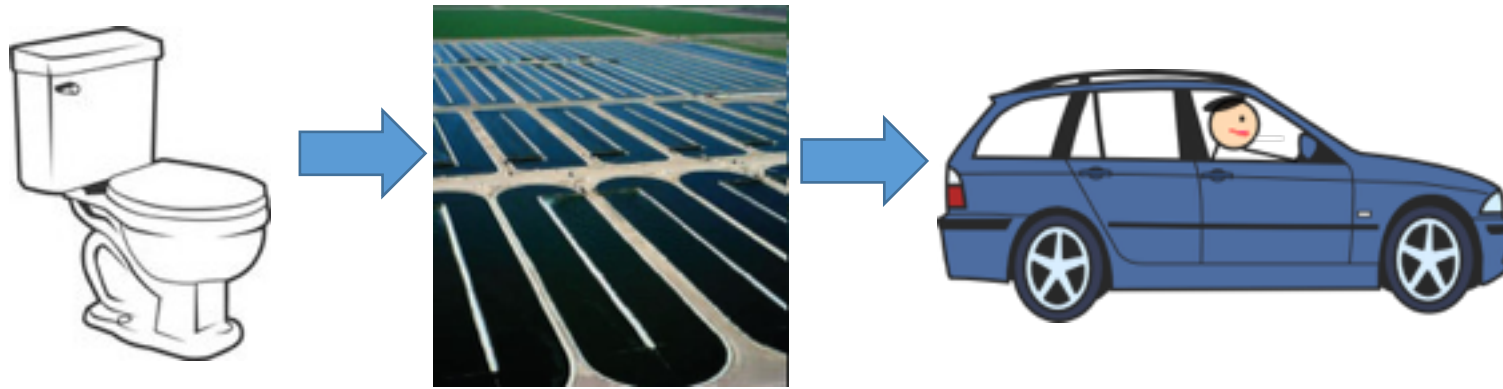


PART 1: KURT RHOADS
ANNIE PEASE
PATRICK DOHERTY
BEN WHITMAN
MUYIWA ONI
DANIELLE KULPINS

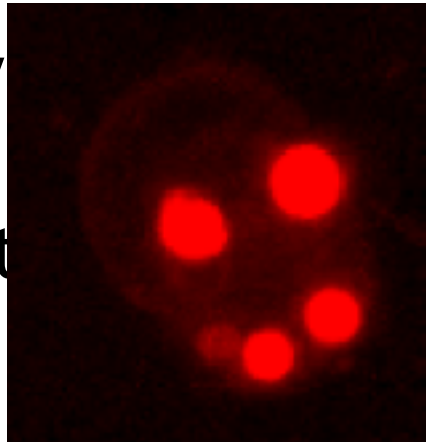
KURT RHOADS

**GEORGE B. MAYER ASSISTANT PROFESSOR OF URBAN AND
ENVIRONMENTAL STUDIES
DEPARTMENT OF CIVIL ENGINEERING**



Why Algae?

- Grow quickly
- Do not need high-quality water
- Algal oil converts easily to liquid fuel

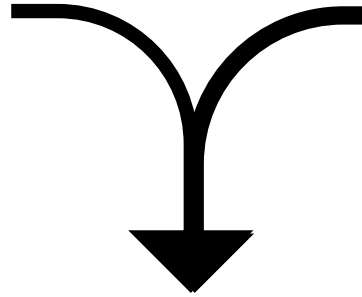


Algal cell with Nile Red Stain

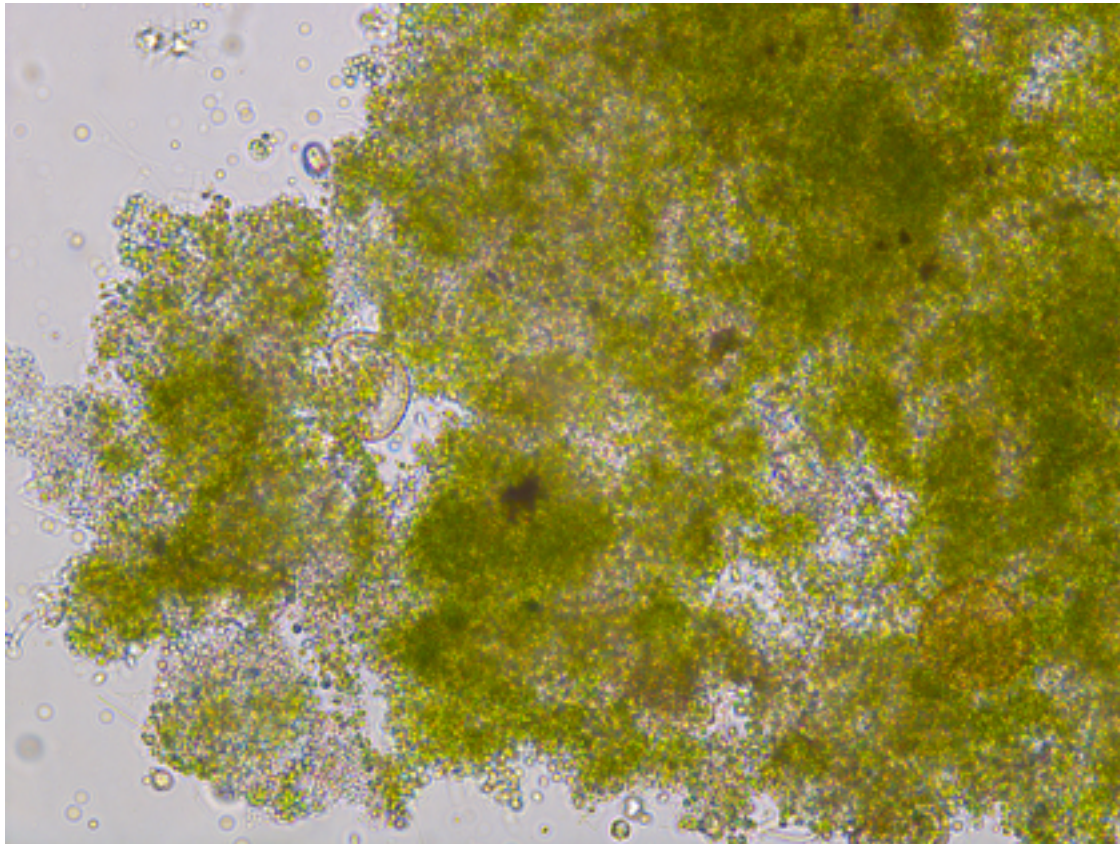
Why Wastewater?

