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Tech Driven Trees: Advancing Urban Forestry with Technology

Thursday, December 11, 2025

- 11:00 a.m. - 12:00 p.m. ET
- 10:00 a.m. - 11:00 p.m. CT
- 9:00 a.m. -10:00 a.m. MT
- 8:00 a.m. - 9:00 a.m. PT

This program is sponsored by the APWA Facilities and Grounds Committee

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A link to the program evaluation will be emailed to you after the program.

To request CEU's - you must correctly answer 80% of the questions.

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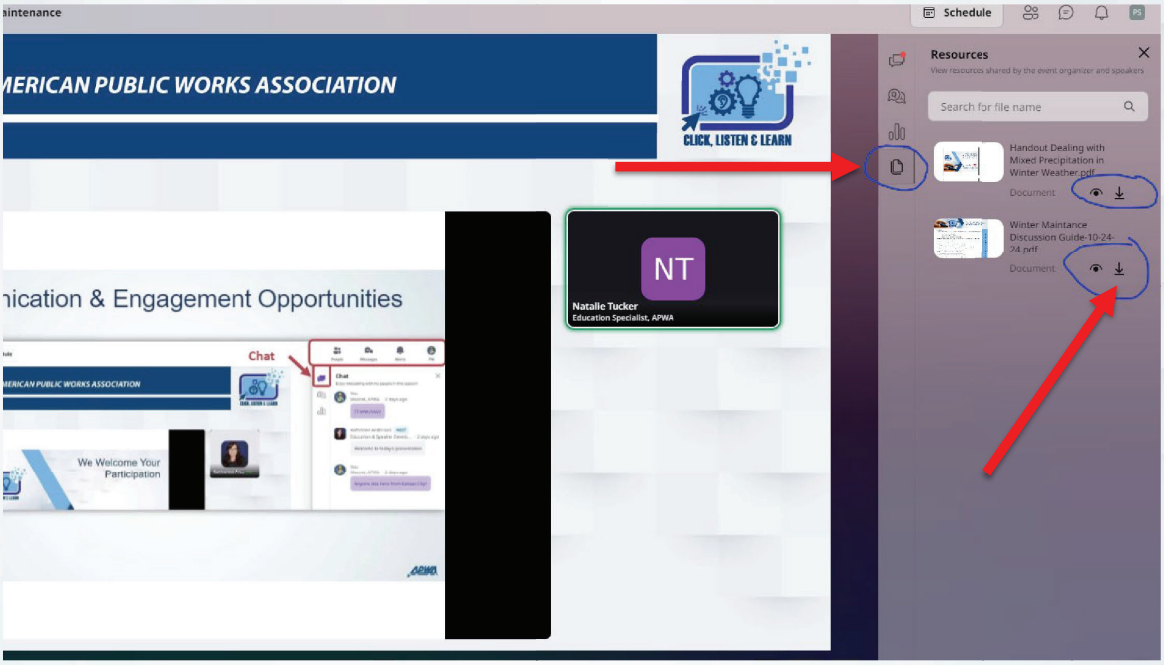
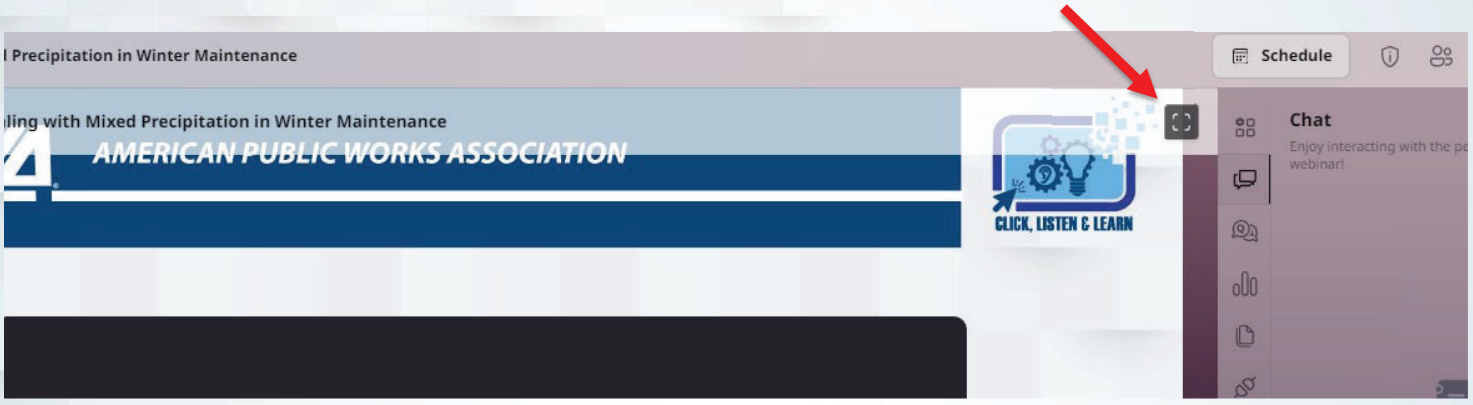
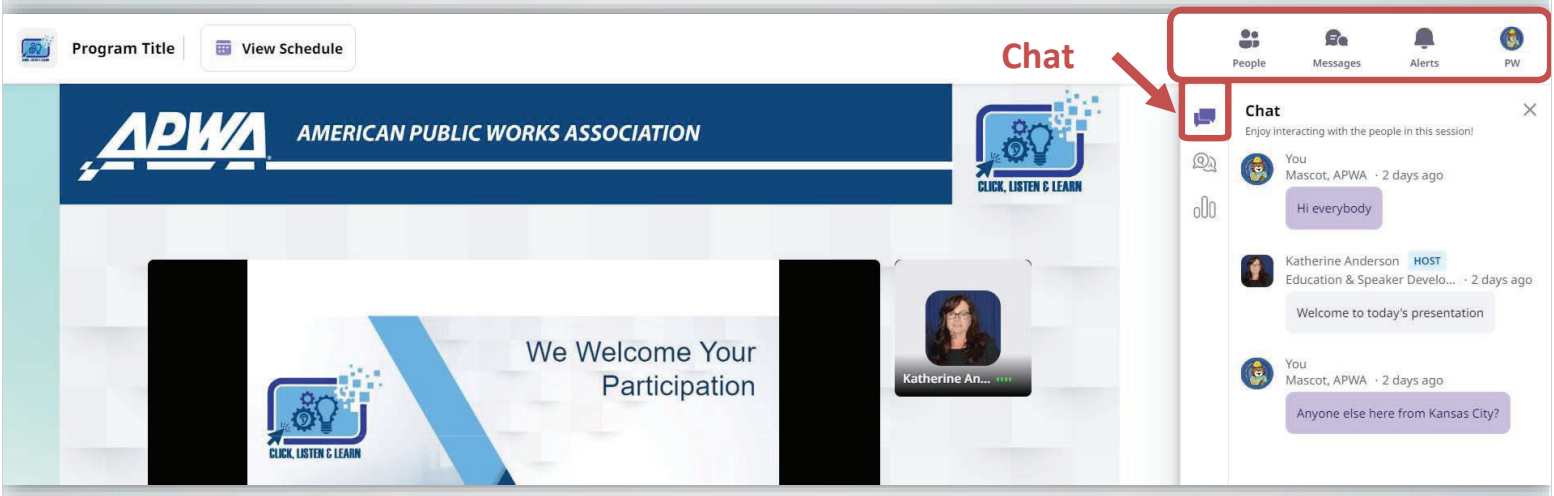
Handout for Today's Program can be download from the right-hand chat panel.



