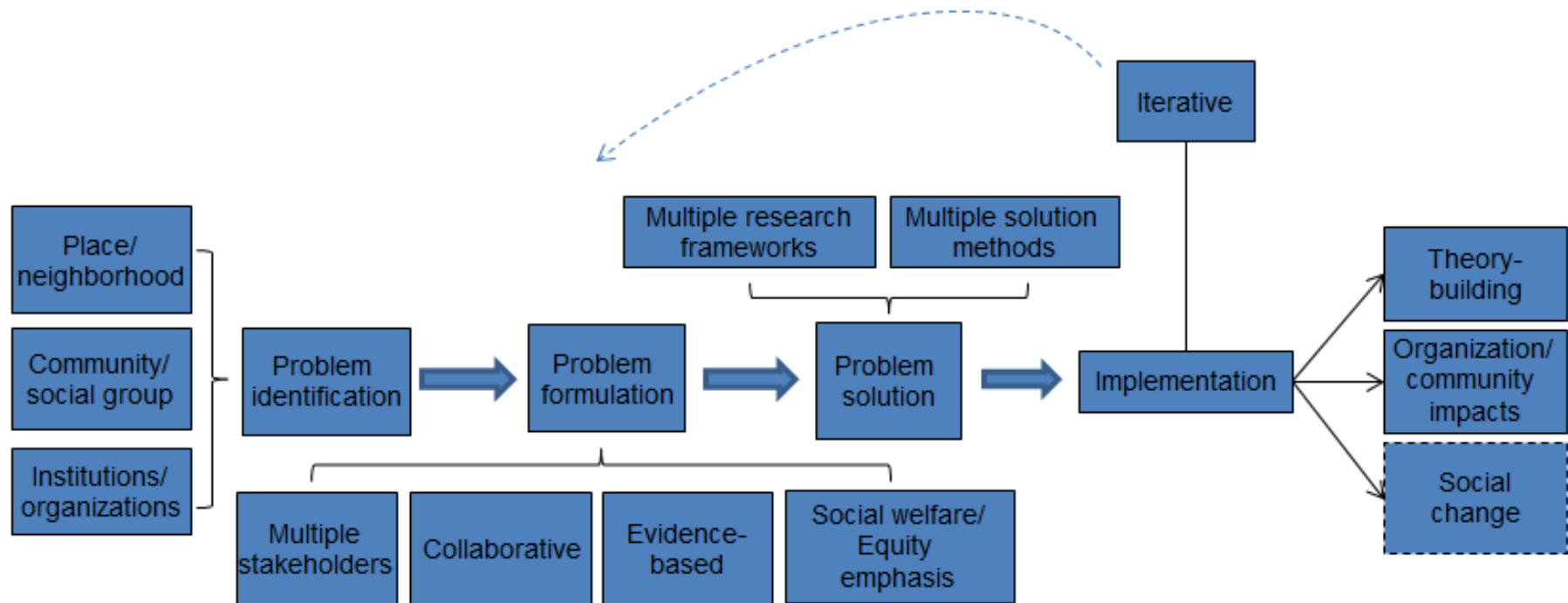
	Barnstable County, Massachusetts		Berkshire County, Massachusetts		Bristol County, Massachusetts		Dukes County, Massachusetts		Essex County, Massachusetts		Franklin County, Massachusetts		Hampden County, Massachusetts		Hampshire County, Massachusetts		Middlesex County, Massachusetts	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Total:	64,500	+/-1,198	12,837	+/-648	20,737	+/-1,154	11,358	+/-375	21,178	+/-1,242	3,223	+/-351	14,228	+/-738	3,636	+/-445	32,129	+/-1,556
For rent	1,600	+/-367	1,305	+/-298	5,339	+/-536	82	+/-79	5,323	+/-568	297	+/-132	3,158	+/-508	686	+/-216	9,634	+/-907
Rented, not occupied	239	+/-105	188	+/-103	1,012	+/-278	37	+/-38	830	+/-265	120	+/-103	338	+/-159	320	+/-156	2,680	+/-454
For sale only	1,927	+/-313	719	+/-194	1,841	+/-356	4	+/-5	2,215	+/-401	373	+/-127	1,580	+/-320	618	+/-198	4,481	+/-548
Sold, not occupied	548	+/-201	117	+/-71	435	+/-177	86	+/-101	688	+/-216	41	+/-29	261	+/-141	46	+/-58	1,422	+/-347
For seasonal, recreational, or occasional use	58,111	+/-1,193	8,192	+/-489	3,383	+/-505	10,844	+/-388	4,459	+/-582	1,323	+/-167	1,882	+/-233	1,049	+/-235	3,348	+/-507
For migrant workers	0	+/-29	9	+/-15	0	+/-29	0	+/-19	0	+/-29	0	+/-29	0	+/-29	0	+/-29	26	+/-39
Other vacant	2,075	+/-428	2,307	+/-433	8,727	+/-735	305	+/-129	7,663	+/-728	1,069	+/-225	7,009	+/-557	917	+/-263	10,538	+/-948