Algal Requirement	Present in Wastewater?
Water	✓
Nutrients (N & P)	✓
Vitamins & Micronutrients	✓

Activated
Sludge



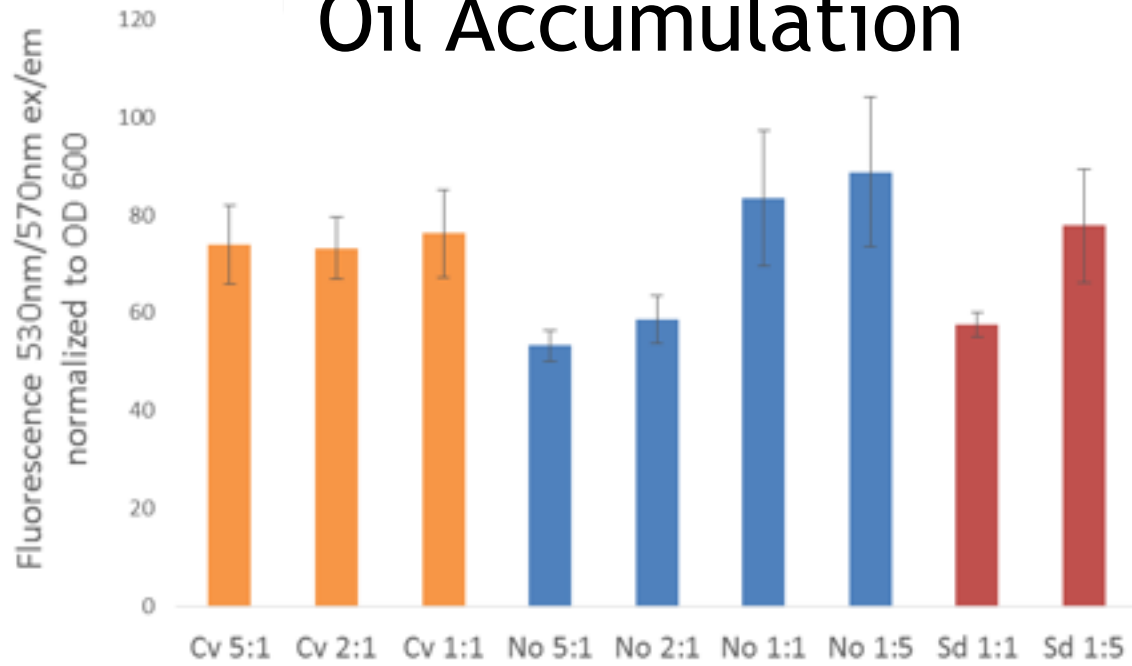
Algae



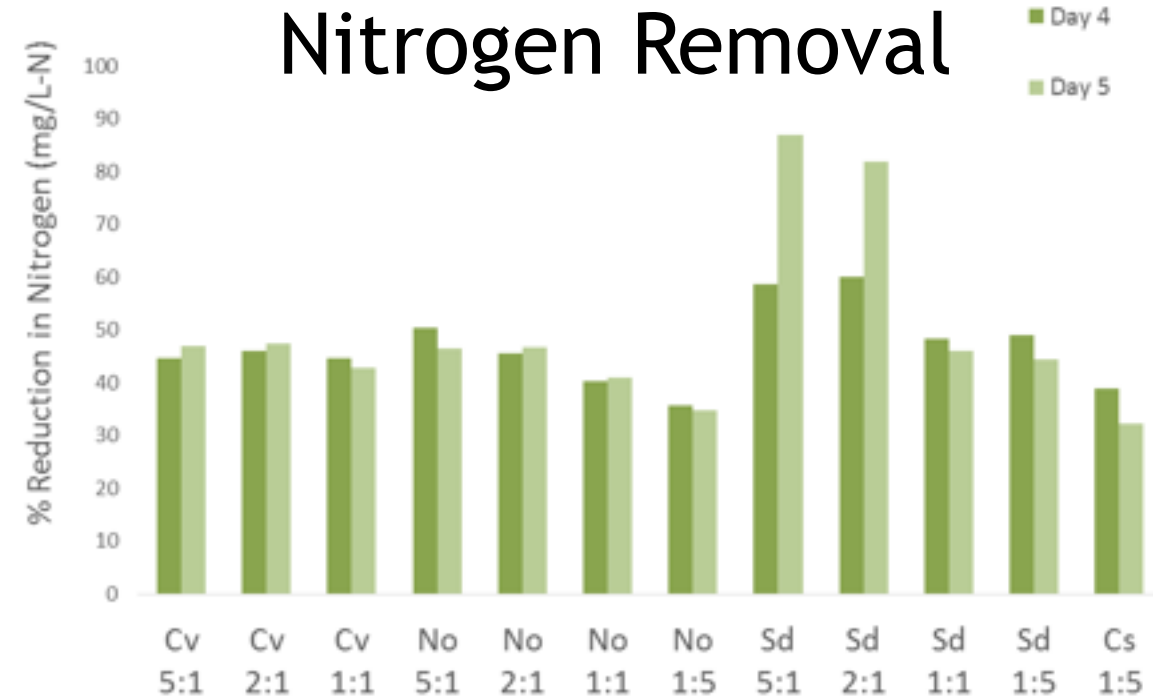
Poorly-
Settled

Well-
Settled

Oil Accumulation



Nitrogen Removal



ANNIE PEASE
UNIVERSITY CIRCLE, INC.