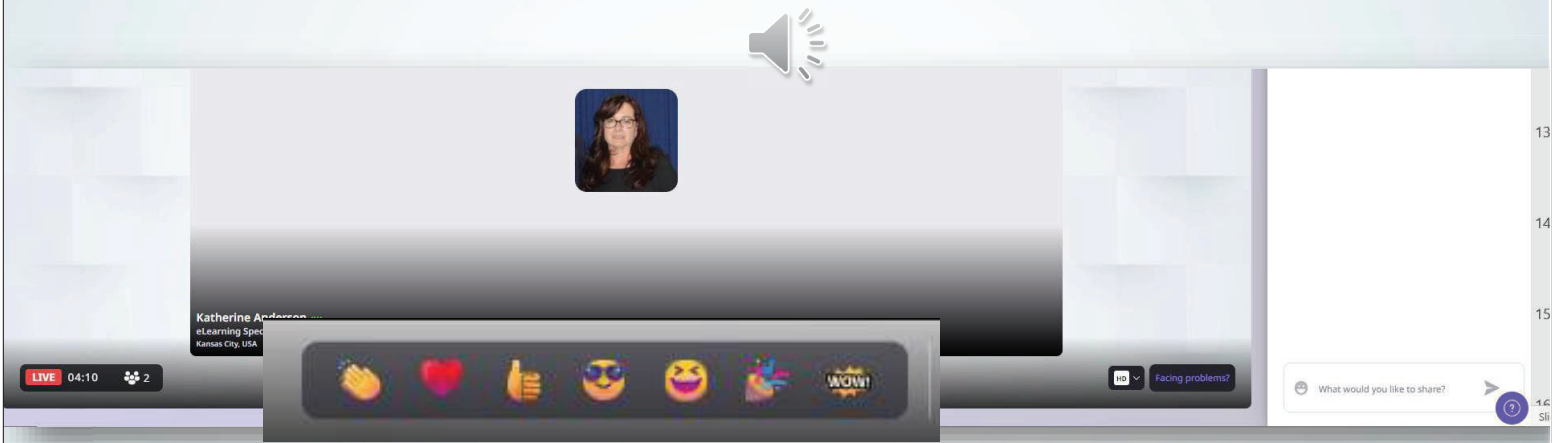
Viewing the Presentation



Communication & Engagement Opportunities



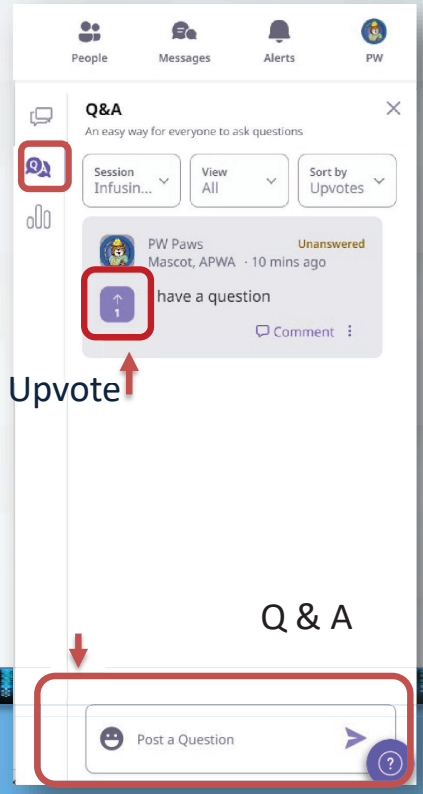
Reactions



Program Questions

1. If you have questions for our speakers, you may ask them using the Q&A feature.

2. Choose to Upvote a question that is the same as your question.



Today's Moderator:

Shane McQuillan

City Forester

Des Moines, Iowa

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Learning Objectives

After completing this course, participants will be better able to:

- Assess the role and potential impact of emerging technologies including AI, machine learning, and LiDAR on urban forest management.
- Explain how emerging technologies work for urban forest management and what types of data it provides.
- Develop a strategic approach to urban forest management that integrates emerging technologies to enhance decision-making, sustainability, and resource allocation.

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Nominations to join an APWA knowledge team or subcommittee are considered year-round. Share your interest via the QR code below.

Get Involved with APWA

Today's Speakers

Josh Behounek

Business Development Manager

Davey Resource Group

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Q & A

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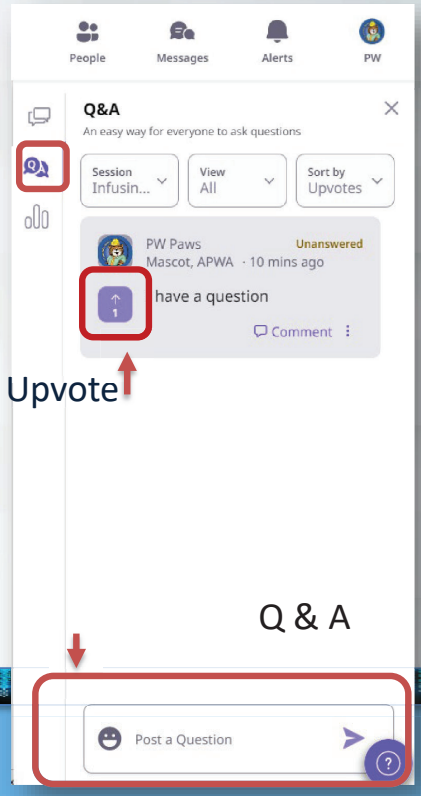

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Please join us in the virtual lounge for continued discussion

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Tech-Driven Trees: Advancing Urban Forestry with Technology

Josh Behounek
Davey Resource Group

Shane McQuillan
City of Des Moines

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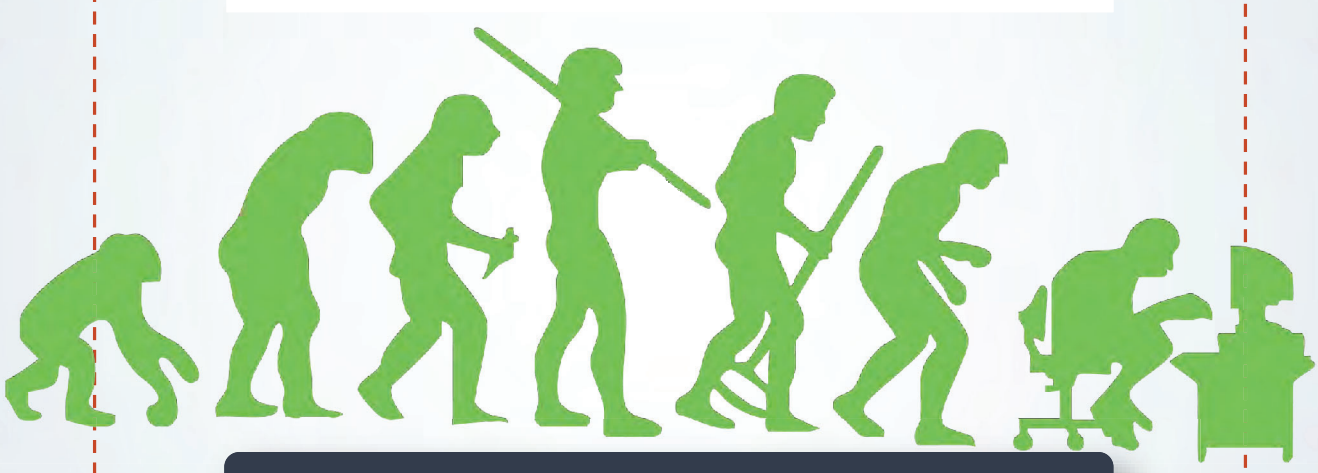
Technology won't replace arborists, but arborists who use technology will replace arborists who do *not*.



Make the **right decision** on the **right tree** at the **right time**.

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Make the Right Decision, On the Right Tree, at the Right Time

Should I **REMOVE** this tree?

Should I **PRUNE** this tree?

Should I **MONITOR** this tree?

When will I **RETURN** to this tree?