Source: <http://factfinder2.census.gov/>



McCORMACK GRADUATE SCHOOL OF POLICY
AND GLOBAL STUDIES
UNIVERSITY OF MASSACHUSETTS BOSTON

Model-driven technologies: Community-Based Operations Research



Source: Johnson (2011)

What alternative approaches to data and analytics research and practice are most relevant to CBOs?

Organizational Characteristics

- Centralized
- Decentralized

Nature of Inquiry

- Model-based
- Data-based

Data Characteristics

- Type
- Source
- Representation

Nature of organization doing research matters: Centralized approach

- Boston Area Research Initiative (BARI)
 - **Goal:** Perform original urban research using innovative methods and large data sets by better connecting academic researchers with service providers via city agencies
 - **Participants:** Harvard and other local member universities, City of Boston agencies
 - **Example projects:** Data Swap; 311 call analysis; Citizen Relationship Management System; Boston Cyclist Safety Report; Ecometrics Study; Data Library
 - **Reference:** <http://www.bostonarearesearchinitiative.net/>

Nature of organization doing research matters: Decentralized approach

- Urban Research-Based Action Network (URBAN)
 - **Goal:** Create a community of scholars, practitioners and community members to support learning across disciplines, geographies and institutions that is transformative and social justice-focused
 - **Participants:** MIT CoLab; Local nodes (Boston, Los Angeles, others); Discipline nodes (Sociology, others)
 - **Example projects:** Community-based networking events; Community discussion on education crisis; Community-engaged scholarship
 - **Reference:** <http://urbanresearchnetwork.org/>

Nature of organization doing research matters: Decentralized approach

- Code for America
 - **Goal:** Localized collaboratives to create applications for social good
 - **Participants:** City experts, tech industry leaders, citizen volunteers
 - **Example projects:** Code Across America; Brigade Network; Civic Startups
 - **Reference:** <http://codeforamerica.org/>

Alternative organizational approaches have different types of impacts

- Centralized approach yields large datasets, high-visibility studies, direct contributions to scholarship, but is not designed to transform local relationships and institutions
- Decentralized approach builds relationships and technical capacity and supports local engagement, but may not yield datasets or applications of immediate use to CBOs

Centralized approach is more visible, better-funded, influential

Nature of inquiry: Model-based vs. Data-based

- “Model-based” approaches
 - Primarily deductive
 - Stylized representation of relevant phenomena and systems
 - Traditional statistics, social sciences, decision sciences
- “Data-based” approaches
 - Primarily inductive and exploratory
 - Accommodates large datasets, many variables
 - Computer science and information science

‘Analytics’ encompasses both approaches
(descriptive, predictive, prescriptive) (Liberatore and
Luo 2010, INFORMS 2014)

Data available to CBOs varies greatly

- Type:
 - Primary
 - Secondary
- Source:
 - Publicly-available
 - Proprietary
- Representation:
 - Qualitative
 - Quantitative

CBOs have deep understanding of local areas
not well-represented in freely-available datasets

Can we validate these insights through data from the field?

