

DIGITAL TOOLS AND THE FUTURE OF INTERNATIONAL DEVELOPMENT

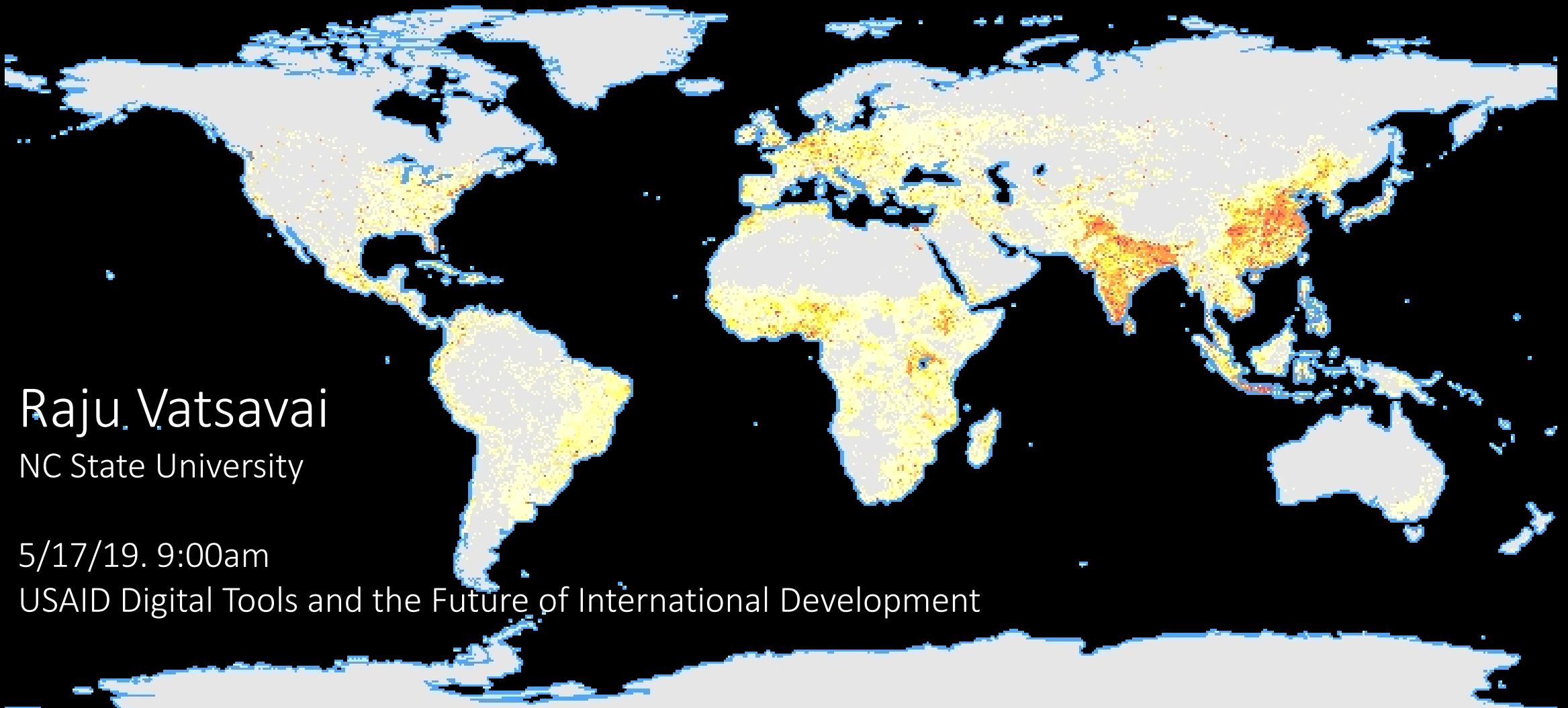
• May 17, 2019 • JW. Marriott Washington DC •
1331 Pennsylvania Avenue, NW, Washington, DC 20004
Grand Ballroom Salon 1



DEVLAB
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NORC
at the UNIVERSITY of CHICAGO

Machine Vision Panel



Raju Vatsavai
NC State University

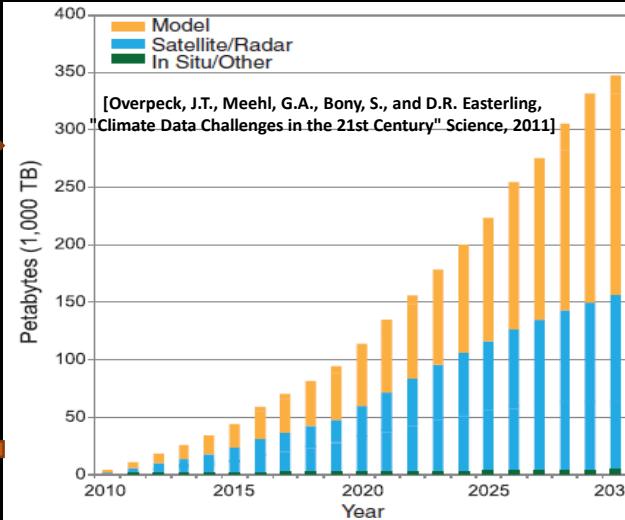
5/17/19, 9:00am
USAID Digital Tools and the Future of International Development

Technology for Local to Global Scale Monitoring

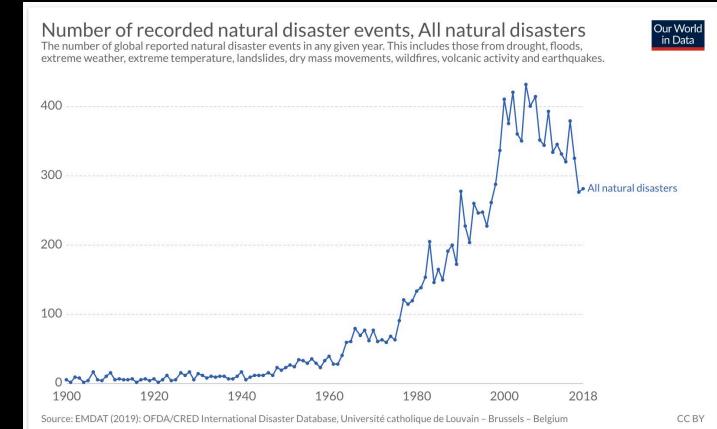


Advances, Challenges, and Opportunities

- Terabyte to Petabytes of spatial and temporal data



- Sparse ground-truth
- Accessibility issues
- No benchmarks



Disasters: > \$155 B (2018)

FAO: 1/3 of Food lost or wasted, whereas 1 Billion people are hungry

- Data + ML is a game changer if this technology is harnessed to meet the challenges of monitoring and prediction at local, regional, and global scales





Measuring agricultural productivity and economic well-being from space

Marshall Burke

Stanford University | Atlas AI

With thanks to collaborators David Lobell, Stefano Ermon, Zhenong Jin, George Azzari, Talip Kilic, Sydney Gourlay, Siobhan Murray, Anthony Perez, Chris Yeh, Anne Driscoll, Zhongyi Tang, and many others

Northwestern, Mar 2019



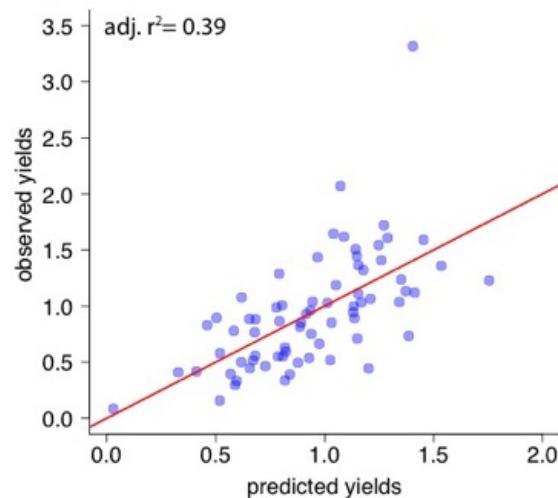


Satellites do a good job of measuring ag productivity

Kenya, 2014

Imagery: 1m Skysat

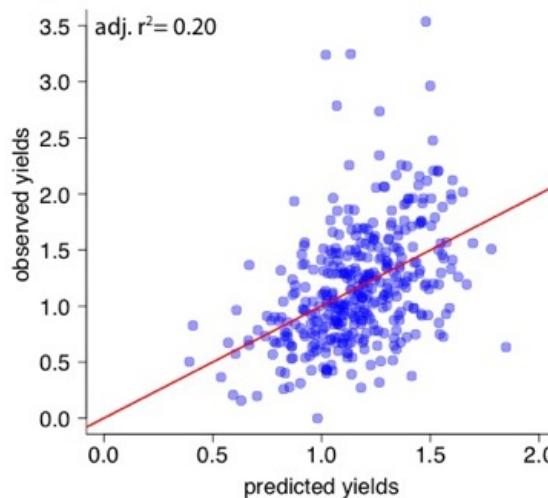
Plot level $R^2 = 0.39$



Kenya, 2015

Imagery: 1m Skysat

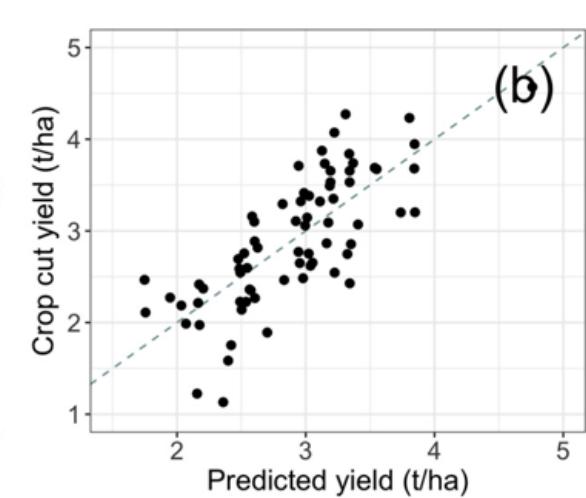
Plot level $R^2 = 0.20$



Kenya, 2017

Imagery: 10m Sentinel

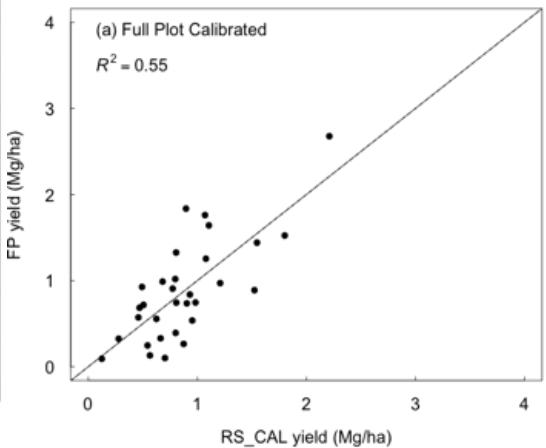
District level $R^2 = 0.55$



Uganda, 2016

Imagery: 10m Sentinel

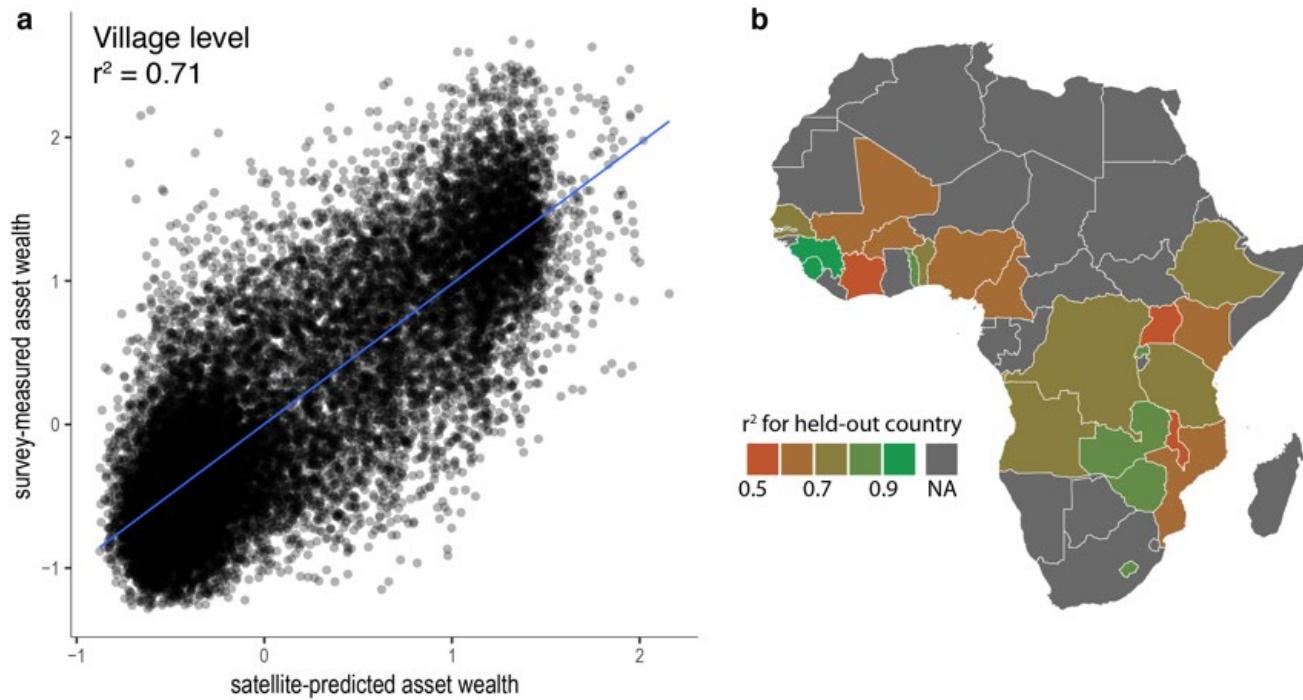
Plot level $R^2 = 0.55$



And errors are as much from noisy ground data as from satellites!

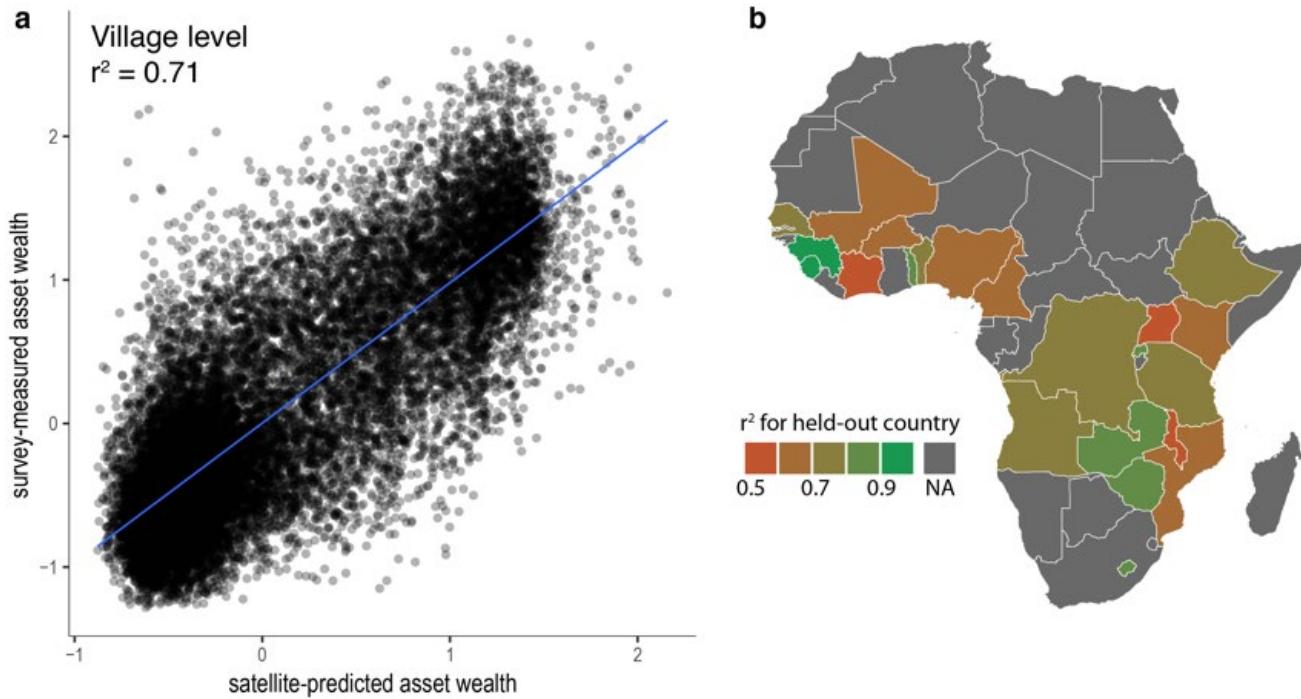
Satellites do a good job in predicting well-being in cross-section