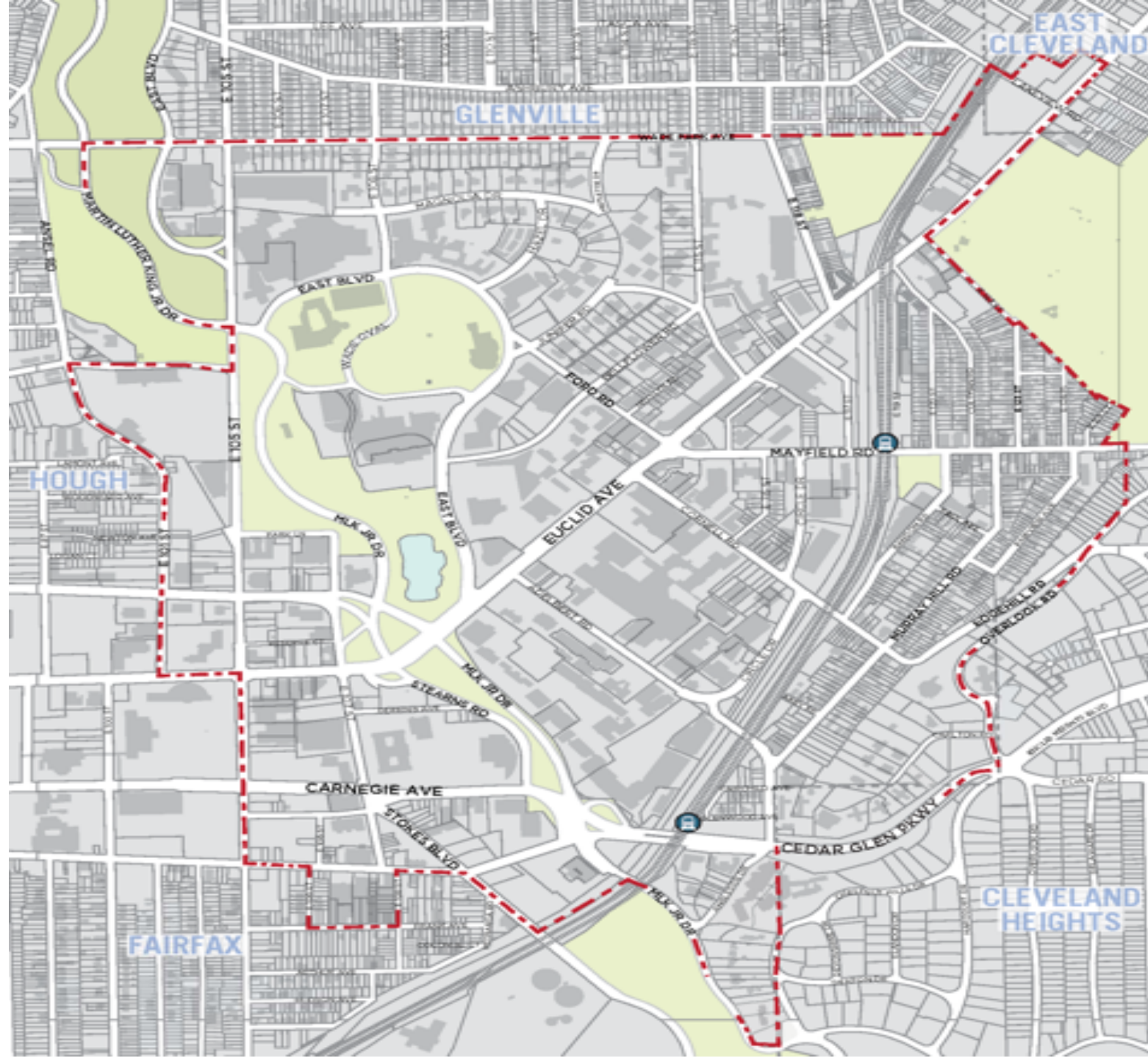
MOVING GREATER UNIVERSITY CIRCLE

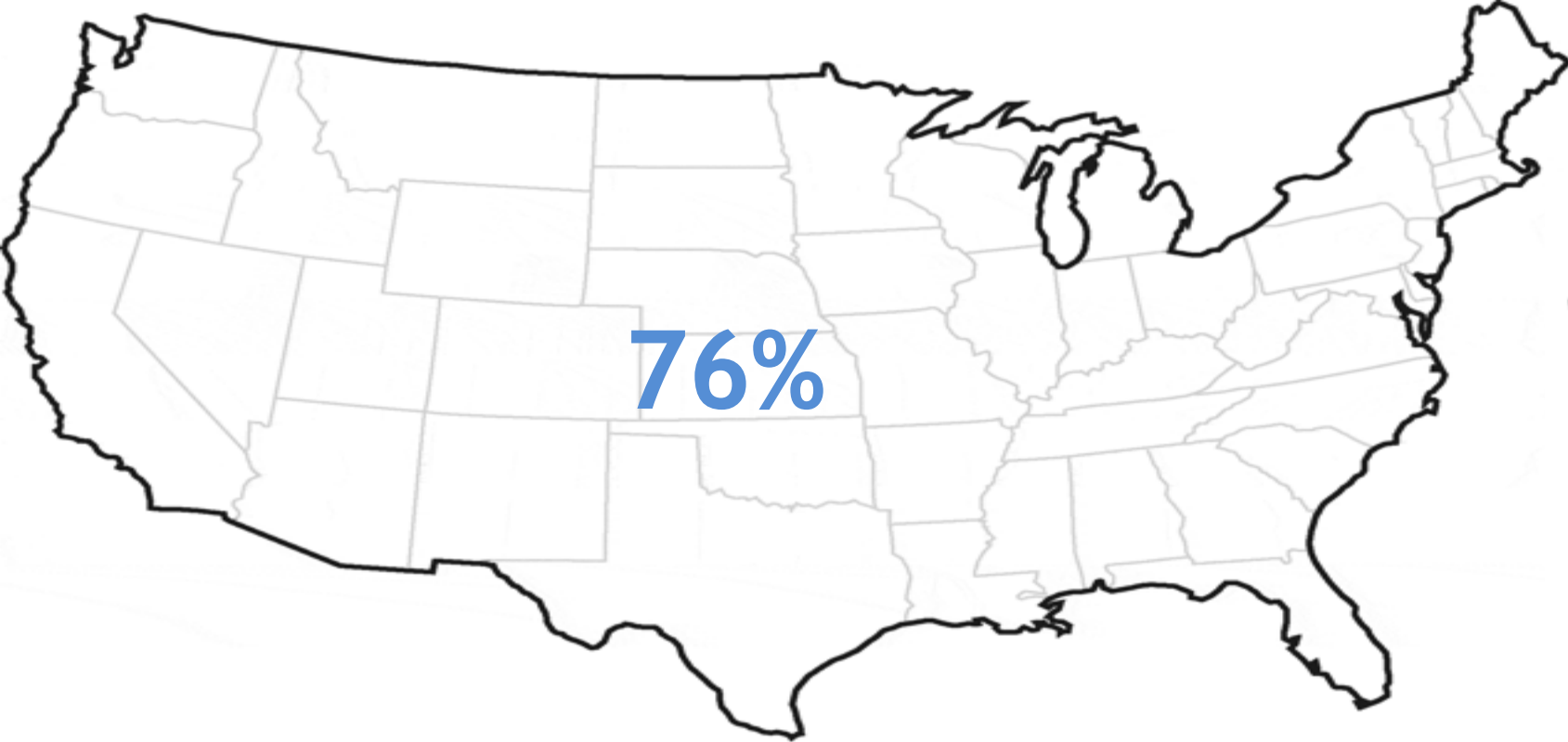
TRANSPORTATION & MOBILITY PLAN

PARKING

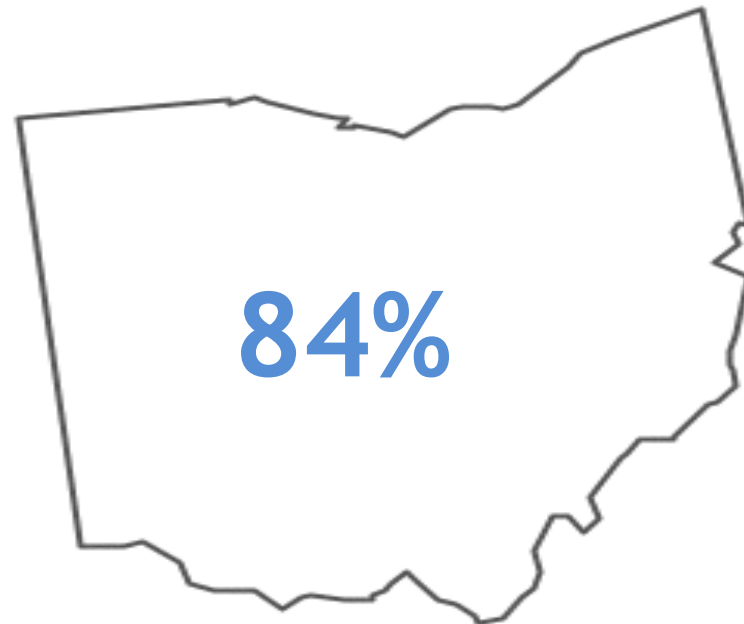
SAFETY

COORDINATION





76%



84%

78.3%



? %

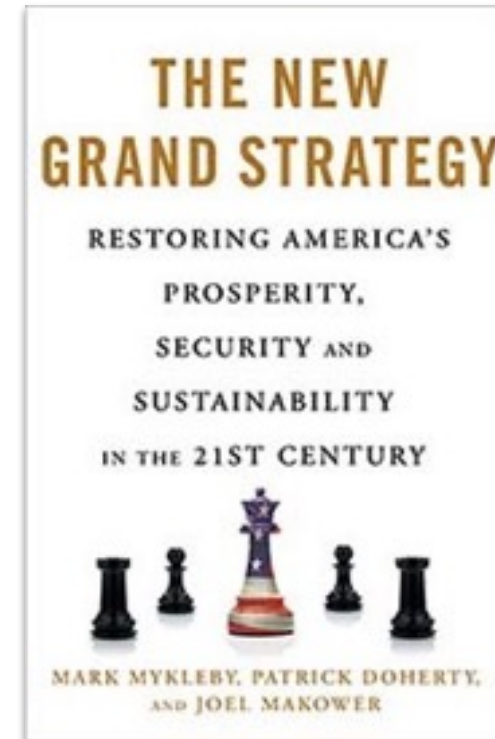
PATRICK DOHERTY
WEATHERHEAD SCHOOL OF MANAGEMENT
STRATEGIC INNOVATION LAB

Strategic Innovation Lab: Background



American Grand Strategy:

The alignment of:
our **economic engine**,
our **governing institutions**, and
our **foreign policy**
to solve the **great challenge** of the era.



