

DAY TWO  
10:45AM - 11:30AM

## POLICY IN THE AGE OF ARTIFICIAL INTELLIGENCE:

HOW DOES GOOD DATA INFLUENCE GOOD POLICY OR THE REVERSE?

MODERATOR



**Felicia Marcus**

William C. Landreth Visiting Fellow,  
Stanford University Water in the  
West Program



**James P. Cooper**

Global Director, Water Optimization,  
Arcadis



**Erik Ekdahl**

Deputy Director, Division of  
Water Rights, State Water  
Resources Control Board



**Frank Ury**

Board President, Santa Margarita  
Water District

8TH ANNUAL CA WATER DATA SUMMIT  
**INTELLIGENT QUESTIONING (IQ)**  
**SHARING WATER WISDOM**  
SEPTEMBER 7&8, 2023



STANFORD UNIVERSITY | PALO ALTO, CA  
[CaWaterDataSummit.org](http://CaWaterDataSummit.org)

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# Policy in the Age of A.I.

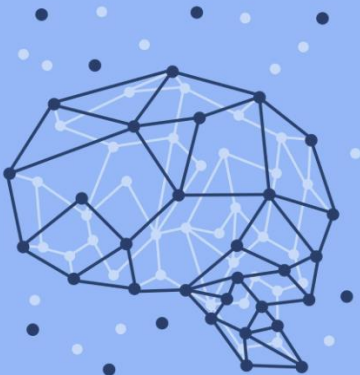
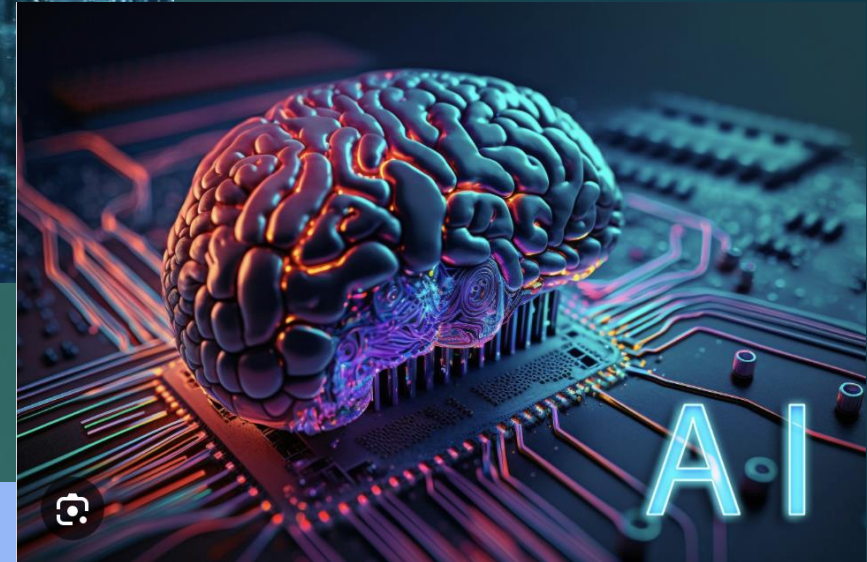


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Felicia Marcus  
Landreth Visiting Fellow  
California Data Collaborative  
Water Data Summit  
Stanford University  
September 8, 2023

# Overview


- ▶ Introduction
- ▶ Our Panel:
  - ▶ Frank Ury
  - ▶ Erik Ekdahl
  - ▶ Jim Cooper
- ▶ Presentations
- ▶ Questions & Discussion



**Artificial Intelligence**

*[är-tä-'fi-shəl in-'te-lə-jən(t)s]*

The simulation of human intelligence by software-coded heuristics.

 Investopedia

# Introduction



- ▶ Artificial Intelligence is a Gamechanger
  - ▶ Not a potential gamechanger, but a gamechanger whether you are ready or not
- ▶ Potential to enable more cost-effective and better management of water resources
- ▶ Will have an impact on policies of all kinds in addition to managing facilities and systems
- ▶ But requires effort
  - ▶ Better data
  - ▶ Right people
  - ▶ Right questions
- ▶ And we have the panel for you to help explore it!



# Data and Technology are making a world of difference. A.I. is more than an accelerant. It has policy implications at scale. Gamechanger.