Village-level asset wealth, Africa

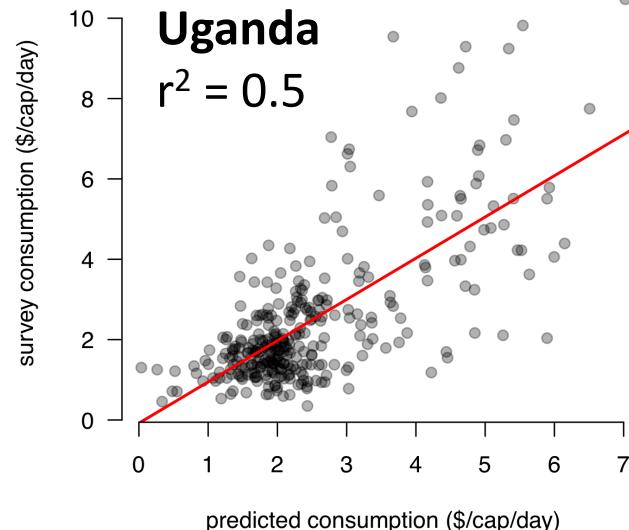


Satellites do a good job in predicting well-being in cross-section

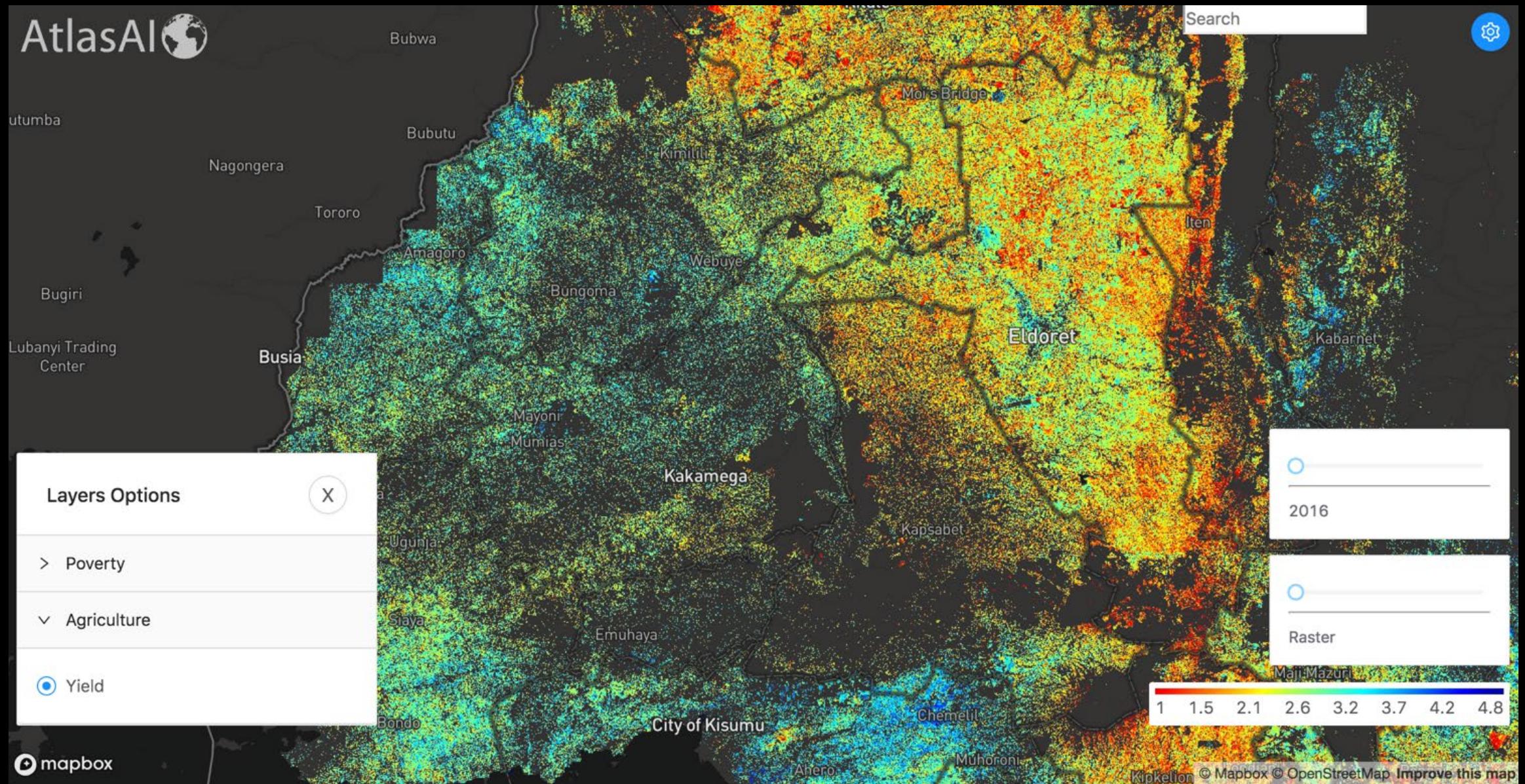
Village-level asset wealth, Africa



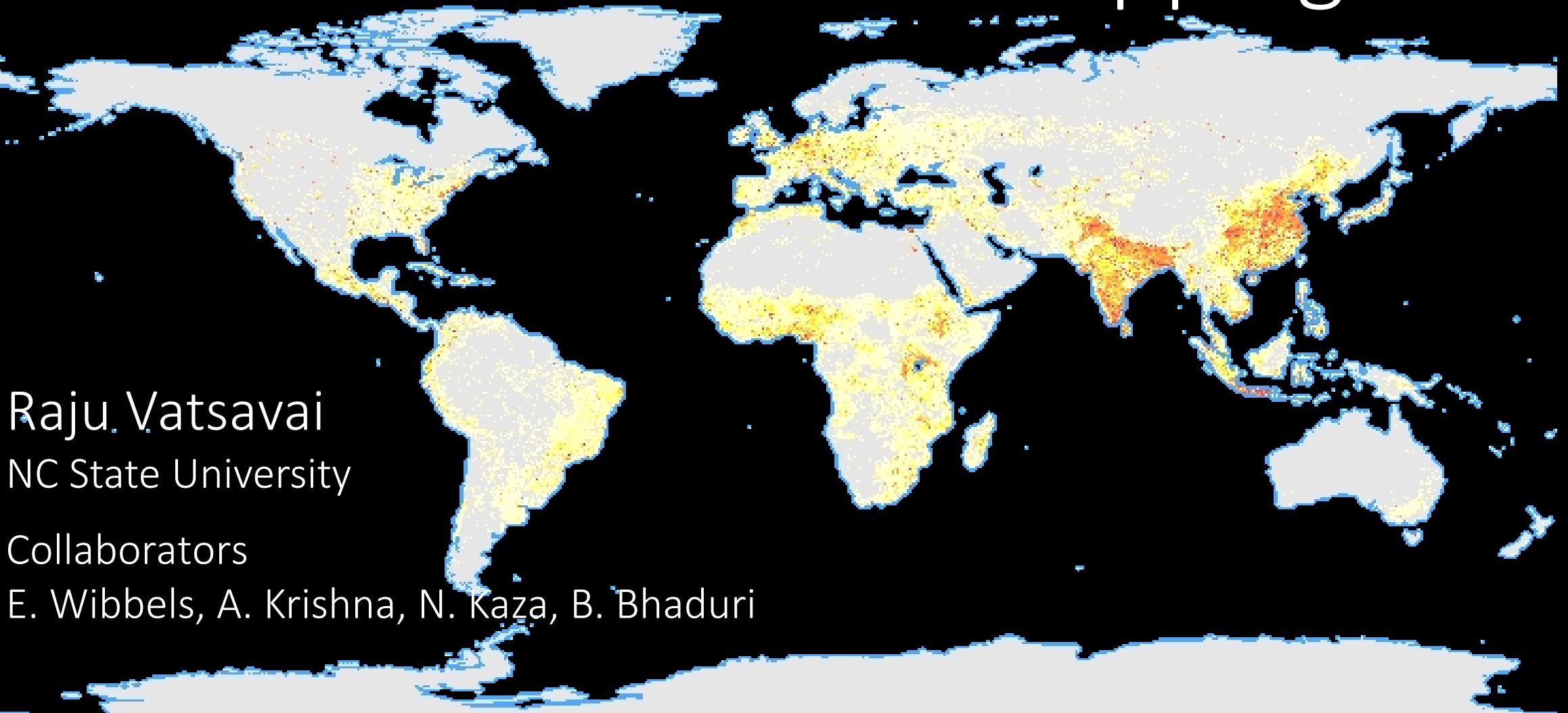
Village-level consumption Uganda



Estimates can be scaled



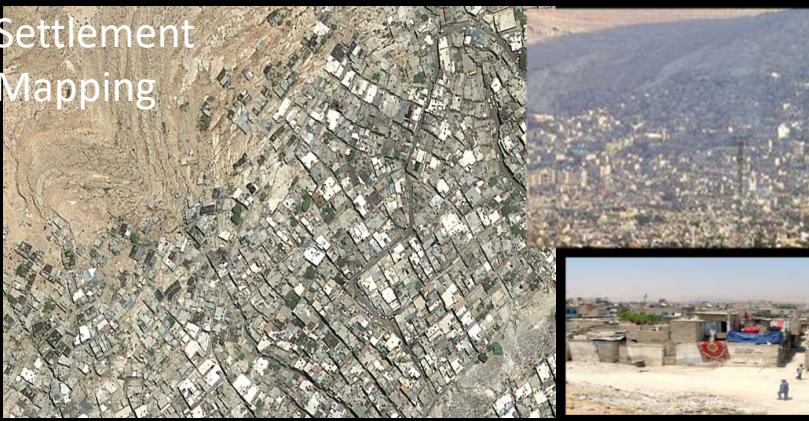
Deep Computer Vision for High Resolution Settlement Mapping



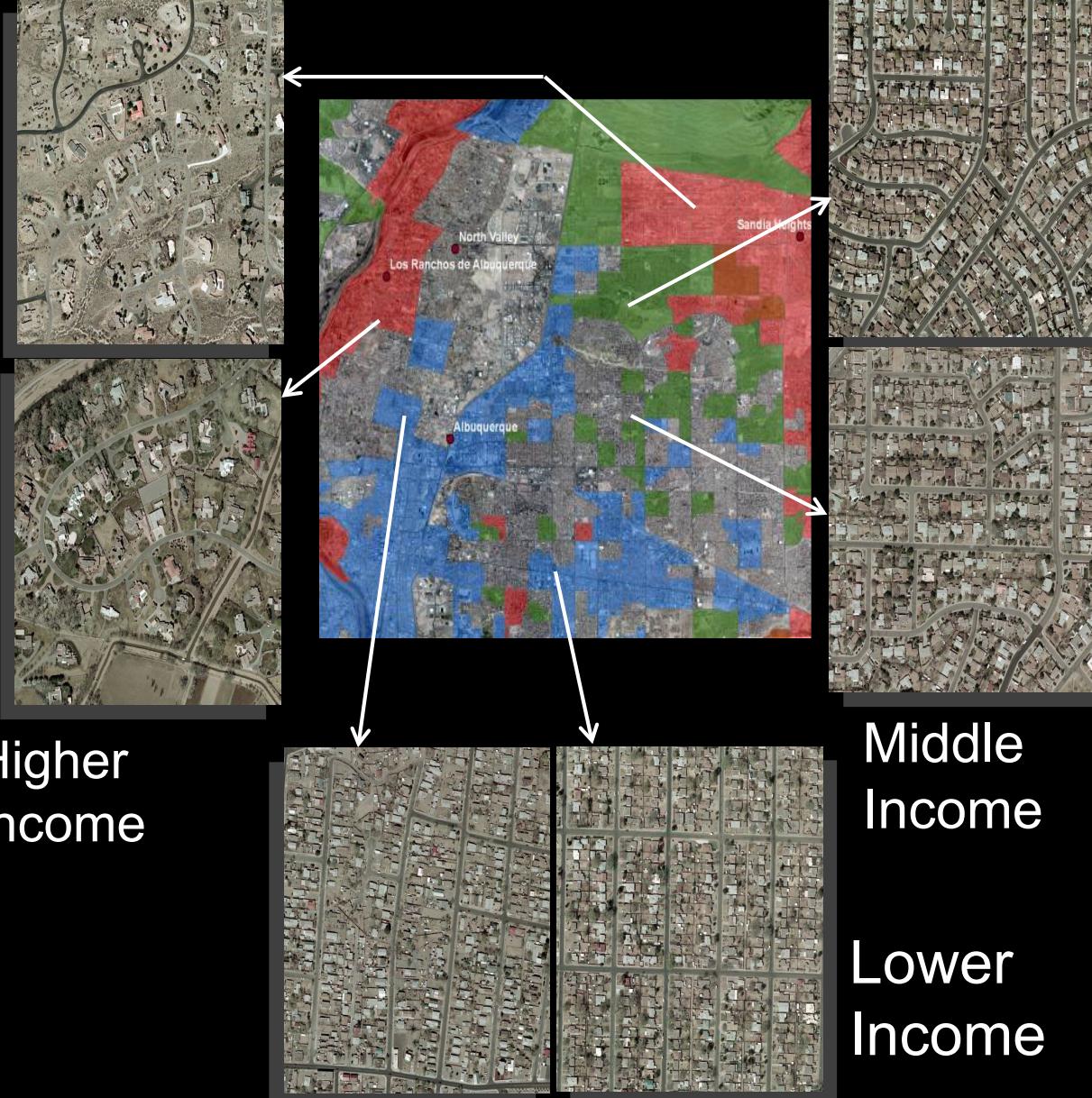
Raju Vatsavai
NC State University

Collaborators
E. Wibbels, A. Krishna, N. Kaza, B. Bhaduri

Technology for Local to Global Scale Monitoring



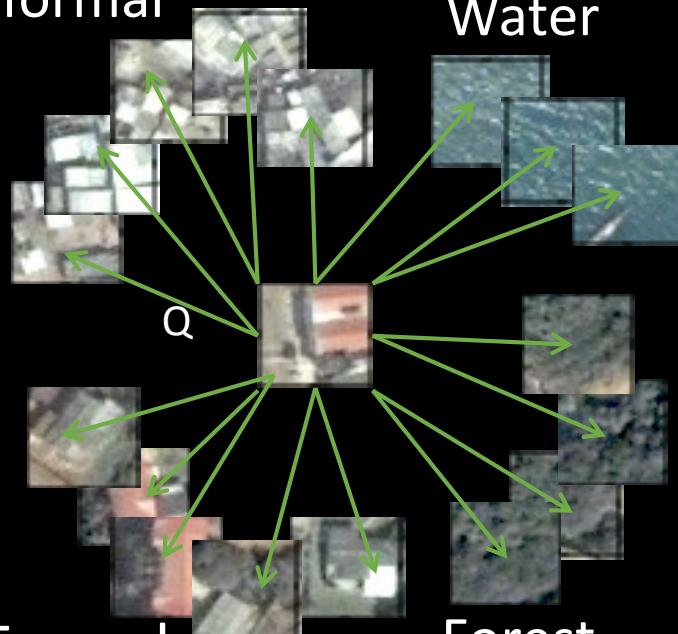
Human Settlement Mapping



- Proportion of population living in slums is increasing
 - 1950: 0.08 Billion (3%),
2000: 0.9 Billion (15%),
2030: 2 Billion (25%)
- In Bengaluru, number of slums increased officially from 473 in 2003 to 597 in 2013 (16.5%) (Gross underestimate).
- There is no census on where these settlements are and how their physical characteristics change over time.
- It is hard to monitor them on the ground and cities have little incentive.
- There is little understanding on how the social and political networks in these areas operate.

Modern Machine Learning Approaches

Informal



Formal

Formal

Feature Space

- 1 Formal = 3
 - 2 Informal = 2
 - 3 => Class = Formal
 - 4
 - 5
 - 6
 - 7 Ranked list of matches
 - 8
- K=5

Classifier Overall Accuracy

Classifier	Overall Accuracy
NB	77.15
DT	79.58
KNN	73.94
MLP	76.76
XGB	83.05
ADB	77.02
RF	82.92
CNN	86.3

Key Findings

- Actual number of slums are far more than those stated in government records
- Area: 4-17% of city area
- 600-2000 neighborhoods
- A number of new slums came up over last 15 years
- Algorithms are better at detecting slums at the lower end of the continuum with poorer infrastructure and housing quality



- Better census enumeration
- Forecasting populations at high resolution

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Big Data and Machine Learning for Development

May 17, 2019 – USAID

Algorithmic Audit

*Formal inspection of
a computer-assisted system
to verify legal and ethical compliance.*

Obvious Requirements of Audits

Audits should be conducted by independent, third parties.

Auditors should have both
algorithmic and domain expertise.

Entities that affect larger numbers of people
with greater effect require more rigorous auditing.

Auditing must be complemented with
penalties and enforcement.

All computer-assisted analysis is in question.

- Not just “AI” or “big data” or “decision-making”
- Not just technical algorithms
- All computer-assisted processes that lead to decisions or influence stakeholders
- *We are already behind.*



Financial audits offer a good model.

- Regular cycle
- Auditing infrastructure
- *Personal accountability of organizational leaders*
- *Auditing will increase overhead costs.*

One Hundred Seventh Congress
of the
United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on
the twenty-third day of January, two thousand

An Act

To protect investors by improving the accuracy and
made pursuant to the securities laws
Be it enacted by the Senate and House of
the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.—This
Act is referred to as the “**Oxley Act of 2002**”.

(b) TABLE OF CONTENTS.—
is as follows:

Sec. 1. Short title; table of contents.
Sec. 2. Definitions.
Sec. 3. Commission rules.

TITLE I.—PUBLIC
Sec. 101. Establishment of
Sec. 102. Registration of
Sec. 103. Auditing, inspecting,
Sec. 104. Inspecting,
Sec. 105. Investigation
Sec. 106. Foreign
Sec. 107. Accounting
Sec. 108. Corporate
Sec. 109. Financial

Sec. 201. Corporate
Sec. 202. Improper
Sec. 203. Forfeiture
Sec. 204. Officer and director
Sec. 205. Insider trades
Sec. 206. Insider trades due



Strategic conservatism is a virtue.

- “First, do no harm” context of development
 - Cf. “Move fast and break things”
- Paradox: Good human institutions are a prerequisite, but they reduce value-add of AI.
- Plenty of other programs to fund while AI kinks are worked out.
(But, research in this area is encouraged)



The image shows the front cover of the book "GEEK HERESY" by Kentaro Toyama. The cover features a smartphone displaying a video of a person working on a bicycle. A large number of black shards or pieces of broken glass are flying out from behind the phone, suggesting it has been shattered. The title "GEEK HERESY" is written in large, bold, black capital letters. Below the title is a red horizontal band containing the subtitle "RESCUING SOCIAL CHANGE FROM THE CULT OF TECHNOLOGY" in white, sans-serif font. The author's name, "KENTARO TOYAMA", is at the bottom of the red band. A small gold circular seal with a figure is positioned to the right of the phone.

Summary

Algorithmic audits should be routine for development organizations.

Audits should be conducted for *any* computer-assisted system that affects decisions or influences stakeholders.

Financial audits offer a good model for algorithmic audits.

In development, strategic conservatism about technology innovation is a virtue.

Thank you!
toyama@umich.edu

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Forecasting Civic Space Closures

Scott de Marchi and Erik Wibbels, Duke University

Converting news into events

Kenyan police launch inquiry over attack on man during protest

Video appears to shows three officers taking turns to hit and kick apparently unconscious man who later said he was not involved in demonstration

Warning: this article contains images some readers may find upsetting



▲ A Kenyan riot policeman repeatedly kicks Boniface Mosoti as he lies in the street. Photograph: Ben Curtis/AP

Kenyan police have launched an internal investigation after graphic video footage of riot police beating and kicking an apparently unconscious man on the sidelines of an election protest caused outrage.

In the latest of several protests by opposition activists who say their leader will be denied a fair chance at next year's election, [police fired teargas and beat demonstrators with truncheons](#) on Monday to stop them storming the offices of the electoral commission in Nairobi.

