

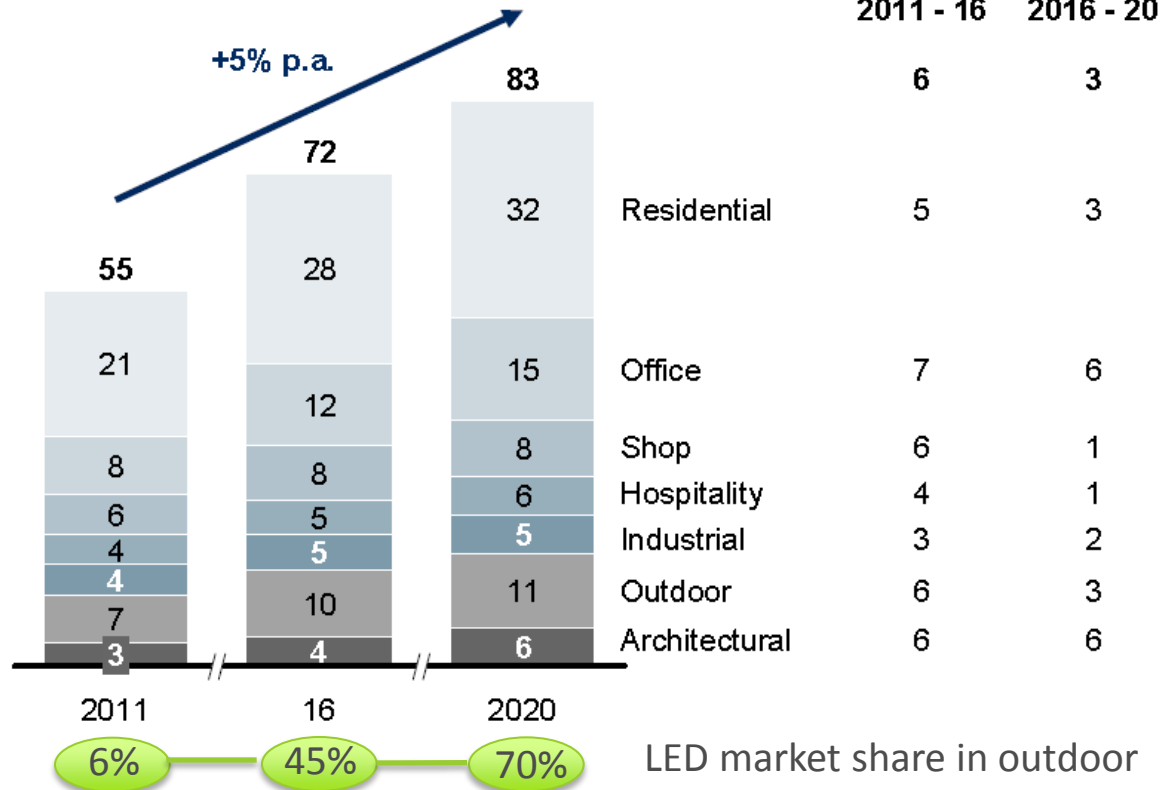
Illuminating Thoughts on Nighttime Design: Technology opportunities, and more...

