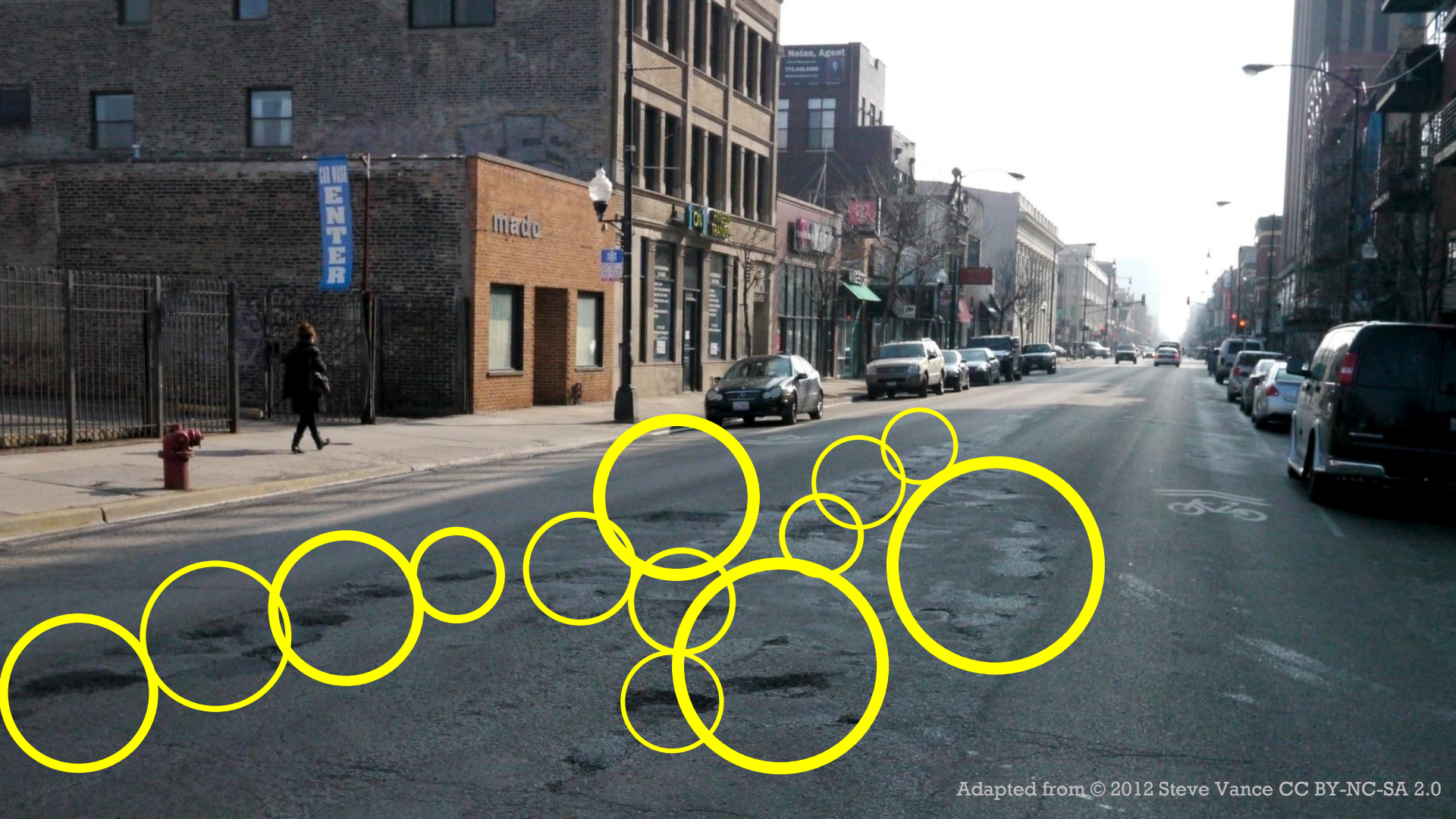
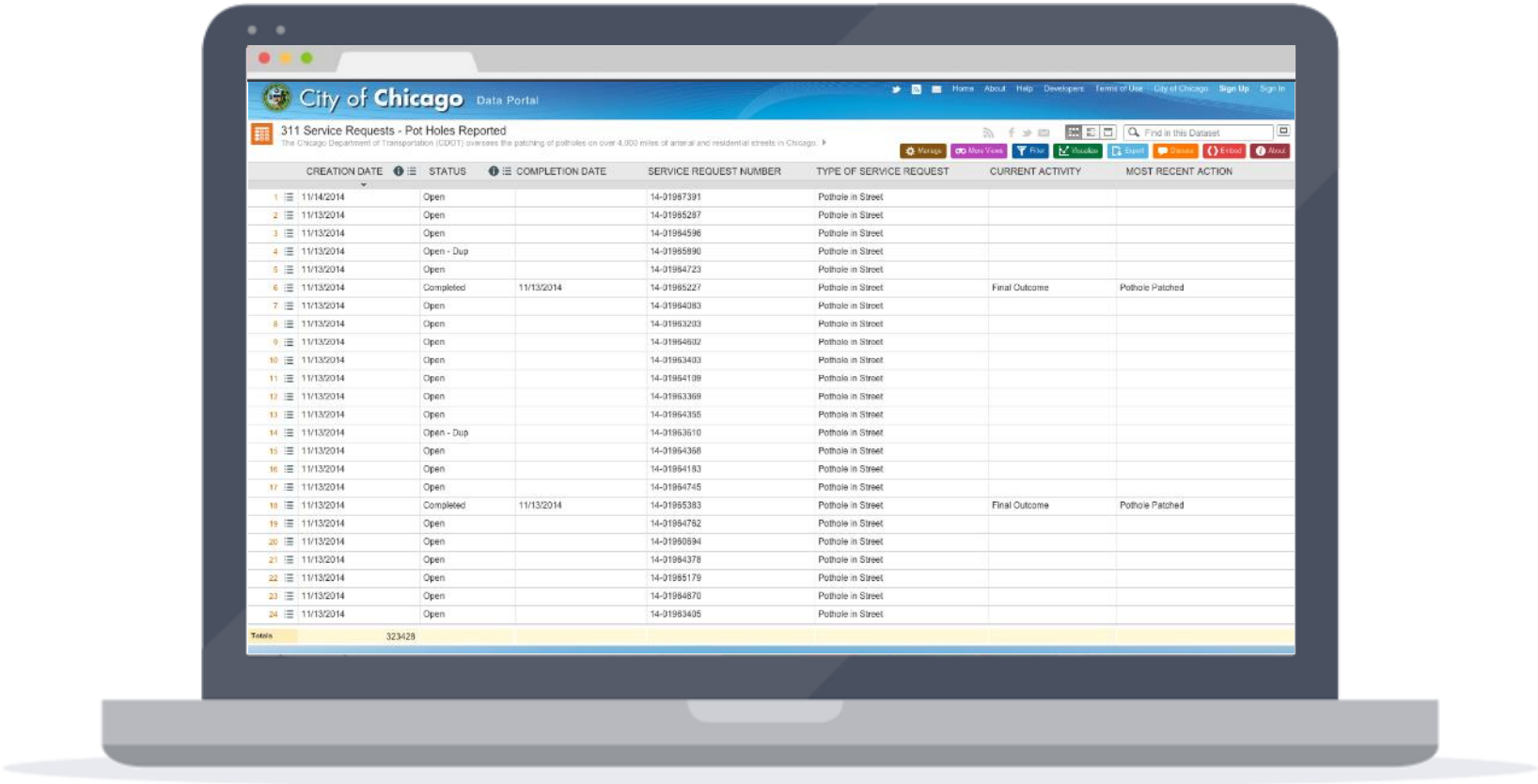
CITY OF #BIGDATA

TOM SCHENK JR.
CHIEF DATA OFFICER, CITY OF CHICAGO
@CHICAGOCDO

Source: techplan.cityofchicago.org

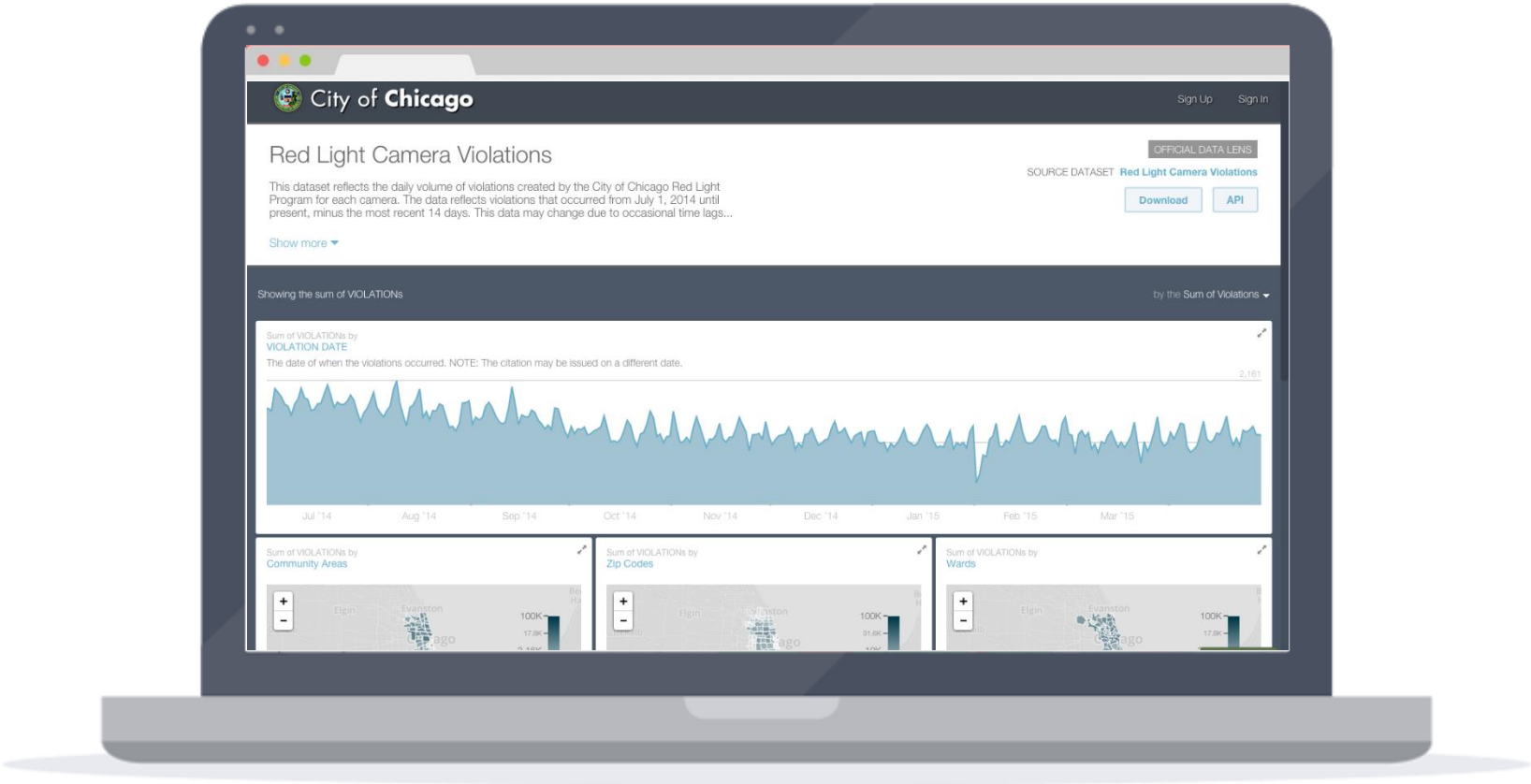




	CREATION DATE	STATUS	COMPLETION DATE	SERVICE REQUEST NUMBER	TYPE OF SERVICE REQUEST	CURRENT ACTIVITY	MOST RECENT ACTION
1	11/14/2014	Open		14-01987391	Pothole in Street		
2	11/13/2014	Open		14-01985287	Pothole in Street		
3	11/13/2014	Open		14-01984596	Pothole in Street		
4	11/13/2014	Open - Dup		14-01985890	Pothole in Street		
5	11/13/2014	Open		14-01984723	Pothole in Street		
6	11/13/2014	Completed	11/13/2014	14-01985227	Pothole in Street	Final Outcome	Pothole Patched
7	11/13/2014	Open		14-01984083	Pothole in Street		
8	11/13/2014	Open		14-01983203	Pothole in Street		
9	11/13/2014	Open		14-01984602	Pothole in Street		
10	11/13/2014	Open		14-01983403	Pothole in Street		
11	11/13/2014	Open		14-01984109	Pothole in Street		
12	11/13/2014	Open		14-01983368	Pothole in Street		
13	11/13/2014	Open		14-01984355	Pothole in Street		
14	11/13/2014	Open - Dup		14-01983610	Pothole in Street		
15	11/13/2014	Open		14-01984368	Pothole in Street		
16	11/13/2014	Open		14-01984183	Pothole in Street		
17	11/13/2014	Open		14-01984745	Pothole in Street		
18	11/13/2014	Completed	11/13/2014	14-01985383	Pothole in Street	Final Outcome	Pothole Patched
19	11/13/2014	Open		14-01984782	Pothole in Street		
20	11/13/2014	Open		14-01980894	Pothole in Street		
21	11/13/2014	Open		14-01984378	Pothole in Street		
22	11/13/2014	Open		14-01985179	Pothole in Street		
23	11/13/2014	Open		14-01984870	Pothole in Street		
24	11/13/2014	Open		14-01983405	Pothole in Street		
Totals		323428					