Two events in lead sentence:

1. Kenyan police have launched an internal investigation
2. riot police beating and kicking an apparently unconscious man on the sidelines of an election protest caused outrage

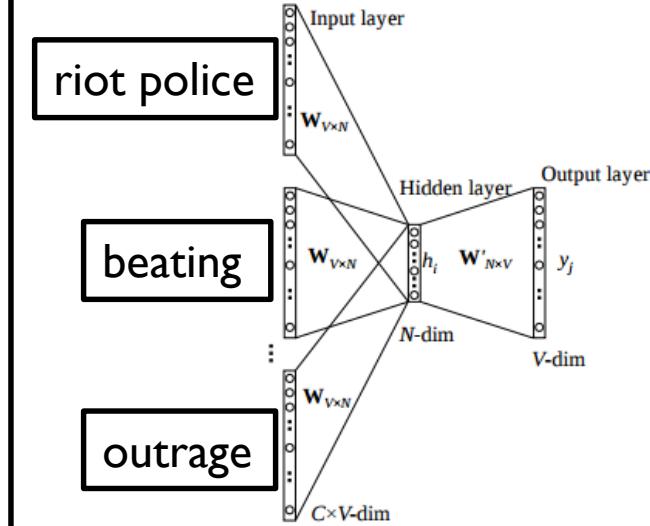
More interested in this one

Event Pre-processing

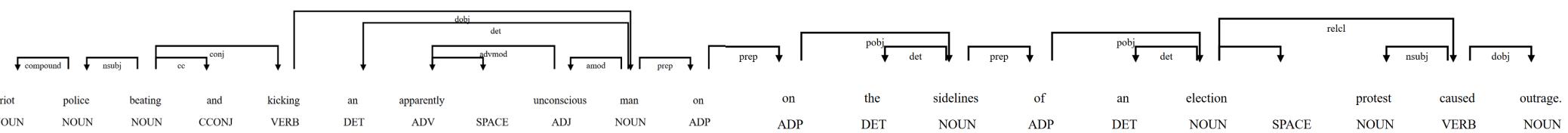
“riot police beating and kicking an apparently unconscious man on the sidelines of an election protest caused outrage”

I. Noun chunks + actor dictionary:
“riot” and “police” becomes “riot police”

2. Word embeddings:



3/4. Part-of-Speech and Dependency:



Learning events

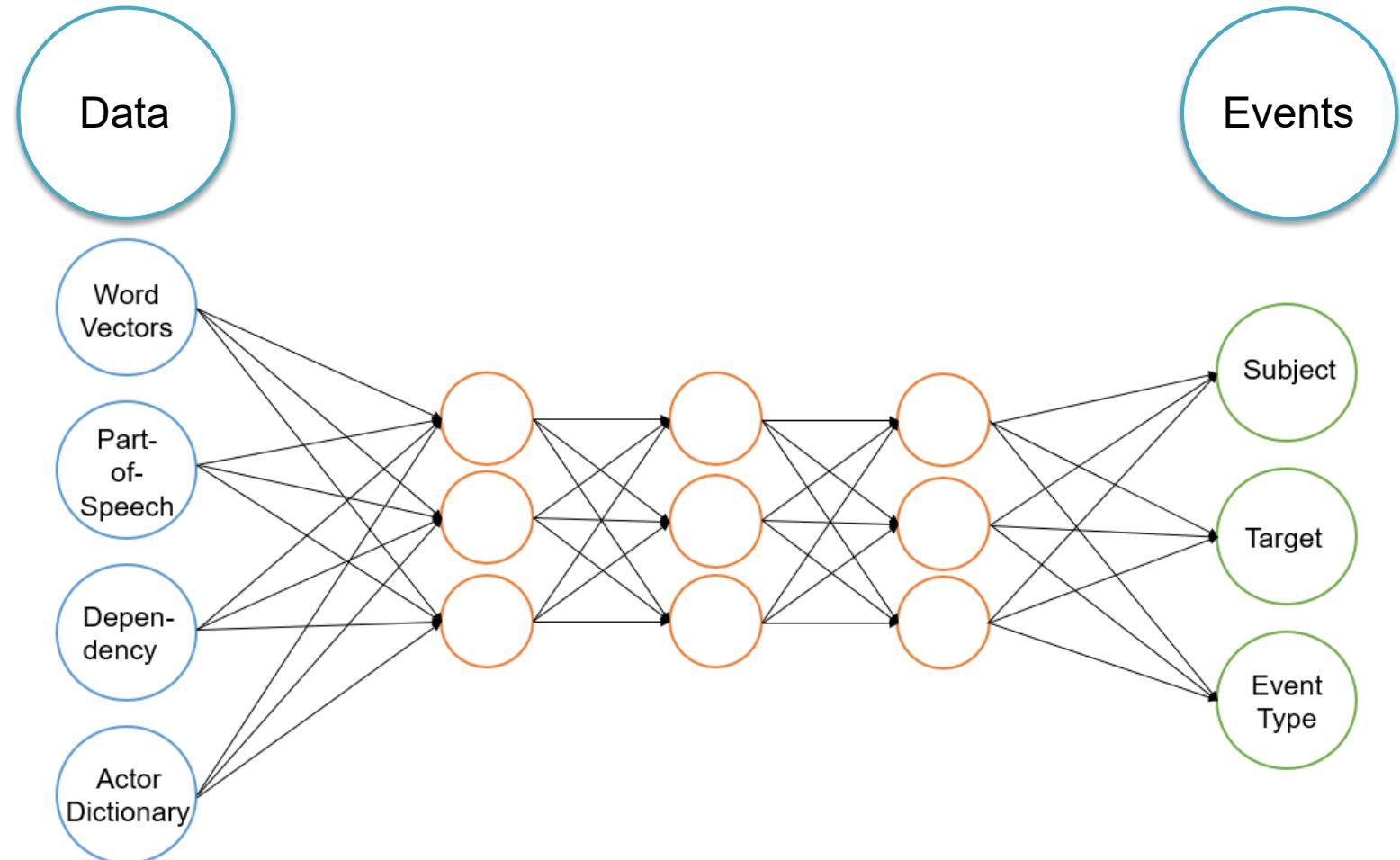
Collect stories + manually
code training set

The
New York
Times



ALJAZEERA

Etc...

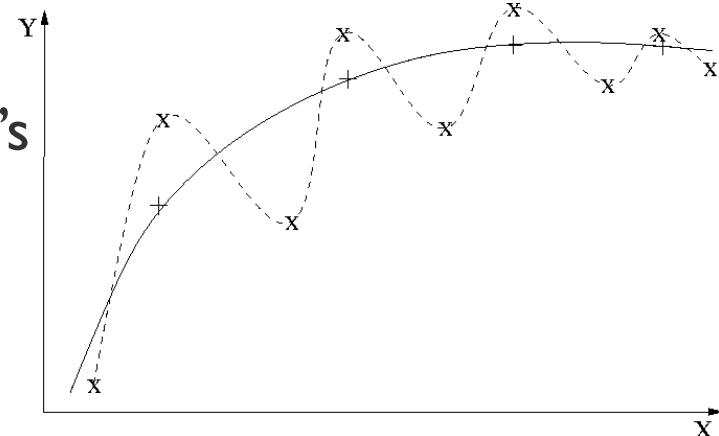


Goal: predict civic space closures

- Key independent variables in forecasting model:
 - Event data will be coarsened into count IV's
 - Structural / economic data
 - SME quarterly surveys
 - Social media data / sentiment
 - Text as data
- Model will work at monthly or quarterly level
 - Four countries initially (Kenya, Mali, Nigeria, Tanzania)
 - Will expand to 100+ countries
 - Results will be pushed out to SME's / users on the ground

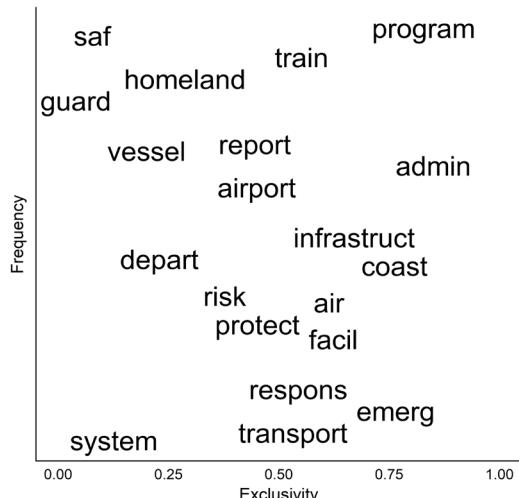
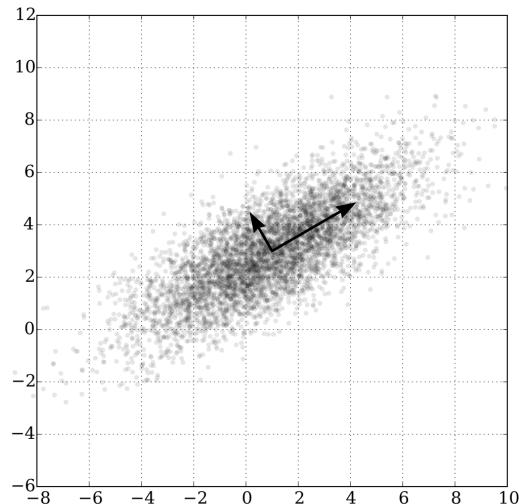
Modeling Challenges

- Events may be systematically biased
 - Sources may not cover nations
 - Urban, English-speaking, etc. oversampled
 - **Solution:** use quarterly SME survey to check actors / events
- NLP applied to event data has spotty history
 - Attribution of actor, target, and action type are difficult, particularly with intrastate phenomena
 - Duplication, missing events, etc.
 - **Solution:** hand-coded training set and new technology via cnn's
- Overfitting in data poor contexts



Modeling Challenges (cont.)

- Parsimonious feature set aids prediction but impedes interpretation
 - PCA (linear) and autoencoders (non-linear) difficult to substantively interpret
 - **Solution:** trade fit for interpretability
- “Black box” models may be most successful at forecasting
 - We expect monotonic effects but often have only local effects
 - T-SNE and LIME vs linear regression coefficients
 - **Solution:** trade out-of-sample accuracy for interpretability





News by Popular Demand: Ideology, Reputation, and Issue Attention in Social Media Sharing

Natalia Aruguete*

Ernesto Calvo †

Tiago Ventura ‡

SundayReview

Why We Believe Obvious Untruths

Gray Matter

 erictucker
@erictucker

FALSE

Anti-Trump protestors in Austin today are not as organic as they seem. Here are the busses they came in. #fakeprotests #trump2016 #austin



RETWEETS 16,931 LIKES 14,521

8:43 PM - 9 Nov 2016

Trump retweets account that traffics in wild conspiracy theories, accused Hillary Clinton of murder

Stay classy.

AARON RUPAR | AUG 4, 2017, 11:13 AM

Jornalista do Estadão: a intenção é arruinar Flávio Bolsonaro e o governo

5 dias atrás • Fernanda Salles



Pizzagate' Shooter to Serve Four Years in Jail

The gunman pled guilty after carrying out a violent response to an online conspiracy theory.



GOVERNO BOLSONARO

Bolsonaro divulga relato deturpado de conversa de jornalista

Presidente diz que repórter quer derrubar governo; jornal O Estado tem frases truídas

COLLEGE OF BEHAVIORAL & SOCIAL SCIENCES THE SOLUTION

 marcelo tinelli
@Cuervotinelli

Argentina, un país con buena gente #NosoyNisman

View translation



RETWEETS 1,943 FAVORITES 1,162

8:35 AM - 19 Jan 2015

How do users activate content?

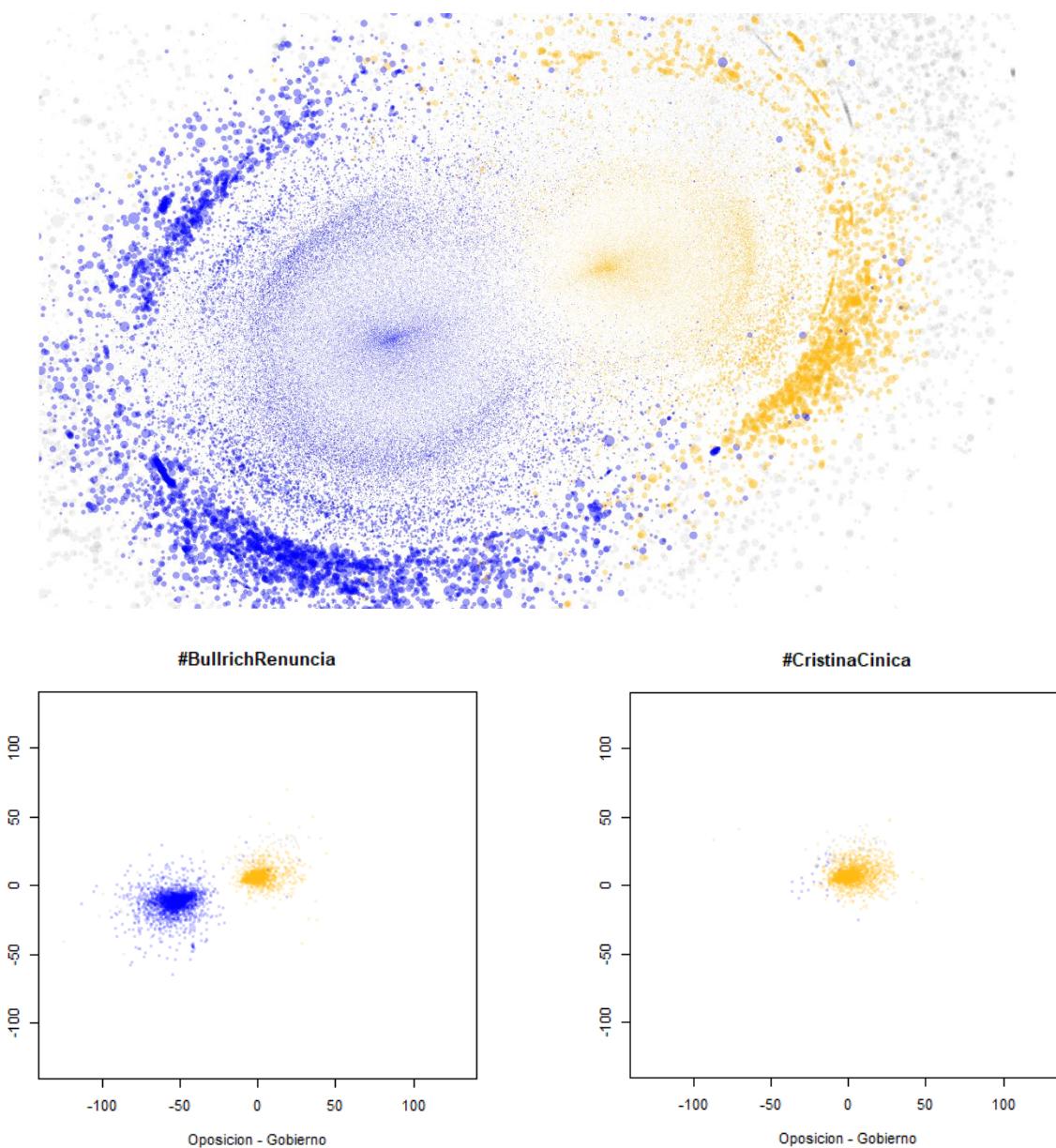
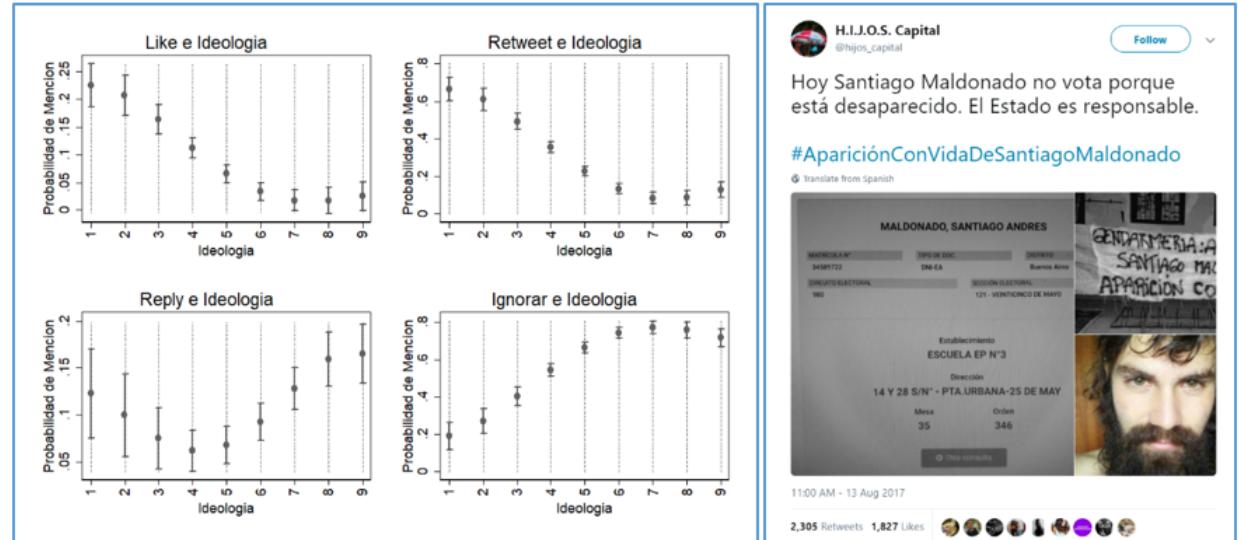


Figura 1: Respuesta de Encuestados al Tuit de @hijos_capital/ sobre el caso #Maldonado



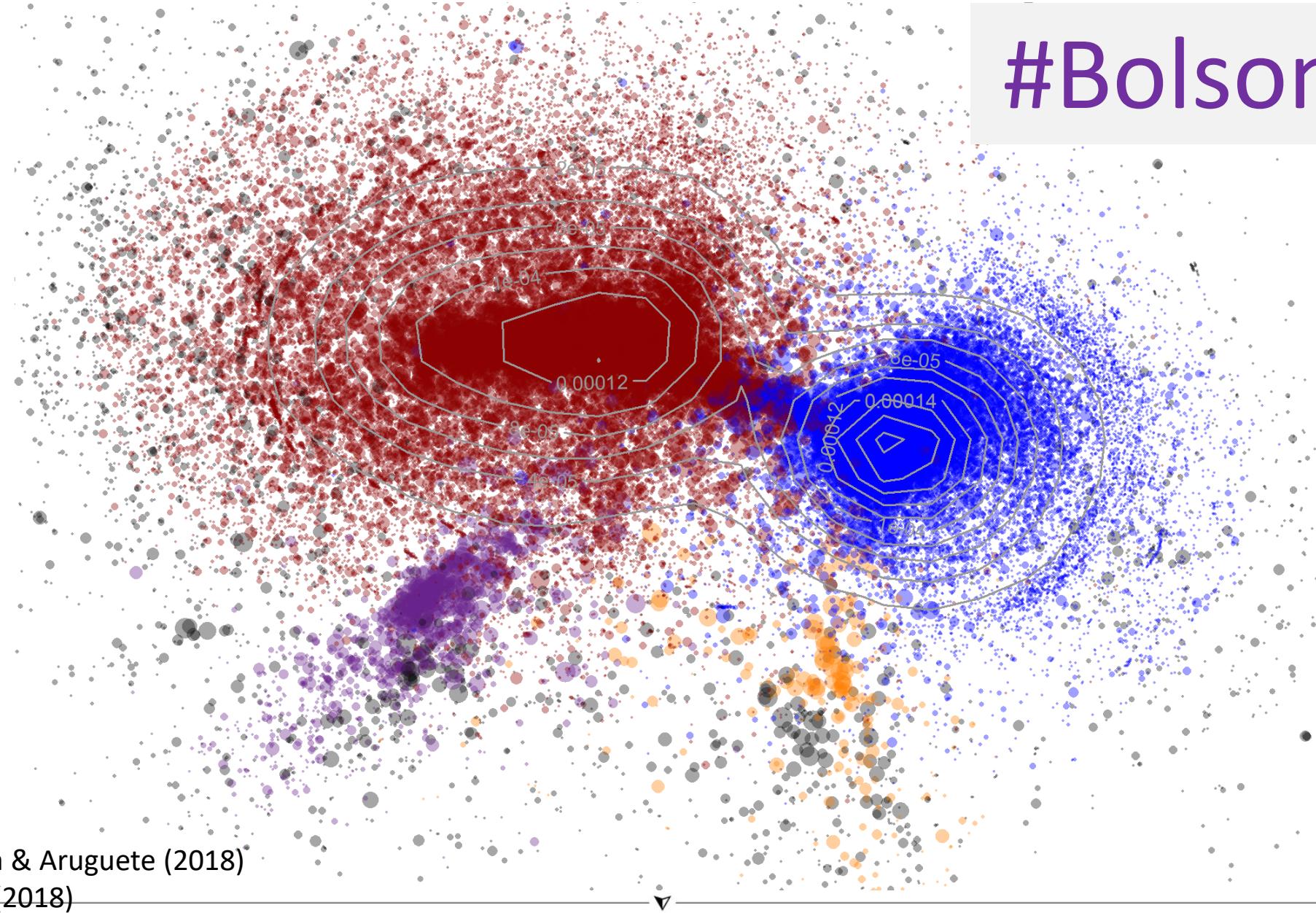
Nota: Encuesta sobre 2,006 votantes argentinos realizada por CIPPEC, octubre 2017. El eje vertical reporta la proporción de encuestados por cada tipo de interacción con el tuit. El eje horizontal indica el auto-posicionamiento ideológico de los encuestados.