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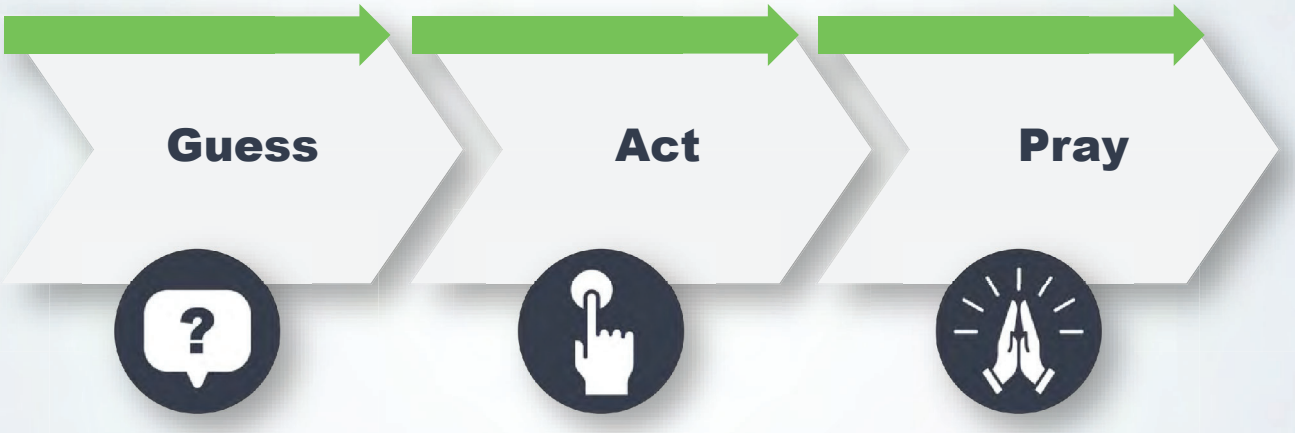
Current Process



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Poll Question

How current is your Tree Inventory?

- Don't have one
- > 10 years
- 5 – 10 Years
- 1 – 5 Years
- < 1 Year

Traditional GIS-Based Tree Inventories

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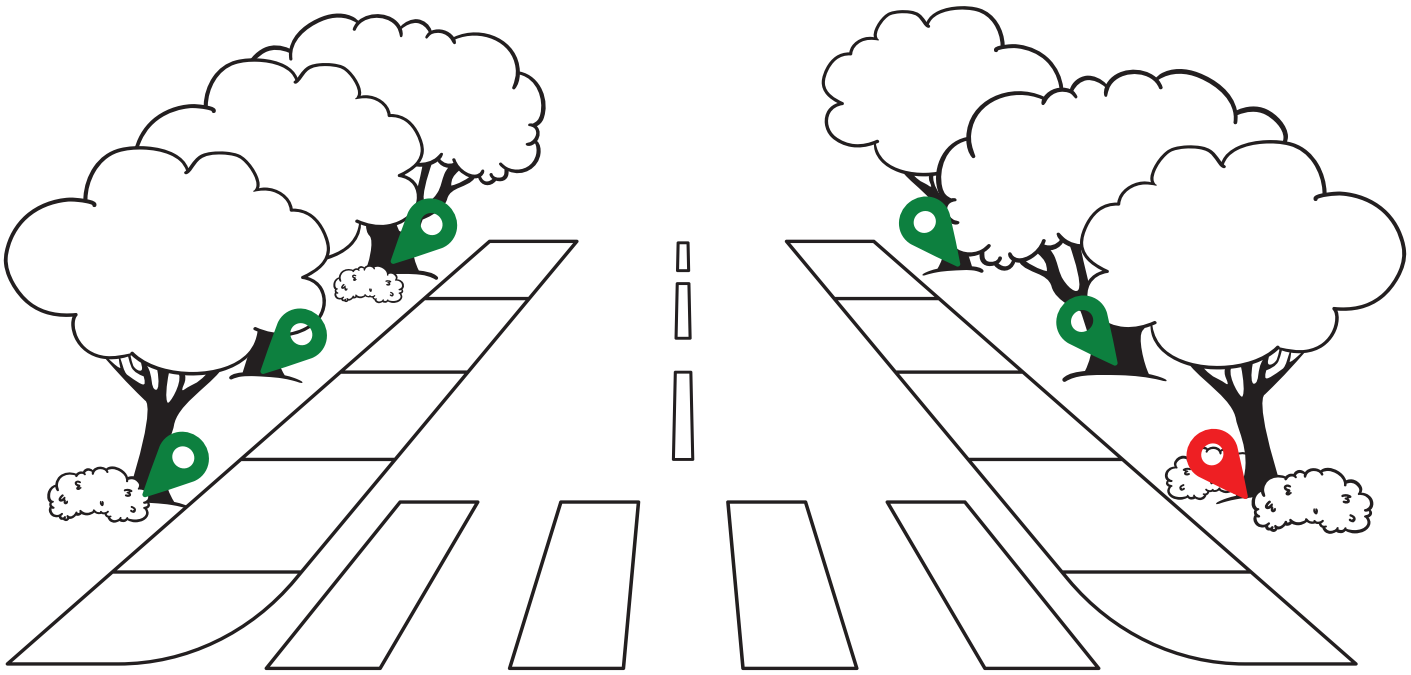
Unnecessary & Limited Data Collection with Standard Fields



Subjective

Poll Question

How would you rate this tree?

- Dead
- Poor
- Fair
- Good
- Excellent

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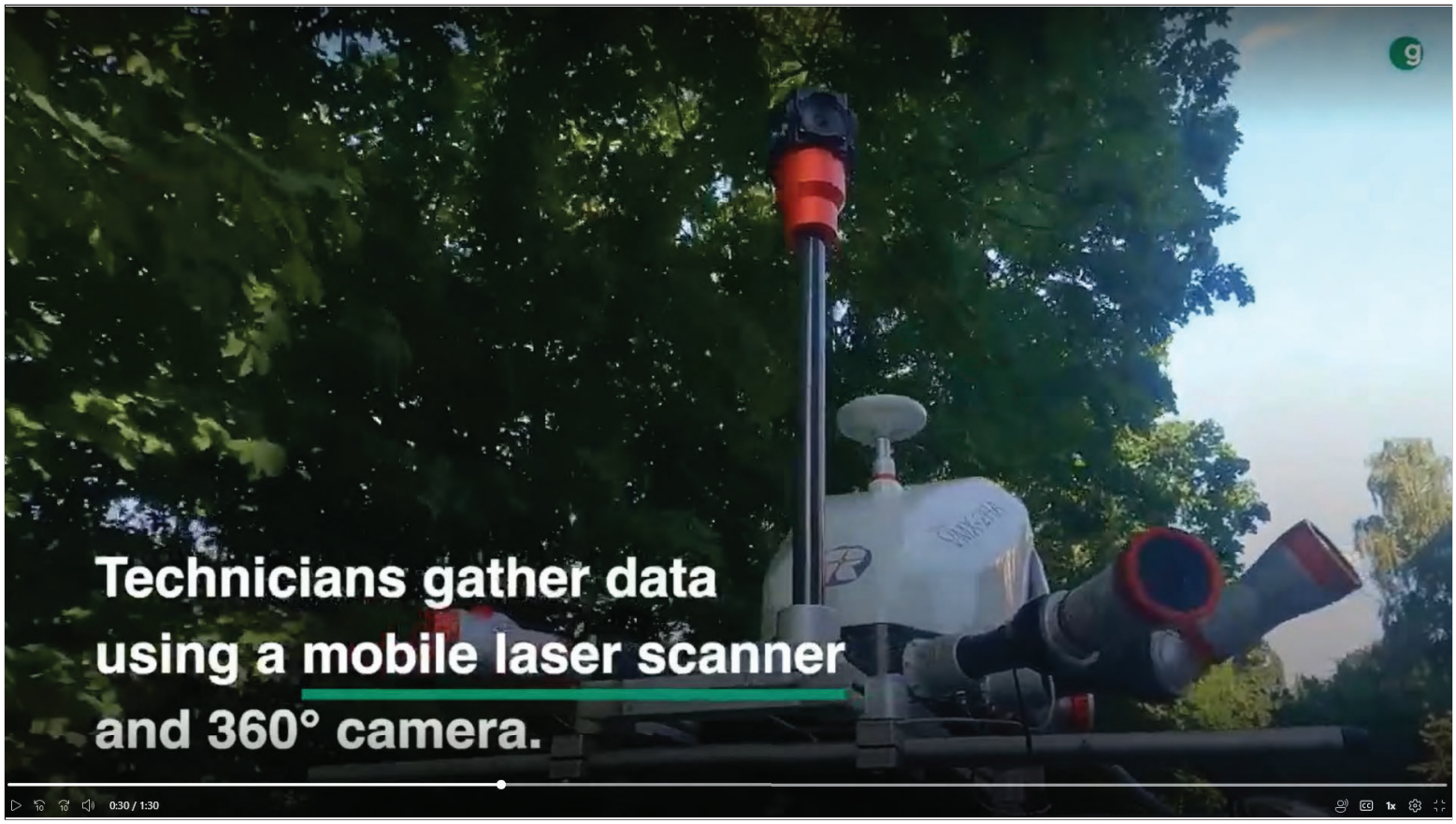
Feedback Loop - Buffalo, NY Inventory Update