- ▶ Data and tech developments support more helpful policy and practice
  - ▶ Atmospheric river predictive capacity
  - ▶ Measurement and reporting, especially when transparent
  - ▶ Sensors—making them count for cost reduction/trust
  - ▶ Telemetry—real time
  - ▶ "Big Data"—predictive analytics
  - ▶ "Digital Twin"—try it on for size
- ▶ A.I. requires upping our game
  - ▶ Staffing
  - ▶ Attitude
  - ▶ Data quality, categorization
  - ▶ Communication to the public/confidence
  - ▶ Sky is the limit; heck, unclear where the limit is
  - ▶ Payoff potentially huge, but scary



# Our panel



Felicia Marcus



Jim Cooper



Frank Ury



Erik Ekdahl

# Policy in the Age of AI

**James P. Cooper**  
Global Director, Arcadis



# *Artificial Intelligence*

*The ability to sense, reason, engage,  
and learn in a manner that seems  
intelligent.*



# *Artificial Stupidity*

*How do we guard against mistakes?*

*~ 3 billion computers in the world.*

*Their primary purpose?*

***people communicating with people.***

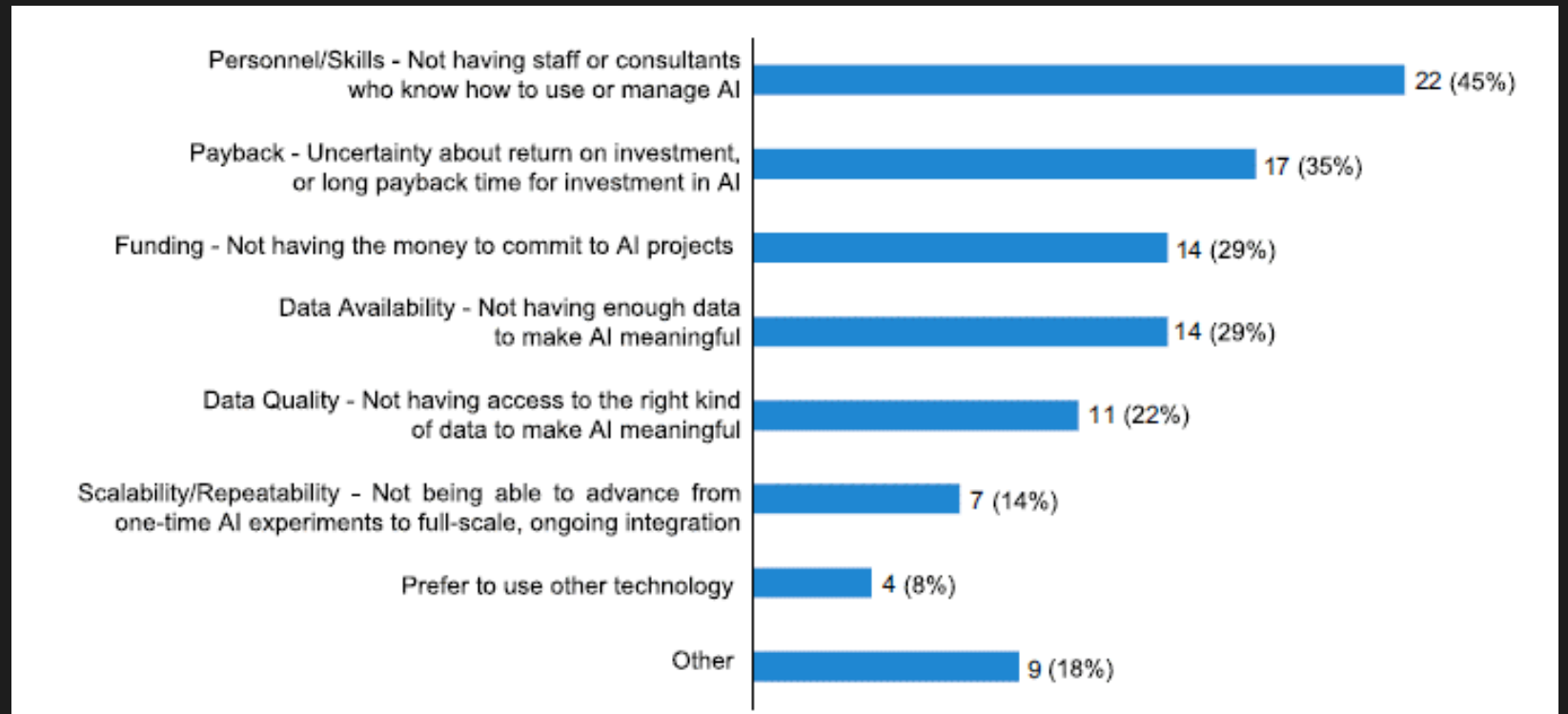
*Why are we not using AI  
more at water utilities?*