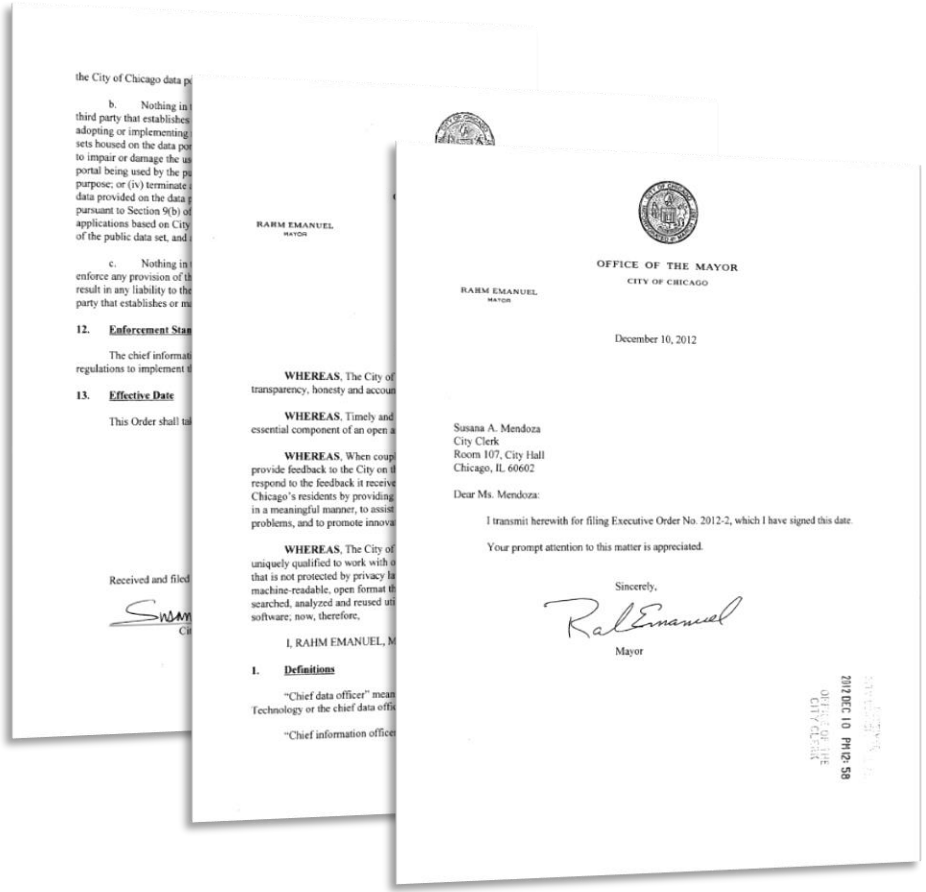
Data on potholes are reported by residents and city staff through the 311 system, which is then reported on the City's #opendata portal—updated daily.

data.cityofchicago.org



Chicago has released more #opendata, including important items such as red light and speed camera violations, problem landlords, and public chauffeurs.

data.cityofchicago.org/view/caas-knxs



RAHM EMANUEL
MAYOR

OFFICE OF THE MAYOR
CITY OF CHICAGO

December 10, 2012

Susana A. Mendoza
City Clerk
Room 107, City Hall
Chicago, IL 60602

Dear Ms. Mendoza:

I transmit herewith for filing Executive Order No. 2012-2, which I have signed this date.

Your prompt attention to this matter is appreciated.

Sincerely,

Rahm Emanuel

Mayor

2012 DEC 10 PM 12:58

Executive Order 2012-2

In 2012, Chicago issued an executive order which formalized the open data portal, endowed powers to the Chief Data Officer, created an advisory committee to advise on the expansion of new datasets, and required an annual open data report.

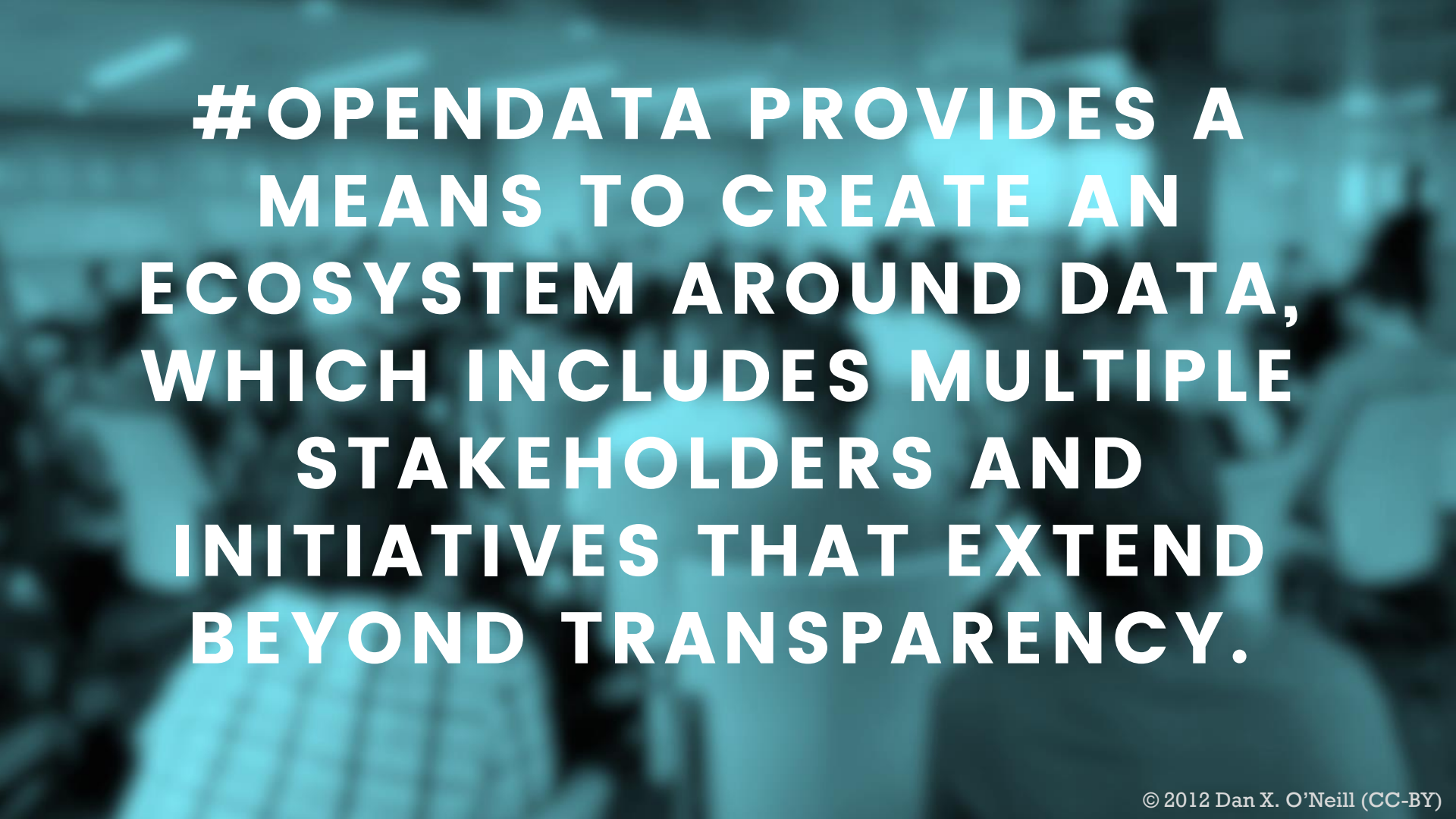
LEVERAGE DATA AND NEW TECHNOLOGY TO MAKE GOVERNMENT MORE EFFICIENT, EFFECTIVE, AND OPEN

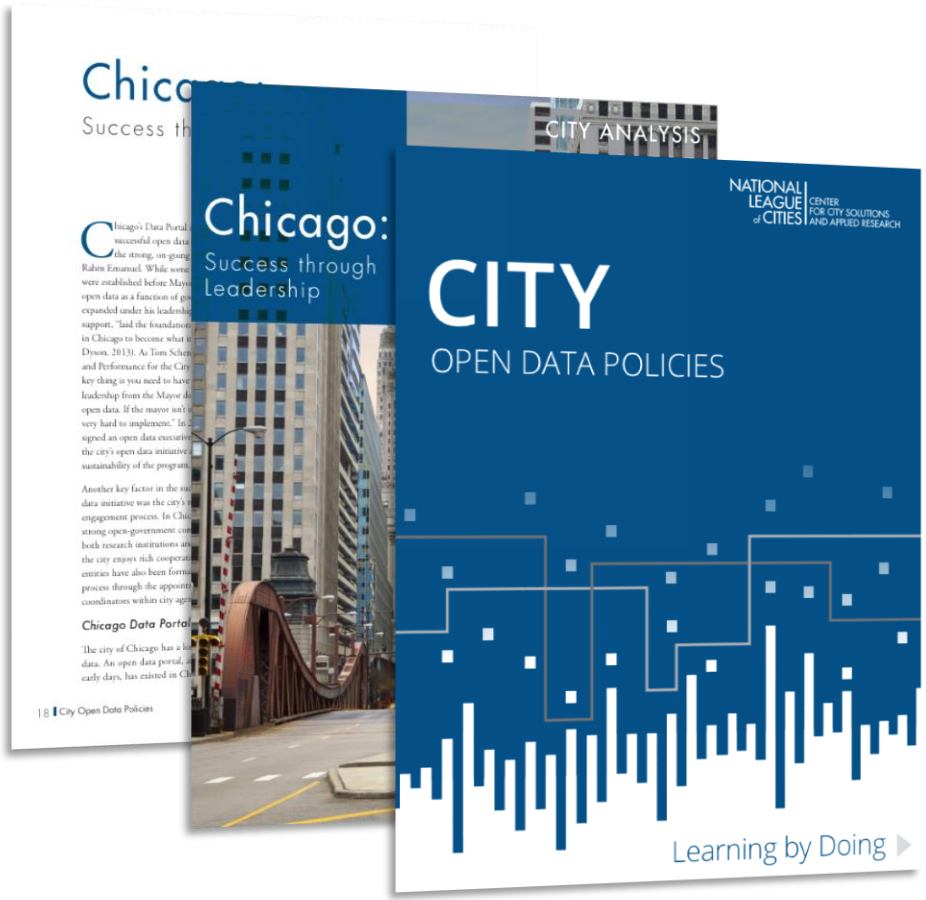
techplan.cityofchicago.org/initiatives-by-strategy/effective-government/

INCREASE & IMPROVE CITY DATA

The City will continue to increase and improve the quality of City data available internally and externally, and facilitate methods for analyzing that data to help create a smarter and more efficient city.

