

Making Cities Smart

April 19, 2017

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About Me

Recently

- Former White House Assistant Director for Innovation Policy

Now

- Advisor to philanthropies and nonprofits



Overview

- **Smart Cities Overview**
- How Are Smart Cities Reshaping the Built Environment?
- How Will the Continued Evolution of Smart Cities Affect Real Estate?

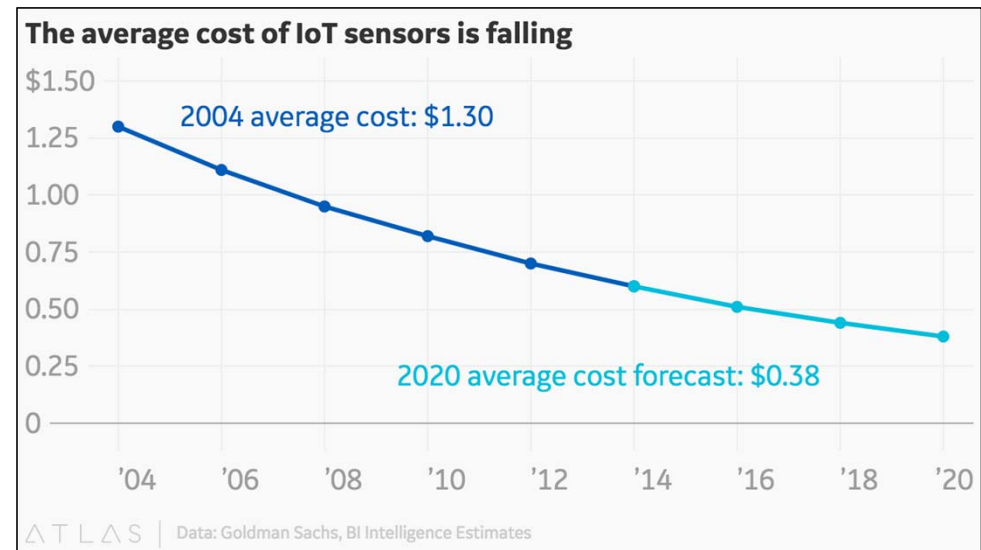
Tech Trends Unlocking Opportunity

Ingredients

- Cheaper, more powerful computing
- Low cost sensors and devices
- Abundant (cloud) storage



- Dramatically more available data
- Powerful analytics/AI to understand and use it.



Source: Atlas

What is a "Smart City"? A Sampling of Answers

Optimistic & Cryptic

- "Columbus, Ohio?"
- "Incorporating technology into the city layer"
- "[E]mbedding new digital technologies into infrastructure, systems, and services to enhance existing, and develop new, city/community resources"

Pessimistic

- "A marketing term cooked up by technology vendors"
- "Not this town; have you tried to pay a parking ticket online?"

A Density-Based Definition of Smart Cities

Premise: Cities are aggregations of individual location decisions. The changing relationship between the benefits and costs of urban density – as experienced by residents – drives migration trends, from suburbanization to urban renaissance.

Technology is eroding several benefits of density, for example:

- Communication costs: smartphone/Internet
- Transportation costs: Ridesharing/AVs
- Specialization: Internet-enabled business models reduce importance of proximity
- Physical interactions: [Never?]

Will it erode the costs of density as quickly?

- Coordination (e.g. planning and zoning, public transportation)
- Trust (e.g., crime, dependence on shared infrastructure)
- Local externalities (e.g. air and noise pollution, congestion)

Conclusion: The first largely reflects individual decisions, while the second typically requires collaboration and government. Harnessing technology to reduce these costs is the essence of smart cities

A Smart City in Four Examples

- Human Services: Seattle counties using predictive analytics to identify precisely when city services succeed in helping homeless individuals transition into permanent housing.
- Civic Participation: Through its smartphone app, *Cycle Atlanta* automatically collects, aggregates and shares individual trip data with transportation planners, helping to advocate for bike lanes where they are needed.
- Infrastructure: In South Bend, a \$6 million investment in smart sewer valves reduces combined sewer overflow by up to 23 percent, saving over \$100 million in new infrastructure.
- Transportation: Smart traffic signals in Pittsburgh have been proven to reduce congestion at intersections by up to forty percent.