“Our nation needs a new grand strategy and this is it.”

Admiral Mike Mullen, (USN-Ret), Former Chairman of the Joint Chiefs of Staff

PROBLEM SET: Unsustainable World

MASSIVE GLOBAL CHALLENGES

+

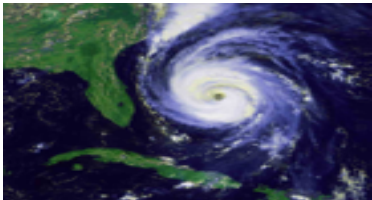
OBSOLETE 20TH CENTURY U.S. ECONOMIC ENGINE

+

POLITICAL DYSFUNCTION



Rapid
Economic
Inclusion



Climate Change &
Ecosystem
Depletion



Contained
Depression



Resilience
Deficit



Suburban
Sprawl



Consumer
Spending



High-Input
Agriculture



Massive
Federal
Subsidies

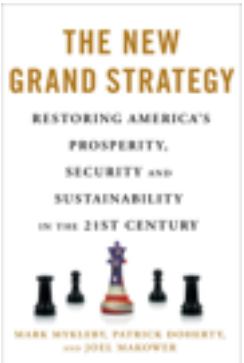


Quarterly
Reporting &
Capital Gains Tax



STRATEGIC INNOVATION LAB: Project Portfolio

GLOBAL U.S. Grand Strategy



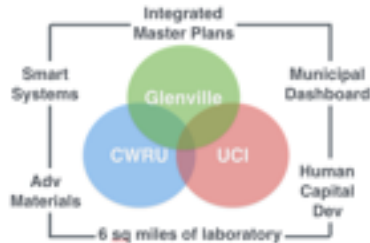
NATIONAL White House Smart Cities Initiative



REGIONAL Lake Erie Crescent



DISTRICT Glenville Project



INDUSTRIAL

Long Term Growth Project



Sustainability Innovation Platform



FINANCIAL



Cuyahoga County Clean Energy Financing Hub



BEN WHITMAN
THINKENERGY FELLOWSHIP PROGRAM

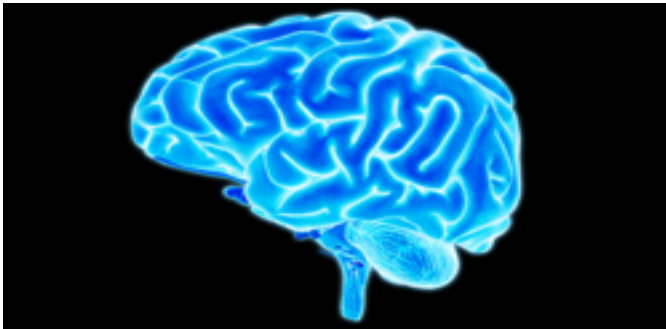


2016 - 2017 ThinkEnergy Fellows

Sam Crisanti, Dane Elliot, Lizzy Kalikasingh, Chen Liang, Eliana Ondrejko, Zane Ostoin, Marley Praprost,
Dai Shen, & Ben Whitman

ThinkTanks

- Global energy overview
- International energy strategies
- State and federal energy policy
- Start-ups and entrepreneurship
- CleanTech Pitch competition



Research

- Grid integration
- Carbon import tariff calculator
- Monetizing renewable energy credits
- Structural batteries (PRESIDES)
- Rare-earth material recycling

Community Involvement



MUYIWA ONI
**THE FOWLER CENTER FOR BUSINESS AS AN
AGENT OF WORLD BENEFIT**

The Shift to Flourishing Enterprise

Thesis anchoring the shift:

By 'doing good' for society and the environment, the company does even better for its customers and shareholders than it otherwise would



this thinking is at the center of a revolution in business towards Flourishing Enterprise.



“Flourishing Enterprise is about people being inspired every day and bringing their whole selves to work; it’s about innovation arising from everywhere; and it’s about realizing remarkable relationship value with stakeholders—customers, employees, communities, and the biosphere—to create unprecedented, enduring business advantage.”

— David Cooperrider, PhD

Celebrating Business Innovations for Global Good



Join Us


AIM2Flourish c
and learn


SUSTAINABLE
DEVELOPMENT **GOALS**
17 GOALS TO TRANSFORM OUR WORLD

[HOME](#) [INNOVATIONS](#) [SCHOOLS](#) [MEMBERS](#) [SIGHTINGS](#) [NEWS](#) [ABOUT](#) [MORE ▾](#)

[Innovations](#) [Browse Innovations](#)

204 Innovations


**A Good Taste for Sustainable Development**




Meet you at the Woolly!

The Woolwich Arrow is an "all-Canadian" local pub inspired by Ontario micro-breweries. Established in the 1990s, "L...


📍 Canada





Ruben Burga Running a restaurant is economically challenging. Having the foresight to run a restaurant and integrate sustainability in every facet of its operations makes the Woolwich Arrow in Guelph a great model for sustainability to emulate.



Stephanie Carmel An encouraging story that shows that running a profitable business and making a significant contribution to improving one's community and surrounding environment do not have to be mutually exclusive.


[View](#)  Goal 11 2 0

**Local Guelph Business Making a Big Impact**




Glass Jars Locally Sourced Produce Reduced Carbon Footprint Organic Produce High Quality Product for Customer


📍 Canada





Ruben Burga Excellent example of local sourcing and production, local consumption and minimizing greenhouse emissions with the potential for scalability.





Patricia Raber The company founders are to be praised for making the bottom line secondary and the needs of their customers and the environment primary. In the end, everyone benefits from their conscientious efforts.

[View](#)  Goal 12 2 0

**From a Plastic Bag to a Fashioned Purse**




**An Ironclad Solution**




Dr. Gavin Armstrong innovated a product known as the Lucky Iron Fish. This product is a carefully formulated iron l...

📍 Worldwide [★ Exemplar](#)





Ruben Burga Lucky Iron Fish Enterprise uses a radical way to improve the health of iron-deficient individuals through cooking with fish-shaped iron ingots! What a great and scientifically proven way to help the malnourished improve their iron content!



George Dionne Thank you so much to the student authors Dan, Ryan, Eric, Blake and Caitlin and the support of Professor Burga for capturing and sharing with the A2F community this truly amazing success story. I see the Lucky Iron Fish as an expression of a business embedded...