NACTO Designing Cities 2016
Sept 26, Seattle, WA

Michael Poplawski
Pacific Northwest National Laboratory

LED Technology is changing outdoor lighting

General lighting market size¹ by application
EUR billions

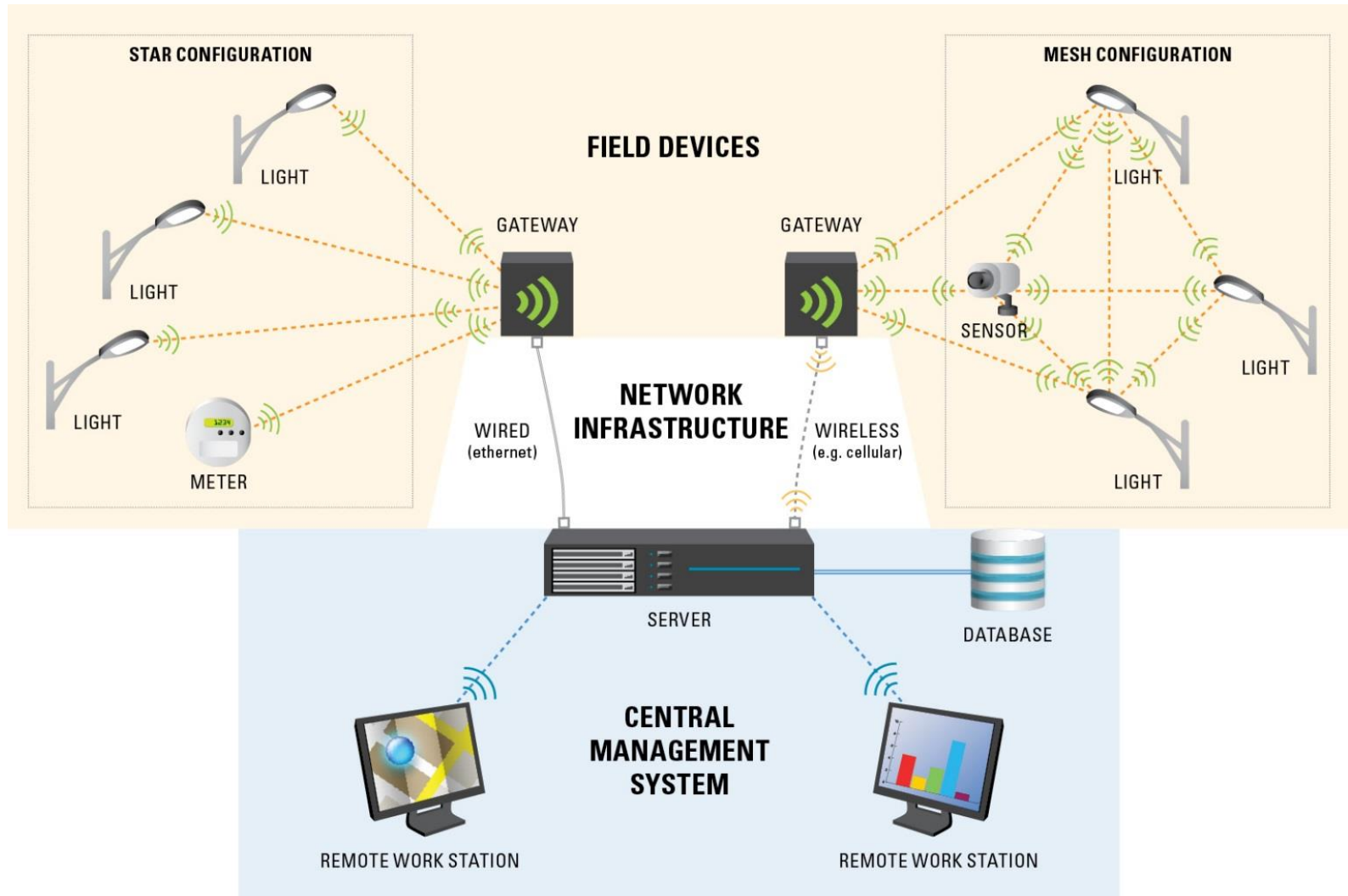


[http://www.mckinsey.com/~media/mckinsey/dotcom/client_service/automotive and assembly/lighting the way perspectives on global lighting market 2012.ashx](http://www.mckinsey.com/~media/mckinsey/dotcom/client_service/automotive_and_assembly/lighting_the_way_perspectives_on_global_lighting_market_2012.ashx)

