



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

Speakers and instructors for APWA education offerings are practitioners and experts in public works and infrastructure issues and solutions. Some may have proprietary interest in services and products used by public works agencies and professionals.

Speakers for APWA educational offerings agree to refrain from specific product or services endorsements or promotions during APWA educational offerings.

APWA Proprietary Interest Disclosure Statement

Today's Program is eligible for .1 Continuing Education Unit (CEU) credits.



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.



APWA has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102; (703) 506-3275.



RESOURCE CENTER

ONE PLACE where a member can access:

- Past Click, Listen & Learn (CLL) presentations
- Content from past conferences (PWX and Snow)



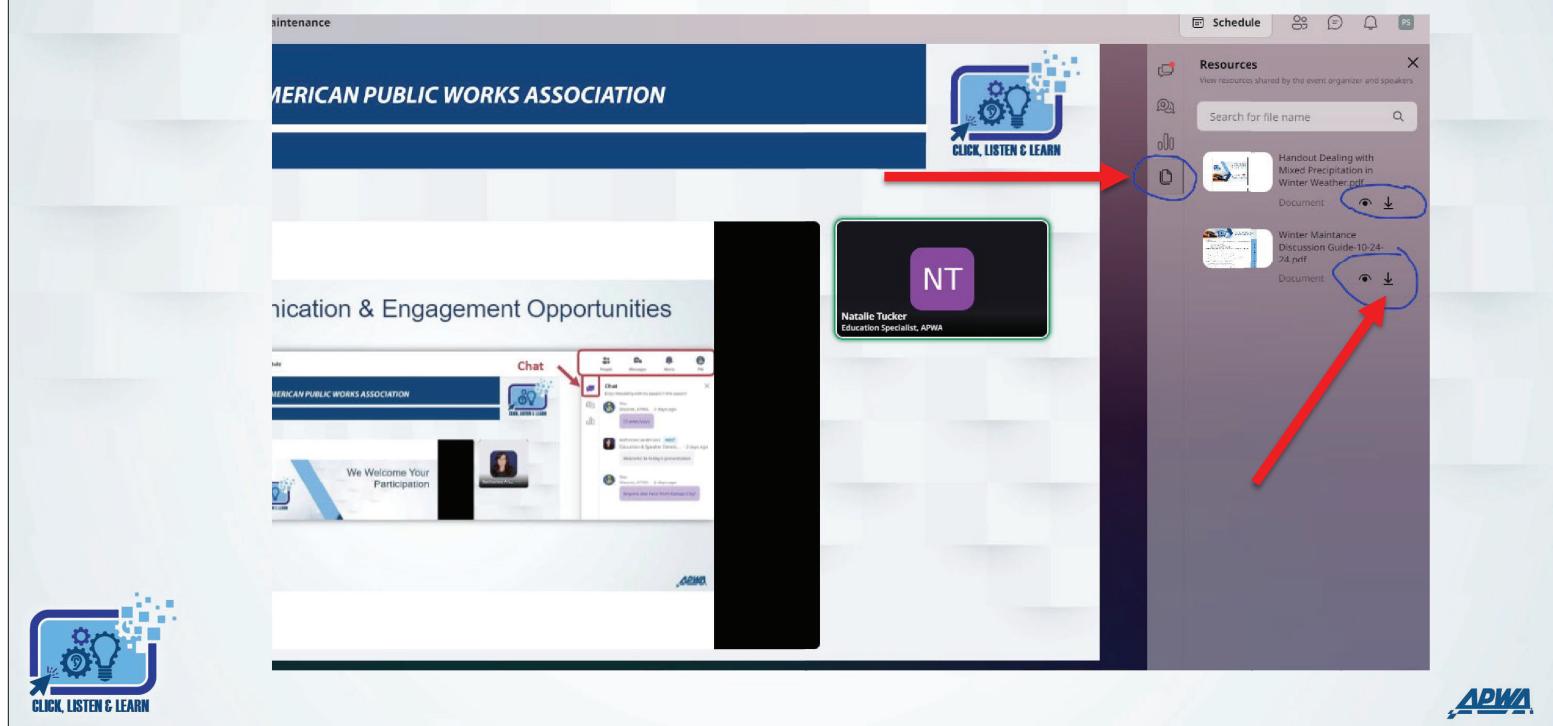
All searchable by topic. All without any extra fees beyond membership dues! No limits to how often you access or open the items in the Resource Center.

