Urban Sustainability Research Activities at a University Level

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THE UNIVERSITY OF CHICAGO | Mansueto Institute for Urban Innovation

Our Approach Our People Our Work Contact Us

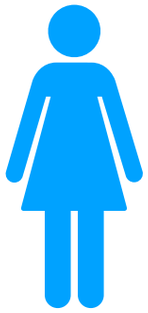
MIurban.uchicago.edu

We study the fundamental processes that drive, shape, and sustain cities.

At the Mansueto Institute for Urban Innovation, our researchers come from the social, natural, and computational sciences, along with the humanities. Together, we pursue innovative, interdisciplinary scholarship, develop new educational programs, and provide leadership and evidence to support global, sustainable urban development.

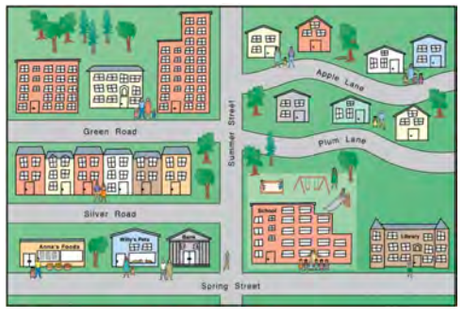
Scale	Integration	Mechanism
		cognition **life-course** **human development** **seeds of economic growth**
Individual	**livability** **safety** **schools** **knowledge**	
Neighborhood		**neighborhood effects** cumulative (dis)advantage
	selection **segregation** **mixing** **contagion**	
City		**scaling and agglomeration** social + physical networks economy, information, land uses
	migration **trade** **knowledge diffusion**	
Urban Systems		**laws of geography** gravity law, Zipf's law urban hierarchy

10^9



billions

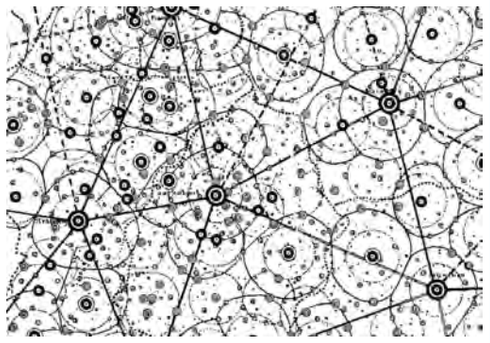
10^6



millions

10^3

thousands



Urban Science: Integrating scales + disciplines

1987

Shanghai

25 years!

2012

credit: telegraph/reuters/jesus diaz

1987

Not Sustainable

Shanghai

25 years!

2012

credit: telegraph/reuters/jesus diaz

Media

30 OF THE WORLD'S LARGEST & MOST INFLUENTIAL CITIES HAVE PEAKED GREENHOUSE GAS EMISSIONS.

Austin, Athens, Lisbon, and Venice latest C40 cities that have peaked greenhouse gas emissions in line with science-based targets to limit global temperature rise to 1.5°C.

C40 announces launch of C40 Knowledge Hub, an online platform providing cities with cutting-edge intelligence to drive climate action at greater speed and scale.

Copenhagen, Denmark (October 8, 2019) - Austin, Athens, Lisbon, and Venice are the latest major cities to have peaked their greenhouse gas emissions. The world's leading scientists have calculated that global greenhouse gas emissions must peak by 2020 in order to limit global temperature rise to 1.5°C. New analysis published ahead of the C40 World Mayors Summit confirms that 30 of the world's largest cities, representing more than 58 million urban citizens, have now reached this crucial milestone.

The 30 cities are: Athens, Austin, Barcelona, Berlin, Boston, Chicago, Copenhagen, Heidelberg, Lisbon, London, Los Angeles, Madrid, Melbourne, Milan, Montréal, New Orleans, New York City, Oslo, Paris, Philadelphia, Portland, Rome, San Francisco, Stockholm, Sydney, Toronto, Vancouver, Venice, Warsaw, and Washington, D.C.