[more](#)

[View](#)  Goal 3 2 0

**Environmental Impact of Reusable Bottle Industry in Guelph**

Search

Full Text Search:

Primary UN Global Goal

School:

Author:

Professor:

Country:

Business Type

Business:

☐ Exemplar Innovations Only

Sort By:

[Search](#)



Discovering Flourishing Enterprise

The Key to Great Performance

June 14-16, 2017

Learn more at globalforum.case.edu

DANIELLE KULPINS
SLOW FOOD

**National Goal: shift \$1 billion to
Real Food purchases**



sustainable

Fair trade

humane

healthy



Producers . Earth . Consumers . Communities

- **Our Campus Commitment: 20%**
spending on Real Food by 2020
- Calculator beginning spring 2017



Slow Food®



BON APPÉTIT
MANAGEMENT COMPANY

food services for a sustainable future®

SPECIAL THANK YOU TO:



1) WHY DO YOU DO THE WORK THAT YOU
DO?

**(WORK = YOUR PASSION, YOUR STUDIES, YOUR JOB,
WHATEVER IT IS THAT BRINGS YOU HERE TODAY)**

2) WHAT IS CWRU'S
(OR CLEVELAND'S) GREATEST
SUSTAINABILITY STRENGTH?

2) WHAT DO YOU THINK IS IMPORTANT TO ADDRESS IN THE CWRU CLIMATE ACTION PLAN IN THE NEXT 5 YEARS?

PART 2 : MATT HABERBUSCH
MOHAMMAD AKRAM HOSSAIN
ALEX BACA
NAVEEN REHMAN/AMALIA G.
MORGAN BULGER
PIPER FERNWAY

MATTHEW HABERBUSCH
STUDENT SUSTAINABILITY COUNCIL

Push for Sustainability



The Student Sustainability Council

The SSC works to increase the environmental responsibility of CWRU by informing the campus community about sustainable practices, facilitating sustainable behaviors and attitudes, serving as a network for communicating ideas, and planning and implementing environmentally restorative projects.





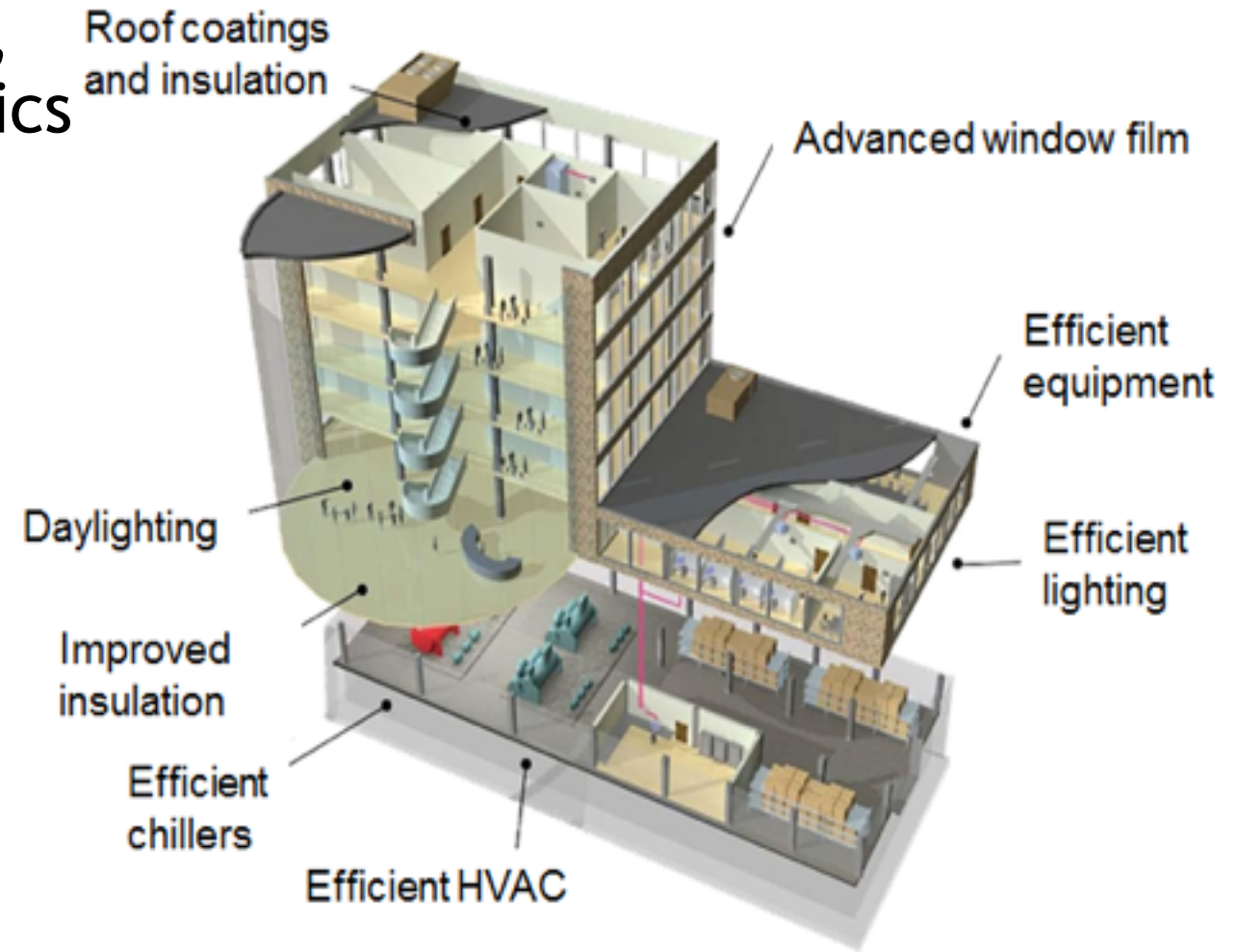
MOHAMMAD AKRAM HOSSAIN
GREAT LAKES ENERGY INSTITUTE

EDIFES (Energy Diagnostics Investigator for Efficiency Savings)