Probability of voting as explained by:
the weight we give to ideology, α_k

- media reputation, R_k
- issue attention, A_i

$$U_k(ik) = -\alpha_i(x_i - N_k)^2 + Reputacion_k + Atencion_i + \delta_i$$

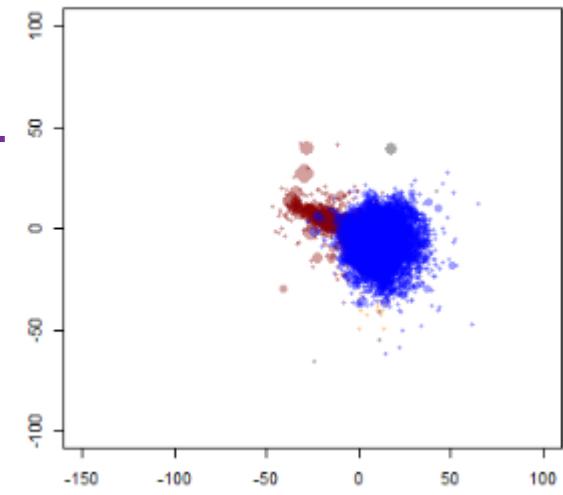
#Bolsonaro



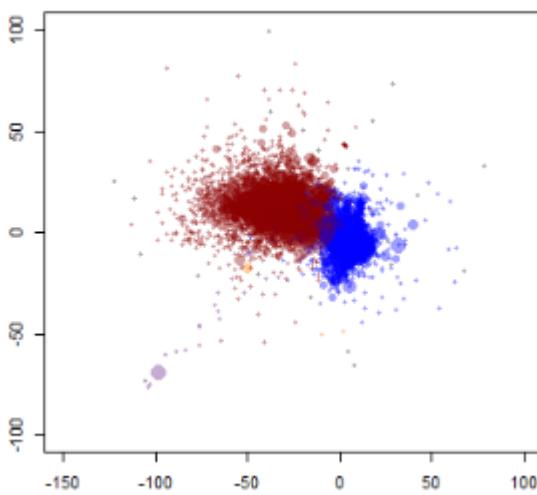
Calvo, Ventura & Araguete (2018)
(2018)

TRADITIONAL MEDIA

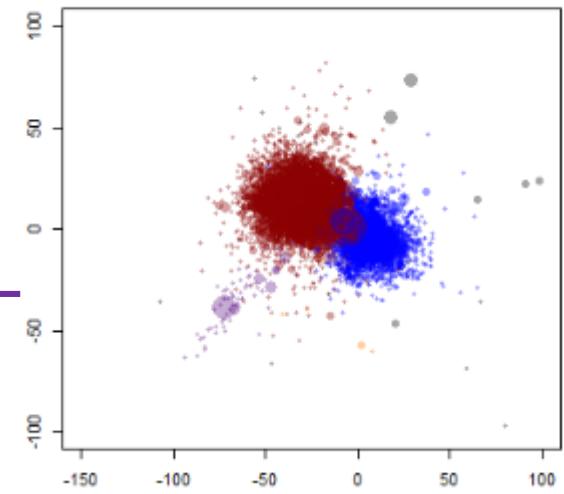
www.oantagonista.com



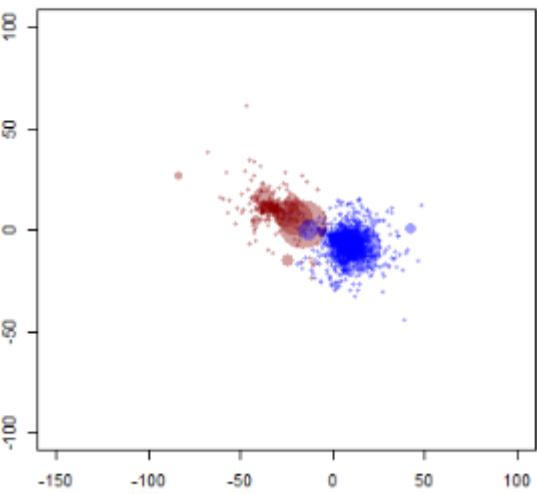
veja.abril.com.br



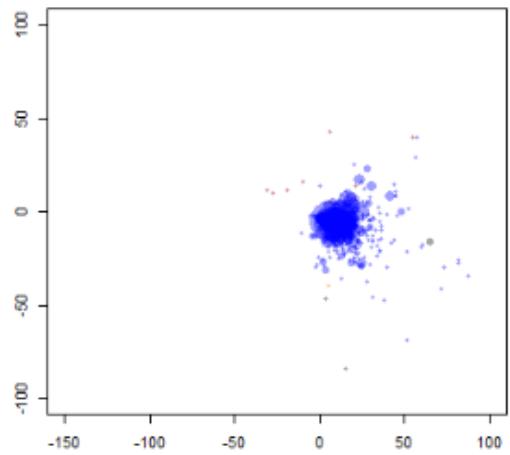
www1.folha.uol.com.br



f5.folha.uol.com.br



republicadecuritiba.net



ASTROTURFERS

$$U_{(ij)}^k = -\alpha_{q(i)}^k \left(x_i^k - \beta_j^k \right)^2 + R_{q(i)}^k N_{ij}^k + A_i^k + G_j^k$$



Table 1: Observational data with Users (row) and Media (columns)

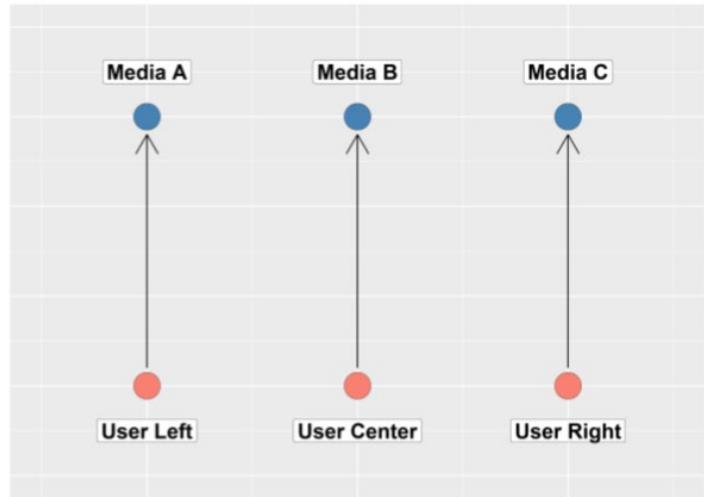
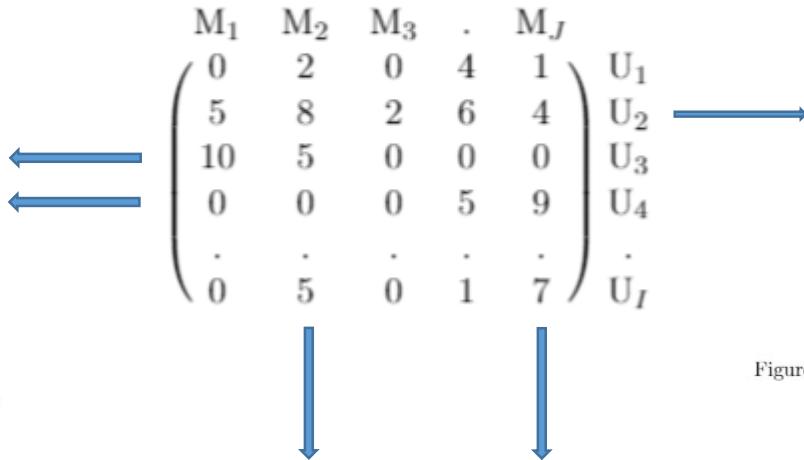


Figure 3: Effect of Ideological Congruence in a social media embeds. Users on the left, center, and right of the political spectrum embed content to media that is ideologically closer to them.

Ideology

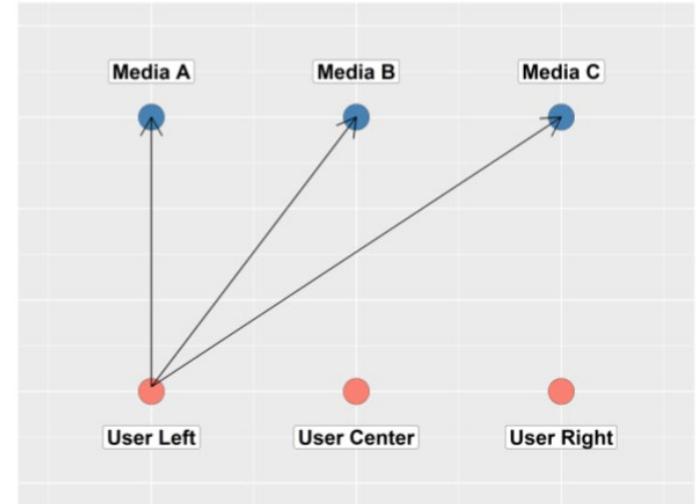


Figure 2: Effect of Attention in a social media embeds. User on the left embeds more content

Attention

Reputation

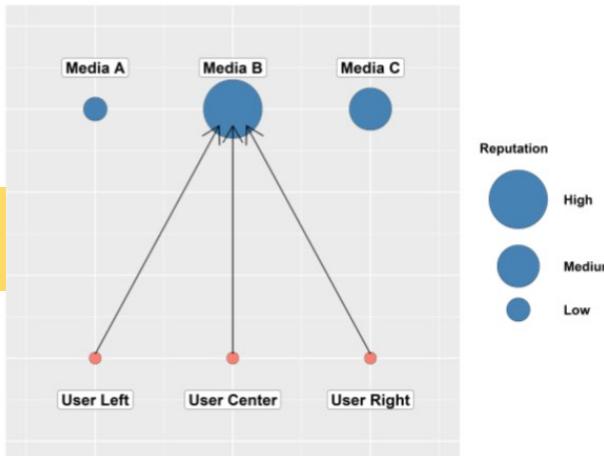


Figure 1: Effect of Reputation in a social media embeds. Users on the left, center, and right of the political spectrum embed content from Media B

Importance of Ideology by quantile

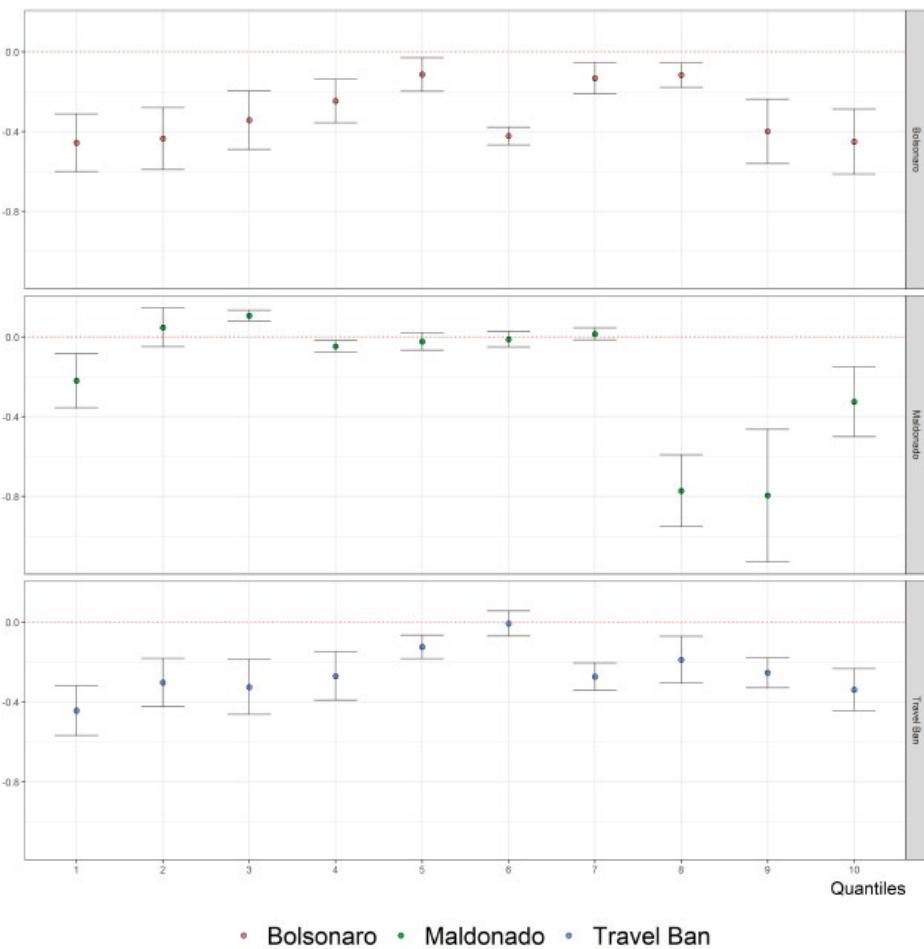


Figure 11: Ideology by quantile, all three networks

Importance of attention by quantile

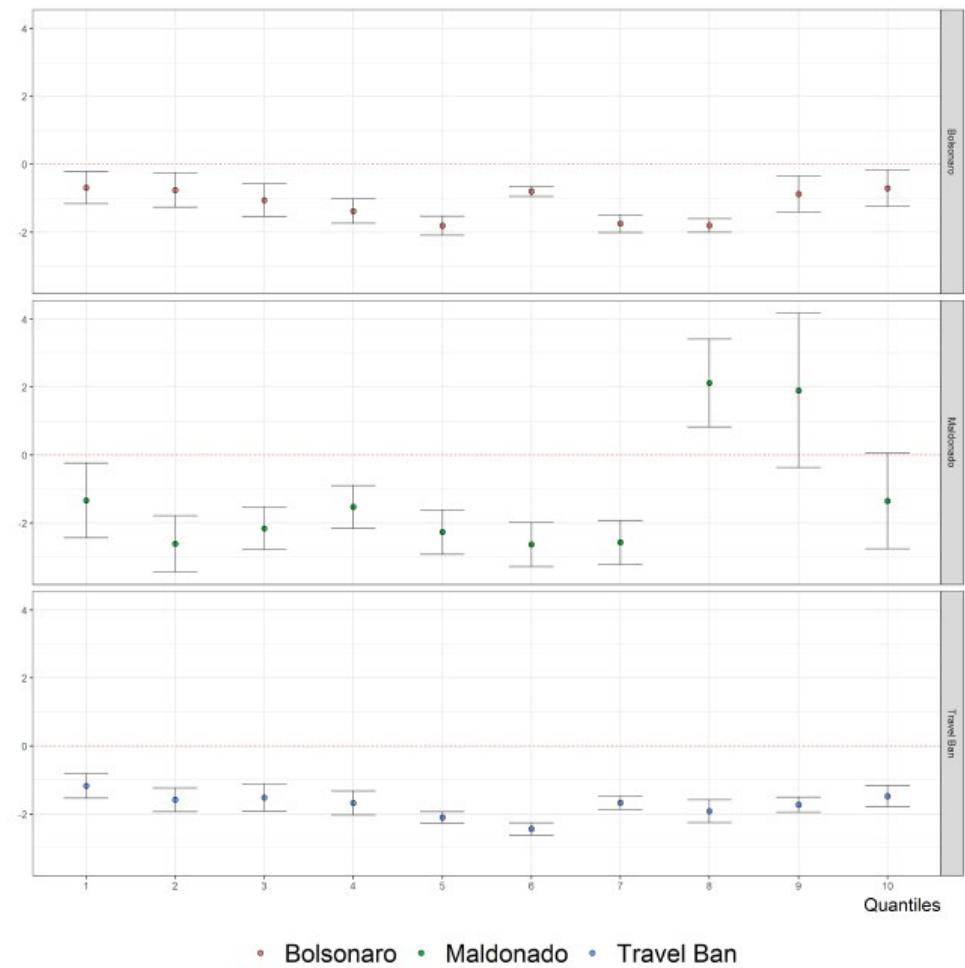


Figure 12: Attention by quantile, all three networks

“pull” by the median weighted user

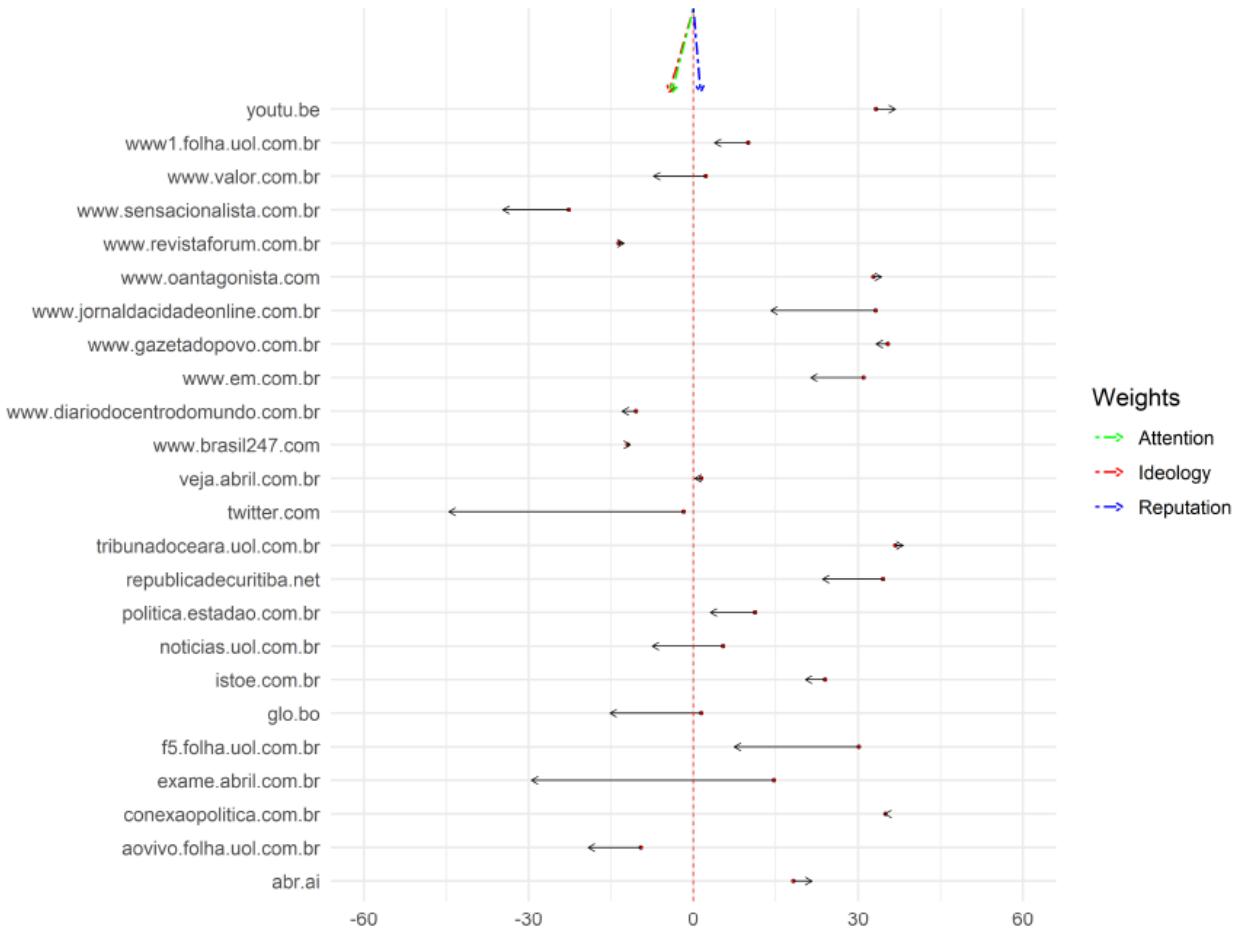


Figure 13: #Bolsonaro: Horizontal arrows describe the difference between the observe location and the optimal location of each news outlet. Vertical arrows describe the difference between the median voter and the weighted median voter by each parameter set, as described in equations (4), (5), and (6)

$$\text{IdeologyShift} = \bar{x}_i - \frac{\sum x_i \alpha_{f(i)}}{\sum \alpha_{f(i)}} \quad (4)$$

$$\text{ReputationShift} = \bar{x}_i - \frac{\sum x_i R_{f(i)}}{\sum R_{f(i)}} \quad (5)$$

$$\text{AttentionShift} = \bar{x}_i - \frac{\sum x_i A_{f(i)}}{\sum A_{f(i)}} \quad (6)$$

Optimal Location, Adams, Merrill, and Grofman (2005)