Connect with C40

Fact Sheets

Why Cities?

C40 on its 10-year anniversary

C40 Networks

Media

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Email Twitter Facebook

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All Rich Cities !!!

Not developing fast anymore

Universities’ contributions to advancing urban sustainability research and practice

Research **Demonstration** **Education** **Partnership**

Research

Research

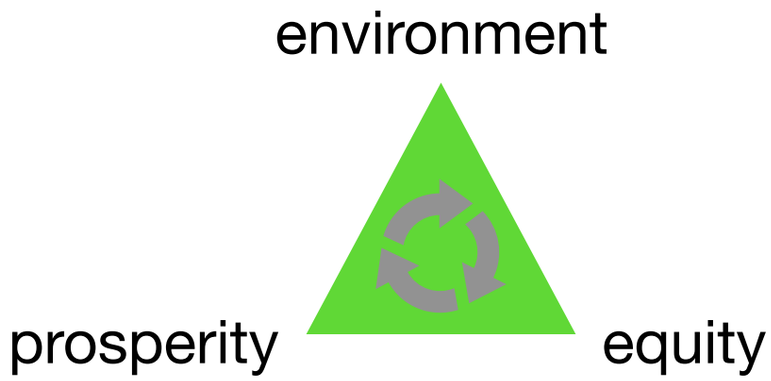
new+ better evidence (data)

mixed methods

multiple scales

theory development

Resolve false dichotomies



Global North ⟷ **Global South**

priorities

RESEARCH ARTICLE SOCIAL SCIENCES

Toward cities without slums: Topology and the spatial evolution of neighborhoods

Christa Brelsford[1,2,*], Taylor Martin[3], Joe Hand[1] and Luís M. A. Bettencourt[1,4]

+ See all authors and affiliations

Science Advances 29 Aug 2018:
Vol. 4, no. 8, eaar4644
DOI: 10.1126/sciadv.aar4644

Heterogeneity and scale of sustainable development in cities

Christa Brelsford, José Lobo, Joe Hand, and Luís M. A. Bettencourt

PNAS August 22, 2017 114 (34) 8963-8968; first published May 1, 2017 https://doi.org/10.1073/pnas.1606033114

Edited by Karen C. Seto, Yale University, New Haven, CT, and accepted by Editorial Board Member B. L. Turner March 21, 2017 (received for review June 24, 2016)

Economic geography and the scaling of urban and regional income in India

Anand Sahasranaman, Luís MA Bettencourt

First Published October 9, 2019 | Research Article | Check for updates
https://doi.org/10.1177/2399808319879463

Growth and development in prefecture-level cities in China

Daniel Zünd, Luís M. A. Bettencourt

Published: September 3, 2019 • https://doi.org/10.1371/journal.pone.0221017

Demonstration

THE UNIVERSITY OF CHICAGO

Sustainability Plan Baseline Report

November 2016

THE UNIVERSITY OF CHICAGO | Office of Sustainability

AREA 1
Climate Change and Energy

AREA 2
High Performance Buildings

AREA 3
Multi-Modal Transportation

AREA 4
Waste Reduction

AREA 5
Food Systems

AREA 6
Green Space

AREA 7
Water Conservation

AREA 8
Environmentally Preferable Procurement

AREA 9
Building Awareness and Partnerships

EXECUTIVE SUMMARY

Executive Summary

Managing greenhouse gas emissions is the University's top sustainability priority.

By reducing building energy use, the University manages greenhouse gas emissions and realizes major economic benefits.

See individual area pages for additional details.