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Harnessing Data to Better Understand and Design Cities, Neighborhoods & Buildings

references	insights into	key techniques	new alg.	new model	new data	data available
Aiello <i>et al.</i> [1]	urban sound	PCA, soundwalks			✓	✓
Alessandretti <i>et al.</i> [2]	transport	networks, factorization	✓			✓
Arcaute <i>et al.</i> [3]	city boundaries	percolation, fractals				✓
Charlton <i>et al.</i> [4]	social media	networks, ABM	✓		✓	✓
Daggitt <i>et al.</i> [5]	urban growth	spectral clustering	✓			
Grindrod & Lee [6]	social media	clustering, random graphs	✓	✓	✓	✓
Leitão <i>et al.</i> [7]	scaling laws	likelihood, BIC	✓	✓		✓
Lenormand <i>et al.</i> [8]	land use	clustering, Ripley K		✓		
Lotero <i>et al.</i> [9]	mobility	networks, clustering	✓	✓	✓	✓
Pregolato <i>et al.</i> [10]	flooding	networks, hydrodynamics				✓
Seresinhe <i>et al.</i> [11]	art/economics	regression, bootstrapping			✓	✓
Tkachenko <i>et al.</i> [12]	flooding	PCA, eigencities				✓
Ward <i>et al.</i> [13]	footfall	ABM, data assimilation		✓		✓
Williams & Musolesi [14]	transport	networks, attacks	✓	✓	✓	✓

Source: Luis Bettencourt

A Fitness Tracker for the City: Array of Things

Data

- 500 outdoor sensor boxes in Chicago delivering real-time block-by-block data on air quality, noise levels, and traffic.

Uses

- Asthma: Mobile application to alert asthma sufferers about poor air quality based on real-time measurements taken on their city block.
- Traffic safety: Track accidents and near-accidents to understand characteristics of dangerous intersections.



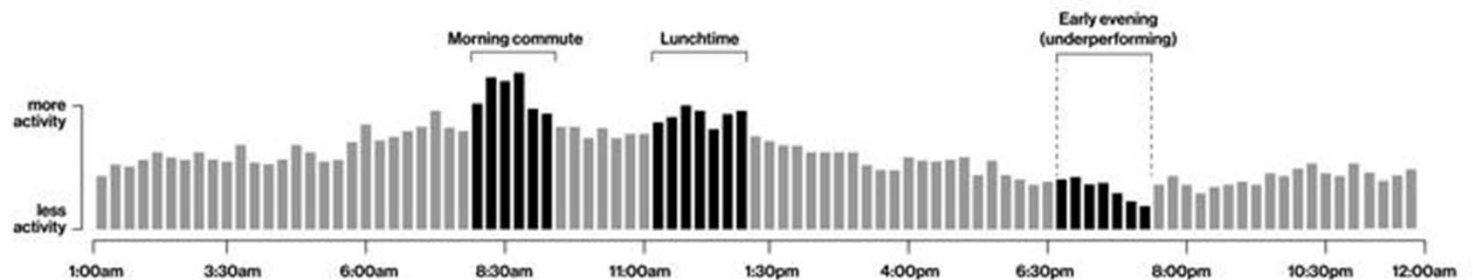
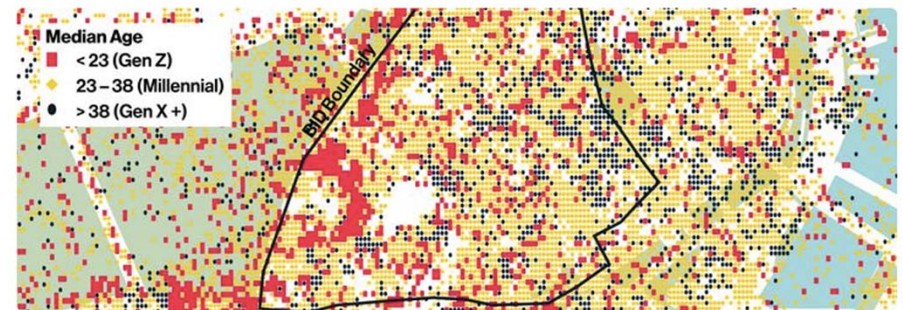
Designing Neighborhoods with new Data: Supernormal.io

Data

- Granular neighborhood data about how people actually use cities: “a census of the street over the course of a day.”

Uses

- Delivering insights to Downtown Boston BID to better understand meeting the needs of residents and commuters.