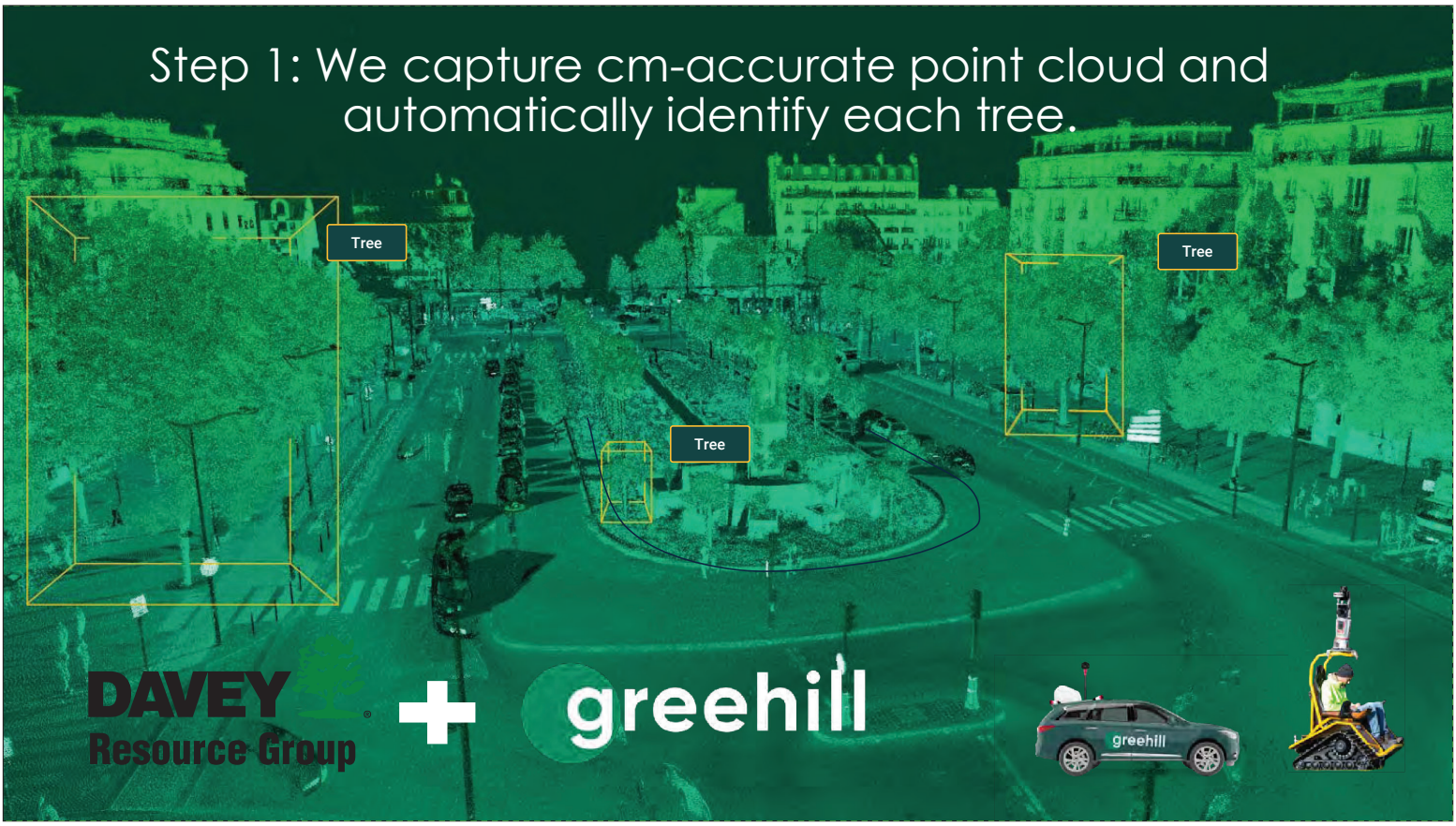
	2001	2014	Difference
Sites	124,445	127,080	2,635
Total DBH	871,173”	817,627”	-53,546”
Average DBH	7”	6”	-1”
# Species	281	247	-34
# Removals	668	2,707	2,039
# Planting Sites	48,761	44,619	-4,142

Feedback Loop - Condition Change Assessment

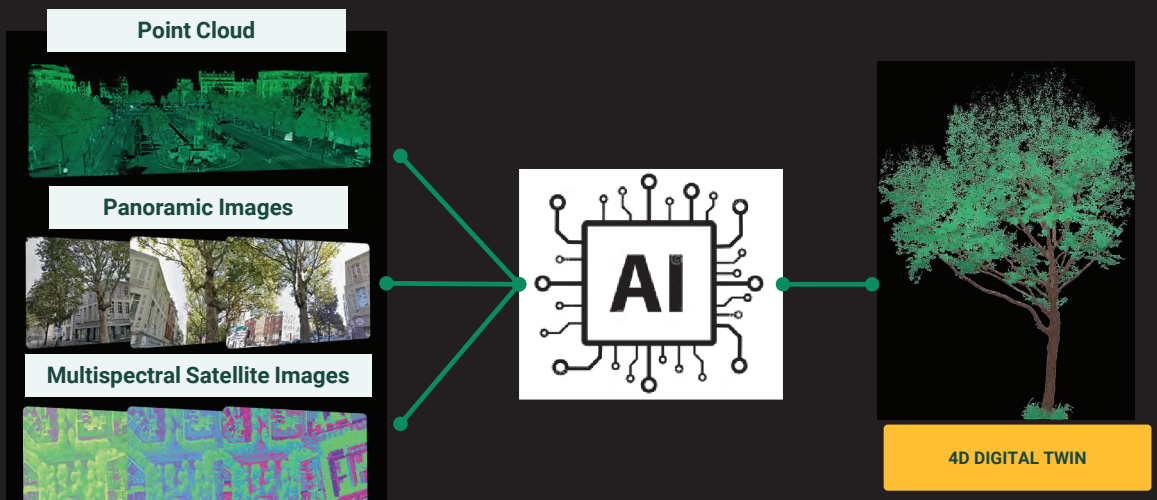
2001 Inventory	5,698 Poor	38,199 Fair	25,632 Good
2014 Inventory	3 Dead	298 Dead	259 Dead
	145 Poor	3,445 Poor	717 Poor
	11 Fair	26,830 Fair	8,952 Fair
	0 Good	962 Good	9,783 Good
	293 Plant	1,365 Plant	1,878 Plant
	5,246 New	5,299 New	4,043 New



Step 1: We capture cm-accurate point cloud and automatically identify each tree.