HIGHLIGHTS

- Recipient of philanthropic support from James and Paula Crown to support the University's aims to reduce its greenhouse gas emissions.
- Accelerate Performance grant partner (a U.S. Department of Energy funded initiative)
- Two-Star Green Restaurant Association Certification at Arley D. Cathey Dining Commons and Café Logan in 2015
- 2011 Green Star Grand Award from the Professional Grounds Management Society for exceptional grounds maintenance
- Member of the Chicagoland Network for Sustainability in Higher Education (CNSHE) since 2010
- Member of the Ivy Plus Sustainability Consortium since 2009

AREA 1
CLIMATE CHANGE AND ENERGY

Approximate 1% decrease in greenhouse gas emissions

AREA 2
HIGH PERFORMANCE BUILDINGS

9 **LEED certified buildings since 2010**

200+ **building energy efficiency measures since 2009**

AREA 3
MULTI-MODAL TRANSPORTATION

39% decrease in greenhouse gas emissions from student commuting

15% decrease in greenhouse gas emissions from faculty & staff commuting

AREA 4
WASTE REDUCTION

More than 40% of UChicago waste was diverted from landfills in 2015.

AREA 5
FOOD SYSTEMS

35% of food served is grown, processed, and purchased within 150 miles.

40% of food served is grown, processed, and purchased within 250 miles.

AREA 6
GREEN SPACE

46%

of the University of Chicago campus is green space.

AREA 7
WATER CONSERVATION

14 centrally controlled smart irrigation systems installed

120,000
gallon underground stormwater retention system installed in 2015

AREA 8
ENVIRONMENTALLY PREFERABLE PROCUREMENT

100% of the cleaning products used in UChicago dining halls and kitchens are Green Seal certified.

80% of the University's janitorial supplies are green products.

AREA 9
BUILDING AWARENESS AND PARTNERSHIPS

27,000+

UChicagoans have a role to play in creating a more sustainable campus.

Campus as a Laboratory

UChicago Sustainability Map

Biking

Campus as a Laboratory

Waste & Recycling Resources

Campus Community Gardens

City and State Resources

Community Resources

Internships and Volunteer Opportunities

Registered Student Organizations

A central challenge of our time is sustaining the world's developing population while minimizing damage to the environment. The Campus as a Lab (CaaL) Initiative uses Chicago's own campus as a test bed for creating innovative solutions and developing skills in analyzing systems of energy and resource flows. CaaL involves education in quantitative environmental analysis, research into practical energy management strategies, and communication that explains our campus and environment. Projects reflect our core values: data-driven and quantitative analysis, implementable solutions, and open-source tools and data.

What is Campus as a Lab?