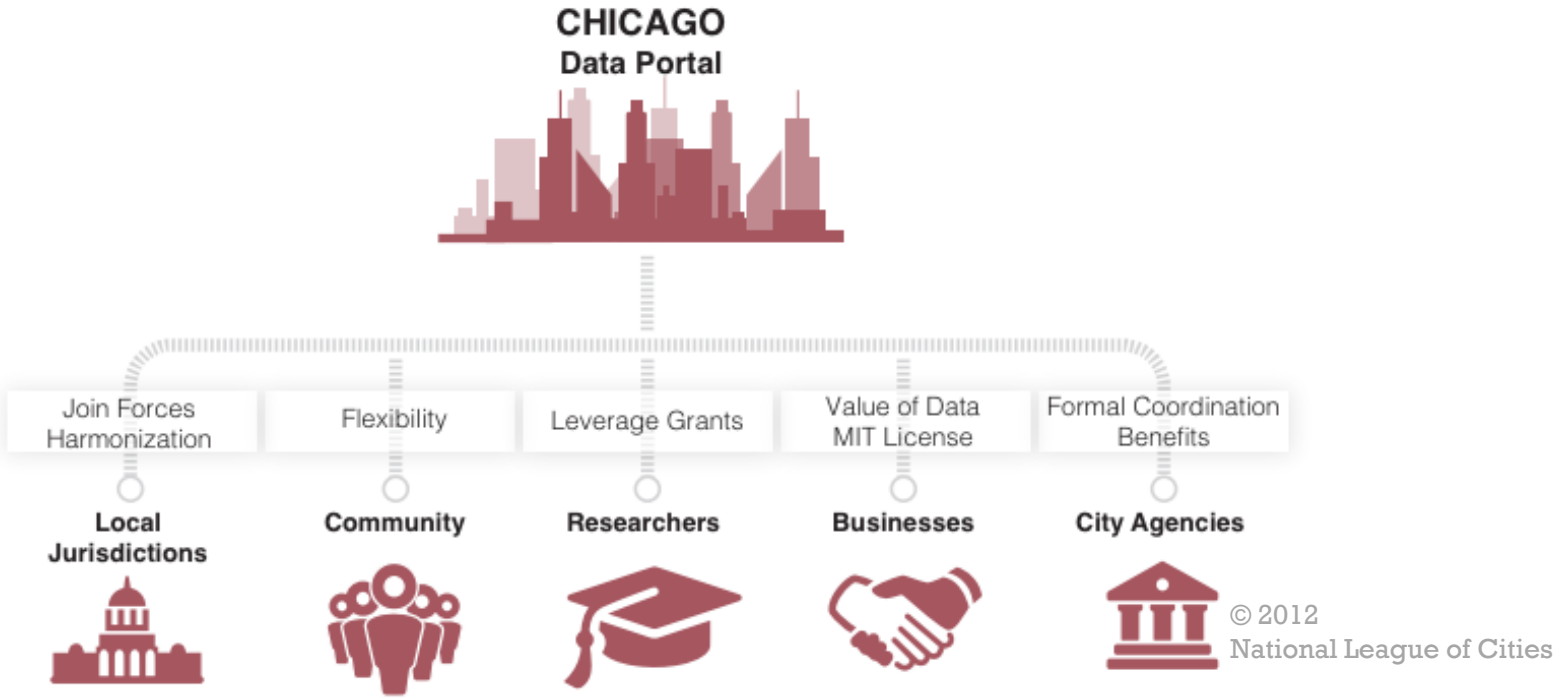
techplan.cityofchicago.org/initiatives-by-strategy/effective-government/initiative-14/





National League of Cities

NLC issued a report discussing the role of Chicago's leadership in developing a leading #opendata portal. The first chapter reviews Chicago's open data program and its benefits to the city, residents, and others.

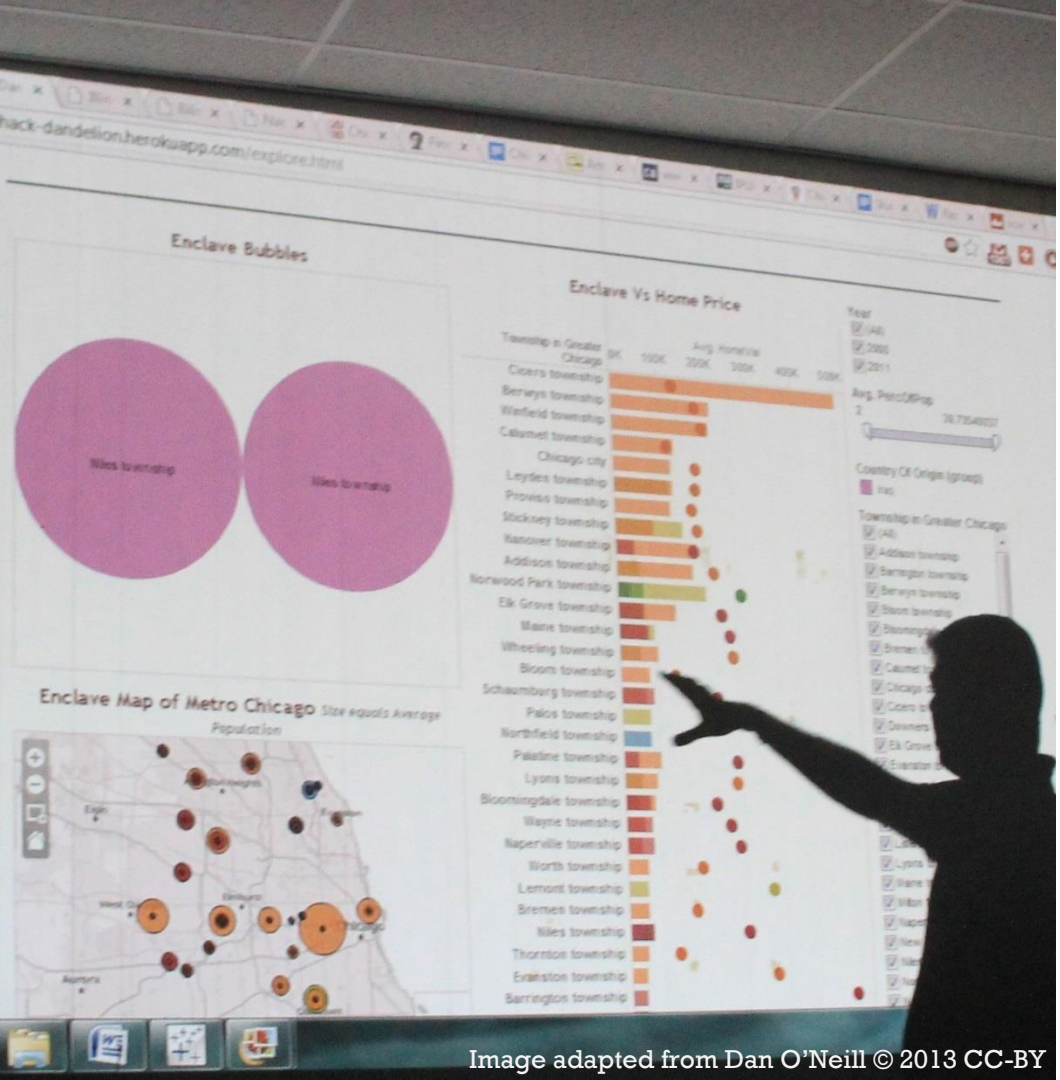


"Open data initiatives are an increasingly popular component of governance. At the national level, Chicago's #opendata initiative has been held up as a model for cities that are seeking to start their own open data programs."

- National League of Cities, p. 22

Civic Tech Community

Chicago has a large, vibrant, **productive**, civic community. This is led by Chicago residents interested in technology and society. Smart Chicago Collaborative and non-profits provide assistance and city officials regularly engage in meetups and other activities. This group has produced several helpful apps using #opendata.