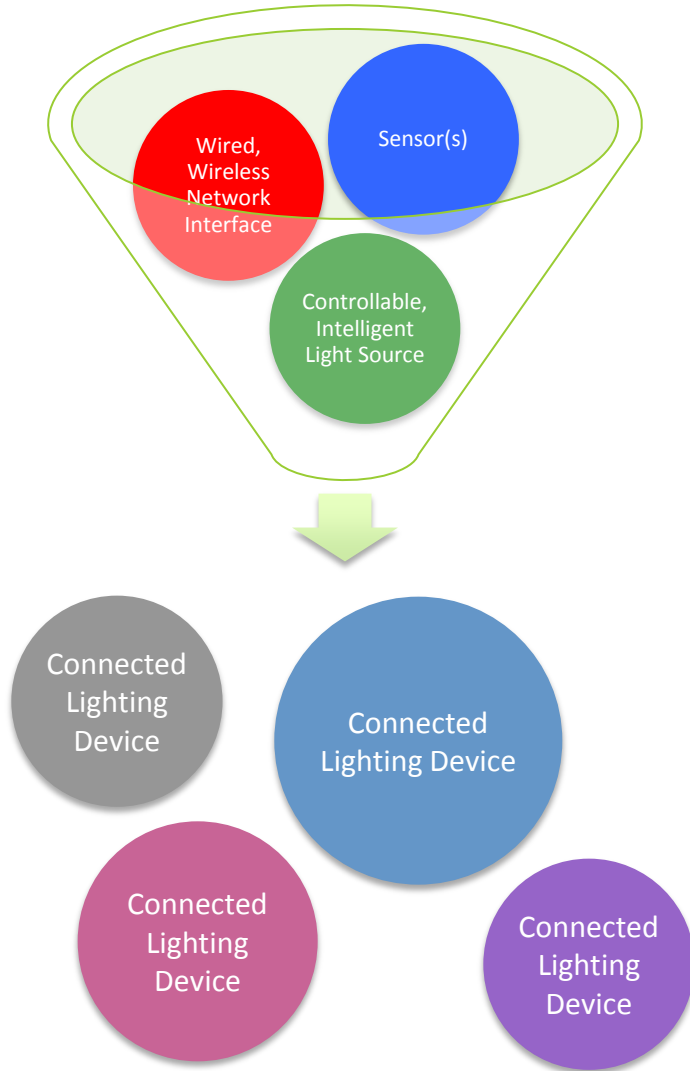
Outdoor lighting control: past



Outdoor lighting control: present and future



Outdoor lighting **devices**: future

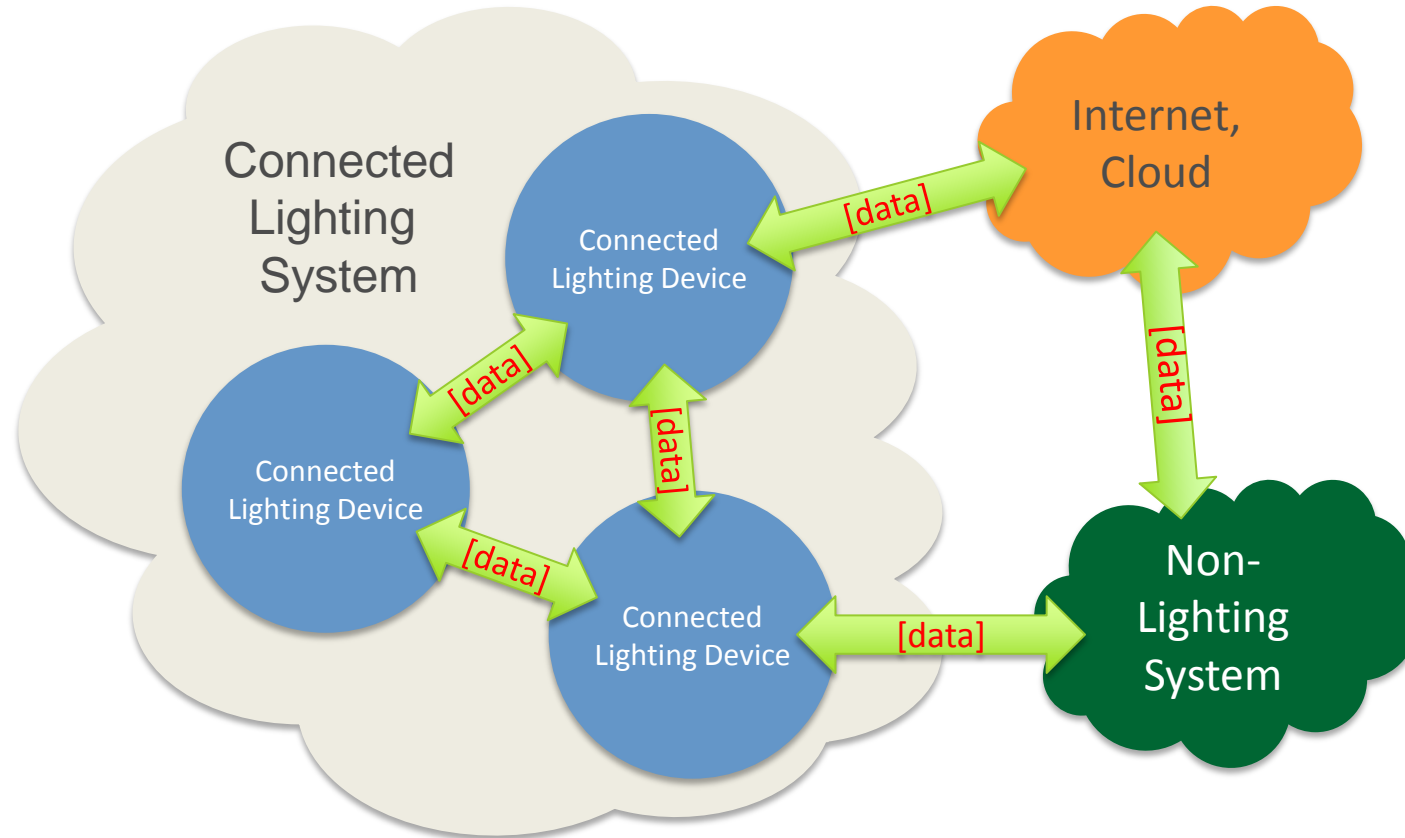


- LED technology is the catalyst
 - Efficacy, Energy/Cost Savings
 - Electronic Platform
- Controllable: light output, CCT, chromaticity, SPD?
- Intelligent: integral data processor, memory, algorithms
- Network interface: wired, wireless, interoperability, standards
- Sensors: ambient light, traffic, occupancy, environmental, video, audio, air quality, radiation

Outdoor lighting **systems**: future

Opportunity

Enabling intelligent lighting devices with the right type and amount of data can result in reduced energy consumption and improved lighting performance