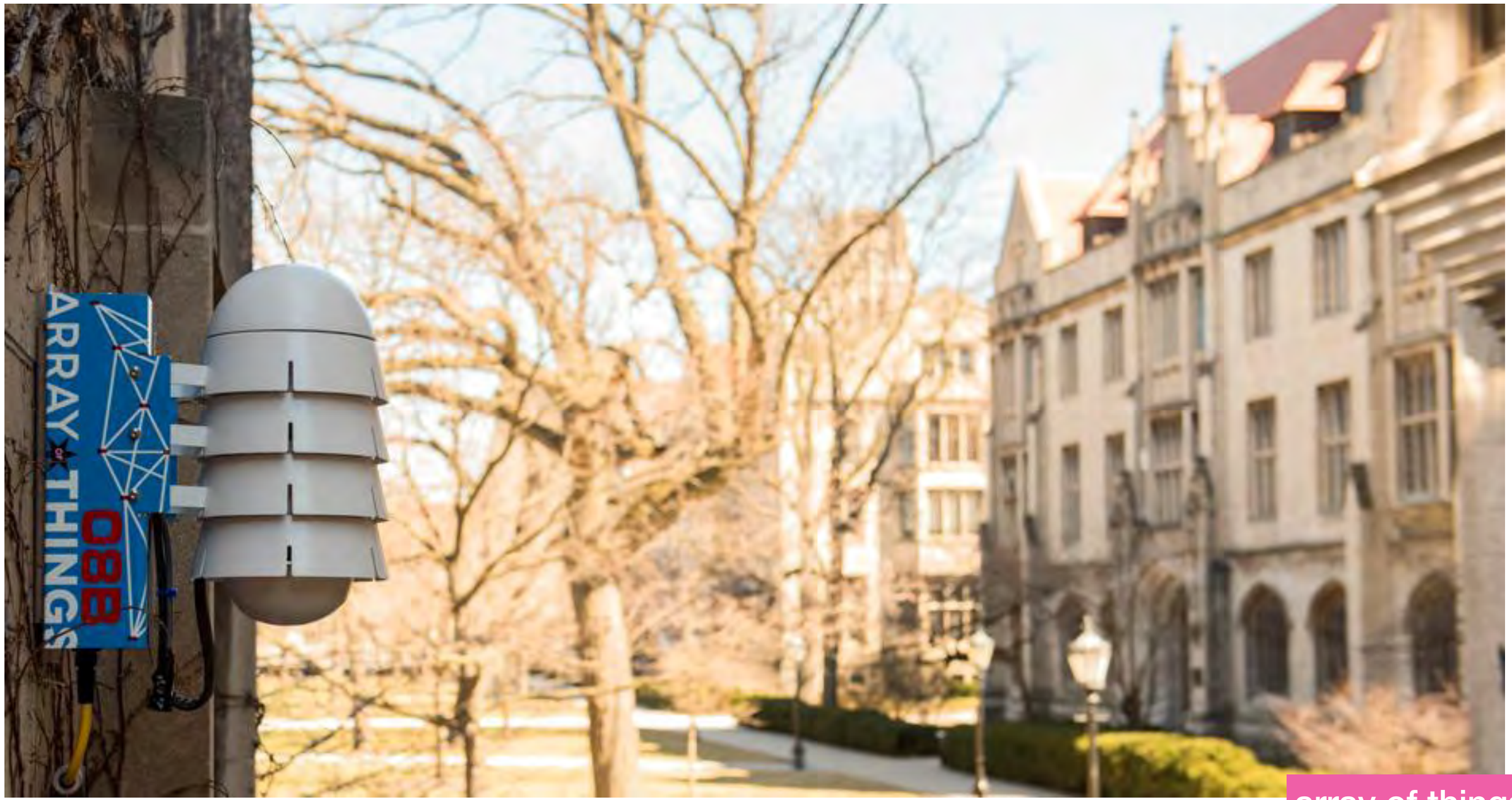
Who: undergraduates, graduate students, faculty, and Facilities staff working in collaboration.

When: ongoing, launched in Spring 2016 and featuring 4 core events in 2016-2017

What: data hackathons on campus energy and resource, demonstration events on waste and energy, and opportunities to be involved in research on campus energy, water, and waste. Focus areas include operation of campus facilities and infrastructure, economics of U Chicago's energy purchases, building retrofit suggestions, transportation planning, and behavioral incentives.