TravelBan

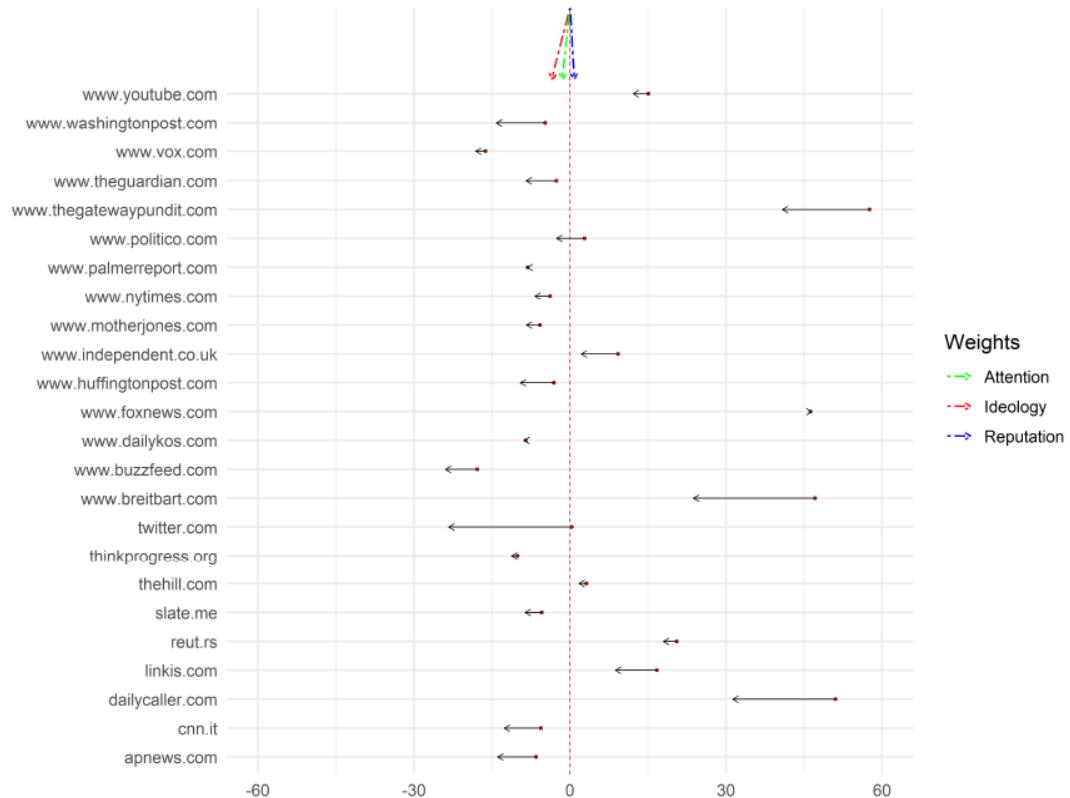


Figure 15: #TravelBan: Horizontal arrows describe the difference between the observe location and the optimal location of each news outlet. Vertical arrows describe the difference between the median voter and the weighted median voter by each parameter set, as described in equations (4), (5), and (6)

Maldonado

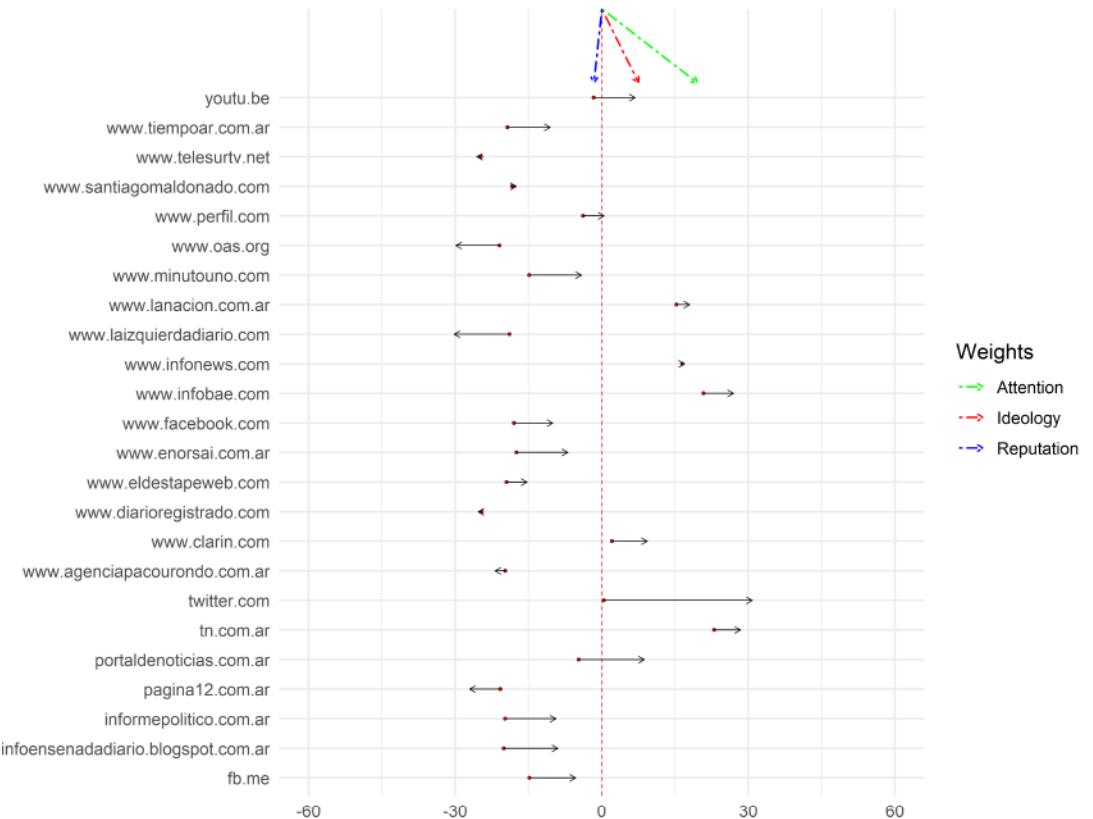
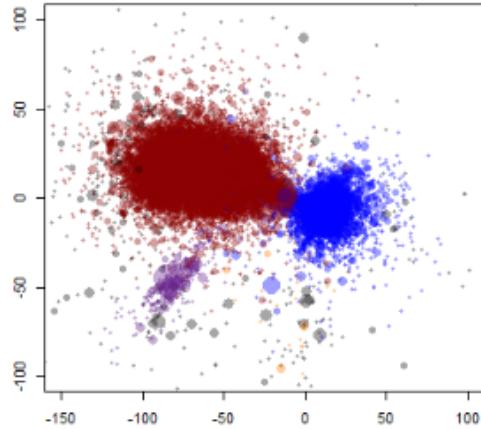


Figure 14: #Maldonado: Horizontal arrows describe the difference between the observe location and the optimal location of each news outlet. Vertical arrows describe the difference between the median voter and the weighted median voter by each parameter set, as described in equations (4), (5), and (6)

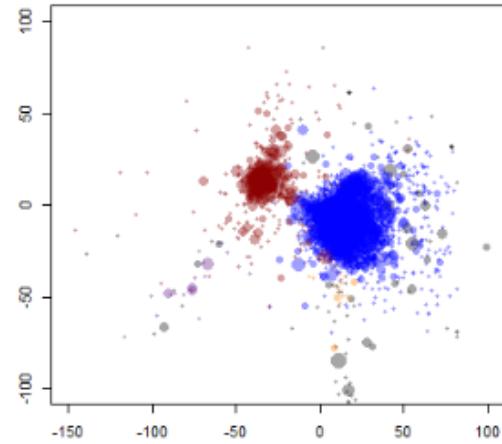
Platforms

Twitter

twitter.com



youtu.be





The Disinformation Campaign Targeting the White Helmets in Syria

Kate Starbird

Human Centered Design & Engineering

University of Washington

kstarbi@uw.edu

@katestarbird

US National Science Foundation

IIS 1342252, IIS 1420255, IIS 1541688

Office of Naval Research

HCDE Human
Centered
Design &
Engineering

dubW

“White Helmets” tweets 2017-2018

 **TurtleWoman**
@TurtleWoman777

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#SyriaHasHeroes: meet the #WhiteHelmets:
#Syria heroes rescue men. #7DaysInSyria

 Hope Sarout 



Khaled Khatib
**volunteer and
cameraman
for The White
Helmets**

1,589 views 0:06 / 0:45

7:37 AM - 30 May 2017

 **Ishana Shekhawat**
@IshanaShekhawat

[Follow](#)

The White Helmets are being targeted for saving lives. They've saved over 85,228 lives. Now they need you and me.



The People's Million
act.thesyriacampaign.org

7:39 PM - 28 May 2017

Disinformation during Conflict The Case of the White Helmets in Syria

“White Helmets” tweets 2017-2018

 **WhiteHelmetsExposed**
@WhiteHelmetsEXP

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Mintpress News/RT Interview- John Pilger:
The White Helmets Are A “Complete
Propaganda Construct”



John Pilger: The White Helmets Are A “Complete Propaganda Construct”
In yesterday's interview with RT's Going Underground, John Pilger outed the White Helmets as nothing more than a “complete propaganda construct in Syria.”, hum...
mintpressnews.com

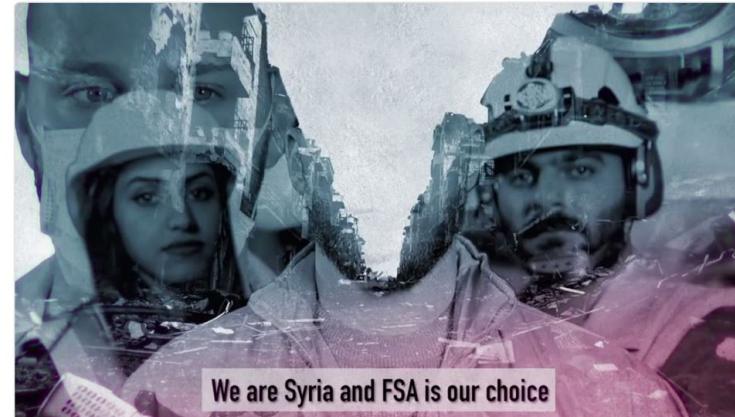
3:54 PM - 11 Jun 2017

 **MintPress News**
@MintPressNews

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Investigation: White Helmets Committing
Acts of Terror Across Syria
mintpressnews.com/investigation-...

#Syria #WhiteHelmets #AlQaeda



5:55 PM - 6 Sep 2017

10 Retweets 13 Likes

 **vanessa beeley**
@VanessaBeeley

Follow ▾

#WHITEHELMETS STEAL & LOOT HOUSES,
TERRORIST LEADERS AMONG THEM -
interview in E Aleppo youtu.be/-6bGXfM8gs @RenieriArts @21WIRE



WHITE HELMETS STEAL & LOOT HOUSES, TERRORIST LE...
I interviewed Ahmad Aldayh in May 2017, in his shop in East Aleppo. He had been held prisoner by Jabhat al Shamiya brigade [affiliated with Nusra Front aka A...
youtube.com

8:39 AM - 19 Aug 2017

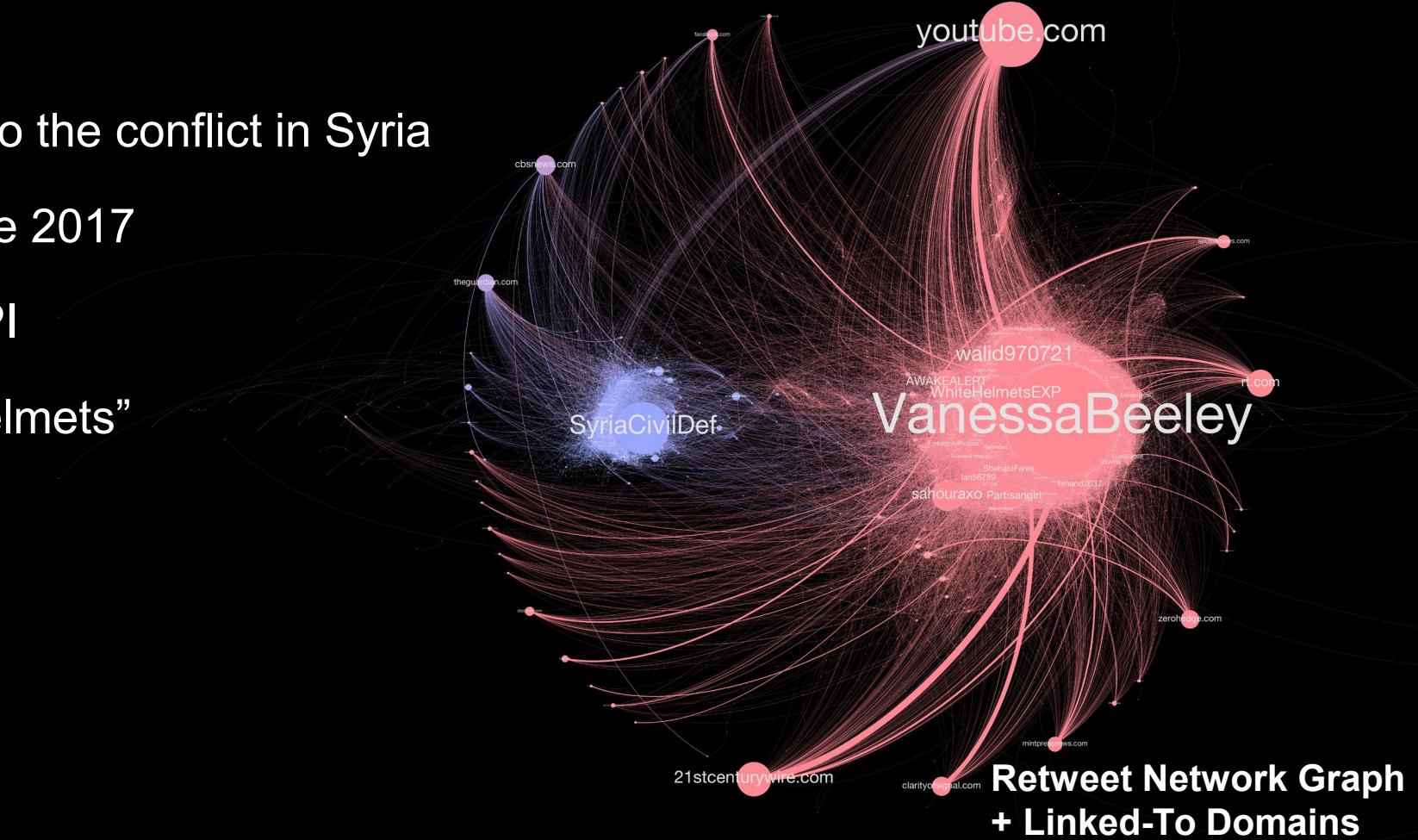
189 Retweets 148 Likes

6 189 148

Disinformation during Conflict The Case of the White Helmets in Syria

Method: Data Collection

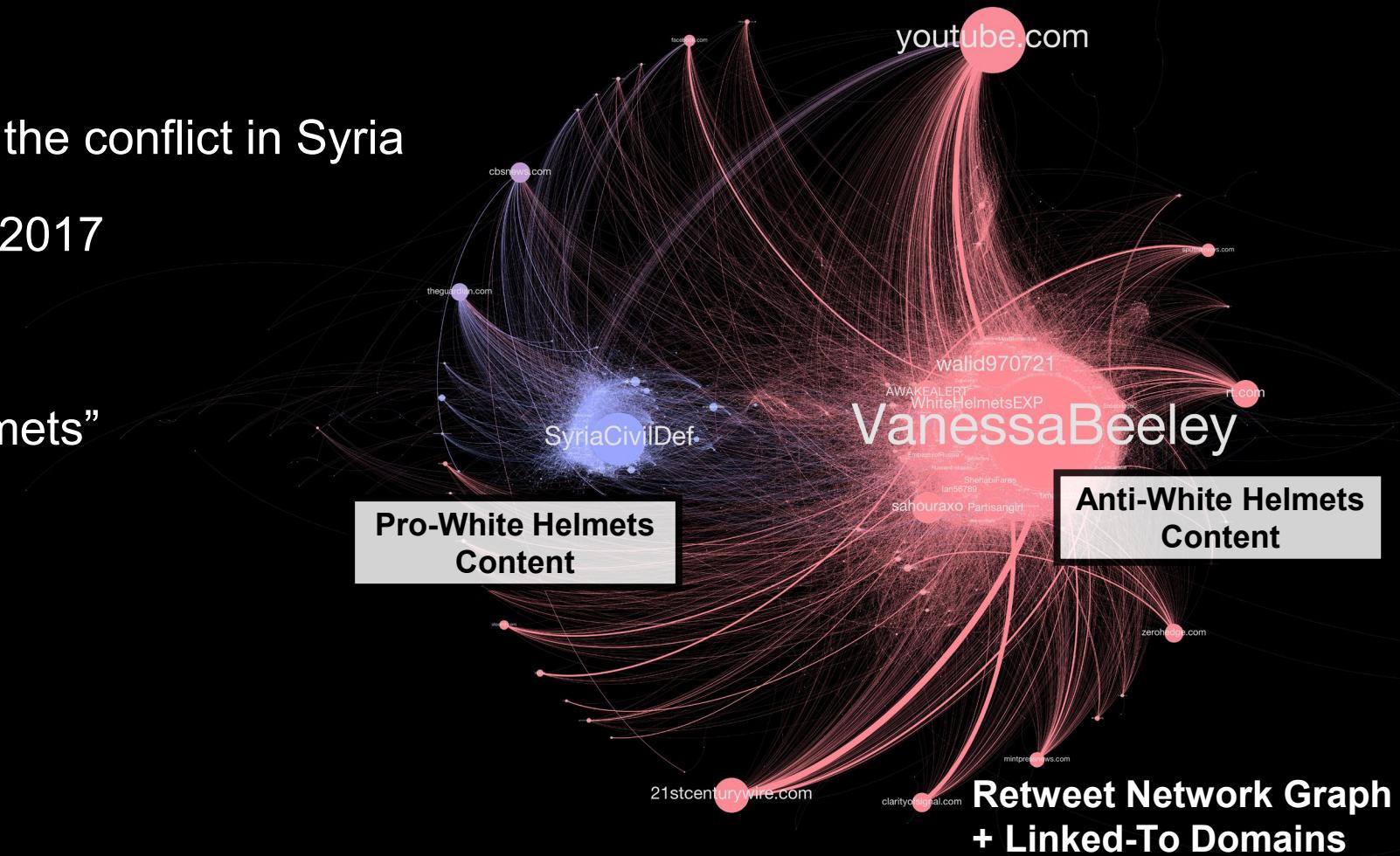
- Collected Twitter data related to the conflict in Syria
- Ongoing collection, began June 2017
- Used the Twitter Streaming API
- Scoped to tweets w/ “White Helmets”
- 2M+ tweets



Disinformation during Conflict
A View from the Twitter Data

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Disinformation during Conflict
A View from the Twitter Data



Disinformation during Conflict Content Sharing across “Independent” Media Domains

Same long passage of text (multiple paragraphs) appears in both articles.

RT QUESTION MORE LIVE

Home / World News / Syria's White Helmets suspend members caught on camera during rebel execution

Published time: 19 May, 2017 13:52
Edited time: 20 May, 2017 13:13

Get short URL

Syria's White Helmets have suspended several members of their rescue team after stomach-churning footage emerged showing rebel militants conducting a summary execution of a man in the town of Jasim, with the White Helmets helping get rid of the body.

Graphic images released on Wednesday show blood pouring out of the execution victim's head. After the man is shot dead on camera – in front of a large crowd in the town of Jasim in Daraa, southern Syria – volunteers from the White Helmets move in to dispose of the body, [AMN reported](#).