# Barriers and concerns regarding AI implementation: industry view

The most frequently cited barrier was personnel and skills, namely the lack of staff or consultants who have the knowledge of both the water sector and big data analytics.

This has been followed by the concerns regarding the payback, uncertainty about the return on investment and the timelines involved.

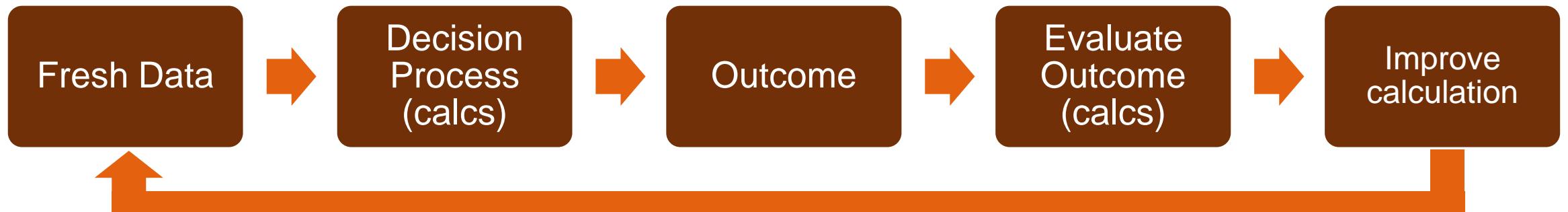
Other issues included lack of funding and scarcity of data that could underpin the AI.



Adapted from: Alyson H Rapp, Annelise M. Capener and Robert B. Sowby: Adoption of Artificial Intelligence in Drinking Water Operations: A survey of progress in the United States. Journal of Water Resources Planning and Management, 2023, 149 (7)