Related Links

- Campus as a Lab



array of things

Array of Things

Faculty Lead

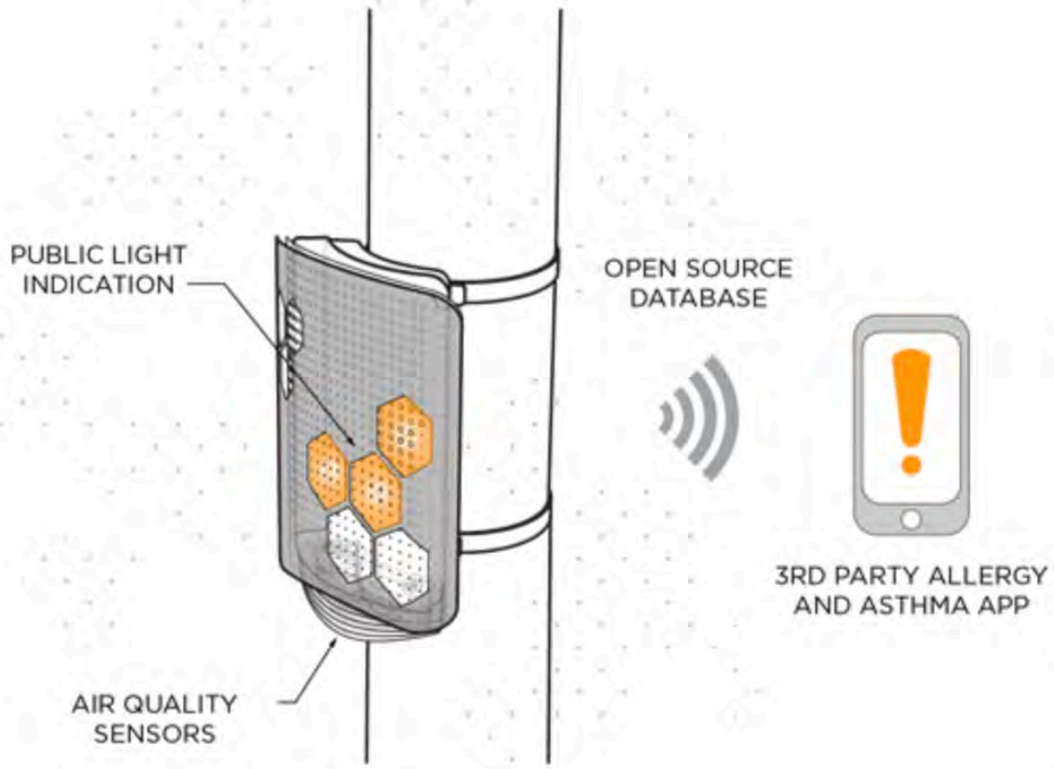
Charlie Catlett

Senior Computer Scientist, Argonne National Laboratory

Creating Sensor Networks and Software Tools to Promote Health and Well-being in Cities

The Array of Things is a network of interactive, modular sensors that collect real-time data on a city's environment, infrastructure, and activity for research and public use. The initiative enables anyone to access data about climate, air quality, noise, and other factors that affect the livability of our built and natural environments.

over 100 nodes operational in Chicago, plans 500.



What Can be Done with this Data?