Read more

Assad: Oscar-feted White Helmets are part of Al-Qaeda

On Thursday, Syria's White Helmets, also known as the Syrian Civil Defense, [issued a statement](#), acknowledging that their volunteers' actions "did not fully uphold the strict principles of neutrality and impartiality."

"Two Civil Defense volunteers were seen to act improperly and not in accordance with the voluntary Code of Conduct for Syria Civil Defense members," the statement said, adding that the members have been suspended for three months.

"Syria Civil Defense expects each and every volunteer to perform their duties to the highest professional standard, as the individual actions of one member impact the reputation of all volunteers and the organization as a whole," the statement noted.

The group explained that earlier this week, members of Syria Civil Defense received a request from local authorities to "dispose of the body of a person that had been sentenced to death by the local court for murder."

RT

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21st CENTURY Every 8 minutes, we respond to a disaster.

International Europe Africa Middle East US News Eurasia Sci-Tech Hollywood White Helmets Subscribe

WHITE HELMETS: Blasphemous Whitewash of Their Execution Black Record SUNDAY WIRE LIVE EPISODE #272

MAY 19, 2017

RT covered the most recent White Helmet execution mop-up in the following report:

"Syria's White Helmets have suspended several members of their rescue team after stomach-churning footage emerged showing rebel militants conducting a summary execution of a man in the town of Jasim, with the White Helmets helping get rid of the body.

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In a recent [Si](#) NATO and G their UK ex-n executions a of Arimathea of crucifying Jesus."

+ Featured Stories Archive

Ilhan Omar in 2020

Explained: Why Julian Assange & Chelsea Manning hold key to Free Press

'Imperialism on Trial' tour comes to Northern Ireland on March 19th and 21st

How Sanctions Against Russia Expose Cracks in Britain's Political Class

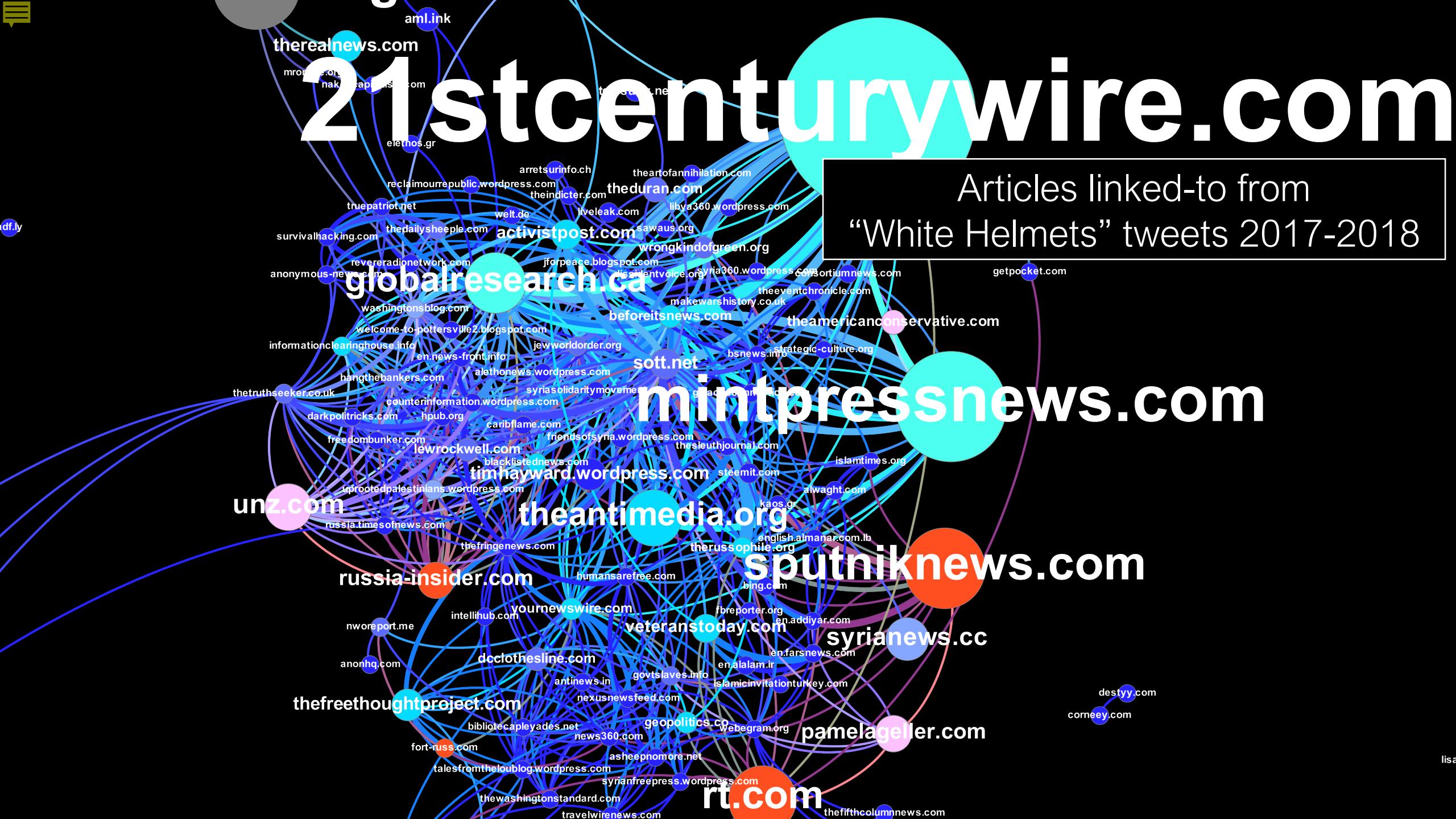
use chemical weapons in Ghouta'

21stCenturyWire

Disinformation during Conflict Content Sharing across “Independent” Media Domains

21stcenturywire.com

Articles linked-to from
“White Helmets” tweets 2017-2018





Take Aways

- Disinformation campaign against the White Helmets worked to sow doubt in the organization — to undermine Western sympathy in their cause, to diminish trust in their documentation of the civilian impacts of the Syrian government and their Russian allies
- The campaign was cross-platform (Twitter, Youtube, news websites and blogs)
- The “alternative media ecosystem” facilitated this campaign — government-controlled (Russian, Iranian, Syrian) outlets were integrated into this ecosystem
- This ecosystem is filled with “astroturfed” content (the same content spread across diverse websites) which microtargets specific audiences and disrupts media literacy strategies (triangulation)

Students

Ahmer Arif, Tom Wilson, Katie Van Koevering, Kayta Yefimova

Many more students from HCDE, CSE, and the iSchool who participated through
Directed Research Groups during 2017-2019

Collaborators

Emma Spiro at UW iSchool

SOME Lab - University of Washington

Kate Starbird

kstarbi@uw.edu

@katestarbird

emCOMP Lab

US National Science Foundation

1342252, 1420255, 1541688, 1715078, 1749815

Office of Naval Research



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FIRMS, MARKETS & ALGORITHMS PANEL

- Background:
 - A plethora of missing/incomplete markets
 - Tension between AI as automation and on-the-ground efforts to secure employment (Mehdi)
- Questions:
 - In the specific markets you work on, what are the frontiers for doing good?
 - Are there low hanging fruit, i.e. under-exploited markets, where these data analytic approaches might promote development w/out huge investments?
 - How can we get these tools/techniques (or at least their output) into the hands of small producers and consumers to improve household outcomes?
 - What are the main challenges (lack of data, regulation, etc.) to applying big data analytics to markets in the developing world? How have you managed capacity-related challenges -- e.g., did you seek out partnerships with large tech or local firms, build in-house data science teams, etc.?
 - Are there unique biases or ethics concerns you've run up against, or that you've found you have to at least be careful with, in using AI/ML in the kinds of markets with which you work?

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SOLVING YOUTH
UNEMPLOYMENT
THROUGH
PARTNERSHIPS

harambee
YOUTH EMPLOYMENT ACCELERATOR



Using big data analysis to provide tailored support to unemployed youth in Africa



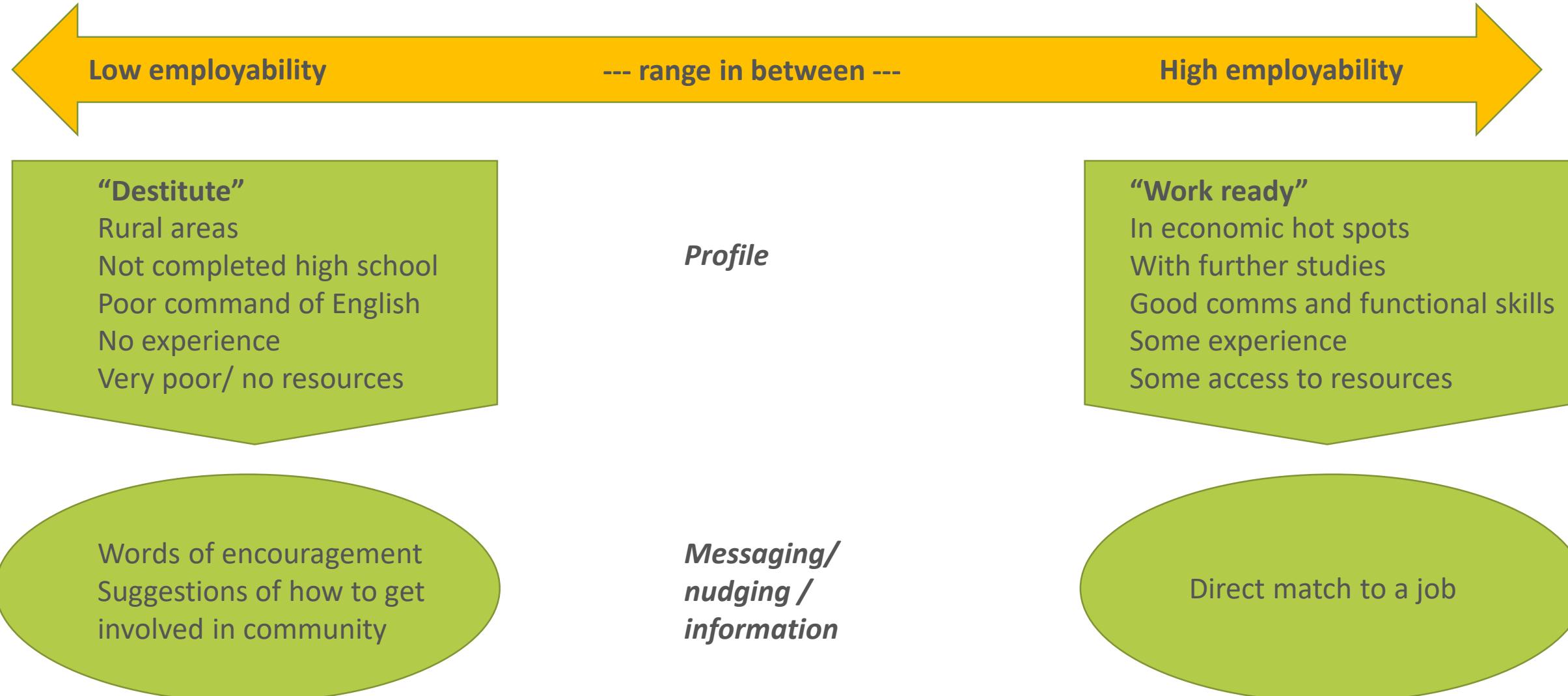
Harambee is a Youth Employment Accelerator currently operating in South Africa and Rwanda



- 50%+ youth unemployment rate
- We help pathway young people into economic opportunities
- 500k+ supported youth so far
- 100k+ jobs and work experiences
- 500+ employers
- Historically high touch face to face work seeker support model
- Now scaling up with technology to provide more tailored support to more young people
- Machine learning used for identifying employability attributes, improve efficiencies and identify segments with similar needs

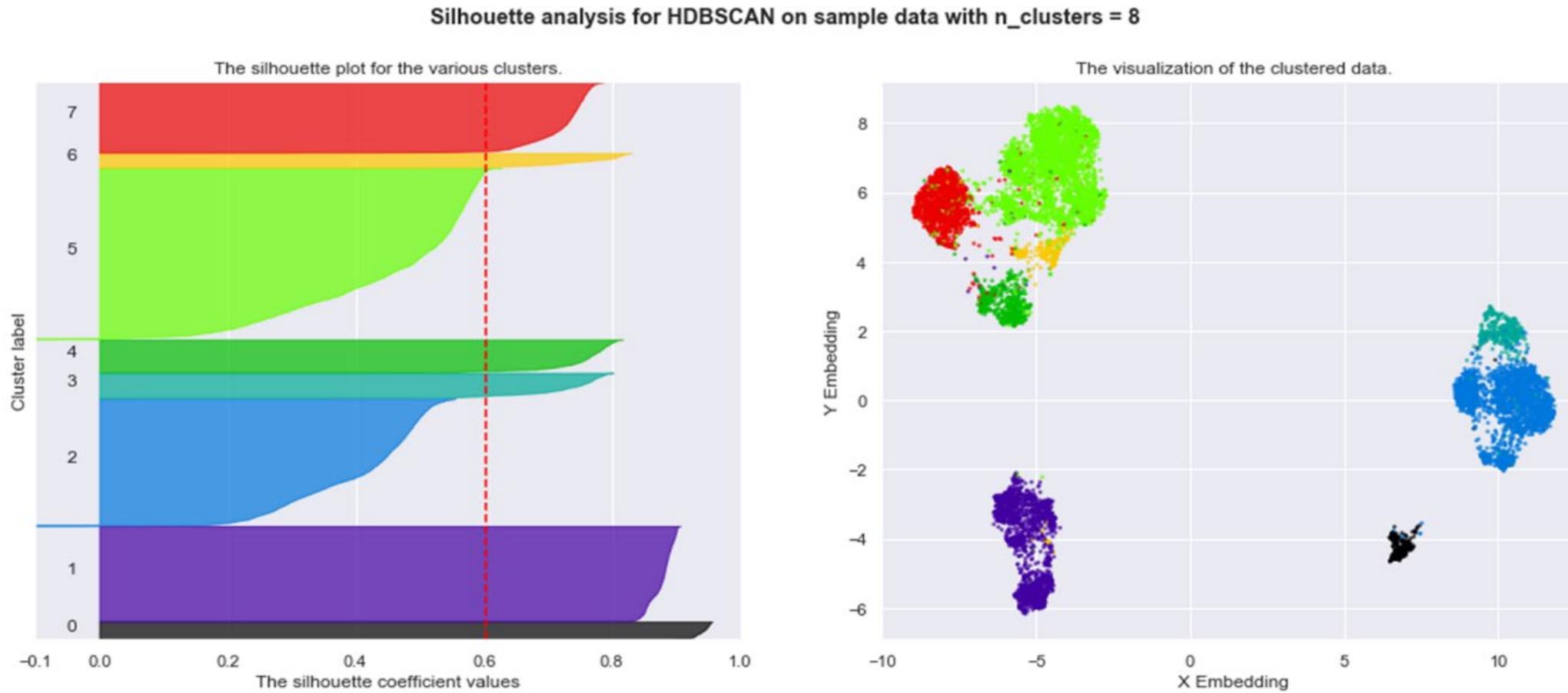


Our current 500k candidates on our database have various levels of employability, and need different support on their journeys





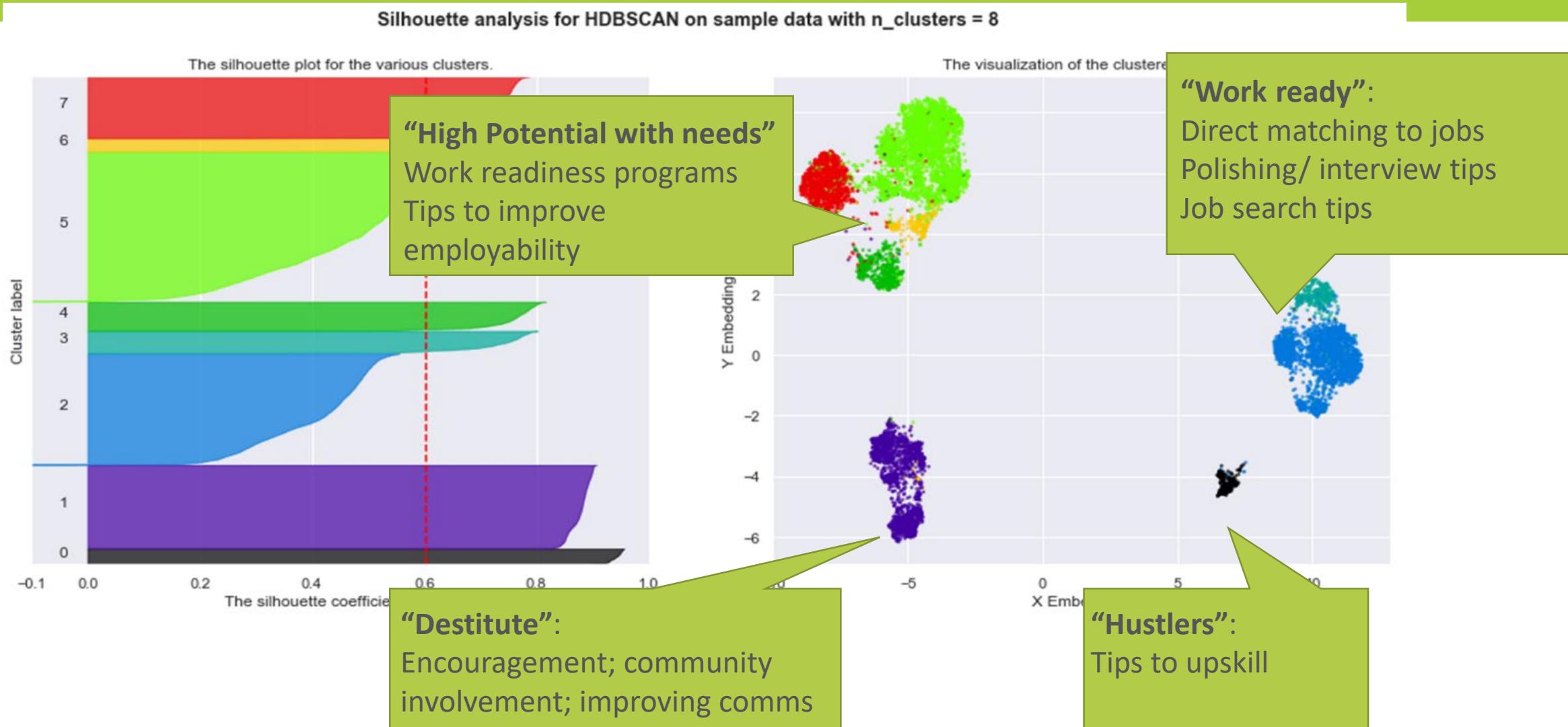
We used unsupervised machine learning to find natural clusters or “segments” of candidates with similar profiles and needs



The graphic represent 50 dimensions of data pressed onto a 2 dimensional space
Four distinct broad clusters emerge, with some of them segmented further



How do we use this info? - These segments are analysed, messaged and served differently





Protecting Vulnerable Populations

A repeatable solution using game theory

Kristin M. Tolle, Ph.D.