Step 2: Create a **4D Digital Tree Twin** of each tree



Step 3: We analyze each tree and extract information

- Species
- Size (DBH, Height, etc)
- Ecological Benefits
- Leaf Area Index
- % Dieback
- Live Crown Ration
- Cohort Analysis
- Clearance Issues
- Leaning Angle
- Change Over Time

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Digital Tree Twin

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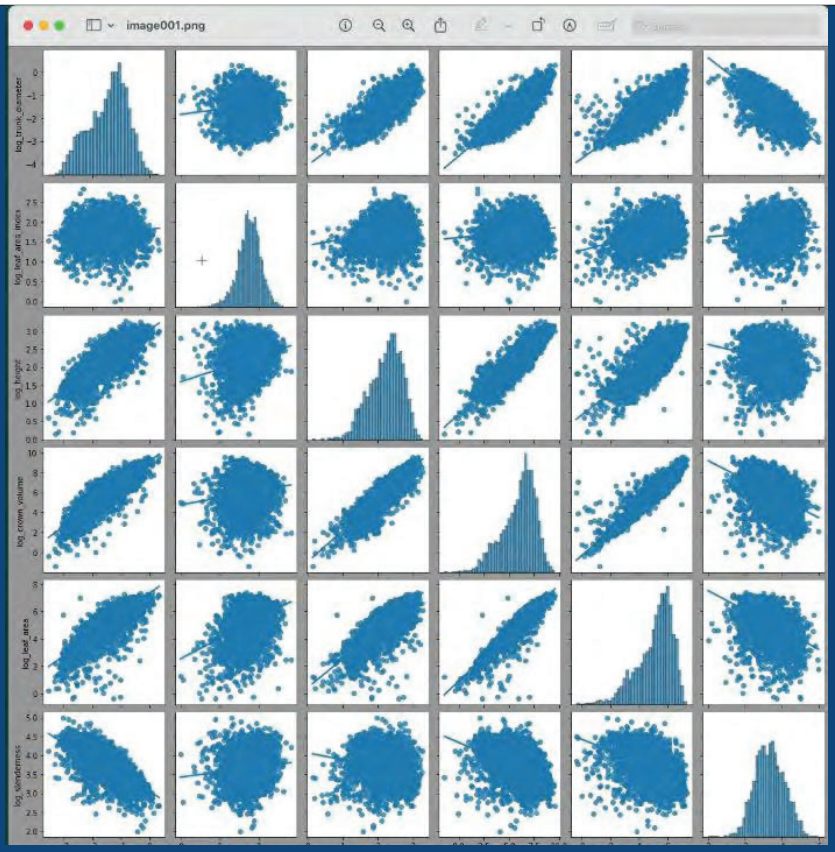
Step 4: Define outliers

Absolute Outliers (cohorts)

- Dead trees
- Too much lean
- Leaf Area compared to Size
- Canopy Width vs Tree Height

Relative Outliers (filtering)

- Trees > x”
- Trees in certain neighborhoods
- Certain species of trees
- Trees >40% dieback



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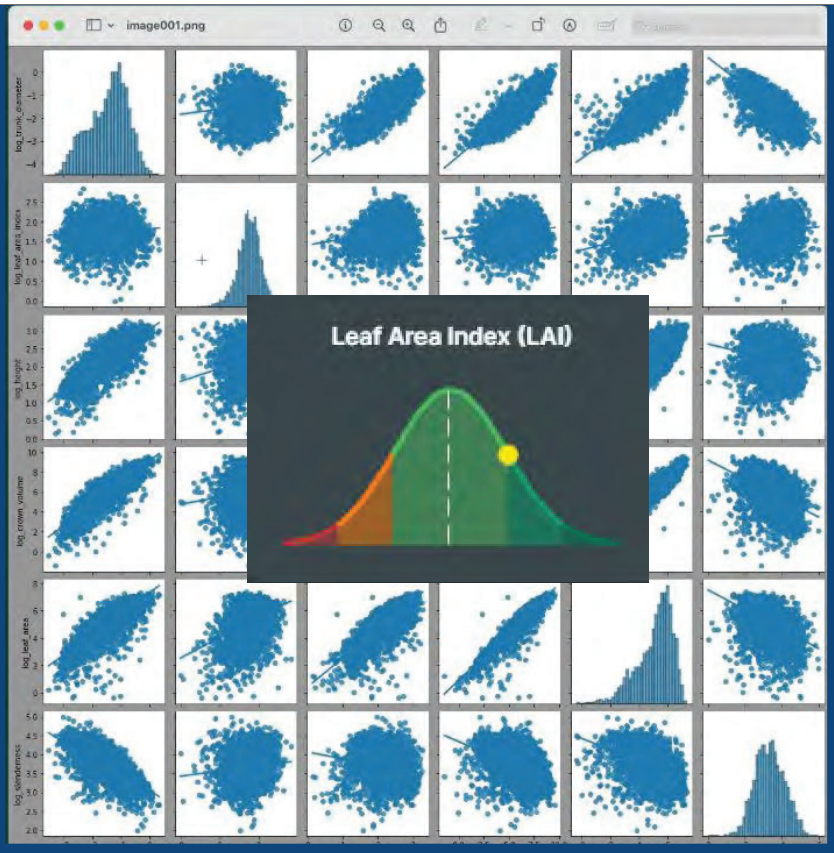

Step 5: Davey Arborists assess outliers

Remotely
0 - 20%

In Field
25 - 100%

Poll Question

Does your community have LiDAR?

- No
- Yes - Aerial
- Yes - Terrestrial
- Yes – Aerial & Terrestrial
- Don't know

LiDAR
(data)

- Location
- DBH
- Height
- Crown Width?

Smart
(actionable insights)

- Location
- DBH
- Height
- Crown Width
- Species
- Condition (measured)
- Leaf Area Index
- Risk (Outliers)
- Cohorts
- Distance to Wires
- Clearance Volume
- 5 Photos & Street View

LiDAR
(data)

- Location
- DBH
- Height
- Crown Width?

Smart
(actionable insights)

- Location
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Make the Right Decision,
on the Right Tree,
at the Right Time

Smart Tree Management Program

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URBAN FOREST PROGRAM CONTINUUM™

STAY ON TRACK FOR SUSTAINABLE GROWTH

Below are the steps that urban forest programs take to create and maintain the healthiest and most resilient urban forest possible. Each component creates a strong foundation of strategic planning, program funding, and community support which results in thriving urban forests.

TREE CITY USA
- ☐ Tree Board
- ☐ Funding
- ☐ Ordinance

DEDICATED COMMITMENT
- ☐ Certified Arborist Staff
- ☐ Annual Level 1 Assessments

TREE INVENTORY
- ☐ Inventory Updating
- ☐ Goal Setting

FUNDED PROGRAM
- ☐ Urban Forest Management Plan
- ☐ Proactive Maintenance

URBAN FOREST MASTER PLAN
- ☐ 20-year Vision
- ☐ Urban Tree Canopy Analysis
- ☐ Stakeholder Input

~~10 Year Cycle~~

~5 Year Cycle

2 Year Cycle

DAVEY RESOURCE GROUP

Key Performance Indicators

KPI

Risk Reduction (80%)

- **Reduced** 311 calls
- **Reduced** storm response time
- **Reduced** tree-related judgments & payouts

Maintenance Cost Efficiency (25%)

- **Better** preventative maintenance
- **Better** tree planting selection

Increased Asset Life Span (30%)