ChiHackNight

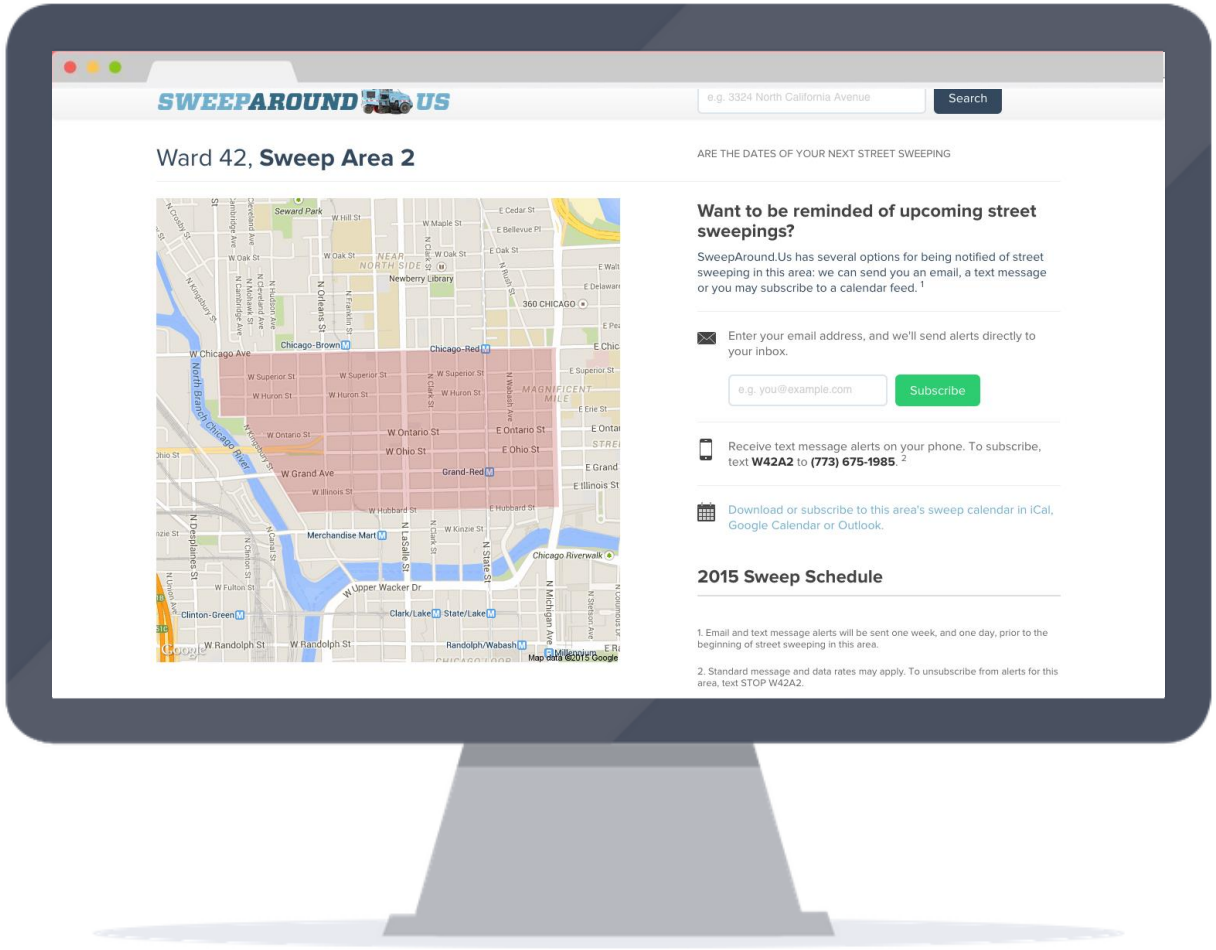
Meets every Tuesday

chihacknight.org

City Data User Group

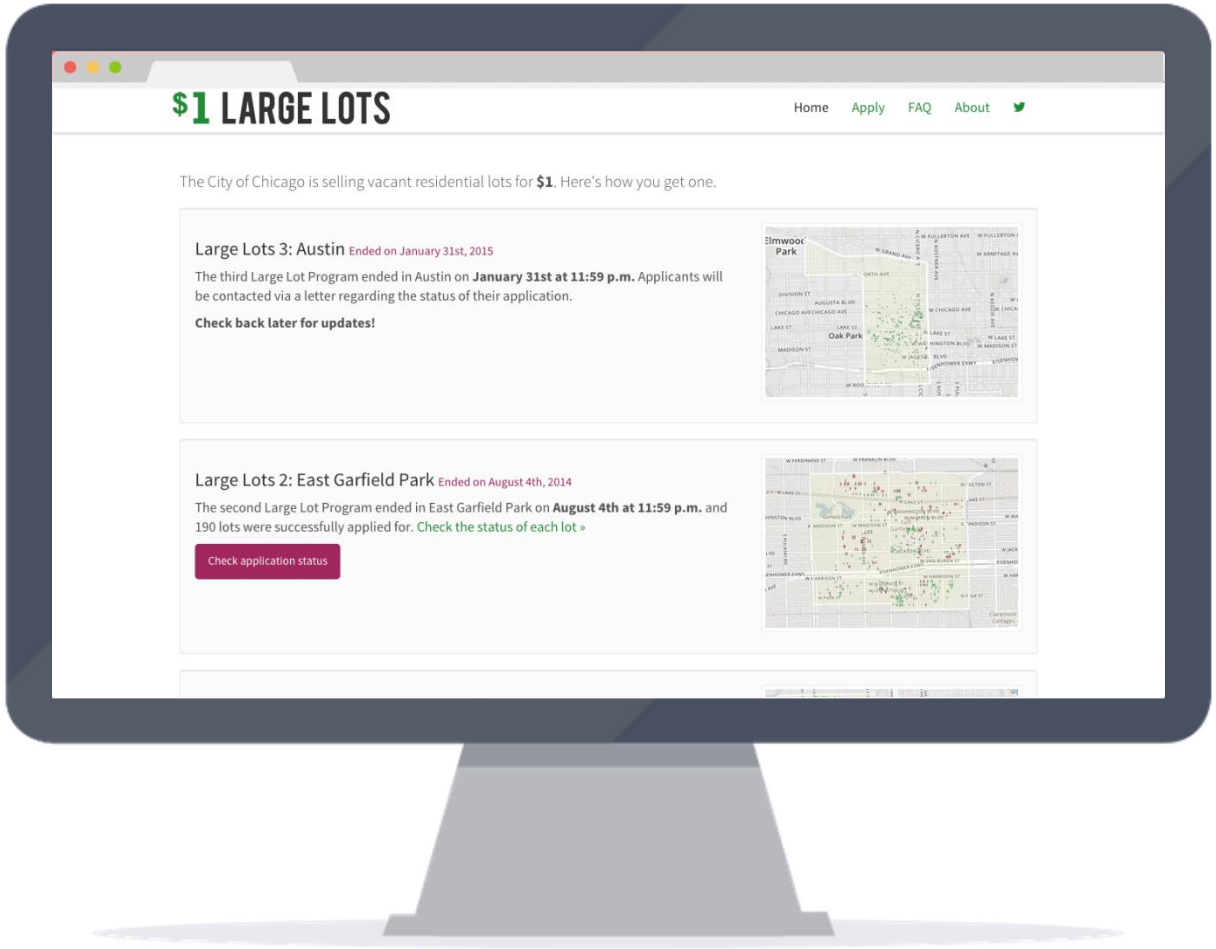
Meets first Weds of month

meetup.com/ChicagoCityData



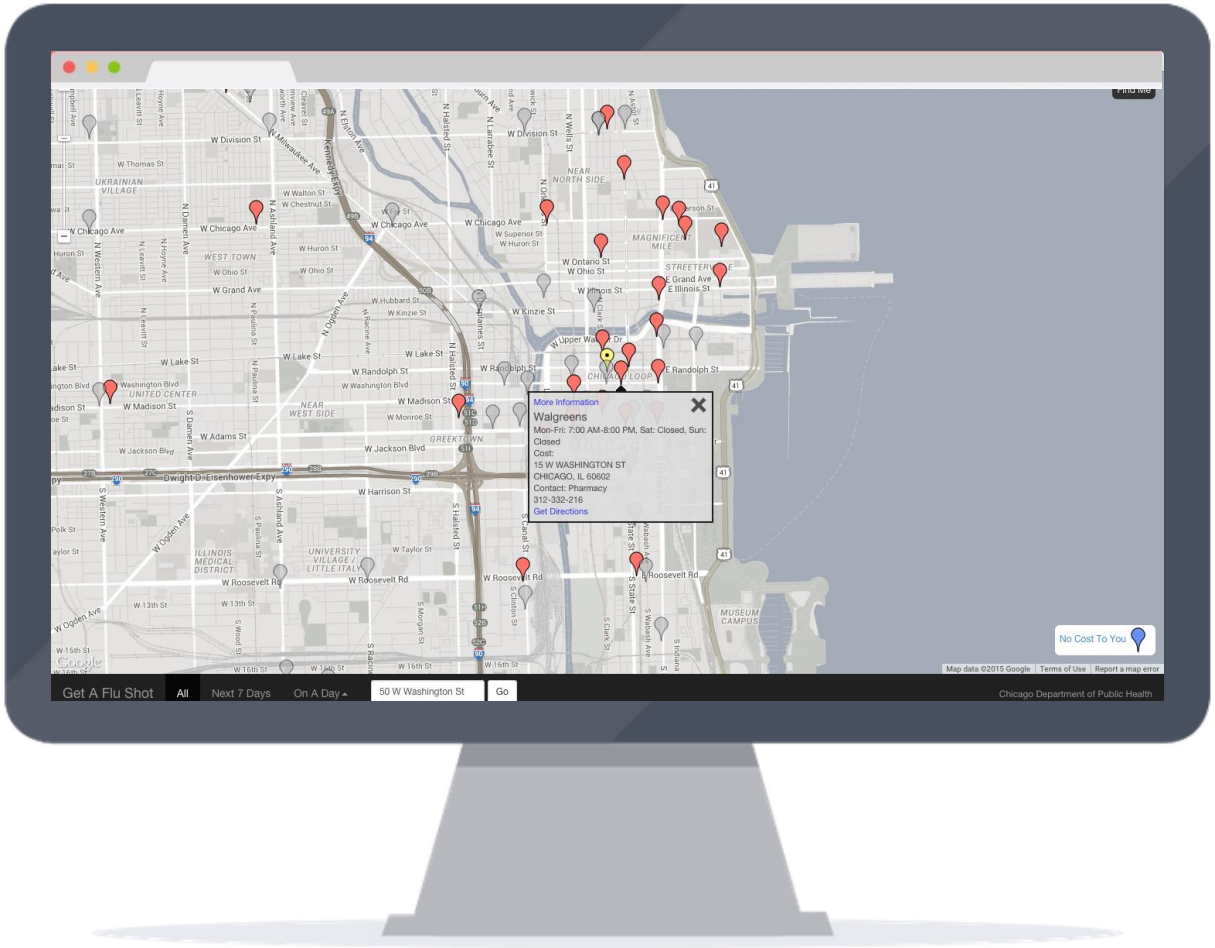
sweeparound.us

Using #opendata, this service developed by the civic community alerts individuals to street sweeping activity by providing email, text, or calendar alerts.



largelots.org

The City of Chicago partnered with developers to create LargeLots, a website using #opendata to help residents apply to the City of Chicago $1 lot program designed to encourage investment in struggling neighborhoods.

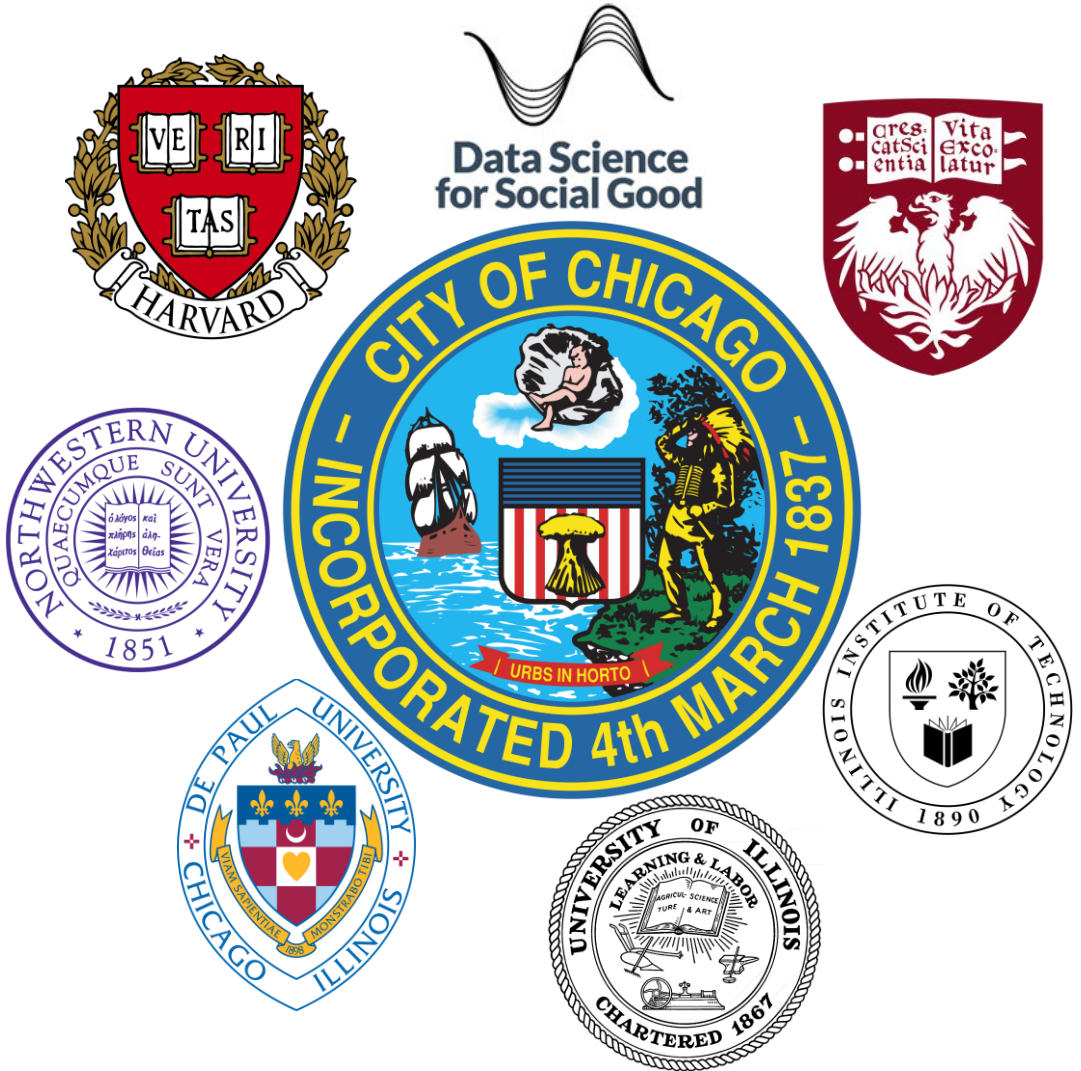


chicagoflushots.org

Chicago Flu Shots was developed to easily find flu-shot locations across Chicago. The code was created by a volunteer is #opensource so the site was adopted by Boston, Philadelphia, and San Francisco.

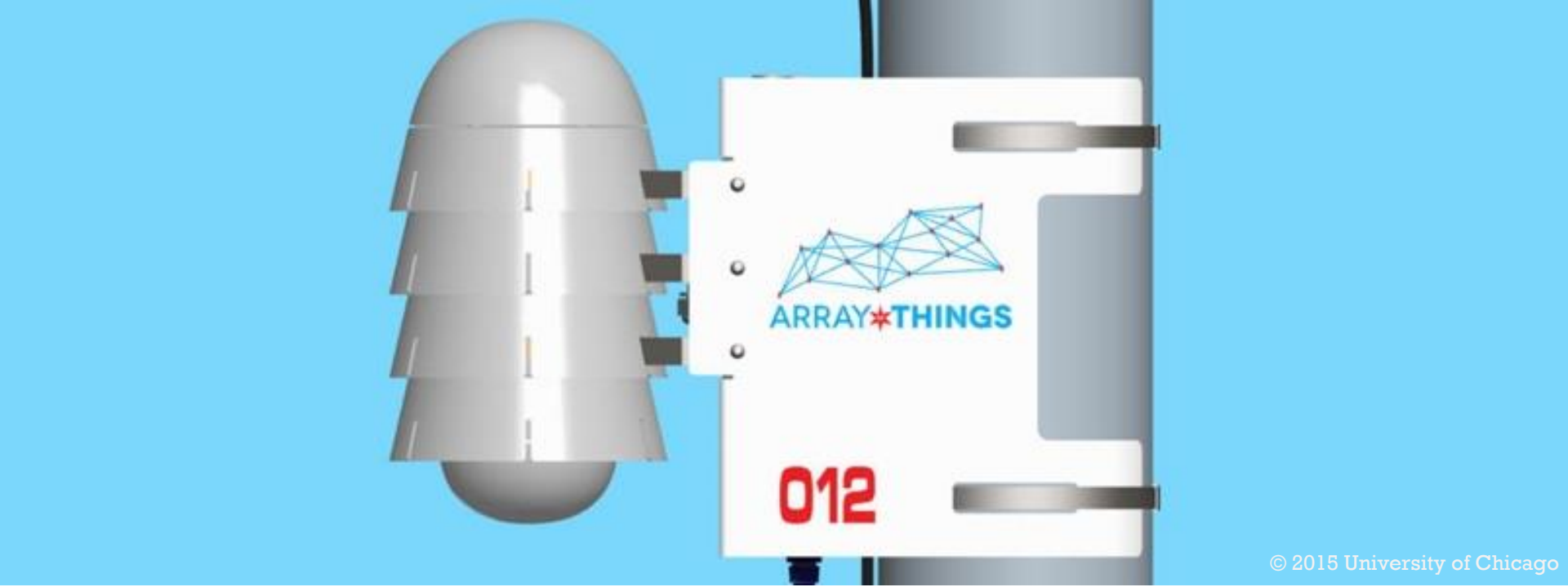
Academia

The City of Chicago has a number of high-quality research universities and groups willing to engage in projects with the city. We can leverage open data portal and data itself to create cooperative relationships.



OPEN DATA & INTERNET OF THINGS

Open data has also spread to physical devices. @chrismetcalf used traffic congestion data from the open data portal to generate an imp to provide a red or green light to denote heavy or light traffic congestion.



Array of Things

arrayofthings.github.io

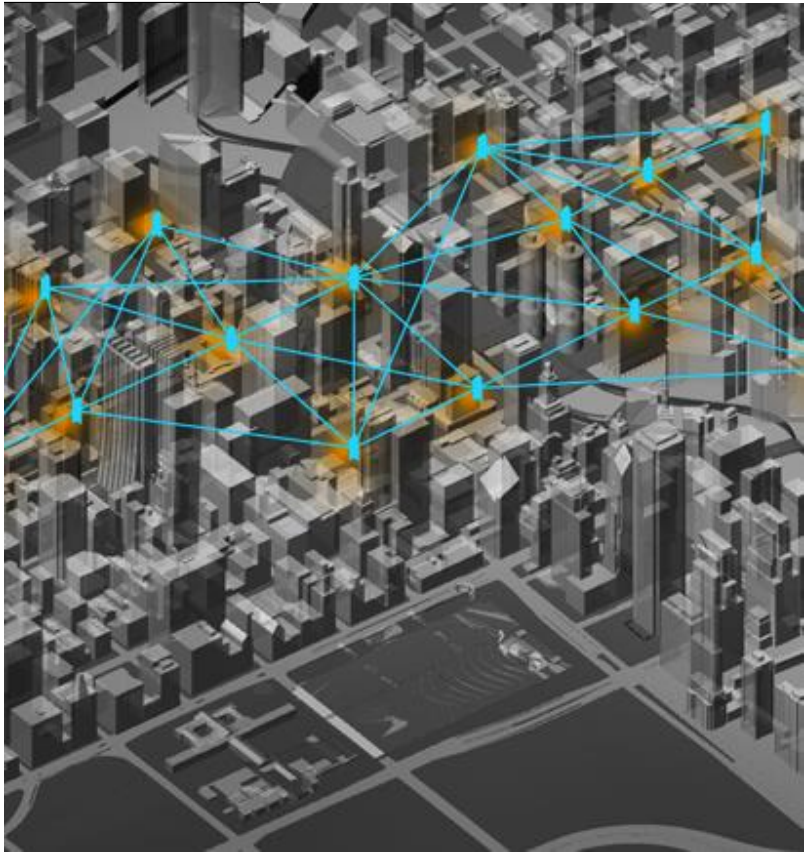
University of Chicago has partnered with multiple institutions to build a mesh network of small sensors, dubbed the **Array of Things**, that will frequently post data for public consumption.