# Machine Learning *Reality*:



Source: Arcadis, 2020



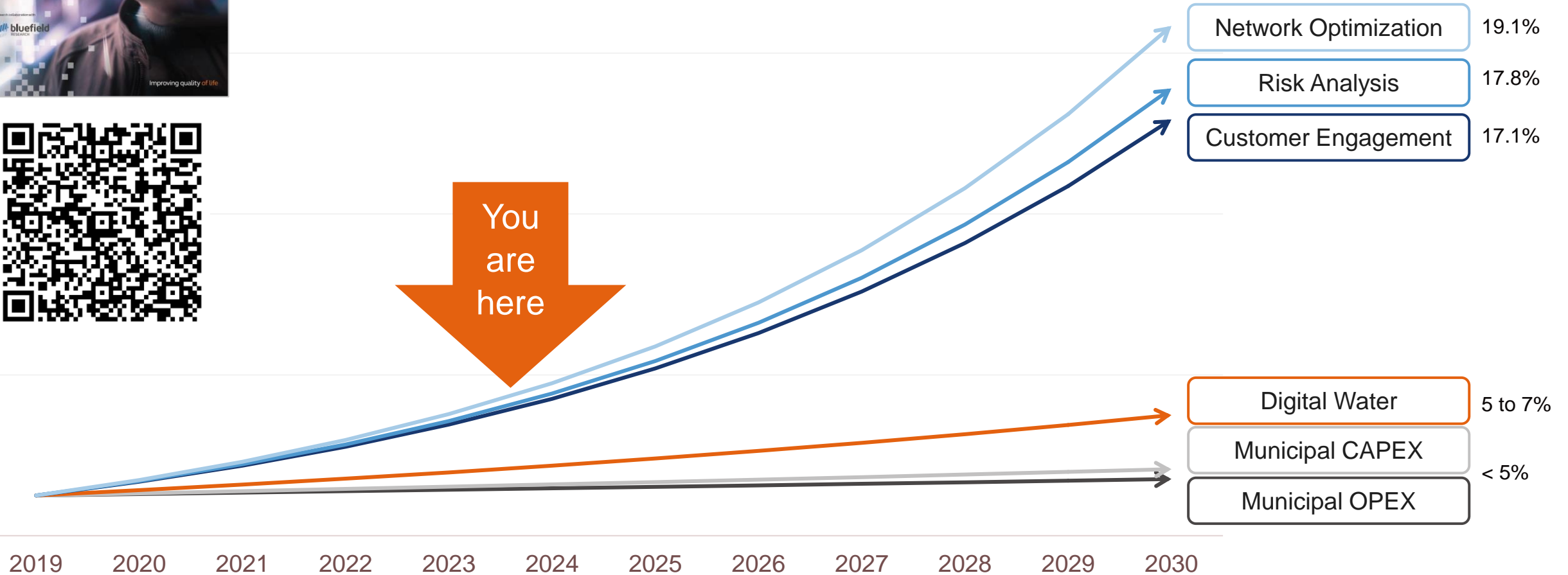
## Machine Learning

The ability of a computer to improve calculation results from experience for a specific need.

Improving quality of life.