- **More** ecosystem services
- **Fewer** annual removals

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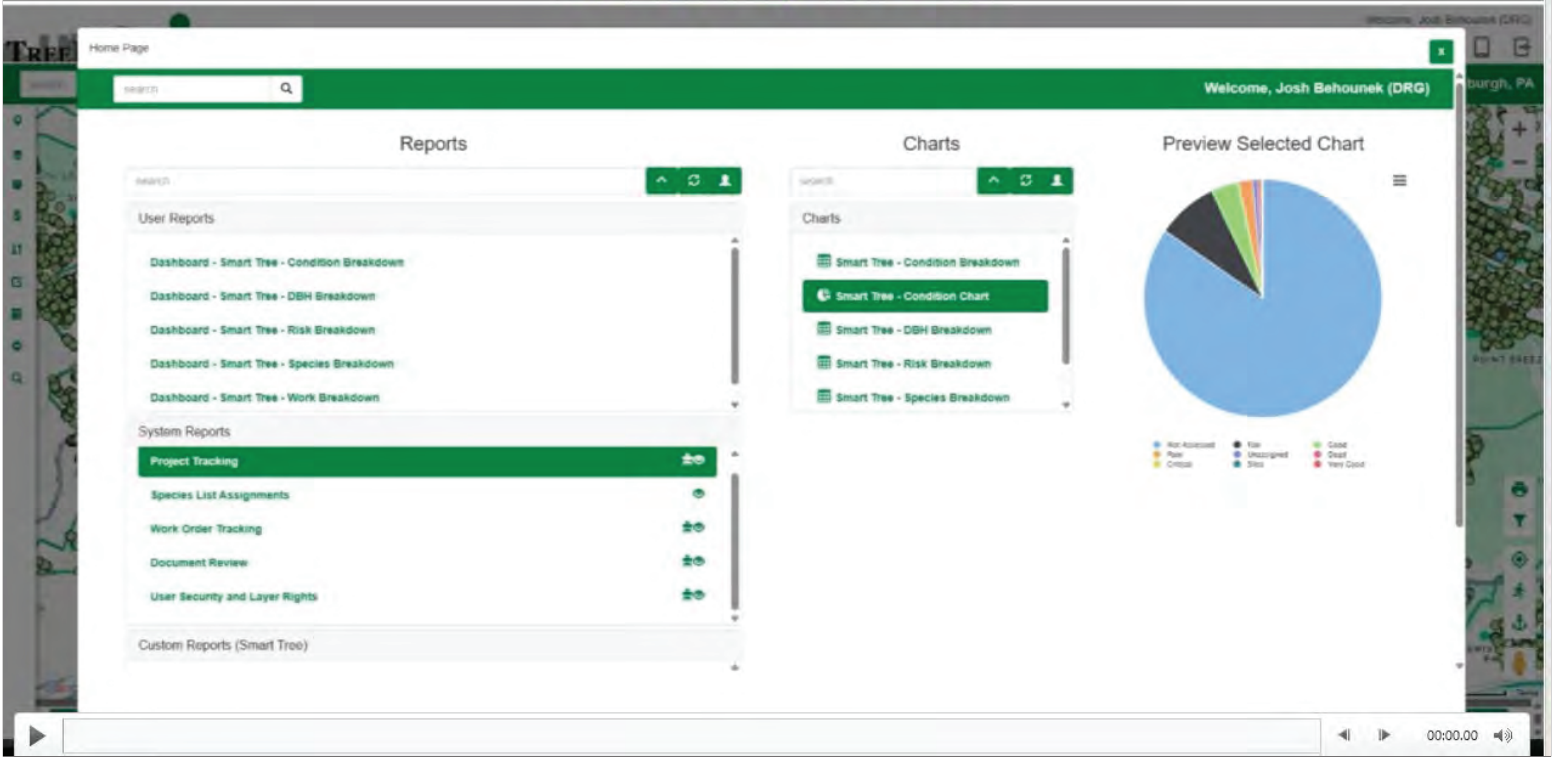
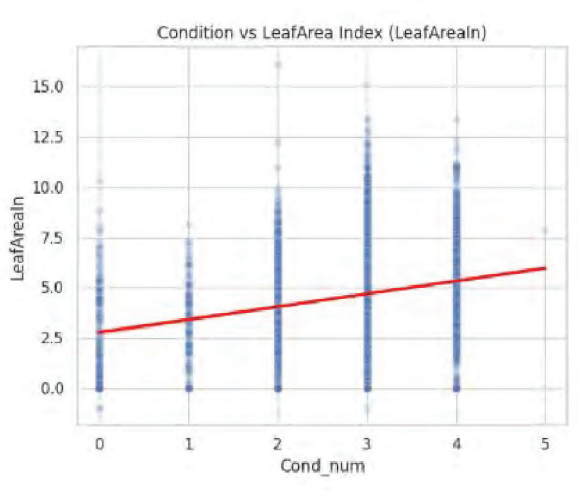
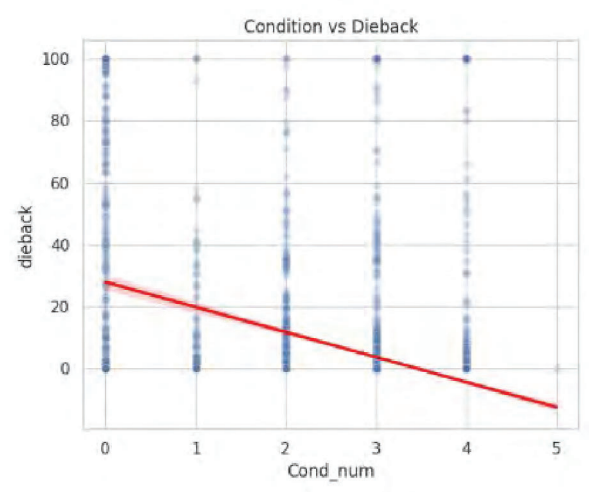
TreeKeeper 360



