Open Data and Instrumenting Cities

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www.UrbanCCD.org
Cities are Central Drivers of:

- Climate Change
- Energy Security
- Economic Vitality

70% GHG
70% Energy
80% GDP

To address Climate Change and Energy Security while maintaining Economic Vitality will require understanding cities as multiscale, complex, dynamic, interconnected systems.
Addressing climate, energy, and economics also requires understanding urban social, economic, and behavioral factors.


Image: http://jointcenter.org/
Understanding the City: Making open data legible.

Instrumenting the City: Integrating many data sources and filling in temporal and spatial gaps.

Modeling the City: Multi-scale, coupled urban models.
Understanding the City:
Making open data legible.
Initial use of open data was mapping and graphing… Useful, but…

Cities need prediction, optimization.
Discovering critical violations sooner rather than later reduces the risk of patrons becoming ill, which helps reduce medical expenses, lost time at work, and even a limited number of fatalities.
San Francisco Sustainable Systems Initiative

Partnership with the City and County of San Francisco Planning Department

Provide districts with dashboards to set and track progress in key areas of sustainability, resilience, and livability.

Hundreds of open data portals…how to search? Merge data from different sources?

Plenario, a Powerful City-Data Tool, Debuts

Chicago’s open-data community takes another step forward with a site that makes working with that data easier, faster, and more comprehensible.

BY WHET NOSER

PUBLISHED SEPT. 24, 2014
Select time period
Start date: 07/01/2014
End date: 12/31/2014

Select aggregation frequency
Aggregate by: Week

NSF CISE/ACI 1348865, “Prototyping an Urban Data Cyberinfrastructure for Computational Social Sciences”
catlett@anl.gov
Select time period
Select aggregation frequency

18 datasets found

City of Chicago
311 Service Requests - Graffiti Removal
4,496

City of Chicago
Business Licenses
1,961

City of Chicago
311 Service Requests - Pot Holes Reported
1,498

City of Chicago
Building Permits
1,341

NSF CISE/ACI 1348865, “Prototyping an Urban Data Cyberinfrastructure for Computational Social Sciences”
City of Chicago: 311 Service Requests - Street Lights - One Out

Start date: 07/01/2014  
End date: 12/31/2014

Aggregate by: Week
Map grid resolution: 100 meters

API queries
View the API queries that are used on this page. Read the API docs.
- /v1/api/grid/
- /v1/api/detail-aggregate/
- /v1/api/detail/
- /v1/api/fields/

1,257 records

Dataset details
Name: 311 Service Requests - Street Lights - One Out
Attribution: City of Chicago
Source: http://data.cityofchicago.org/api/views/3aa6-uy2v/rows.csv?accessType=DOWNLOAD
Update frequency: daily

NSF CISE/ACI 1348865, “Prototyping an Urban Data Cyberinfrastructure for Computational Social Sciences”
NSF CISE/ACI 1348865, “Prototyping an Urban Data Cyberinfrastructure for Computational Social Sciences”
Instrumenting the City:
Integrating many data sources and filling in temporal and spatial gaps.
Map of current EPA sensor station in Chicago. Many scientific and policy questions require much greater spatial and temporal resolution. How can new, lower cost sensors fill in the gaps? How can new sensors be rapidly tested and deployed?
A Platform for embedded sensing and ICT in urban areas.

An initiative of the City of Chicago Strategic Technology Plan,
Argonne “Waggle” Technology

- Low-cost networked programmable “nodes” that collect, process, and publish real-time data on a city’s environment, infrastructure, and activity.

- Leverage $1.3M of UChicago and Argonne internal funding to create an open platform for instrumenting cities and for “smart city” R&D.

- Current version with 14 sensors, modular and expandable.
  (Temperature, Humidity, Barometric Pressure, Vibration, Light, Sound, Road Surface Temperature, CO, NO\textsubscript{2}, O\textsubscript{3}, SO\textsubscript{2}, H\textsubscript{2}S, Camera, Bluetooth)
Third Generation AoT

July 2014

Street Light Pole Units

May 2015

Embedded in Street Furniture

Fall 2015

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NSF CISE/ACL 1528966, “Prototyping a Scalable and Evolvable Urban Sensing Platform for Smart Cities”
Agreed to partner to test and extend the open source platform.

Expressed interest in testing.

Initial discussions and partner universities/labs.
AoT Community

Science Collaborators: Argonne National Laboratory, University of Chicago, Arizona State, Clemson, DePaul, IaaC/FabLab Barcelona, GaTech, IIT, MIT, Newcastle University, NYU, NIU, Northwestern University, Notre Dame, Portland State, Purdue, School of the Art Institute of Chicago, University of Amsterdam, University of Bristol, University of Calabria, University College London, Radboud University, University of Strathclyde, UI-C, UIUC, University of Michigan, University of Texas Dallas, University of Texas Austin, University of Washington

More Information: http://arrayofthings.us
http://UrbanCCD.org
http://wa8.gl

Industry and Government Project Partners
DOE, NSF, City of Chicago, BigBelly, Cisco, Intel, Microsoft, Motorola Solutions, Qualcomm, Schneider Electric, Zebra Technologies

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Modeling the City: Multi-scale, coupled urban models.
Computational Models to anticipate design impacts.

Site plan (zoning, phasing)
Near-Term Challenges

Integrating Many Diverse Data Sources (in Real Time)

Integrating Computation and Data (in Real Time)

Understanding interactions and capturing in coupled, multi-scale models

High-quality, low-cost, resilient sensors (with in-situ processing)