Chief Data Officer, Tech for Social Impact, Microsoft Philanthropies



Data and AI Tech for Social Impact

We are committed to help nonprofits leverage the Data and AI tools to support their missions; by building and publishing the most commonly requested solutions





AI for Good



Earth



Accessibility

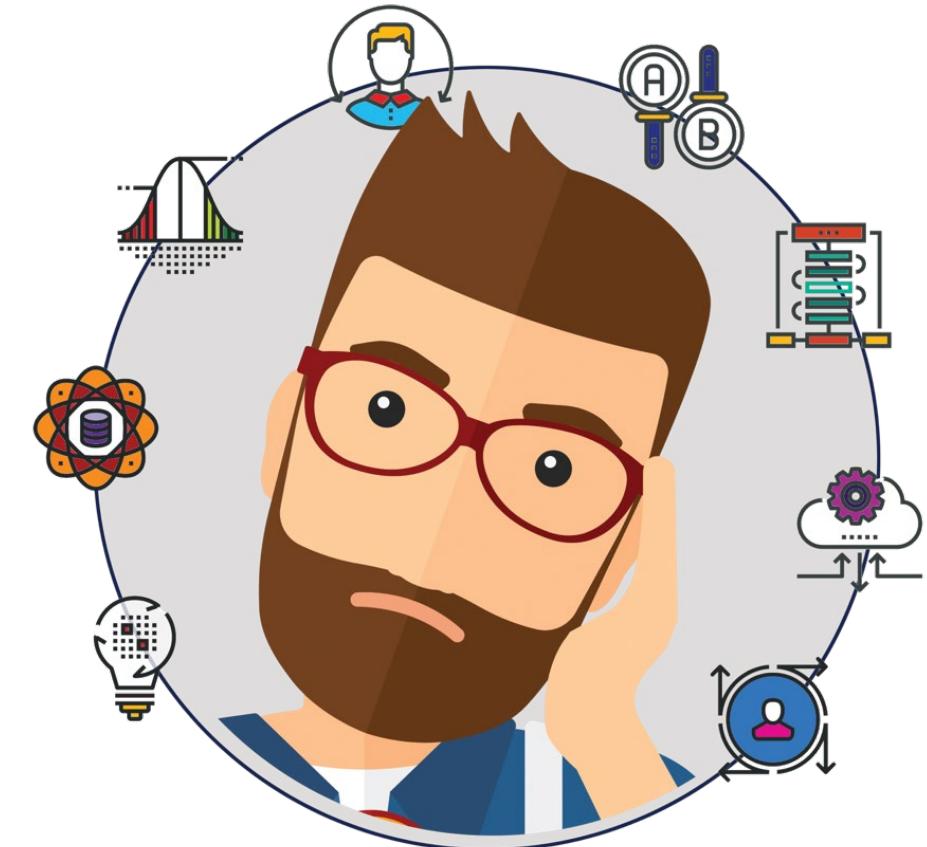


Humanitarian

Getting Started is Easier Said than Done

Common nonprofit pain points

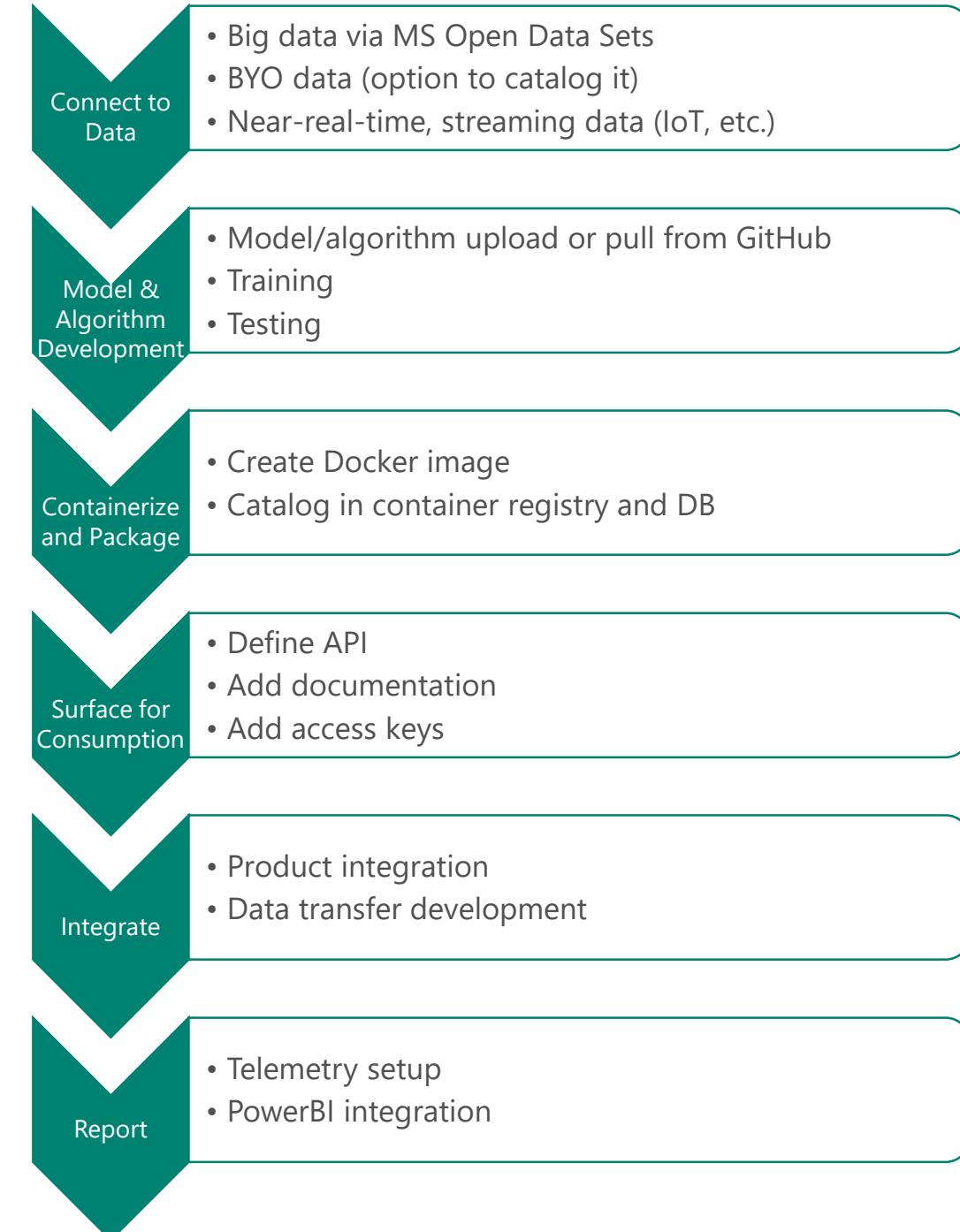
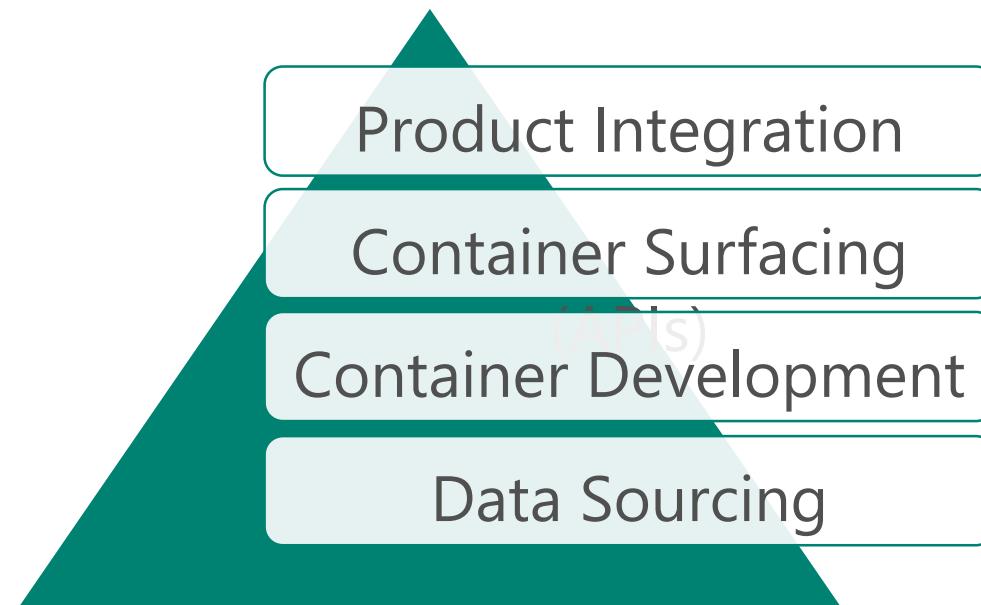
- Lack of IT staffing and familiarity with the cloud
- Lack of data science/machine learning expertise
- Hard to find “funding” for non-program projects
- Complexity with unclear potential outcomes
- Unclear how to protect people’s right to privacy in a cloud environment
- **Unsure where to start**



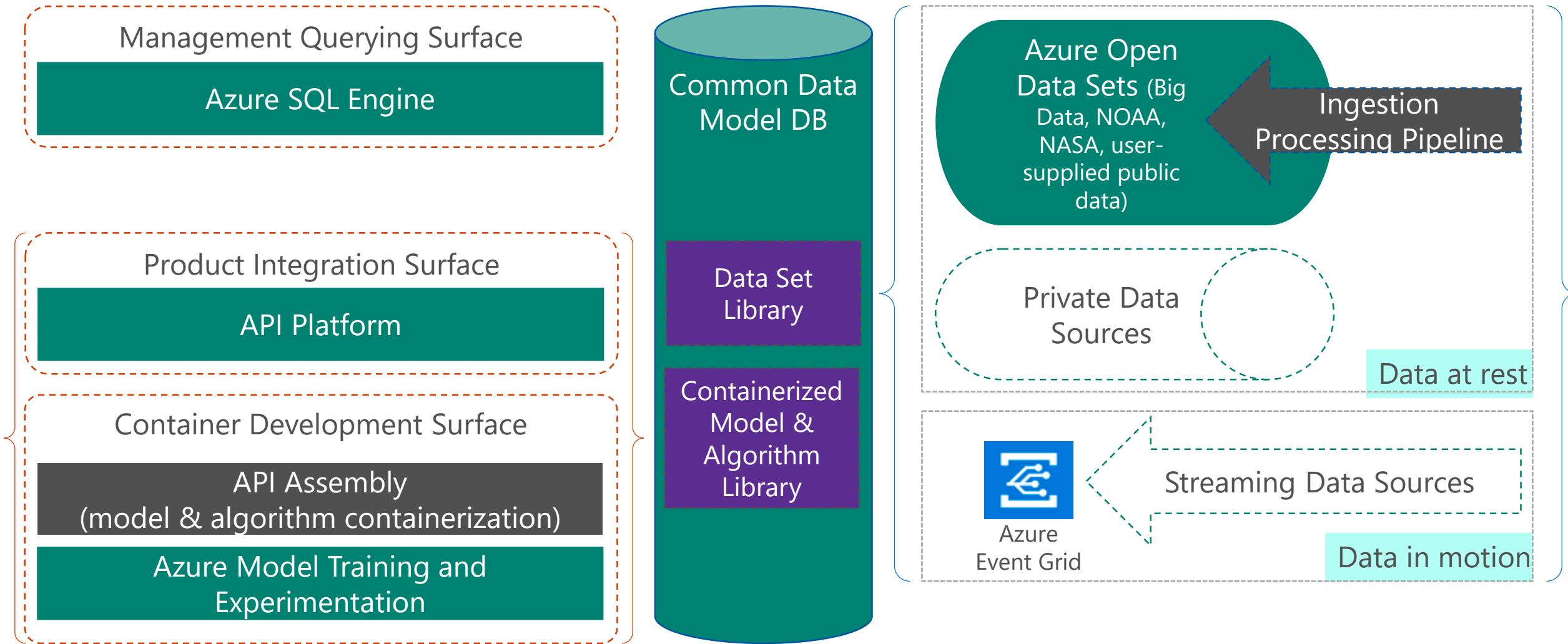


AI Development and Deployment Process

This process satisfies both, model development for one-off reports and model development for inference-based products. The data sources and the models are stored in a library, ready to be infused in subsequent products.



Architectural Elements



Data and AI Platform Example

Protection Agent for Wildlife Security



PAWS: Protection Assistant for Wildlife Security

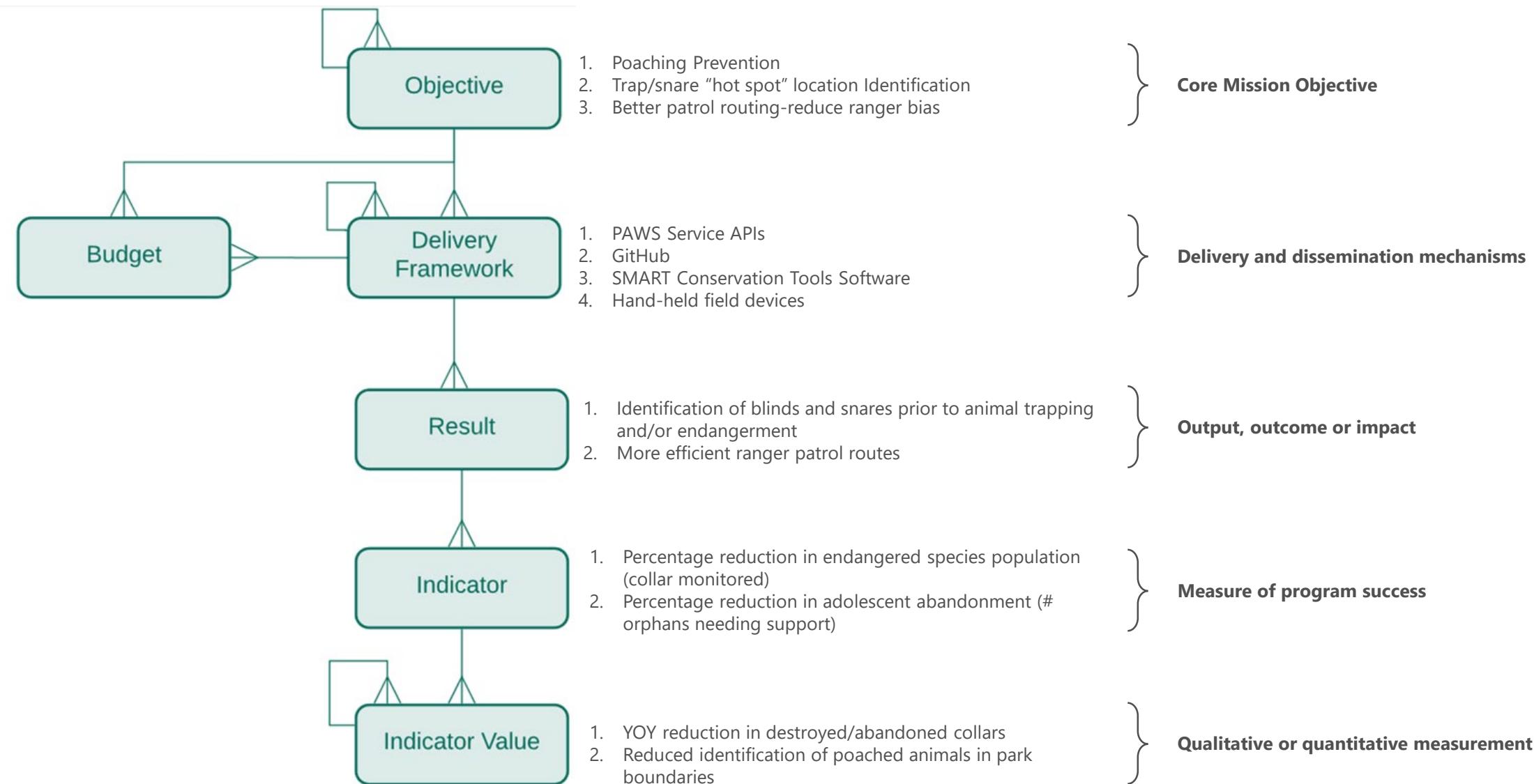
PAWS applies AI for Wildlife Conservation. It uses machine learning to predict where poachers may strike and it also helps generate randomized patrolling paths.

[More Info.](#)

Use Case: Poaching Prevention

- Build with Customer: PAWS (Protection Assistant for Wildlife Security) and University of Southern California
- Build-with ISV/Consortium: [SMART Conservation Tools](#)
- Use Case: Reducing poaching in game parks
- Solution: Uses game theory, historic poaching data, and park geospatial features to predict snare and trap “hot spots”
- Out of Scope: solution owned by MSFT for customers *beyond* the initial three to validate the system

PAWS Program Delivery-Entity Diagram



PAWS Extension: Human Trafficking Prevention

Related Build: PAHT (Prevention Assistant for Human Trafficking)

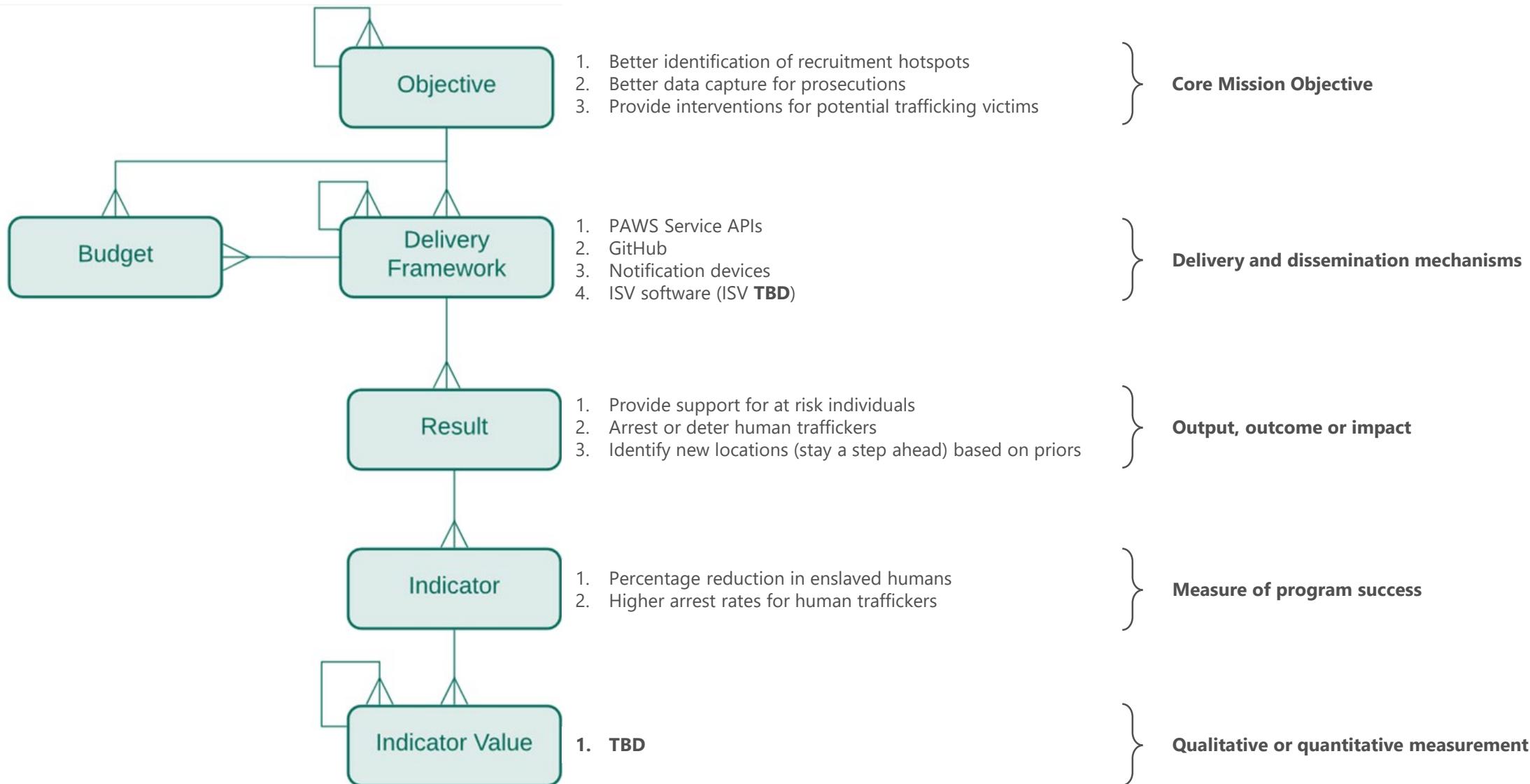
Related Components: PAWS game theoretic reasoning (adversarial) model

Explanation: Genericize the system (API pipeline “building block”)

Facilitation:

1. Modularize models and data manipulation tools via APIs
2. Create model/tool ensembles through API pipelines
 - a. Prepend/append trafficking custom modules to the genericized game theory model (from PAWS)

Program Delivery-Entity Diagram: PAHT



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ML Capacity building: Growing local technical talent



How can we bolster technical education in under resourced environments?