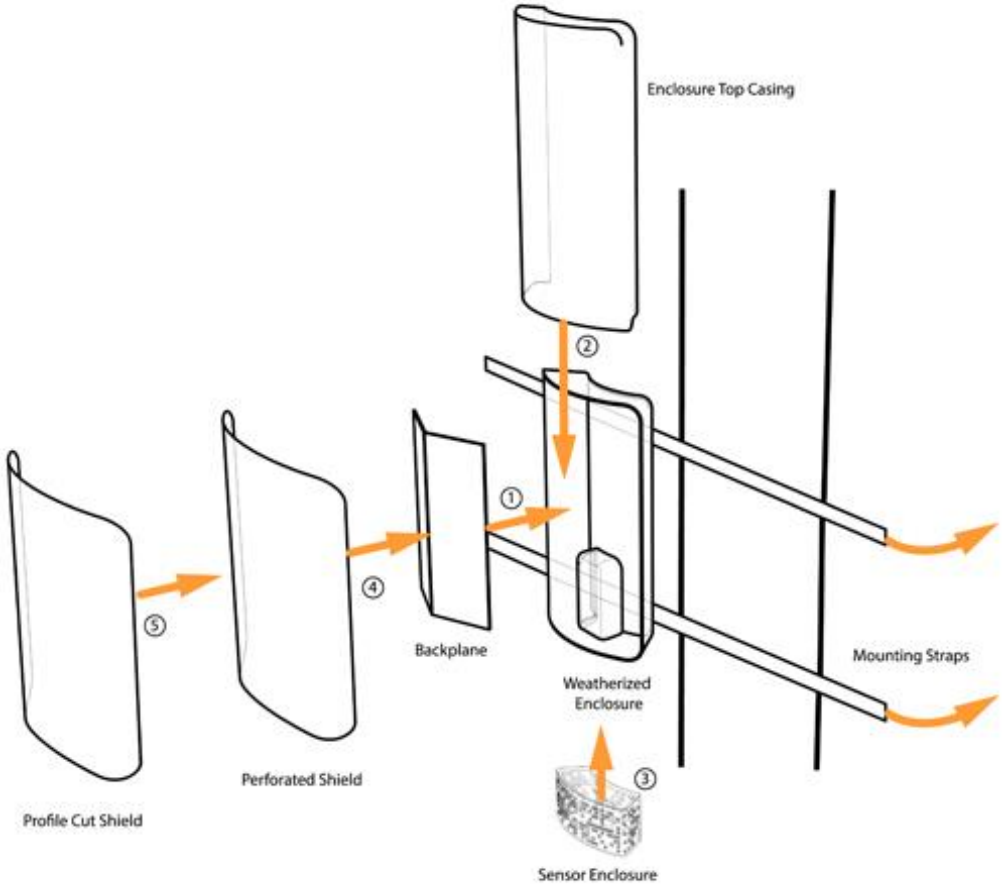
Array of Things

The Array of Things will provide hyper-local, temporal data on using a variety of sensors:

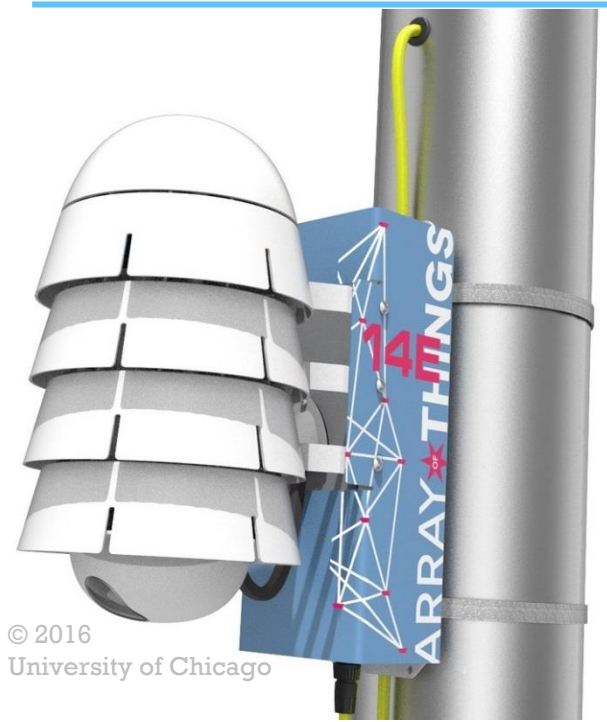
- Sensors measuring **sound and vibration**
- **Low-resolution infrared cameras** measuring sidewalk temperature
- **Climate and environmental data**, such as air-quality and temperature

Array of Things

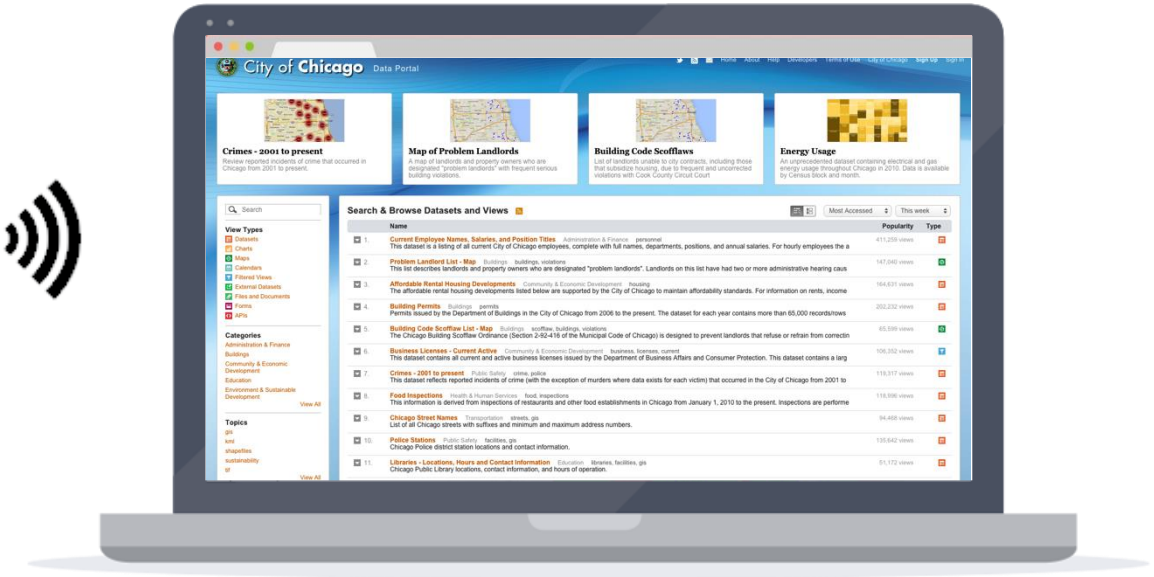




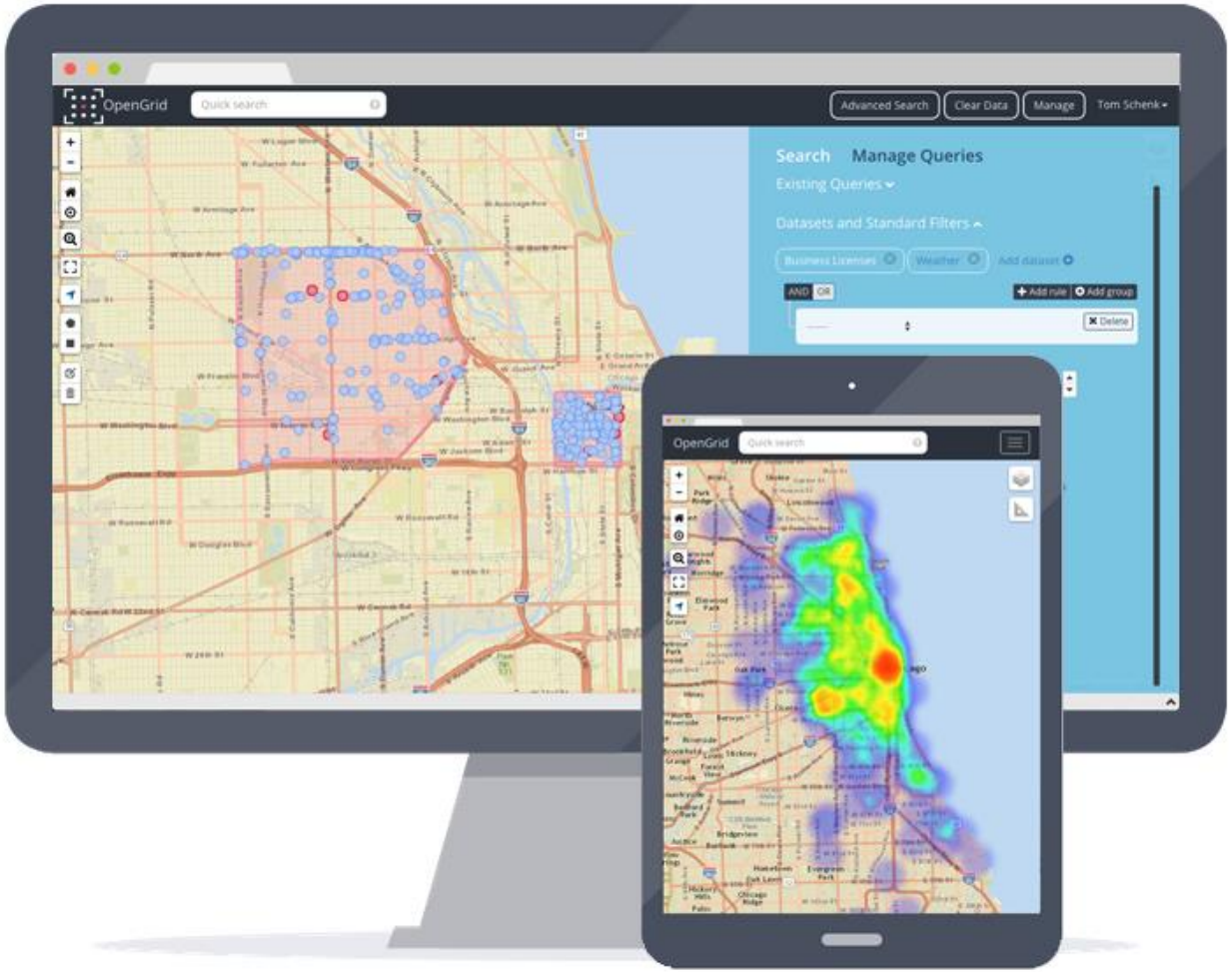
OPEN INTERNET OF THINGS



Array of Things



Chicago Open Data Portal



OpenGrid.io

An #opensource platform which allows you to explore events such as 311 calls, crimes, permits, inspections, DIVVY trips in an interactive map. This software can be used by the public and an internal version drives situational awareness.