Source: Supernormal.io

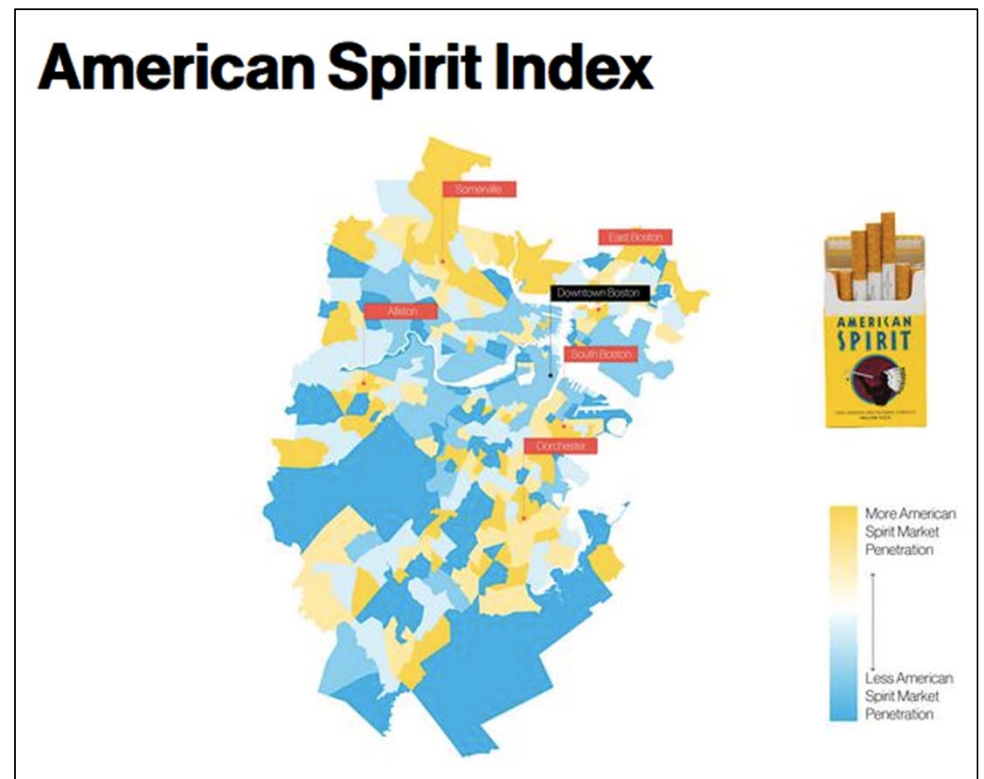
Designing Neighborhoods with new Data: Supernormal.io

Data

- Estimate the market penetration of American Spirit cigarettes, a brand favored by hipsters and artists.

Uses

- Understand geography of cultural shifts



Source: Supernormal.io

Data-Driven Experimentation in Building: Cover.build

Features

- Custom, prefab, backyard studios designed in three days, based on local zoning, sun path and geospatial data.

What It Represents

- Coming wave of VC investment aiming to “disrupt” construction industry and reduce building costs by 70% through new tech, data and business models.

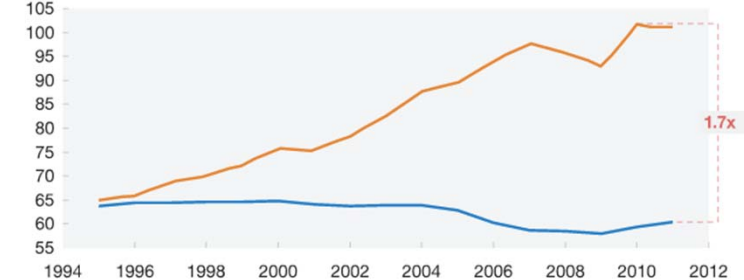


Source:
Cover.build

Overview of productivity improvement over time

Productivity (value added per worker), real, \$ 2005

\$ thousand per worker



Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

McKinsey&Company

Designing Cities From Scratch: Y Combinator New Cities

Proposition

- Design new cities from a blank slate, free of historical constraints.

Sample Inquiry

- “How can we lay out the public and private spaces (and roads) to make a great place to live? Can we figure out better zoning laws?”

NEW CITIES Y COMBINATOR RESEARCH

Request for Locations

We want to build a city.
Know of a specific location that works?
Tell us about it below.

Where is the site located? *

Link to a Google Maps pin dropped in the center of the property.

How large is the site (km²)? *

Source: Y Combinator

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How Will the Continued Evolution of Smart Cities Affect Real Estate? Possibilities Include:

- Parking: 30 to 60% of cars downtown in any city are just circling. Can better public and private parking inventories dramatically reduce that number, and reduce the need for minimum parking requirements?
- Aging in Place: Improved health monitoring can unlock a future of remote care for the elderly. How will the needs of an increasingly independent elderly population reshape the built environment?
- Zoning: Digital tools are already fundamental to city planning. How might approaches like Bike Atlanta unlock “algorithmic zoning” to automate deliberative planning processes based on observed data (i.e, park usage)?
- Blight: Researchers have developed data tools to track ownership and status of neglected property, preventing further decay and demolition. Would the widespread availability of such tools help break a cycle of decay in struggling rust belt communities?
- Autonomous: Ridesharing may already closely approximate autonomous vehicles on the streets of every city. What will be different?
- Experimentation: How might smart city technologies lower costs of experimentation in the built environment?

Conclusion

“At their heart, cities are the absence of physical space between people.”

- Ed Glaeser

Where do we go from here?