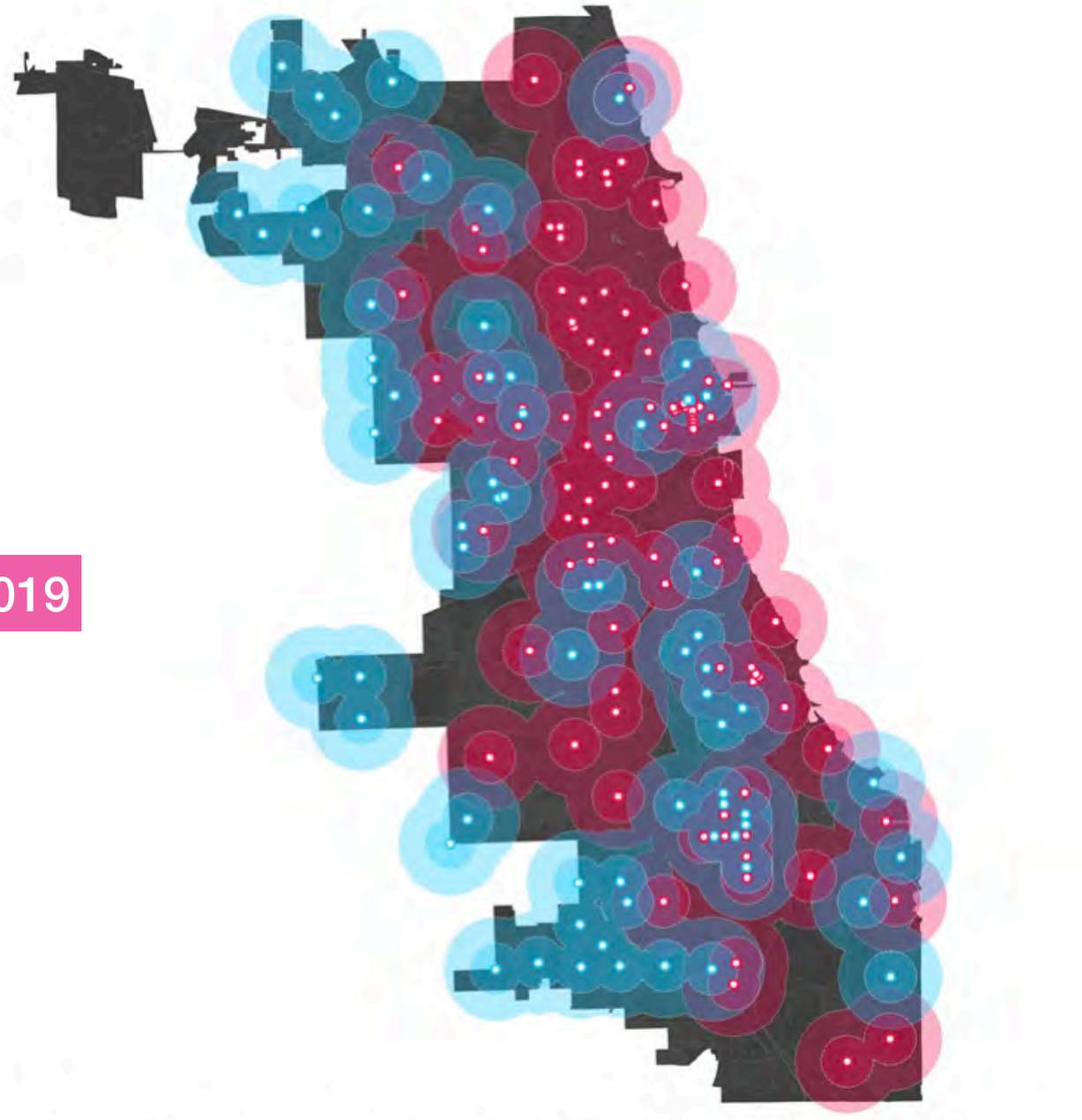
Potential applications of data collected by the Array of Things include:

- Sensors monitoring air quality, sound and vibration (to detect heavy vehicle traffic), and temperature can be used to suggest the healthiest and unhealthiest walking times and routes through the city, or to study the relationship between diseases and the urban environment.
- Real-time detection of urban flooding can improve city services and infrastructure to prevent property damage and illness.
- Measurements of micro-climate in different areas of the city, so that residents can get up-to-date, high-resolution "block-by-block" weather and climate information.
- Observe which areas of the city are heavily populated by pedestrians at different times of day to suggest safe and efficient routes for walking late at night or for timing traffic lights during peak traffic hours to improve pedestrian safety and reduce congestion-related pollution.

Array of Things data and technology will also be available for educational purposes, engaging local students and training them on important job skills. Read more about our educational initiatives and curricula

Array of Things Releases APIs for Chicago Data, Enabling Applications

Array of Things Follow
Nov 5, 2018 · 2 min read



GIS map created by Arpan Laha, Center for Spatial Data Science, University of Chicago.

Education

Lane of Things Project with High Schools

Over the course of eight weeks, the student teams learned important skills, such as:

1. **Formulating an hypothesis or question to be answered through experimentation.** Although the curriculum revolves around sensors and IoT technologies, these are means rather than ends. To conduct a real scientific project, student teams first conceived of an hypothesis or a question. A good example is the project from Group 403. These students were interested in learning whether there is "a correlation between temperature, humidity, carbon monoxide, hydrogen, and UV levels in a greenhouse. The greenhouse gets the most sunlight out of any room in Lane Tech, so we wondered if there was any correlation with UV from the sun and the various gas levels in the room."

Environmental Frontiers

Faculty Leads

Liz Moyer and Sabina Shaikh

Professor, Department of Geophysics; and

Senior Lecturer in Environmental Studies and Public Policy Studies

Empowering Students to Create a Scientifically Robust, Sustainable Future

Environmental Frontiers gives UChicago students a scientific and practical understanding of urban sustainable development, starting with projects on campus. Students work under the guidance of faculty to develop research and applied projects that explore and enhance campus sustainability, with an eye toward broader impact into whole urban areas and their neighborhoods.