ADVANCED ANALYTICS

#Prediction

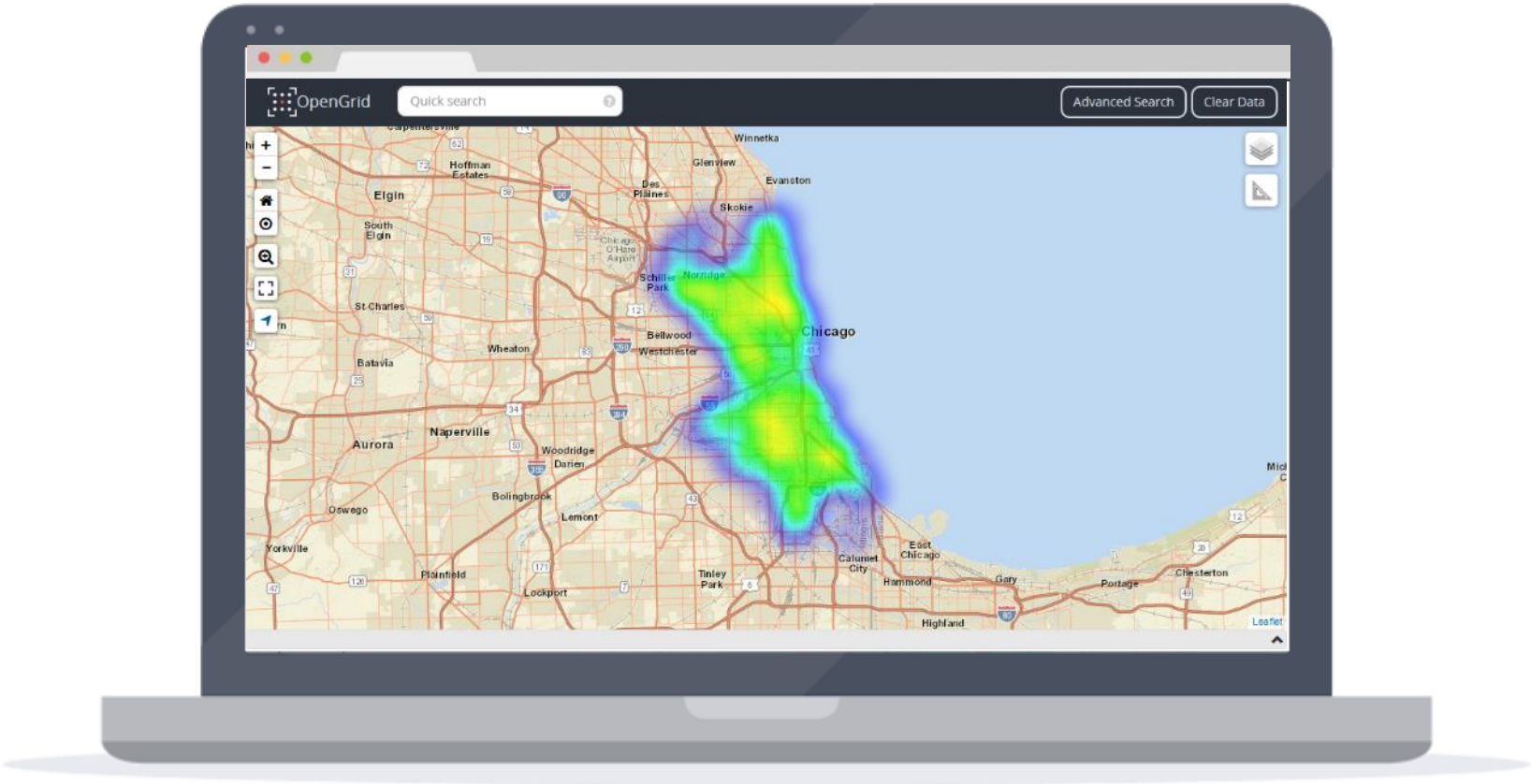
Using data and advanced research techniques to forecast and predict events in the city.

#Evaluation

Evaluate the effectiveness of programs, including the effectiveness of advanced analytics.

#Optimization

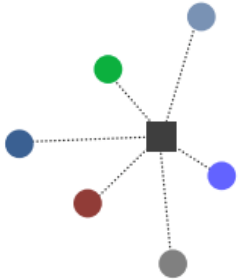
Optimizing the allocation of resources across the city to engage



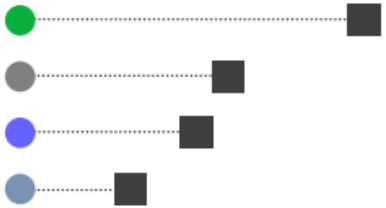
A map of rodent complaints across the city.

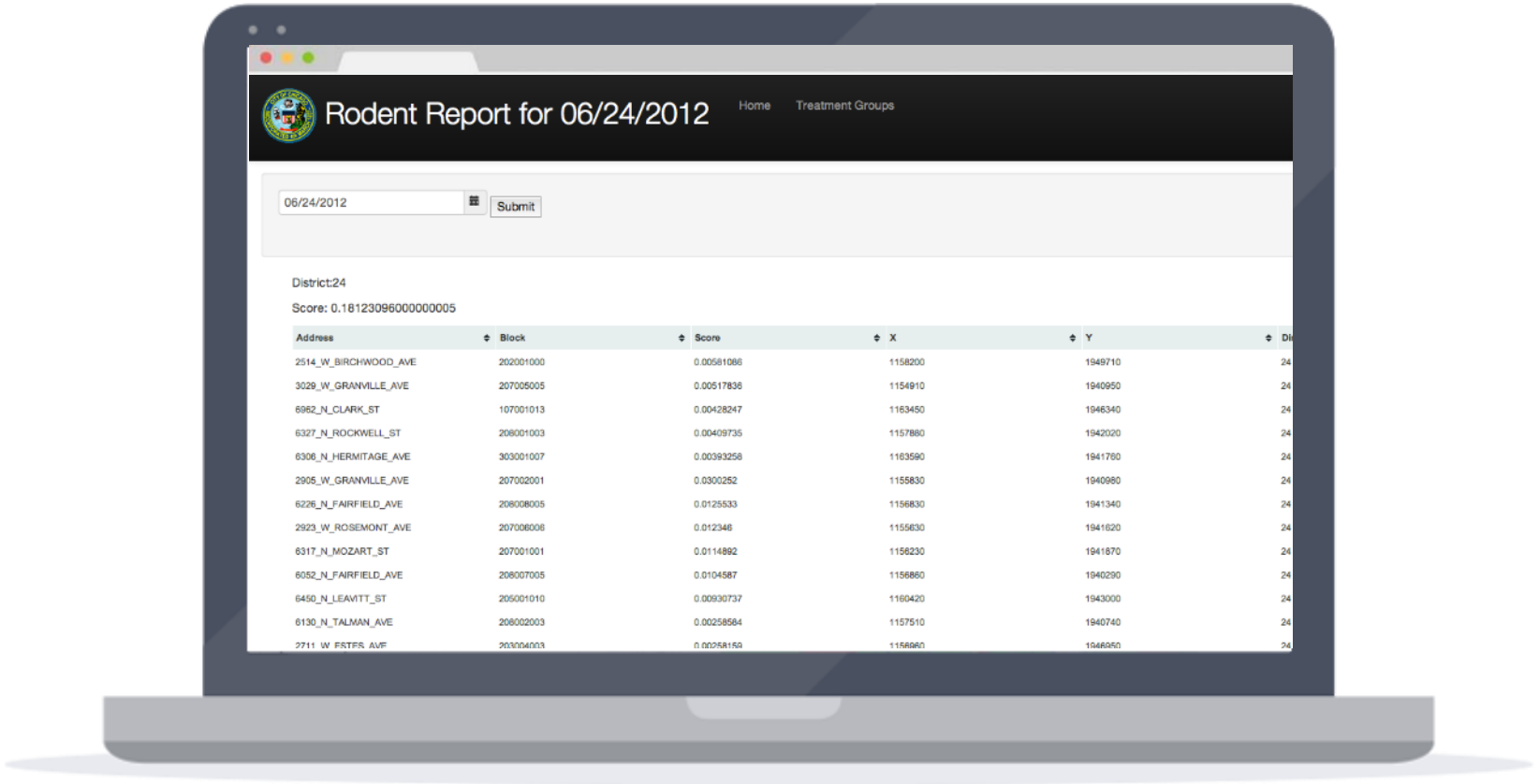
City of Chicago found 31 factors that predicted when and where rodent complaints are most likely in the next week. We used spatial-temporal relationships to create these #predictions, which started as an investigation of over 350 different factors.

Spatial Correlation



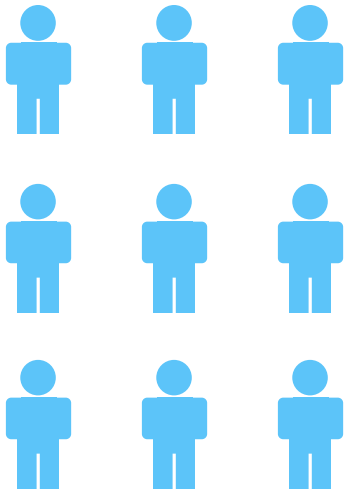
Temporal Correlation

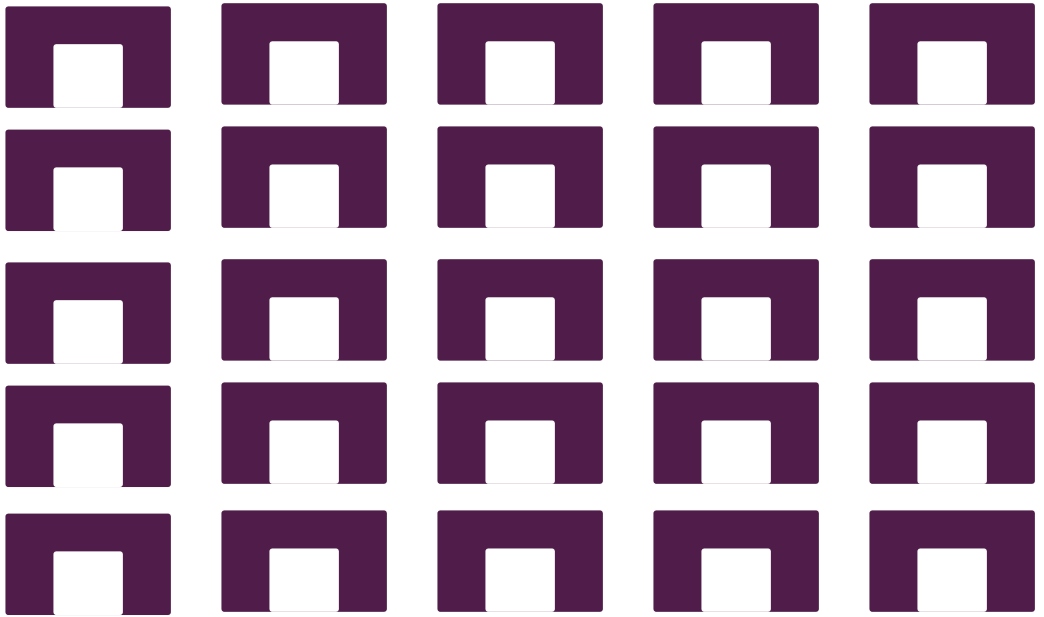




The #predictions generate a list of likely locations and published to an internal site used to route preventative baiting crews to bait likely locations.