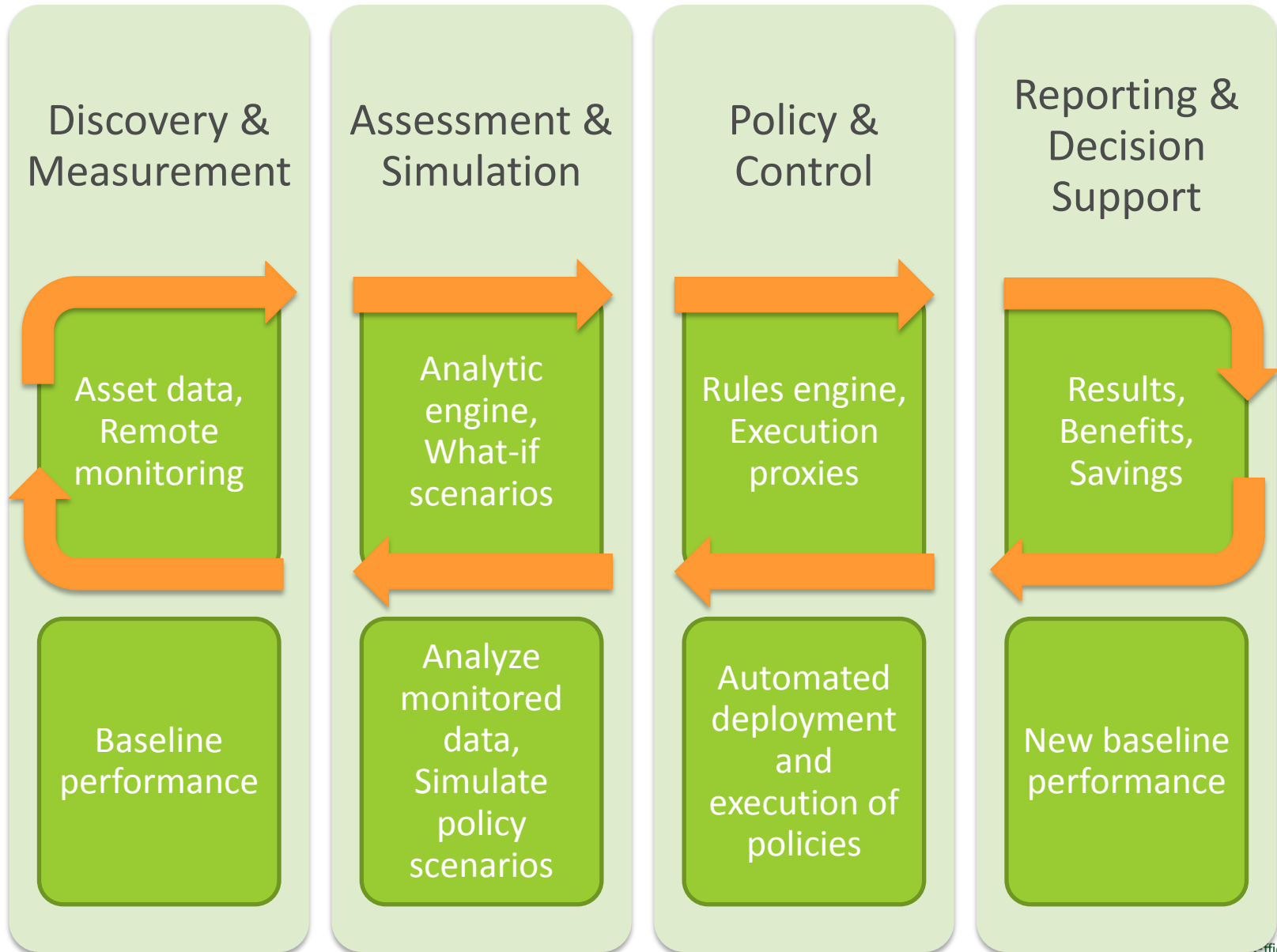
The collected data may enable other revenue streams that compete with lighting and energy performance.