How do we retain such talent in our current context of heightened global demand?

How can we support the local research community in tackling local challenges?

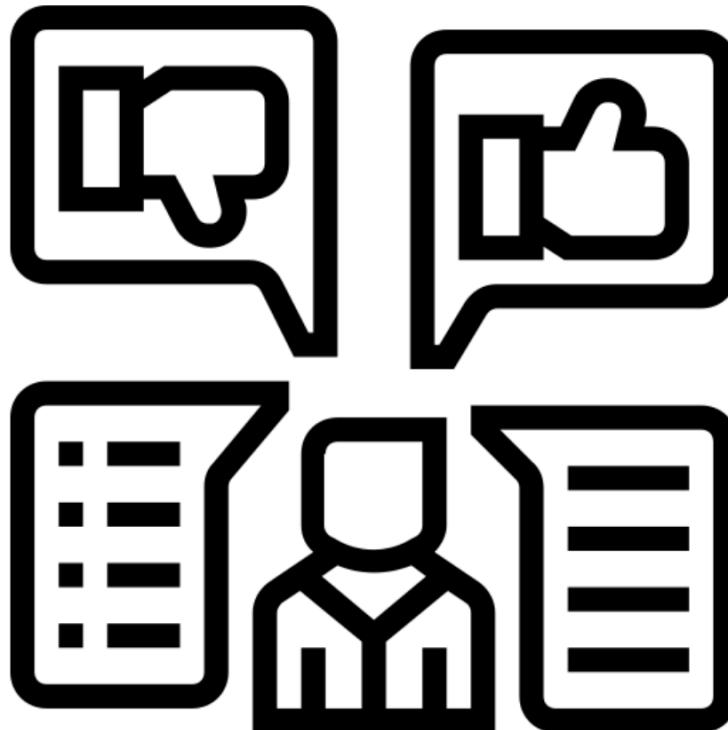
ML Capacity building: Access to quality data.



How do we foster a culture of data gathering and sharing?

How do we balance the need for data availability with security, privacy, and ethical concerns at the policy level?

ML Capacity building: Optics and public perception



How do we contextualize these technologies for a public with little exposure?

How do we ensure that knowledge exchange initiatives such as today are able to reach the political, developmental, and business circles of the areas we aim to serve?

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Fairness and Policing Algorithms

What is predictive policing?

Predictive policing uses police records to learn patterns in the occurrence of crime.

police records

Using these patterns, the computer then predicts the most likely locations of future crimes.

where crime will be detected in the future.

Additional police are then dispatched to the locations with the highest predicted rate of crime, thus preventing the crime that would have occurred from occurring or catching criminals in the act.

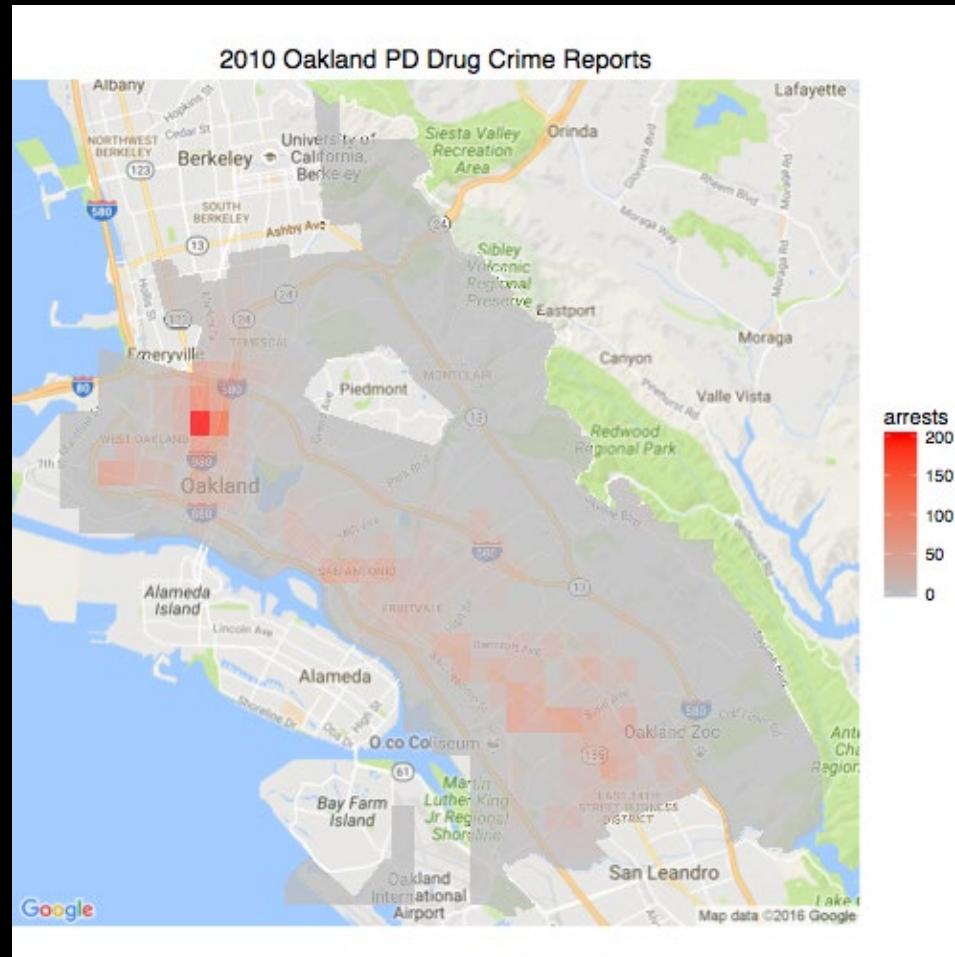
finding crime you wouldn't have found otherwise?

Are police records a representative sample of crime?

- Variation in reporting rates
 - NCVS indicates that reporting rates vary substantially by demographic characteristics, i.e. some crimes are more likely than others to be reported to police depending on who was victimized.
 - In this case, the bias derives not from the police themselves but from the community the police serve.
- Variation in police attention
 - Crimes that are committed in areas that are highly patrolled by police are more likely to be discovered by police than those committed in less patrolled areas.
 - Police are not tasked with collecting a random sample, so bias in the data may come from legitimate police strategy.
- Variation in rates of *arrest* even for similar criminal behavior
 - While white and black populations use marijuana at similar rates, blacks are arrested for marijuana possession at a rate several times that of whites.*

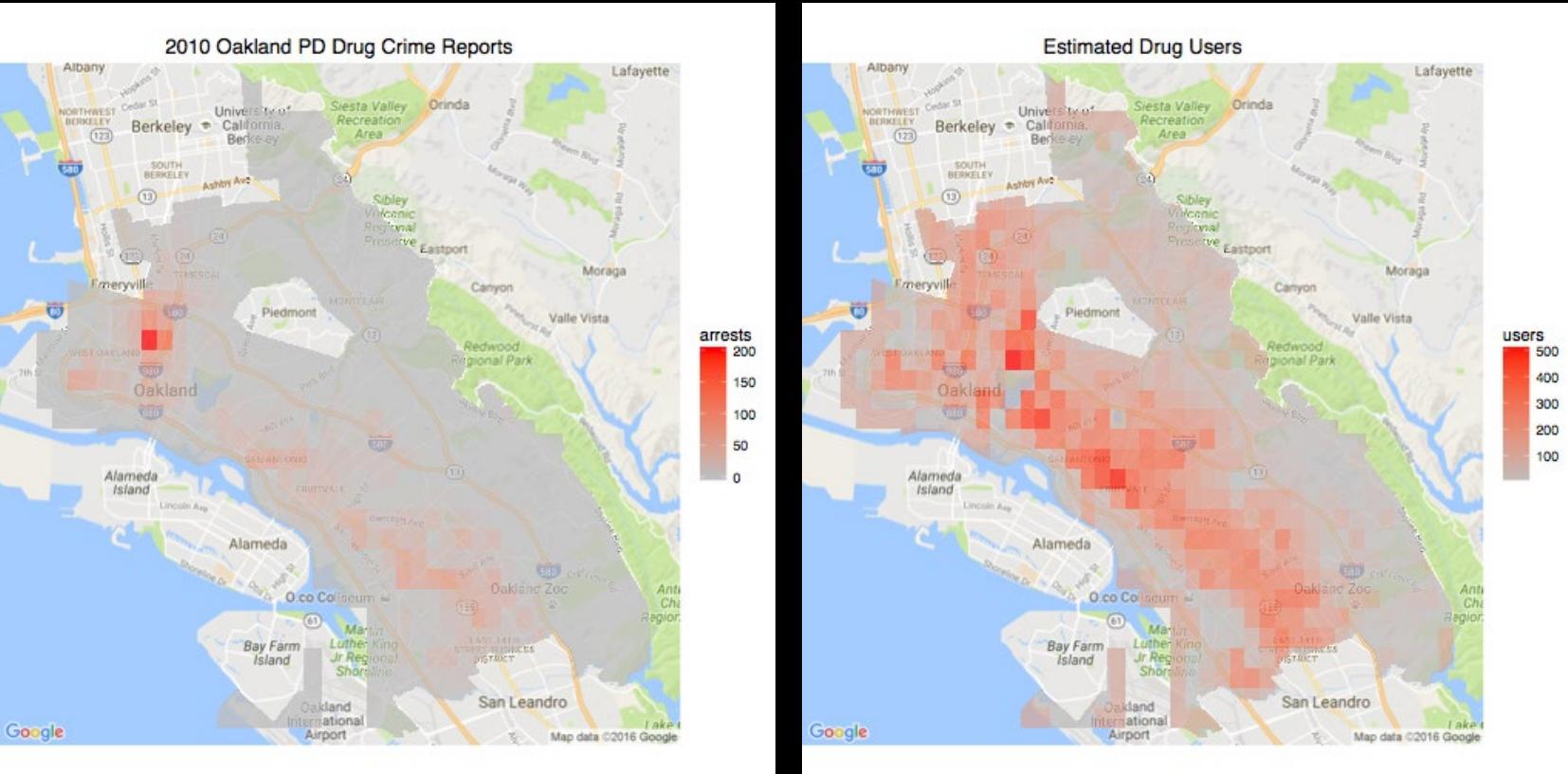
*<https://www.washingtonpost.com/news/wonk/wp/2013/06/04/the-blackwhite-marijuana-arrest-gap-in-nine-charts/>

Drug Crimes in Oakland



Data provided by openoakland.org

Drug Crimes in Oakland



Drug Crimes in Oakland

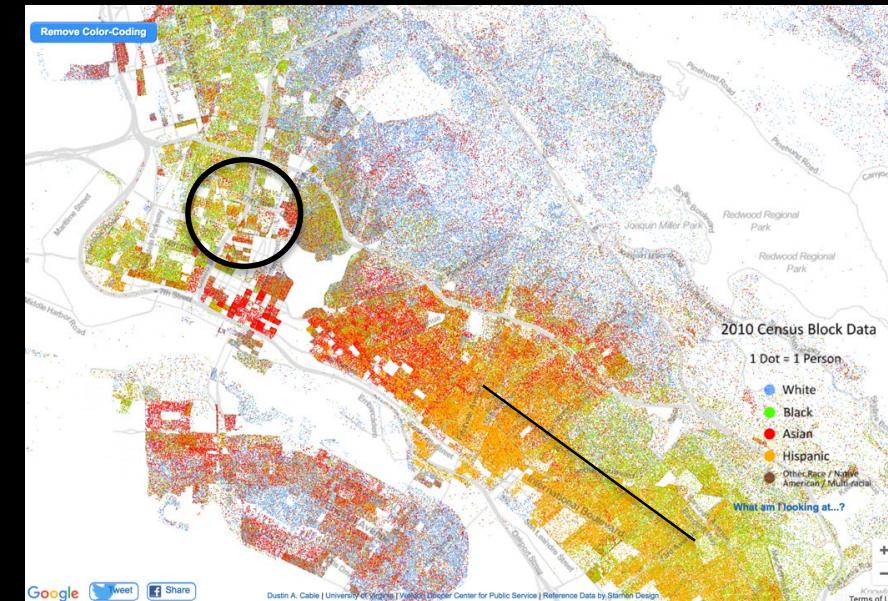
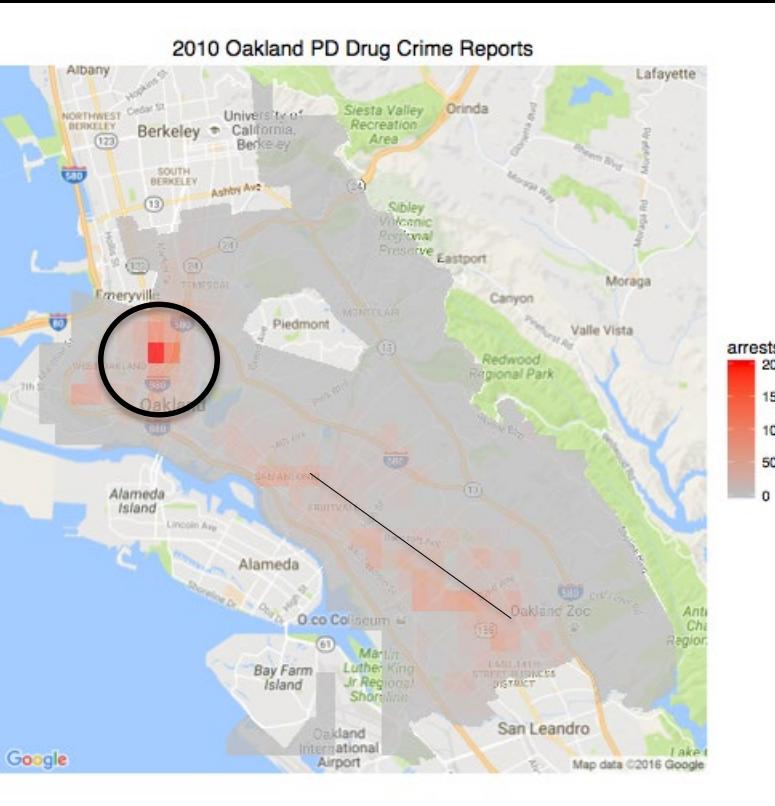
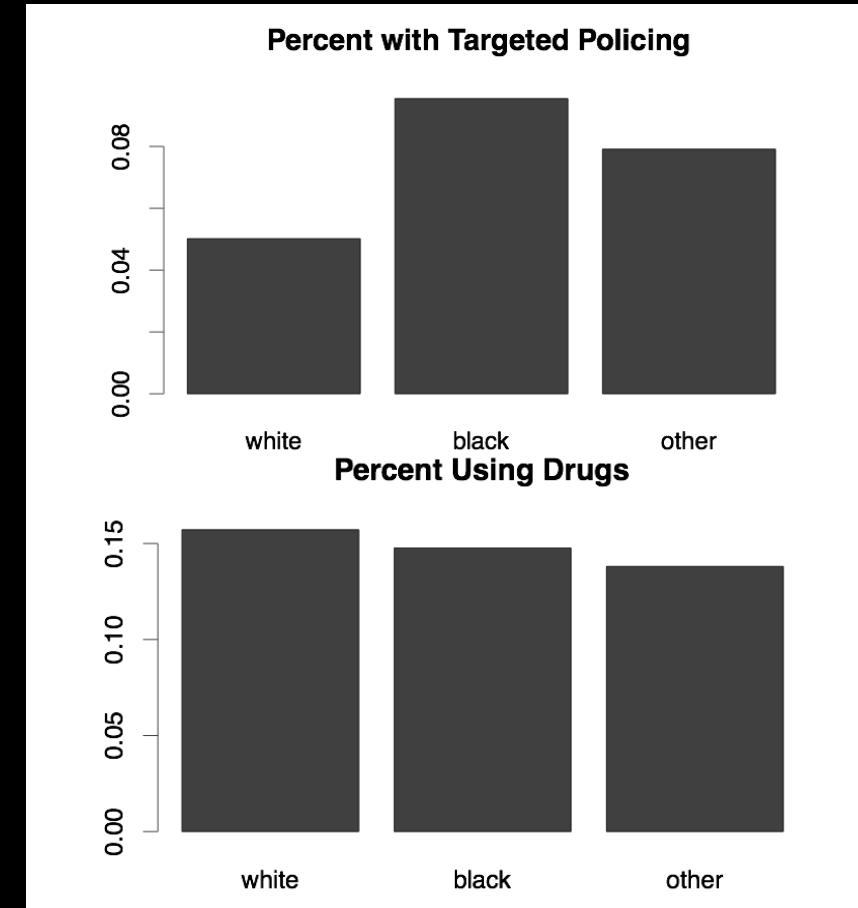
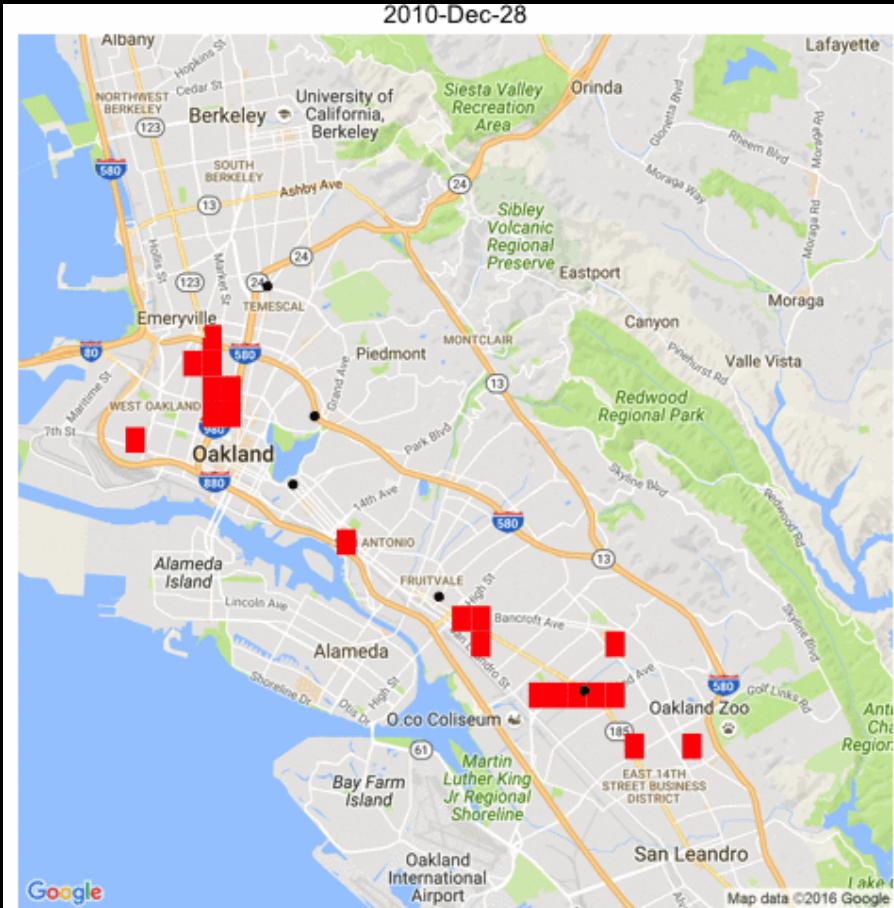


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Demo on Oakland Data



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