OPTIMIZING FOOD INSPECTIONS





OPTIMIZING FOOD INSPECTIONS

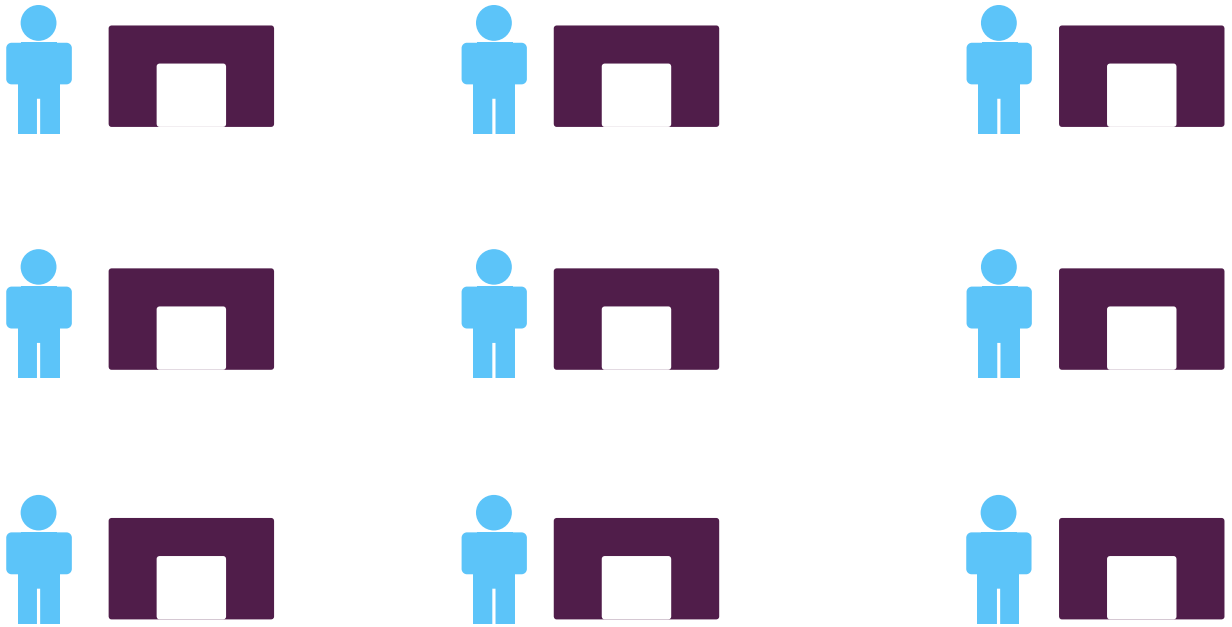
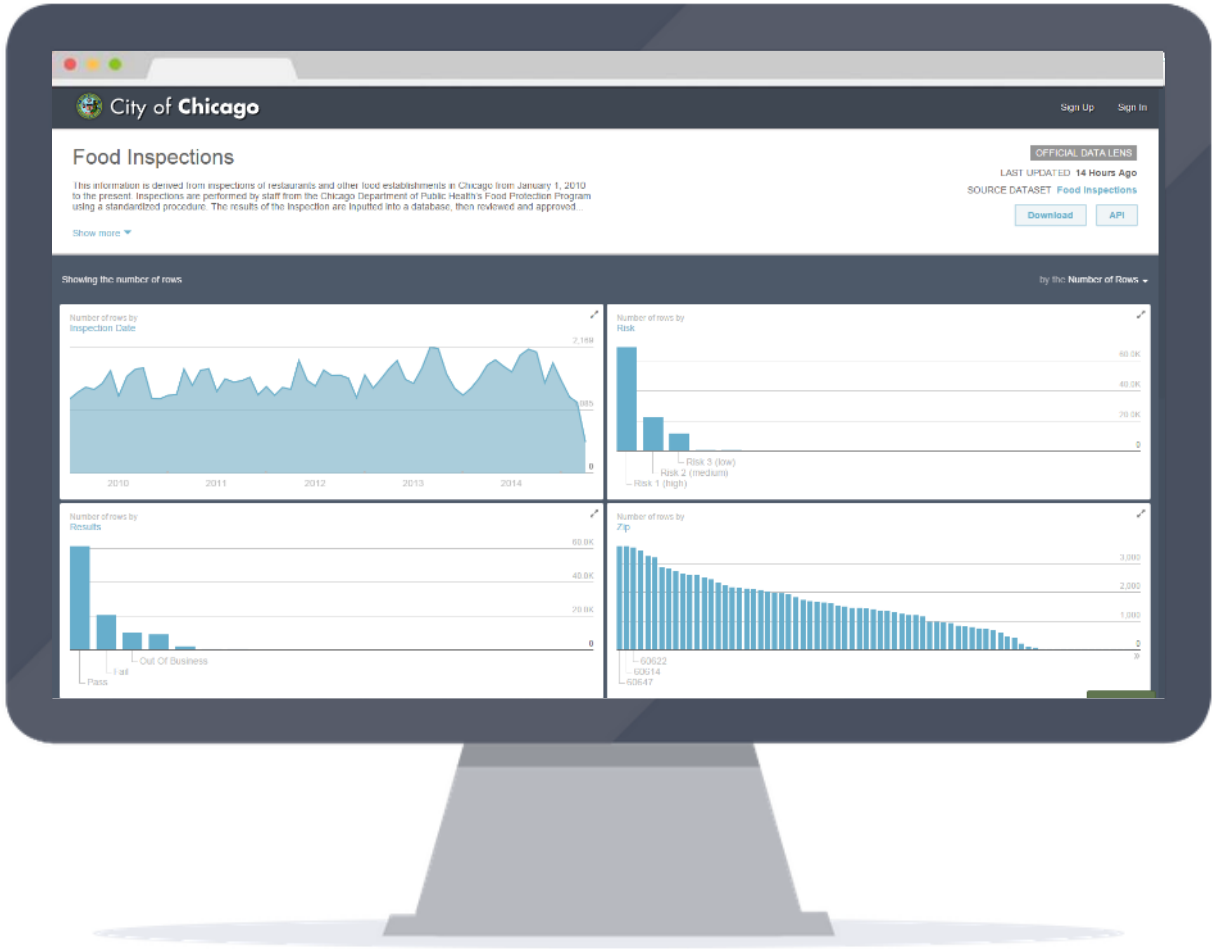


Image adapted from Michael Mooney's *Little Chicago* (CC-BY 2.0).



USING OPEN DATA

Chicago leveraged the #opendata portal to share data with external researchers, leveraging the city's premiere method of sharing data and saving time on data-sharing agreements to create #predictions.

data.cityofchicago.org/view/2bnm-jnvb

The model predicts the likelihood of a food establishment having a critical violation, a violation most likely to lead to food borne illnesses. Over a dozen #opendata sources were used to help define the model. Ultimately, ten different variables proved to create #predictions of critical violations.

Significant Predictors:

Restaurants with previous critical violations

Three-day average high temperature

CDPH risk level

Location of restaurant

Nearby garbage and sanitation complaints

Type of facility

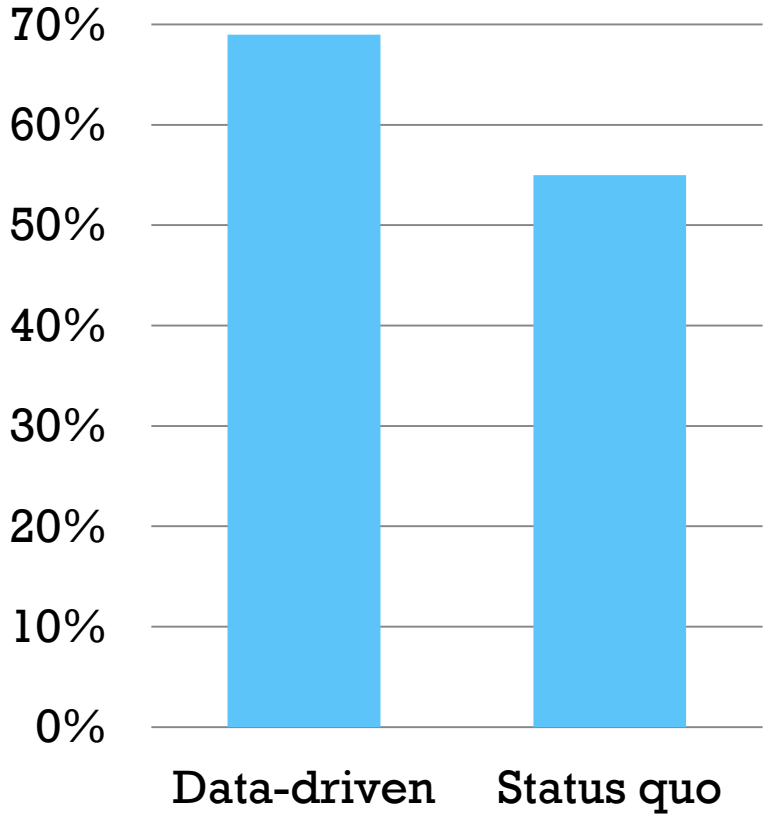
Nearby burglaries

Whether the establishment has a tobacco or has an incidental alcohol consumption license.

Length of time since last inspection.

Length of time the restaurant has been inspecting.

Critical violations



The #predictions revealed an opportunity to find deliver results faster. Within the first half of work, 69% of critical violations would have been found by inspectors using a data-driven approach. During the same period, only 55% of violations were found using the status quo method.

IMPROVEMENT

7 days

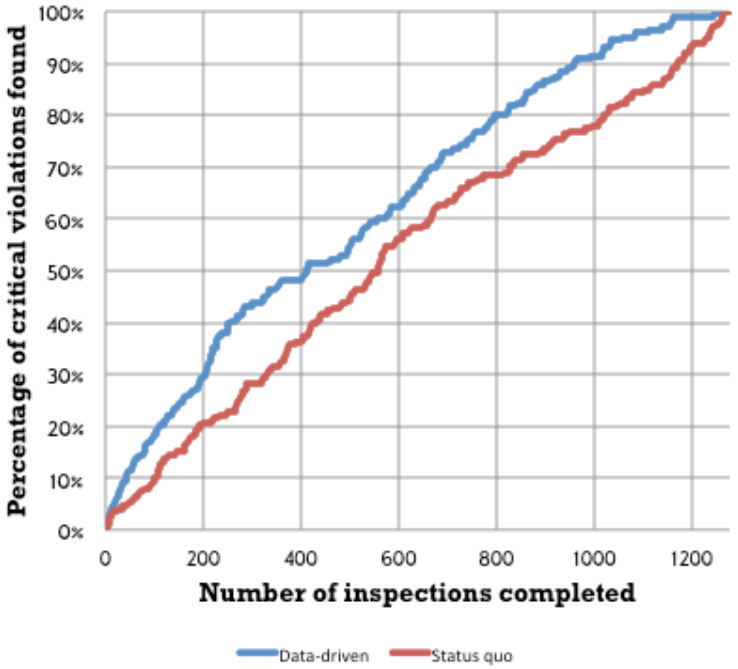
The food inspection model is able to deliver results faster.

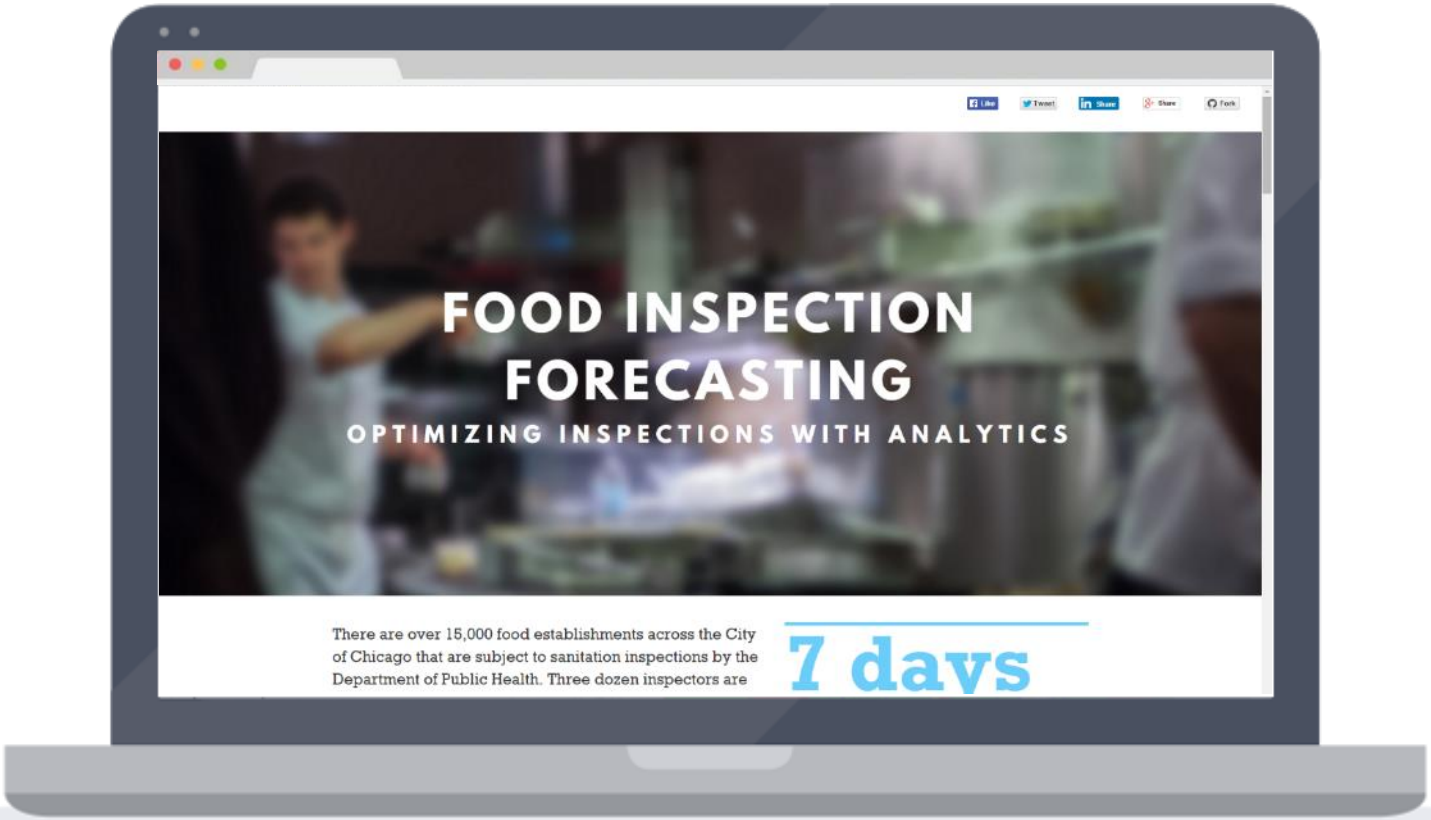
After comparing a data-driven approach versus the status quo, the rate of finding violations was **accelerated** by an average of 7.4 days in the 60 day pilot. That means the #predictions led to more violations would be found sooner by inspectors.