Objective

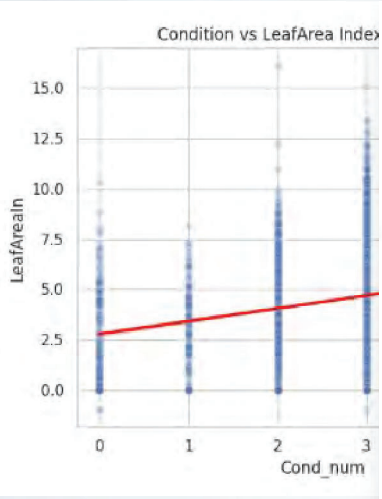
Leaf Area Index & Percent Decline

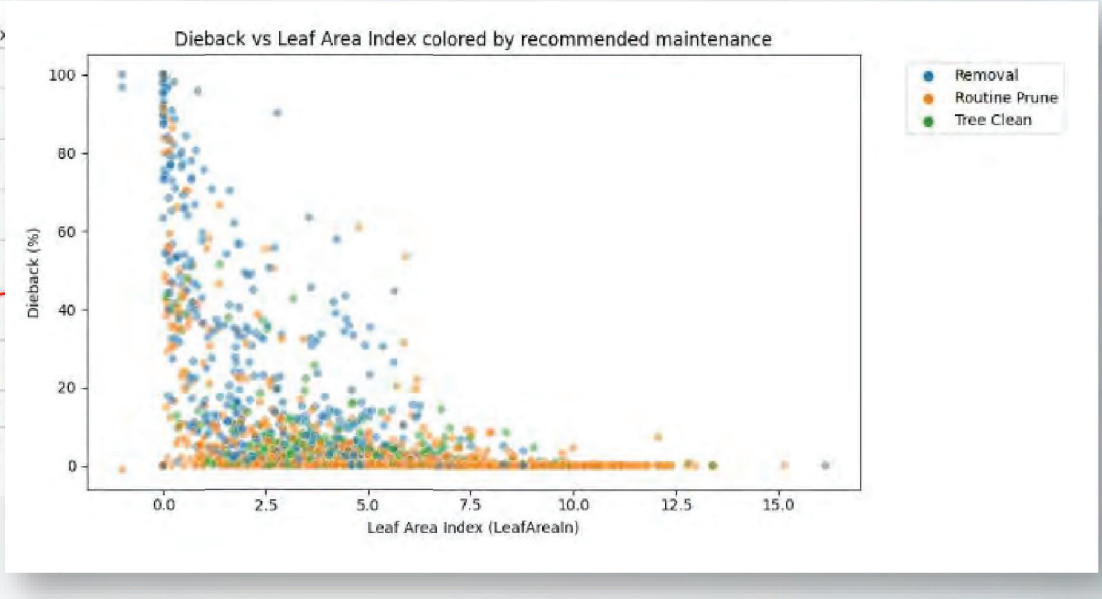




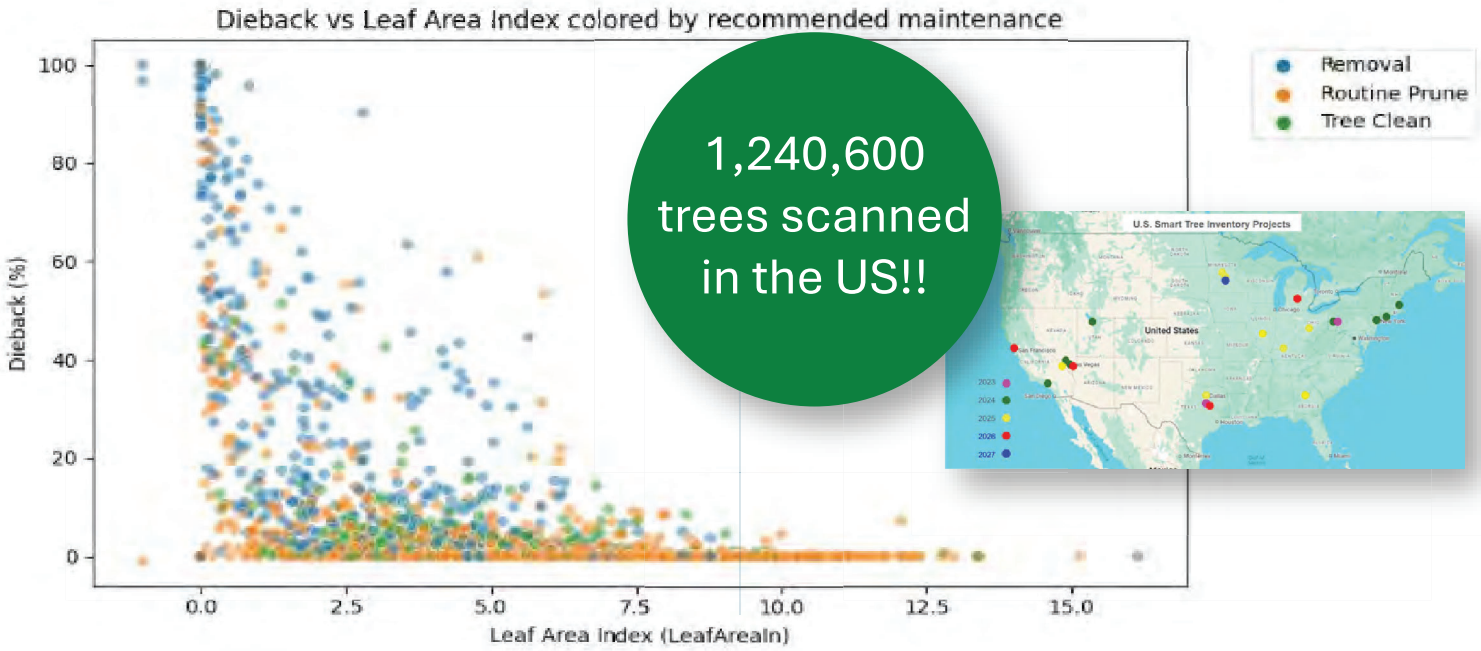
Objective + *Predictive*

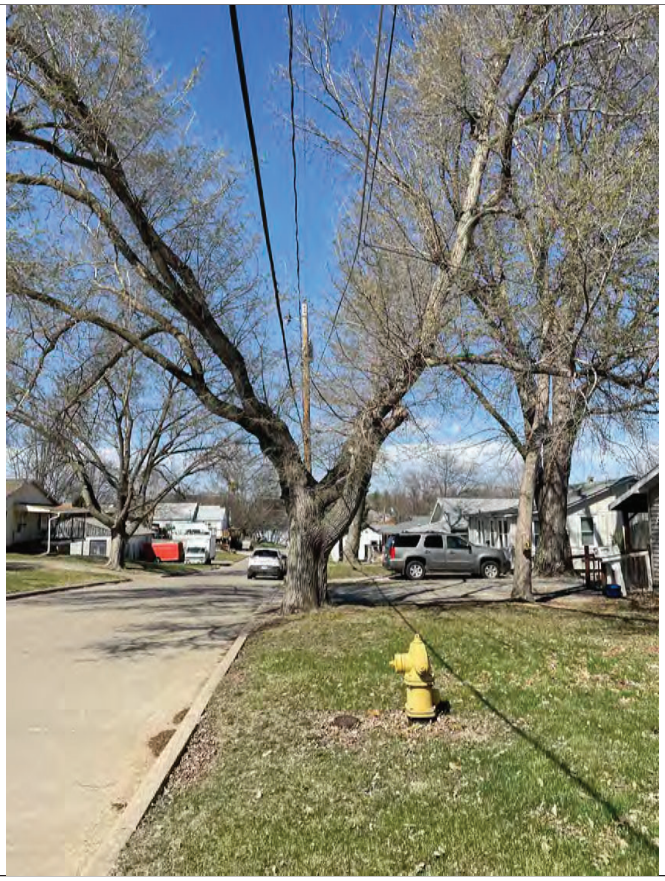
Leaf Area Index & Percent Decline



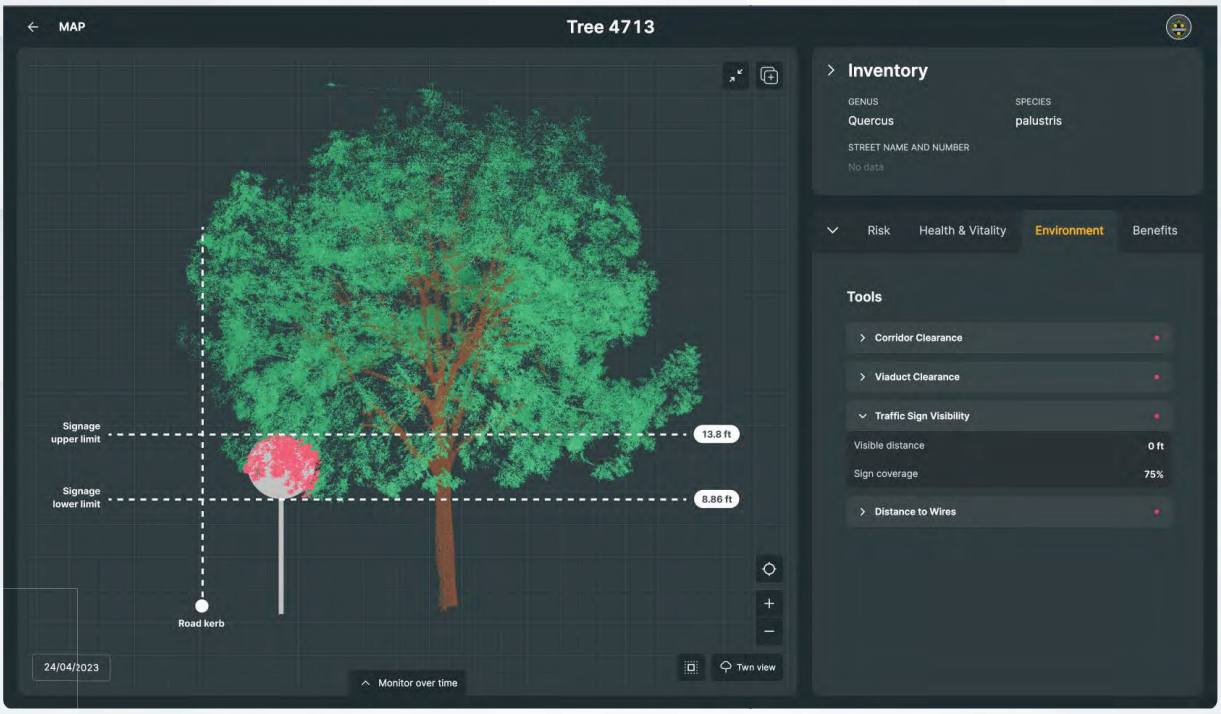


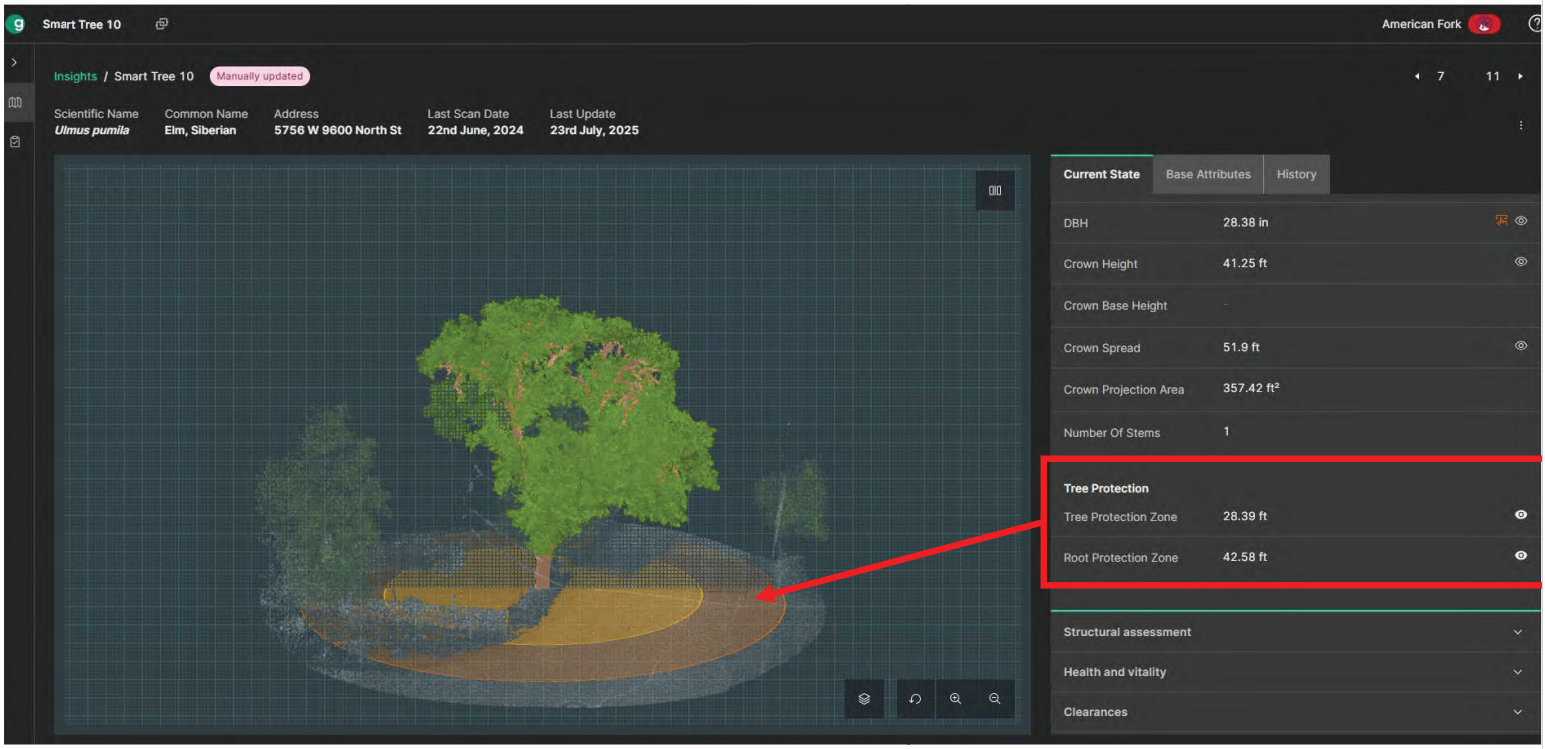