Some initial propositions:

- CBOs can **effectively articulate** their information needs
- CBOs **lack knowledge of and access to** expertise and technology to create appropriate information
- CBOs **lack capacity to identify and solve** mission-aligned decision problems

Field research: Key informant interviews

- Sources: 10 informants (6 CBOs, 1 government, 1 academic, 1 large NPO)

Practice	Knowledge	Resources
<ul style="list-style-type: none">• Funders require irrelevant data• Hard to integrate multiple applications• Want outcomes, not outputs• What's necessary beyond descriptive stats and maps?	<ul style="list-style-type: none">• 'Big data' not relevant• Lack of training and awareness• Low interest in acquiring skills• What is the 'real problem', 'story', 'benchmarks'?• Some interest in decision modeling	<ul style="list-style-type: none">• Financial and time constraints limit hiring and retention of skilled staff

'Big data' and IT not seen as a solution

Field research: Data/application trainings

- Sources:

- NPO-provided software; U.S. Census; data methodology training

- Observations:

- Moderate level of knowledge about how data is organized is assumed/expected
- Applications are difficult to master by typical CBO staff
- If used correctly and customized appropriately, could substantially improve data-analytic skills and quality of data for decision-making

Use of data-intensive applications will add value only if staff have appropriate training and organization has 'theory of change'

Field research: focus group

- Source: Economic development organization with multiple neighborhood branches
- Observations:
 - Dissatisfied with applications for knowledge transfer and sharing
 - Required output measures do not capture neighborhood impacts
 - Want to quantify desired outcome measures, not sure how
 - Strong interest in data sharing and 'dashboards'
 - Some potential solutions are low-tech and inexpensive; other solutions require training; none require advanced degrees

There may be strong demand for CBO-focused data and analytics projects that reflect community-based participatory research principles

Did field research validate our understanding of the problem context?

- Assumptions:
 - Mismatch between CBO needs and perceived resource availability - **YES**
 - Missed opportunities due to lack of data expertise - **YES**
- Propositions:
 - CBOs can articulate information needs - **Supported**
 - CBOs lack knowledge of and access to expertise and technology to create information – **Supported**
 - CBOs lack capacity to identify (**Not supported**) and solve (**Supported**) mission-aligned decision problems

Principles for applied research in community-focused data and analytics

Values-driven

Collaborative

Distributed

Inductive

Multi- and mixed-methods

Appropriate use of resources and capacity

Iterative and constructive

A research agenda for CBO data and analytics

- Survey
 - Organization size, type, service area
 - Primary data needs and uses
 - Problem types and analytic methods
- Participatory solution-building
 - Organizational management and IT:
 - Data concierge
 - Circuit rider
 - Low-tech, small-data IT solutions
- Decision modeling:
 - Values elicitation
 - Service and catchment area design

Research goals:
Support collaboration, appropriate technology and shared resources

Policy recommendations

- Increased willingness of funders to support IT and decision modeling training, infrastructure and solutions
- Increased access by CBOs to training, software and technical support to improve access to and use of data and analytics
- Increased collaborations, using PAR and CBPR principles, between researchers and CBOs, to develop solutions and build theory

Acknowledgements

- Holly St. Clair, Metropolitan Area Planning Council
- Deborah Elizabeth Finn, Tech Networks Boston
- Mark Warren, University of Massachusetts Boston and URBAN.Boston
- Research assistants Leibiana Feliz and Sandeep Jani
- Peter Shane, Moritz School of Law, Ohio State University
- Many Boston-area practitioners and scholars