Threat

Connected lighting systems: a growing list of other benefits



Data-driven performance (e.g. energy) management

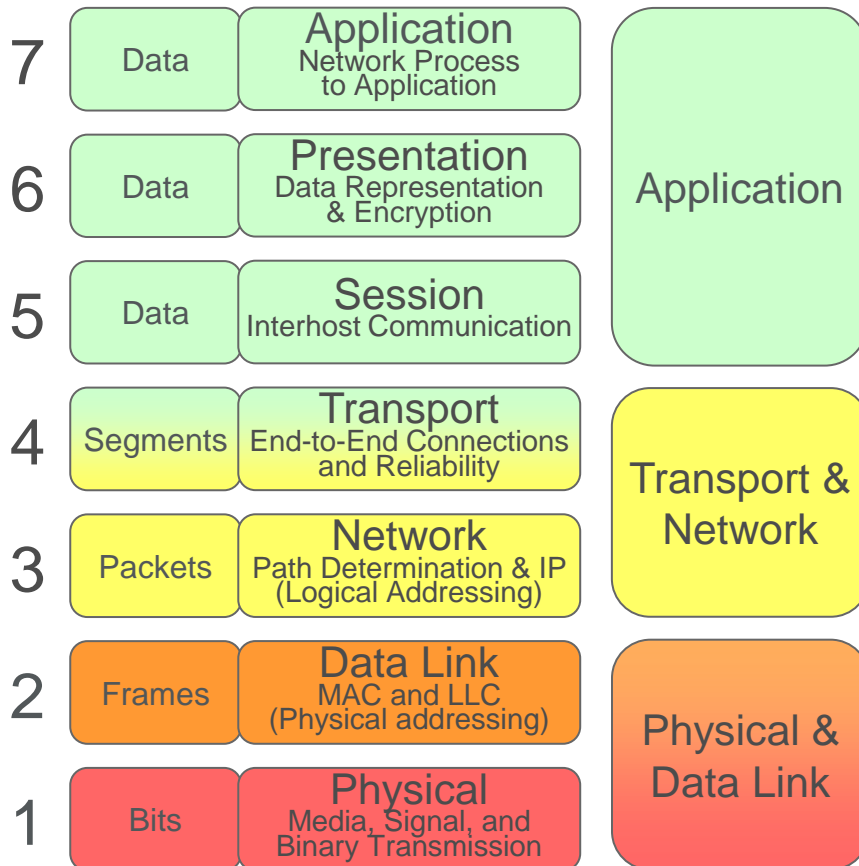


Key technology considerations

- Cost, value propositions, justification
- Adaptive lighting (intensity and spectrum?)
- Available data producers (i.e. sensors)
- Data accuracy
- (Big) data storage, transport, analytics
- Cybersecurity
- Data privacy
- **Right now: Interoperability**
 - Today: mostly achieve via Application Programming Interfaces (APIs)
 - The near future: must be specified. “Must be interoperable with my asset management system” is not good enough
 - Eventually: one or more ecosystems where things “just work”

Interoperability and standards

Interoperability: The capability of two or more devices, applications, networks, or systems to reliably and securely **exchange and readily use data** with a commonly shared meaning.



Food for thought

- Transition from justification by energy savings to justification to other features and benefits
- Quantification, monetization of many features and benefits still unproven at present; right now some still need to be justified by energy savings
- How much energy savings can be realized?
 - More than before; limited by adaptive lighting guidance, viability
 - Monetization limited by utility tariffs
 - Self-energy reporting facilitates verification, management
- How to establish value of other features and benefits?
 - Early adopters
 - Does value translate, scale?
- How do we learn how to use (big) data?

Big data in practice

The image is a screenshot of the City of Chicago's official website, specifically the 'DATA-SMART CITY SOLUTIONS' section under 'INFRASTRUCTURE'. The page features a navigation bar with links for Home, City Services, People We Serve, Programs & Initiatives, Chicago Government, and About Chicago. A search bar is located in the top right corner. The main content area is divided into two sections. The top section is titled 'Using Predictive Analytics to Combat Rodents in Chicago' and includes a sub-header 'What We Do with Data'. The bottom section is titled 'Chicago's Data-Powered Recipe for Food Safety' and includes a sub-header 'Advanced Analytics'. The background of the page shows a kitchen scene with chefs in white uniforms working at a counter.

City of Chicago The City of Chicago's Official Site

English | Español | 中文 | Polski | عربي

Keyword Search

Home City Services People We Serve Programs & Initiatives Chicago Government About Chicago

DEPARTMENT OF INNOVATION & TECHNOLOGY

DATA-SMART CITY SOLUTIONS

INFRASTRUCTURE

What We Do with Data

We treat data as a resource to visualize, analyze, and use to improve city operations.

The data science unit provides:

- Advanced analytics
- Open data
- Business intelligence
- Data management

Each unit works together to streamline the city portal and internal reports. Our techniques to uncover relationships and trends.

Advanced Analytics

The advanced analytics unit is responsible for identifying hidden correlations between events, forecasting or projections on events to resolve issues. The team also engages in evaluating the effectiveness of analytics.

The team is also responsible for creating advanced analytics by the city.

Open Data

The open data unit is responsible for providing data in machine-readable format. The team manages the City of Chicago data portal, which contains almost 500 datasets ranging from crimes to energy consumption. The team also manages the city's data dictionary, a directory of databases kept in the city with detailed information on data stored within those systems.

Chicago's Data-Powered Recipe for Food Safety