Objective + *Predictive*





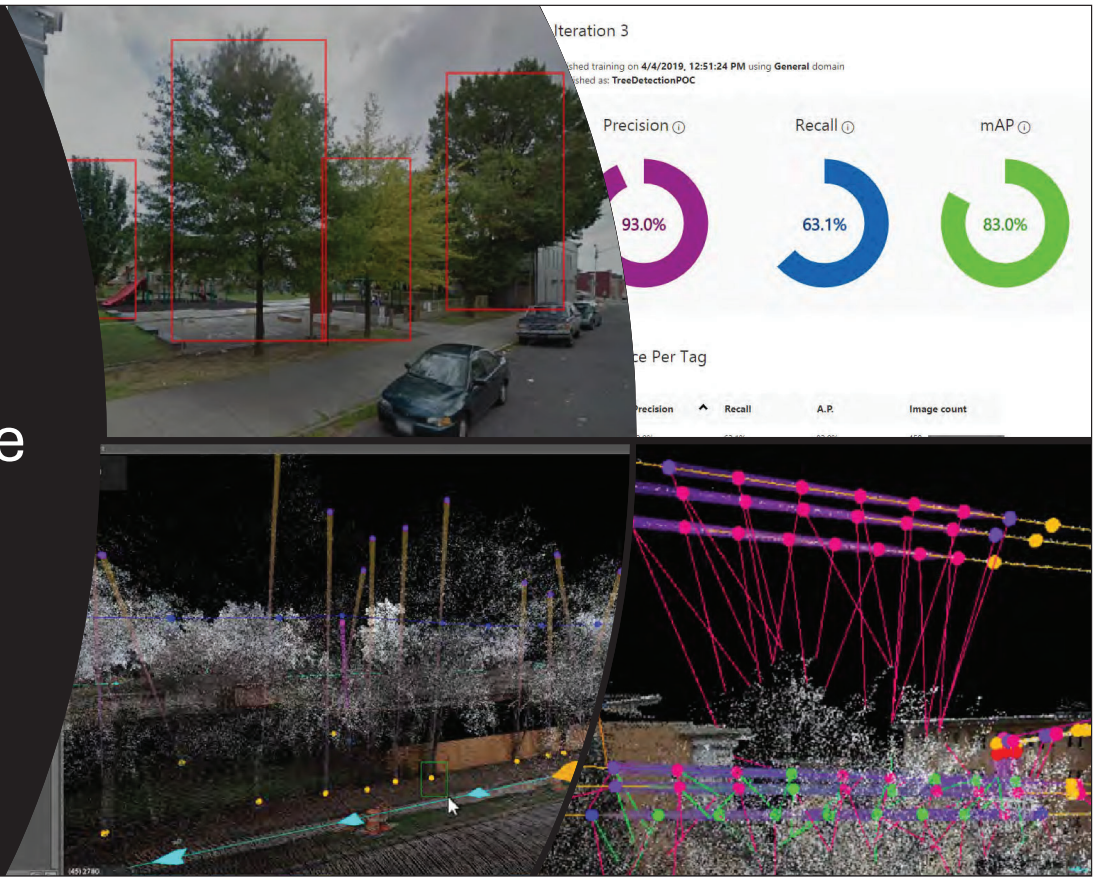
Traffic Sign Clearance



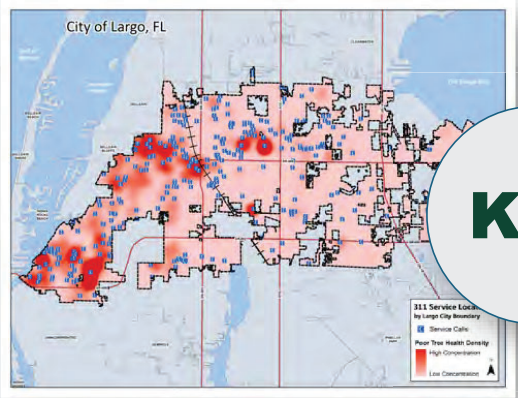


Machine Learning Advantages

- Objective
- Repeatable
- Efficient
- Precise



"From Reactive to Proactive" + *Predictive*



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CITY OF DES MOINES