# AI-powered technologies are the fastest growing market segments in the water industry

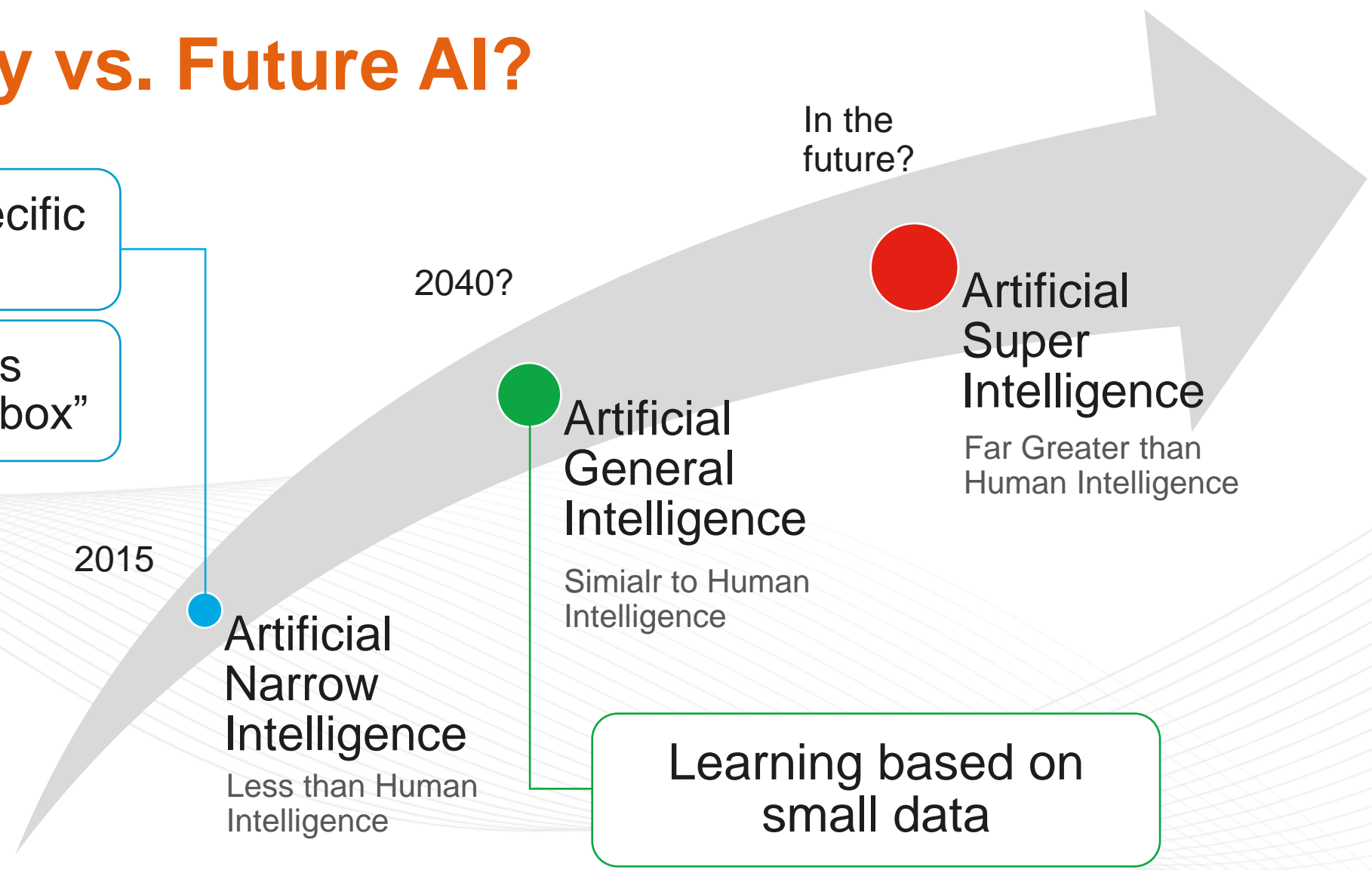


Relative Compound Annual Growth Rates (CAGRs) for Select Market Segments, 2019-2030.  
Source: Bluefield Research.

# What is Today vs. Future AI?

Isolated, project-specific examples

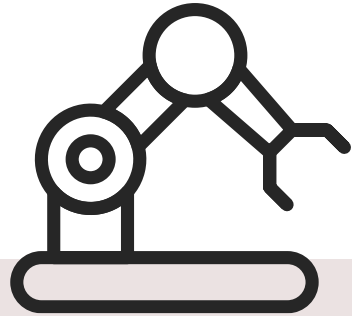
Many applications considered a "black box"



Learning based on small data

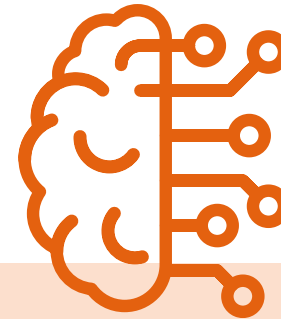


# Defining AI and CI



## **Artificial Intelligence (AI)**

Ability of machines to sense, reason, engage and learn in a manner that seems intelligent.



## **Collective Intelligence (CI)**

**Ability of humans and machines to collectively present far greater intelligence than either could on its own.**

# Does Policy Matter?



It takes the most creative minds to tackle today's water challenges.

**Working as one . . .**

**One Community. One Water.  
One Technology.**



Learn more:  
[arcadis.pub/One](https://arcadis.pub/One)



**James P. Cooper, PE, CWO, ENV SP**  
Global Director

[Jim.Cooper@arcadis.com](mailto:Jim.Cooper@arcadis.com)



Santa Margarita  
Water District



# AI In Water

Policies, Pitfalls and Possibilities

# Policies

AI is coming, best to take the lead

- The Rise of AI in public policy is inevitable
  - Key is to get in front of it, to shape its impact on your agency
- Policies
  - Data cleanup and standardization
    - Setting a strategy to impact data for your agency
  - Transparency
    - How to handle PRAs and requests for info
    - Setting policies that will govern your data AND the data you integrate into your strategies
  - Understand the Bias inherent in all AI systems
  - **Keep humans in the loop**
    - Let the tech do the repetitive work, migrate your staff to data consumers