Program on the Global Environment

the college
THE UNIVERSITY OF CHICAGO

Environment and Urban Studies Major

Beginning in Fall 2019, PGE's Environmental and Urban Studies major will have two tracks: Environmental or Urban

Learn more! ›

About the Program

Welcome!

new, revamped curriculum for 2019/20

THE UNIVERSITY OF CHICAGO | Mansueto Institute for Urban Innovation

Strategic Functions

A pipeline of Talent for a new Field

College Major + Undergraduate research + Masters Support + Urban Doctoral Fellows + Postdoc Fellows

Constantly Identifying and Promoting Transformational New Ideas

working groups + conferences + fellows convenings+ visitor series + Initiatives

Leading and Enabling a Network of Scholars at the University and throughout the World

International Schools + Convening Peer Institutions + Signature Thought-Leadership Events + Global Centers

Partnership

(& Policy + Practice)

save the date

October 23-25, 2019

City of Chicago, IL

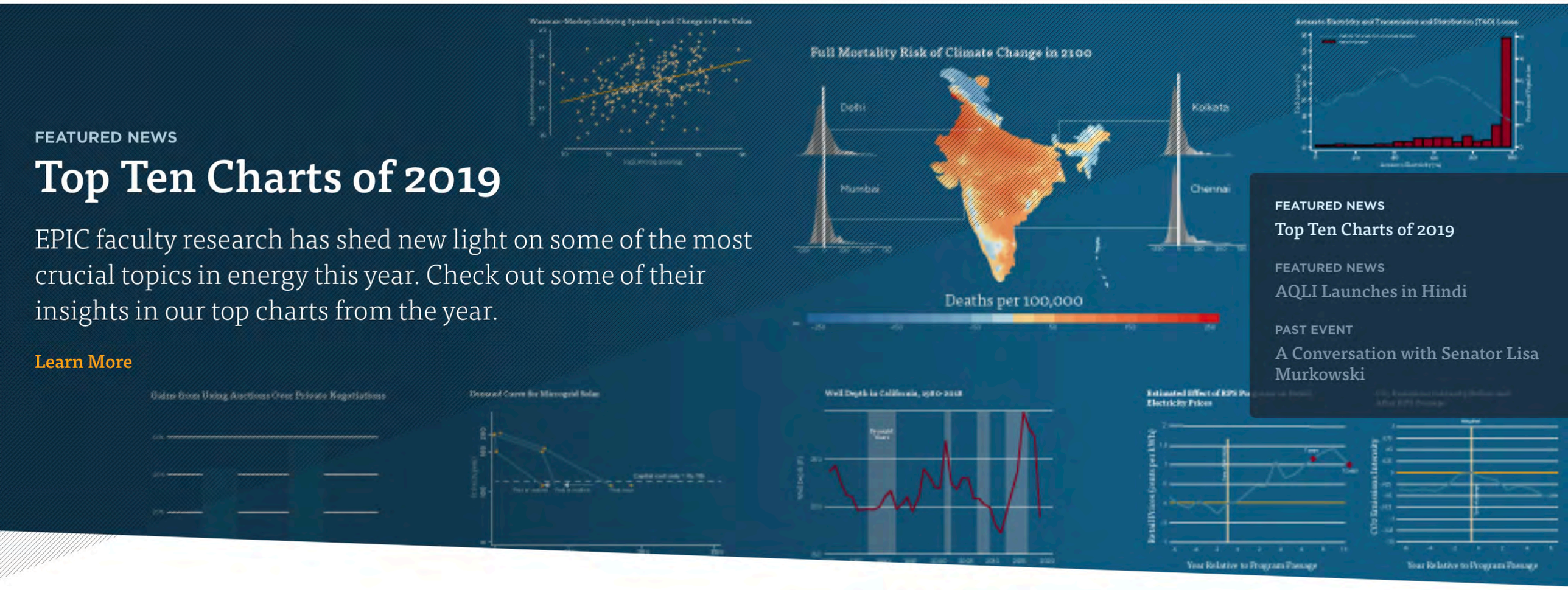
Global Symposium on Sustainable Cities and Neighborhoods