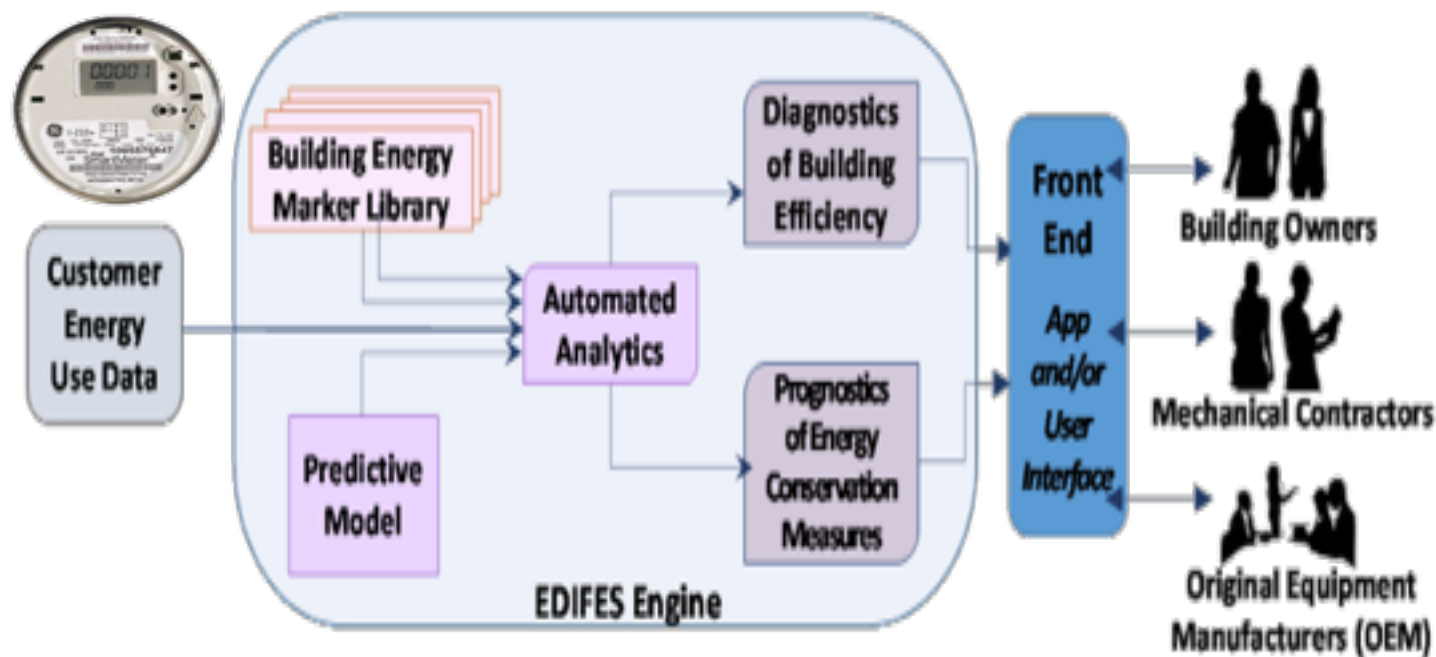
The problem: expensive, complex, high-risk, untrustworthy diagnostics and recommendations

The market need and EDIFES capabilities:

1. Virtual energy diagnoses
2. Energy efficiency recommendations and ROI
3. Measurement and verification of energy efficiency measures (post-implementation)
4. Continuous commissioning



EDIFES: simple diagnoses and recommendations with high ROI using “big data” approach



Efficiency Conservation Measures	ROI (3 yr)
HVAC schedules	\$800K
Upgrade controls architecture	\$750K
LED retrofit	\$650K
Upgrade chillers	\$550K
Upgrade RTUs	\$350K

EDIFES: Tech to Market

Market Size:

1. 107 on DoE Qualified List of Energy Service Companies(ESCO)
2. \$5 billion investment in energy efficiency annually

Potential Customer Segments:

1. Real Estate Manager
2. ESCOs
3. Chain Business

Contact: Chris Littman

Email: christopher.littman@case.edu

Phone:216.368.0374

EDIFES Competitive Analysis

Competitor	No Touch	Building of any size	Audit Capabilities	Targeting ESCOs
Building IQ			X	
Ecova Retroficiency, C3	X	X	X	
Plotwatt		X	X	
ecoInsight		X	X	X
EDIFES	X	X	X	X

ALEX BACA
UH BIKES

UHBikes



University Hospitals



BIKESHARE = VERY "GREEN"!

22 stations!
(full + drop zones)
(more coming soon)



Wade Oval South, W.O. Walker Hospital,
Cedar-University RTA, Tony Brush Park, Uptown

SOON: North Residential Village, Thwing Center, Adelbert Road, Cornell Road



UHBikes.COM

This could be you!

12 cents per minute / \$2 out-of-hub locking charge / \$20 out-of-system charge (don't!)

\$3.50

PAY AS YOU GO
per 30 min
prorated

\$21

PREPAID
for 3 hours and get
1 additional hour free

\$15

MONTHLY BASIC
includes 60 min.
daily ride time

\$20

MONTHLY PLUS
includes 90 min.
daily ride time

NAVEEN REHMAN
AMALIA GITOSUPUTRO
FOOD RECOVERY NETWORK



Fighting Waste. Feeding People.

frnexec@case.edu

**4,000+ lbs of
food in the past
year**

Cleveland

- **1 in 6** people go *to bed hungry*
- **1 in 5** children live in a *food insecure household*
- The lifespan of the average person in Cleveland ***drops 20 years*** 3 miles away from campus

(Source: The Hunger Network Website)

MORGAN BULGER
ORGANIZATIONAL BEHAVIOR PHD CANDIDATE

Nested Model of Sustainability & Two Key Frameworks

Economy

Society

Environment

Equity

The idea that because of structural and systemic barriers, we are starting from a place of inequality. To address this inequality, a focus on equality is not enough, rather an emphasis needs to be placed on building equity.

Empowerment

The idea that charity or service do not promote equity, and that it is only through empowerment models that we see sustainable development of communities and individuals.

Service Model: Tom's Shoes



TOMS

**BUYING A PAIR
GIVES A PAIR**

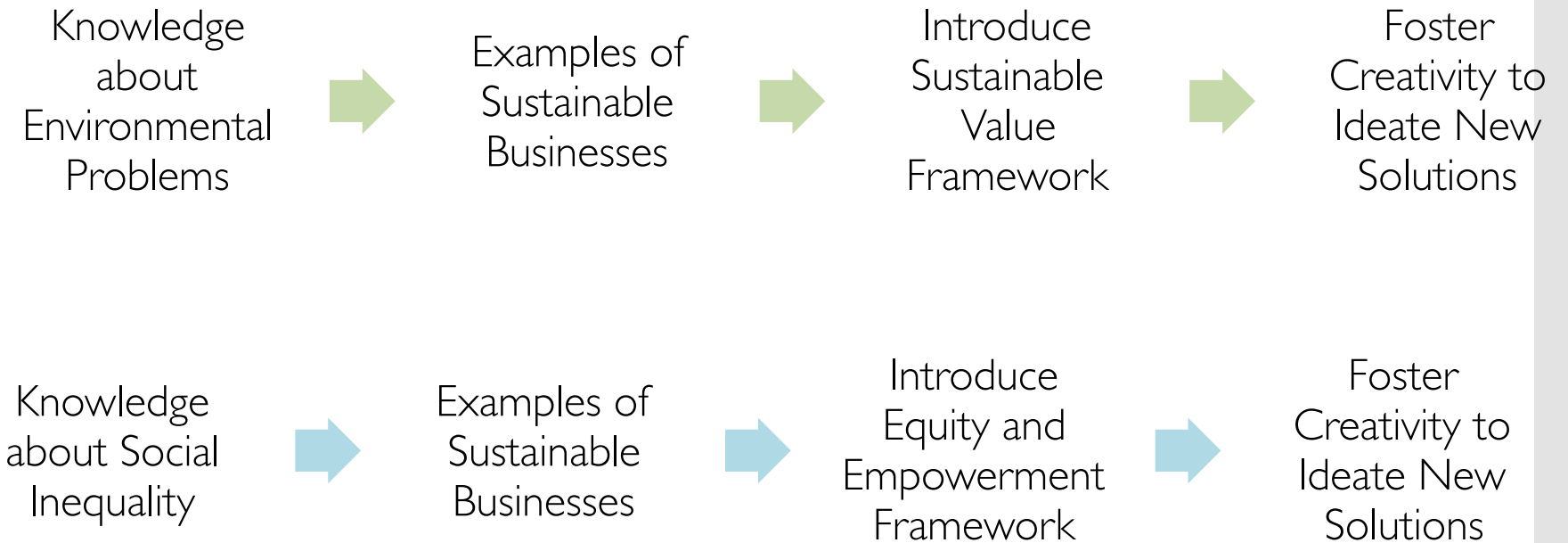
SHOP TOMS >

With every product you purchase,
TOMS will help a person in need.
One for One®.