OPTIMIZING FOOD INSPECTIONS

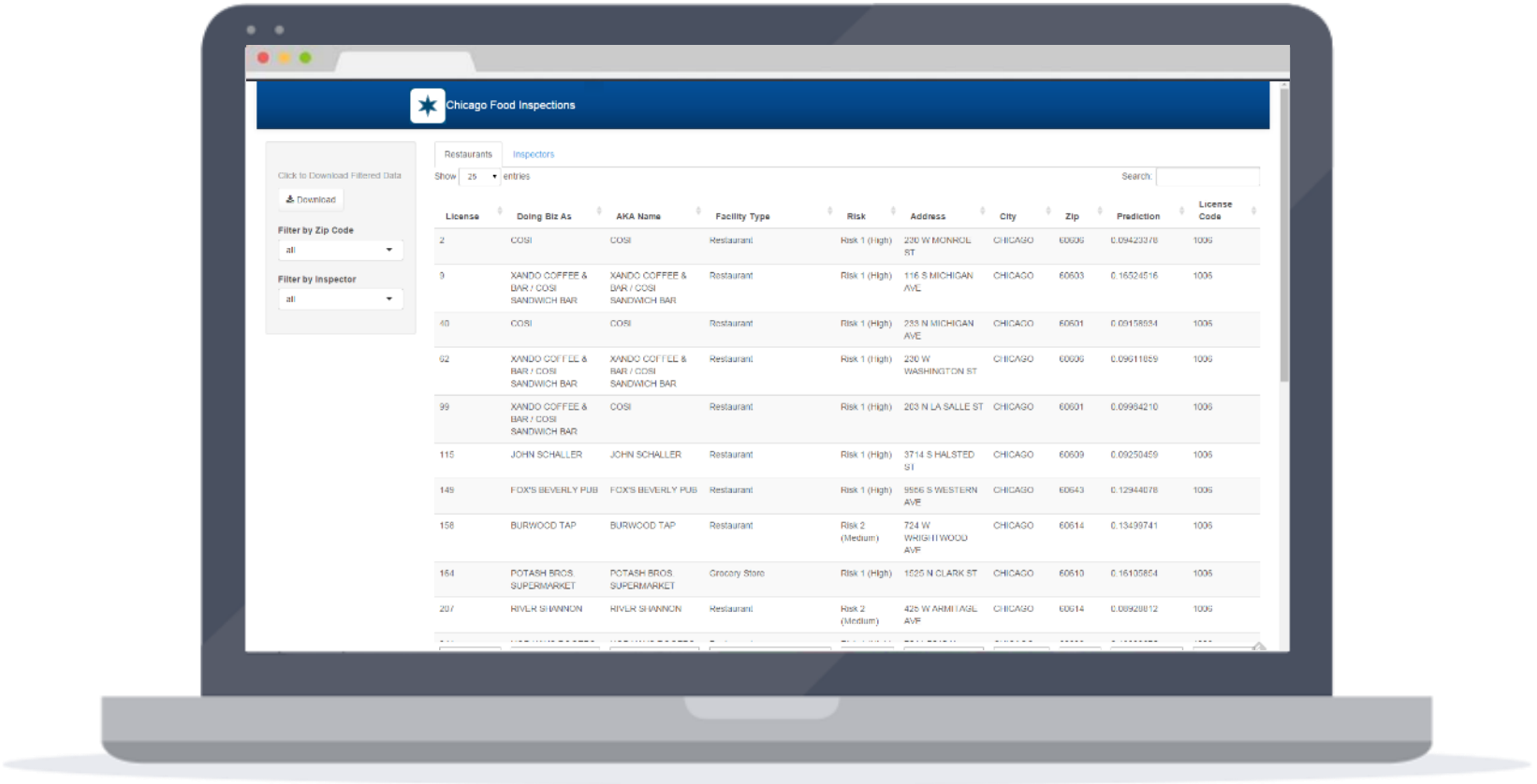
Discovering critical violations sooner rather than later reduces the risk of patrons becoming ill, which helps reduce medical expenses, lost time at work, and even a limited number of fatalities.

Impact

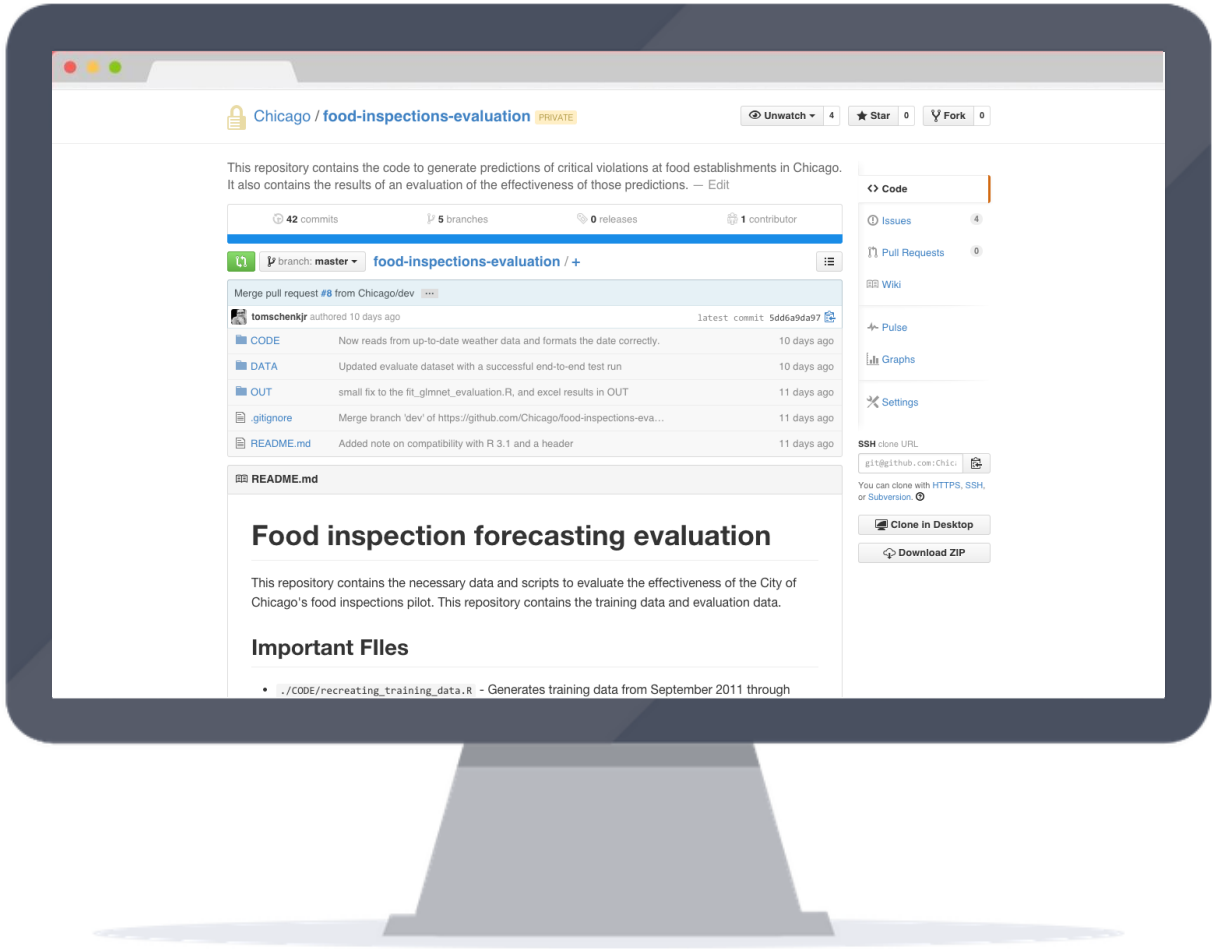




http://chicago.github.io/food-inspections-evaluation/



The data science team has built a website which lets CDPH prioritize inspections based on projected risk.



http://github.com/Chicago/food-inspections-evaluation

#OPENSOURCE

The analytical model will be released as an open source project on GitHub, allowing other cities to study or even adopt the model in their respective cities. No other city has released their analytic models before this release.

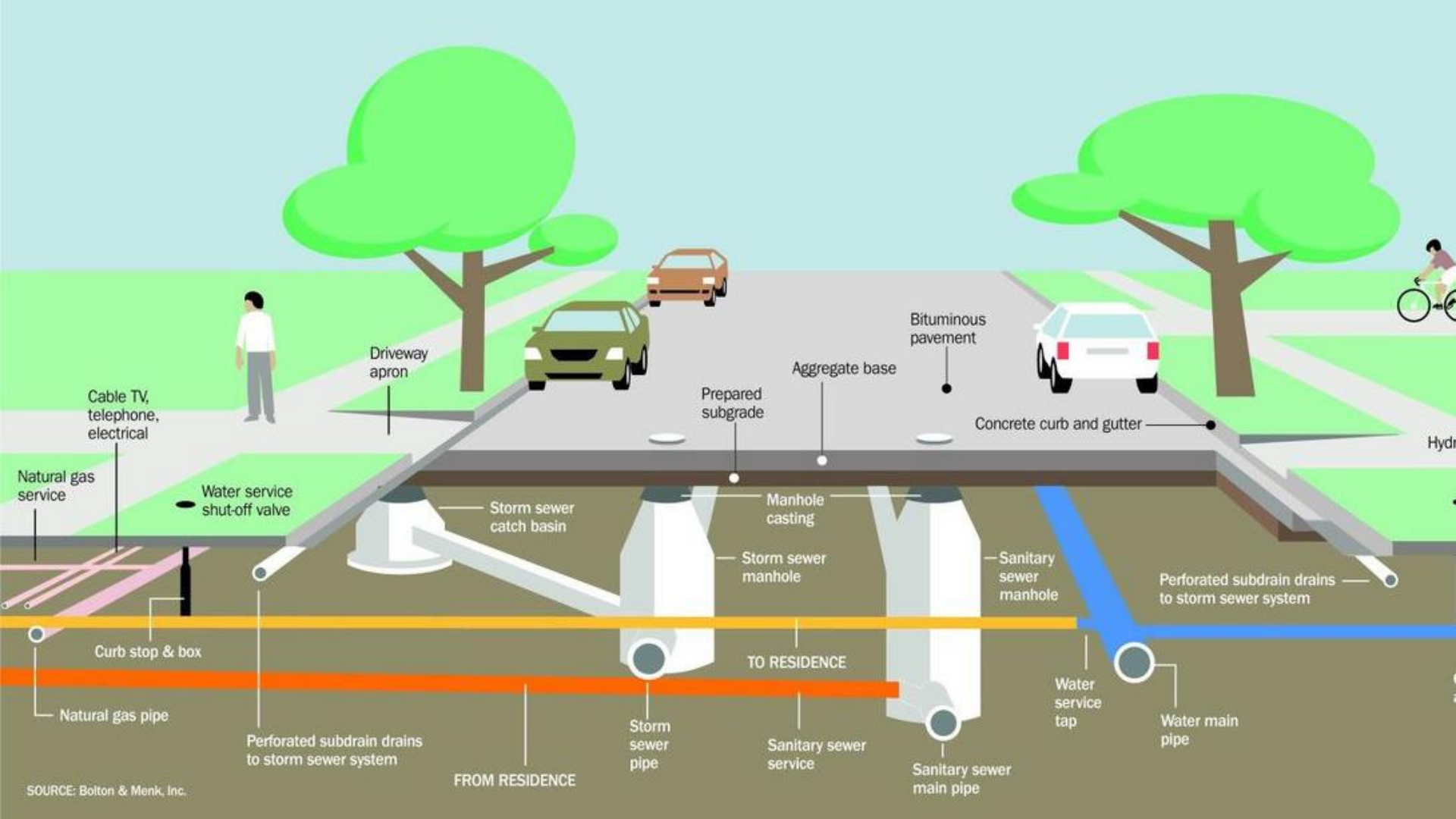
Technical Documentation

The project was released using an academic-quality technical paper instructing others on the the variables and statistical methodology used in the project. In addition to source code, the paper will help researchers adopt this approach.

Reproducible Research

The technical paper was written as a highly-reproducible "knitr" document, allowing other researchers to understand how summary numbers were calculated. Each statement in the project can be traced to an original source.


UNDERGROUND INFRASTRUCTURE IS HIT ON AVERAGE EVERY 60 SECONDS. THE TOTAL COST TO THE NATIONAL ECONOMY IS ESTIMATED TO BE $1.6 BILLION
6572
CHICAGO
© 2016 Chicago Tribune


Driveway apron
Bituminous pavement
Aggregate base
Prepared subgrade
Concrete curb and gutter
Cable TV, telephone, electrical
Natural gas service
Water service shut-off valve
Storm sewer catch basin
Manhole casting
Storm sewer manhole
Sanitary sewer manhole
Perforated subdrain drains to storm sewer system
Curb stop & box
TO RESIDENCE
Natural gas pipe
Perforated subdrain drains to storm sewer system
FROM RESIDENCE
Storm sewer pipe
Sanitary sewer service
Sanitary sewer main pipe
Water service tap
Water main pipe
SOURCE: Bolton & Menk, Inc.

Underground Map

Using off-the-shelf DSLR cameras, photos are stitched together to create a 3-D model of the city's underground infrastructure. City Digital, City of Chicago and a consortium of partners are piloting the tech.

THANK YOU

Tom Schenk Jr.

Chief Data Officer

City of Chicago

Contact Info:

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Websites:

Data @ data.cityofchicago.org

News @ digital.cityofchicago.org

Maps @ opengrid.io

Strategy @ techplan.cityofchicago.org

Slides @ speakerdeck.com/tomschenkjr