THE UNIVERSITY OF CHICAGO | Mansueto Institute for Urban Innovation

UN-HABITAT

FORD FOUNDATION

THE UNIVERSITY OF CHICAGO | DIVISION OF THE SOCIAL SCIENCES



FEATURED NEWS

Top Ten Charts of 2019

EPIC faculty research has shed new light on some of the most crucial topics in energy this year. Check out some of their insights in our top charts from the year.

Learn More

FEATURED NEWS
Top Ten Charts of 2019

FEATURED NEWS
AQLI Launches in Hindi

PAST EVENT
A Conversation with Senator Lisa Murkowski

MISSION

To confront the global energy challenge by ensuring **Energy Markets** provide access to reliable, affordable energy needed for growth, while limiting emissions that cause **Climate Change** and damages to the **Environment**.

Applied Economics + Policy

The circular economy could save life on Earth – starting with our cities

Cities are where we square the circle between consumption and sustainability.

Image: Unsplash/Lacey Williams

08 Mar 2018

Luis Bettencourt
Pritzker Director of Mansueto Institute for Urban Innovation, University of Chicago

Imagine a future where human prosperity does not translate into sacrificing nature.

A world with no wastes, no pollution, where animals and plants on land and in the oceans prosper from the existence of humans as much as we do from the biology and geophysics of the Earth.

The Math Behind a Localized Approach to the UN's Sustainable Development Goals

LUIS BETTENCOURT | OP-ED FEBRUARY 28, 2018

World Urban Forum 9 convened earlier this month in Kuala Lumpur, Malaysia, to take the measure of our fast-urbanizing world. Central to all discussions was how to create human sustainable development worldwide through better cities as part of the Sustainable Development Goals (SDGs) and the New Urban Agenda.

Chicago's Ambitious Transformation is Possible. The SDGs Can Help.

Mansueto Institute for Urban Innovation Follow
Nov 7 · 4 min read

When Mayor Lori Lightfoot delivered her first budget address last month, she spoke of her commitment to equity and prosperity "for every community and every resident." She emphasized that the "budget is more than just a math problem…It's a values statement for what we prioritize and the kind of city we want to be." Areas for investment include health care and well-being, safe streets, housing, education, clean air and clean water, and neighborhood development with the goal of "leaving no one behind."

METROLAB NETWORK

ABOUT MEMBERS PROJECTS ANNUAL SUMMIT HUMAN SERVICES BLOG JOIN

TECH TRANSFER FOR THE PUBLIC SECTOR.

We are MetroLab Network, a City + University Collaborative for Civic Innovation.

We drive partnerships between local governments and universities, poised to help the public sector adapt to rapid technology change.

We activate this network of stakeholders through convening, collaboration, and programming.

30+ Cities

30+ Universities

100+ Projects

Annual Meeting October 2020 @uchicago

Universities' contributions to advancing urban sustainability research and practice

Research **Demonstration** **Education** **Partnership**

critical and unique functions

Learning

Memory

Connective Tissue

Incubation

Support

Questions for Panel I:

- Among your key urban sustainability research activities, what are the most significant outcomes of research in an interdisciplinary context?

- What are characteristics of urban sustainability programs at universities? For example, are these multi-disciplinary, cross-campus initiatives? Do they bring together research and practice? What disciplines are engaged and/or taking the lead?

- What key strategies have been developed for linking research to policy, promoting sustained collaboration, and making impacts on policy decisions?

- What are some of the key strategies that can be effectively implemented across universities? How have these efforts been developed and what makes them succeed?