Empowerment Model: Fair Trade Winds



Integrating Equity and Empowerment into Sustainability Education



PIPER FERNWAY
BON APPETIT MANAGEMENT COMPANY



THE UNSOLD SURPLUS FOOD
FROM THIS ESTABLISHMENT
FEEDS PEOPLE, NOT LANDFILLS

FOOD
RECOVERY
CERTIFIED

Accredited by Food Recovery Network

Local Cereal



THANK YOU!

Piper Fernwey
Community Programs & Sustainability Support Manager
Bon Appétit Management Company

Piper.fernwey@cafebonappetit.com

SHEILA PEDIGO SOURCE

Learn more about energy &
sustainability through SURES!

Sponsored by:

SOURCE

Support of Undergraduate Research & Creative Endeavors

Apply for funding for your summer research!



SURES is a 10 week summer research program running from May 30-August 4, 2017.

The program has approximately 12-16 research scholars each summer.

A 10-week summer lunch seminar series broadens students' knowledge of energy and sustainability beyond their research topic.

More information is available on the SOURCE website: [SURES](http://www.case.edu/provost/source/opportunities/sures.html)

SOURCE

Support of Undergraduate Research & Creative Endeavors

The summer research experience provided by the SURES program and my research lab, the SDLE Center, exceeded my expectations of how it would improve my research skills, capabilities, and knowledge.

---Noah Tietzsort



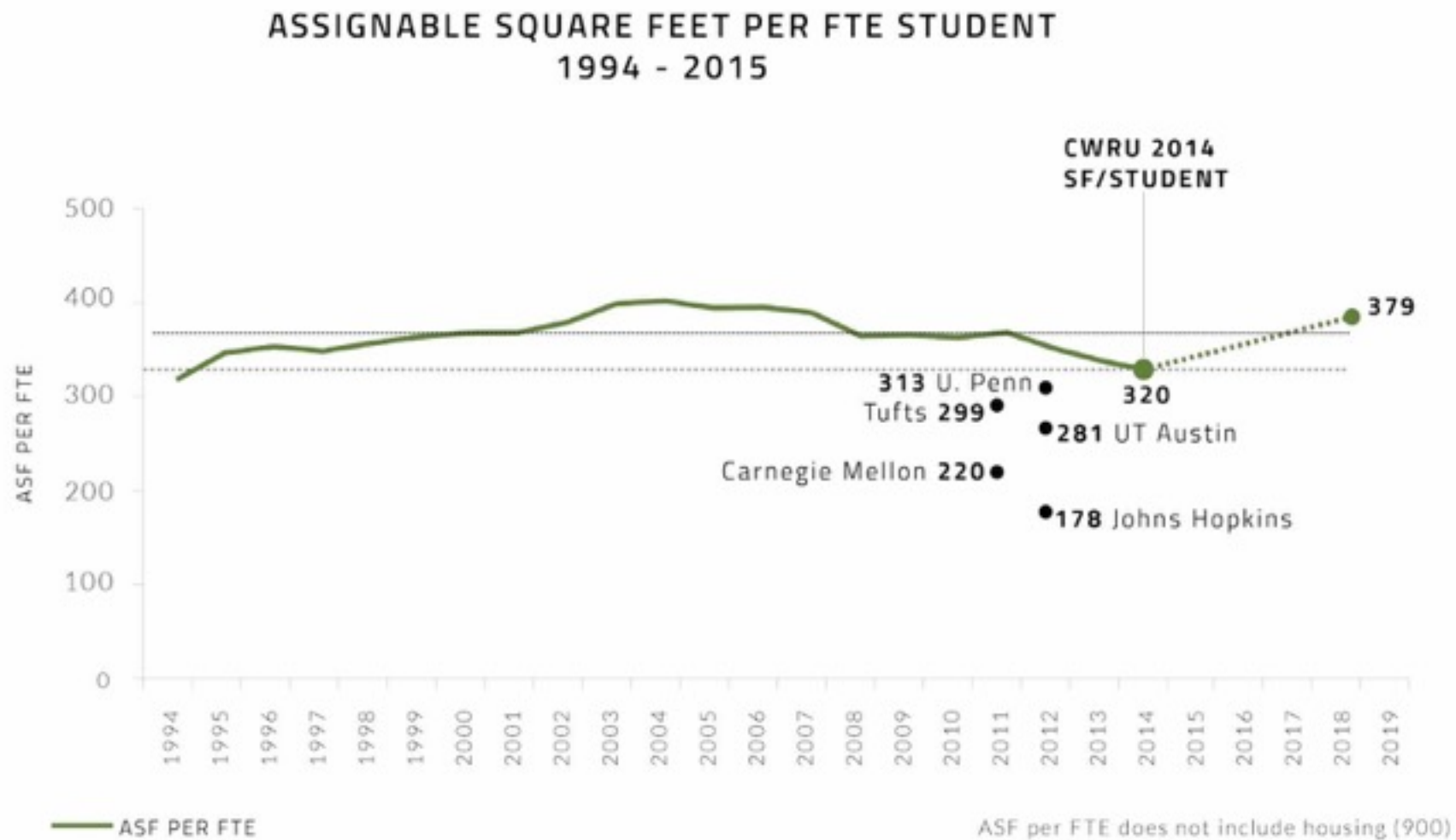
Staying on campus to do research this summer was an amazing experience. I learned so many valuable skills in my 10 weeks in SDLE as well as from the SURES Seminars. The concept of research was a lot to get used to since it is so different from anything I've done in the past.

---Amy Weaver

IRWIN LOWENSTEIN CAMPUS MASTER PLAN

MASTER PLAN CONTEXT

Campus Development + Population Growth



10,300 FTE TOTAL (PROJECTED 2019)

HOW DOES DATA REINFORCE THE VISION?

18% LEARNING

RIGHT-SIZE & REFRESH...