# Policies

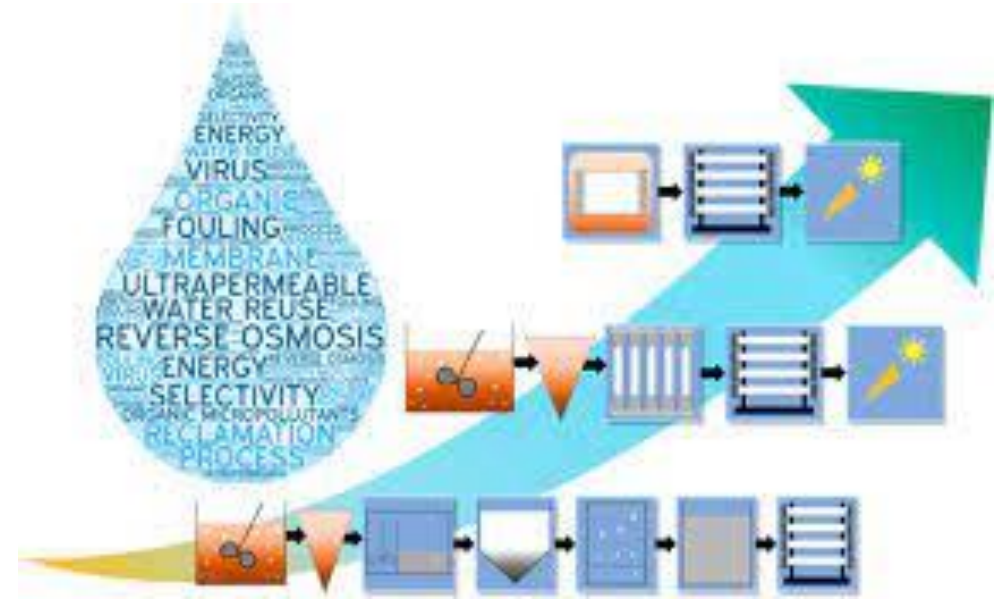


- Policies (cont.)
  - Get the community engaged
    - Keep them informed of your strategy
    - They will want to know that you are taking the lead
  - Embrace RISK
    - For your staff
      - AI is VERY early into development
        - Encourage your staff to take risks
        - Do not be critical of failures
          - Make them learning opportunities
    - For Public Agencies, will be hard to find talent
      - **Key will be private sector partnerships**



# Pitfalls

- How do you control that which your team does not fully understand?
- Cyber Risk
  - This will never end
  - Sensors, sensors everywhere.....
- Opening your internal data
  - Control when and how
  - Data governance is key
- Ratepayer privacy



So many points of cyber vulnerability

- The biggest risk: Inaction



# And the possibilities

Some are easy, some we have never even contemplated

## A start of a list, not in any way comprehensive

- START WITH EASY!
- Predictive maintenance
  - Proactive notification, think credit card fraud
  - Behavior analytics
- Real time leak detection and other
- Regional Predictive Operations
  - Compliance
- Ratepayer Sentiment
  - This may be an easy, low hanging fruit
- Ratepayer self service
  - Take your IVR system to the next level
    - Also online
- Language translation
  - Meet your customers in THEIR language





# The possible future.....

- **This list is JUST getting started**
  - So cross-pollenate
    - Bring in data scientists, not just for water, but from other industries
    - Bring in talent from other agencies
      - “Sometimes you need the CEO of Nestle to run Intel”

Frank Ury Santa Margarita Water District Board President  
[frankury@cox.net](mailto:frankury@cox.net) 949 922 9979



# Policy in Age of AI

Erik Ekdahl, Deputy Director  
Division of Water Rights, State Water Resources Control  
Board



September 8, 2023

# Modernizing Water Rights Data

- \$60 million for modernizing Water Rights Data System
- UPWARD- Updating Water Rights Data for CA
  - Replace antiquated data system
  - Digitize millions of paper documents
  - Geospatial system
- Telemetry pilot project
- Supply-demand modeling tools

# Why is this necessary?

Example: Data Quality Issues in Self Reported Diversion Data (Riparian and Pre-1914 Claims)

Watershed	Number of Claims	2018 Reported Diversion (AF)	2019 Reported Diversion (AF)
<b>SAN JOAQUIN RIVER</b> (>5,000 AFY diverters only)	2,601	3,751,671 (original) 3,229,774 (corrected) <b>13% reduction</b>	4,999,286 (original) 3,742,052 (corrected) <b>25% reduction</b>
<b>SACRAMENTO RIVER</b> (>5,000 AFY diverters only)	3,969	12,455,707 (original) 3,978,399 (corrected) <b>68% reduction</b>	29,688,143 (original) 4,063,238 (corrected) <b>86% reduction</b>