DIVERSIFY + SCHEDULE OPTIMIZATION

33% RESEARCH

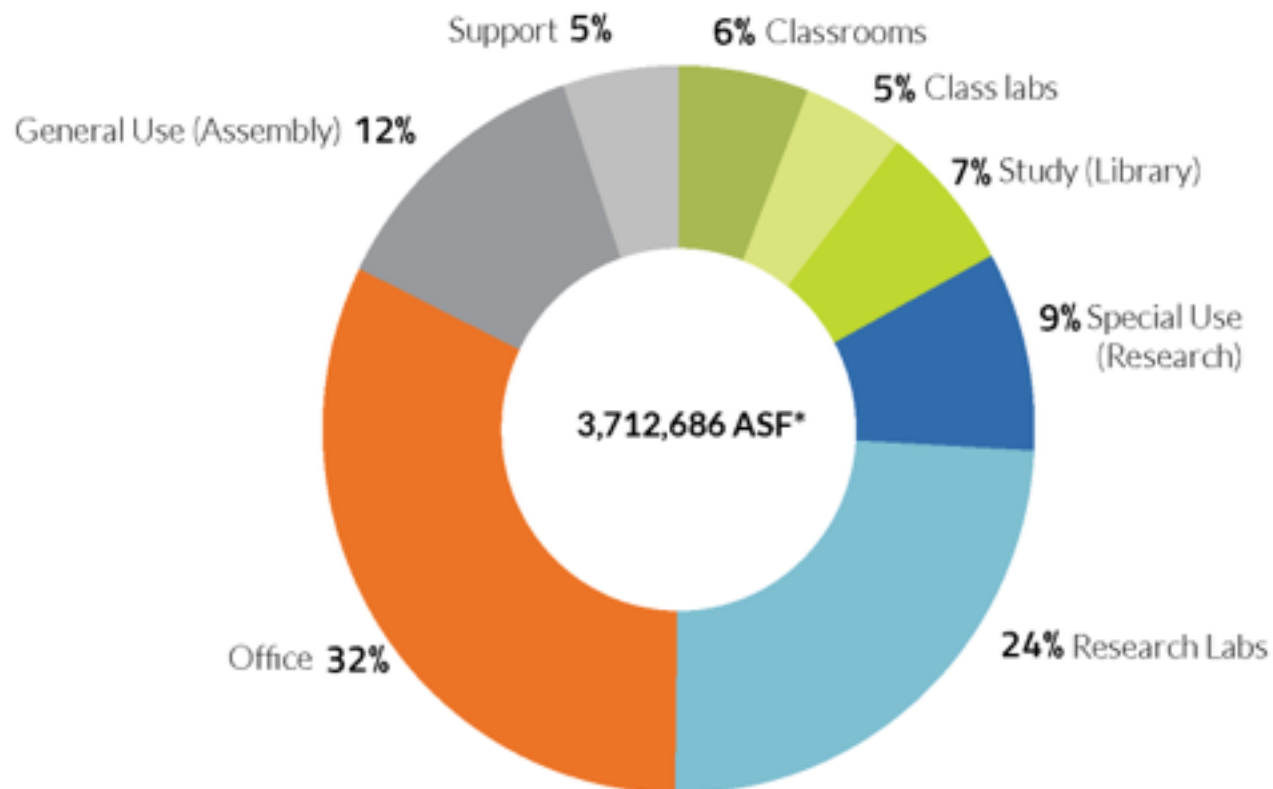
IMPROVE QUALITY...

DOWN-CYCLE & REPLACE UNSUITABLE BUILDINGS

32% OFFICE SPACE

MODERNIZE...

CONSOLIDATE + REFURBISH



*CWRU-Owned assignable square footage not including parking, residential or farm areas
Fall 2014 Space Only - Does not include Thinkbox, HEC or Maltz PAC

STRATEGIC INFILL





IDENTIFY AND UTILIZE STRATEGIC SITES
TO MAXIMIZE THE CAMPUS'S VISIBILITY

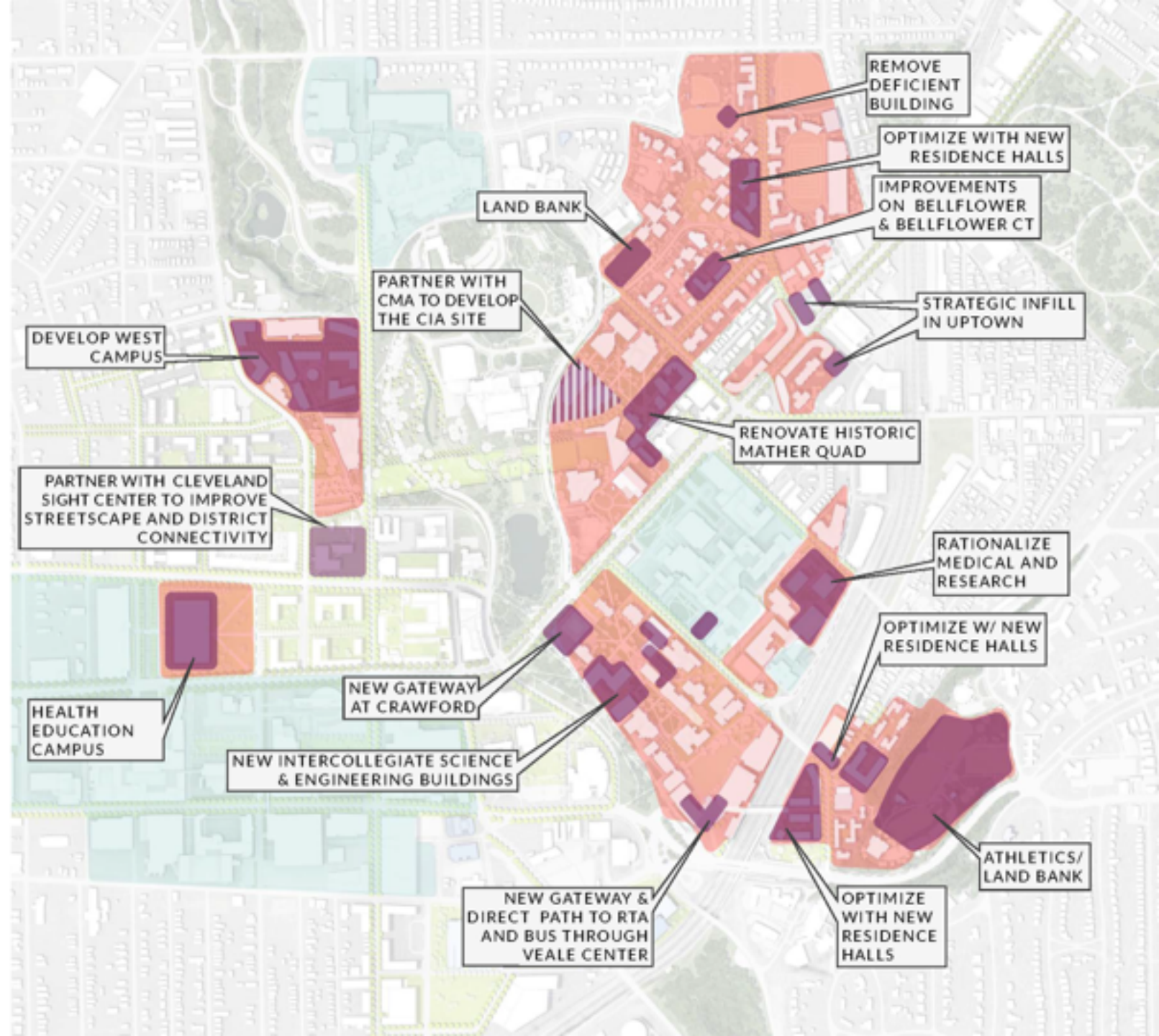
MEET SPACE NEEDS USING DATA BASED
SPACE MANAGEMENT & ALLOCATION

USE LAND STRATEGICALLY TO DENSIFY
LOW DENSITY DISTRICTS & STRENGTHEN
THE CHARACTER ACROSS THE CAMPUS

PRIORITIZE LAND OWNED BY THE
UNIVERSITY OVER LAND ACQUISITION

OPPORTUNITY SITES

-  Redevelopment Opportunity
(Demo, Renovation, Addition or New)
-  Partnership Development Opportunity
-  Campus District
-  Partnering Opportunity



THANK YOU FOR COMING!

SPECIAL THANK YOU TO:

Upcycle Parts Shop