# Modernization outcomes



**Data driven, timely decisions**



**Data accessibility drives policy**



**How will AI integrate?**

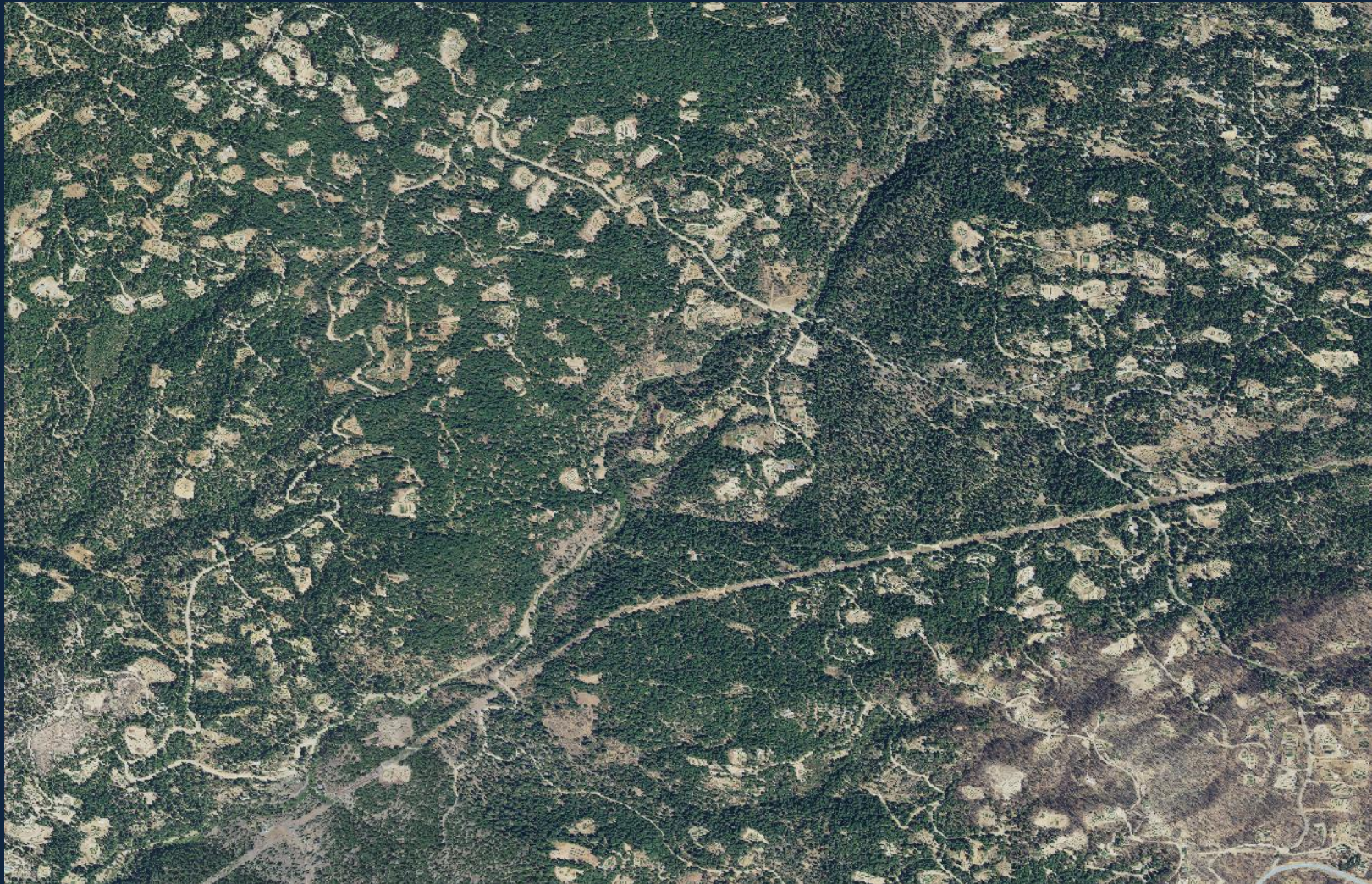


**CannaVision**

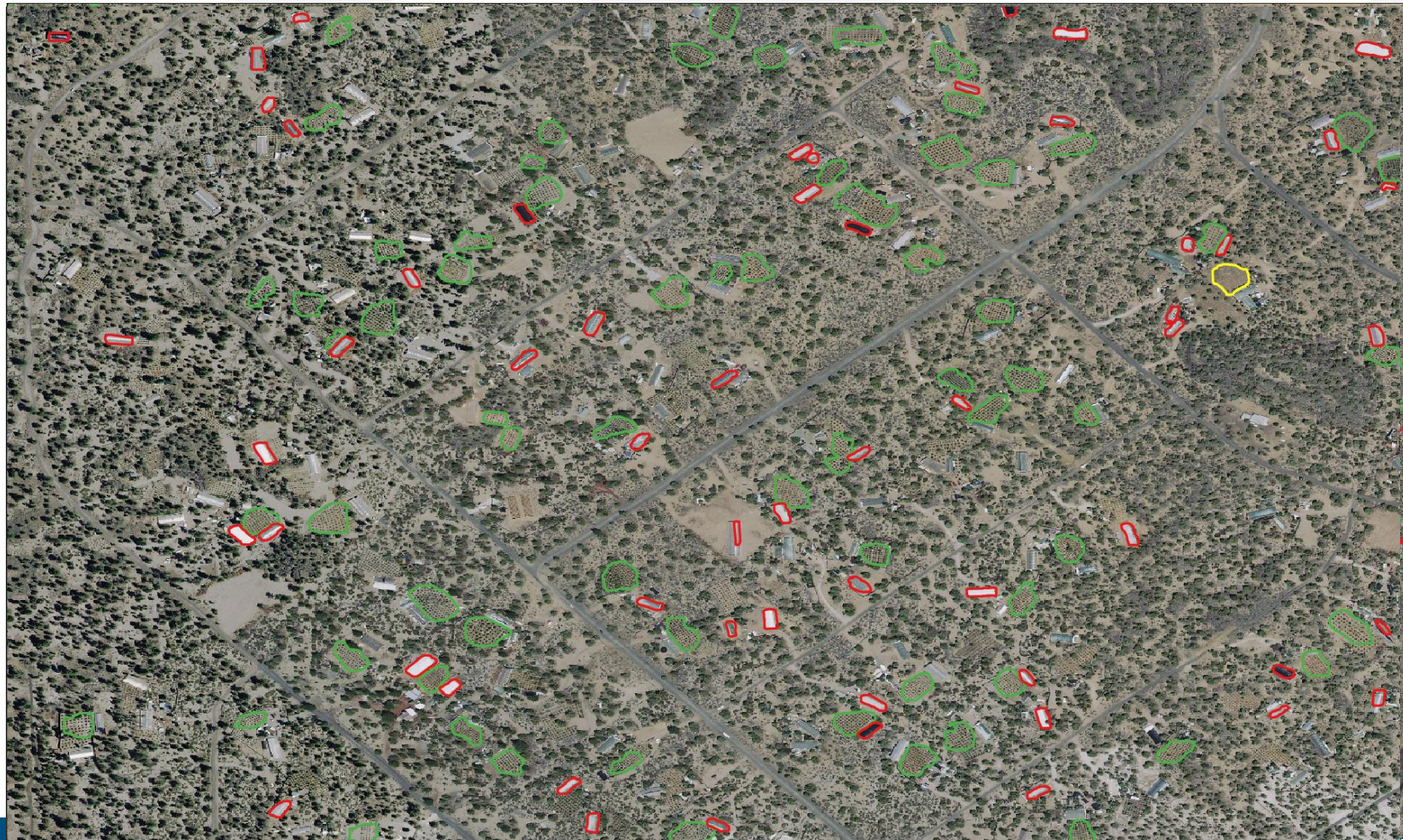
Andrew Hill, Lance Le, Kason Grady



# Challenge: ID Unlicensed Cultivation Sites



# Automated image analysis





# CannaVision Outcomes

- Faster! More efficient...
- But correlative increase in development-related work
- Still needed just as many staff...
- But those staff could work on other action/outcome oriented tasks

# AI in the Age of Policy

- Efficiencies already being realized. Tees up policy questions earlier.
- Be prepared for pushback if questions/answers come too soon.
- Staff workload will not decrease. It will change, though, and change is hard. The policies we develop for managing that change are going to be critically important.

# Questions and Discussion

- ▶ Lightning round: why should elected officials care?
- ▶ Starter questions
- ▶ Audience questions
- ▶ Final lightning round



📷 A time-lapse image of lightning bolts from a thunderstorm near Mudanya in Turkey on June 16. (Image credit: Uğur İkizler)