No travel. No scheduling hassles. No delays while waiting for someone else's approval. No waiting for registration payment to be processed.



For more information go online to
www.apwa.org/resources/resource-center.

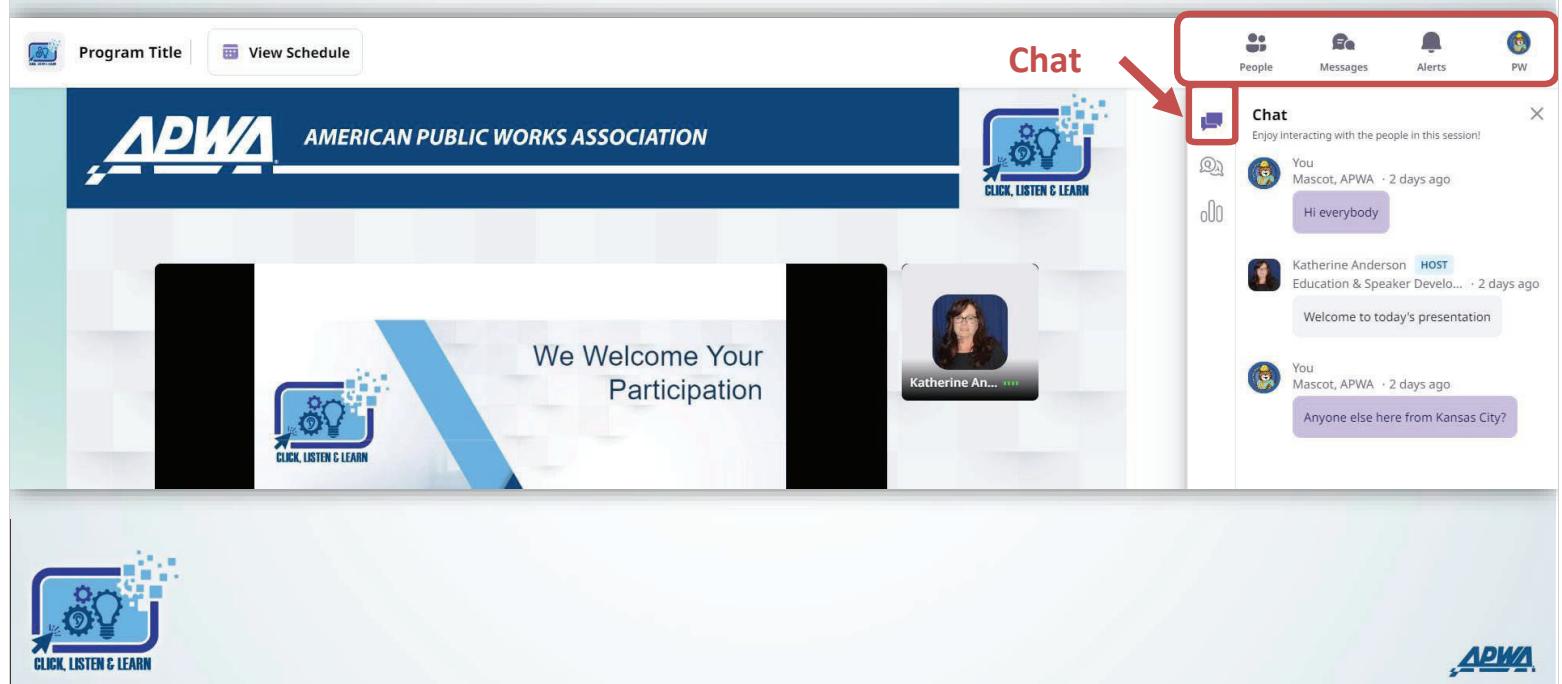
Handout for Today's Program can be download from the right-hand chat panel.



Viewing the Presentation



Communication & Engagement Opportunities



Program Title | View Schedule

AMERICAN PUBLIC WORKS ASSOCIATION

We Welcome Your Participation

CLICK, LISTEN & LEARN

Chat

People Messages Alerts PW

Chat

Enjoy interacting with the people in this session!

You Mascot, APWA · 2 days ago

Hi everybody

Katherine Anderson HOST Education & Speaker Develo... · 2 days ago

Welcome to today's presentation

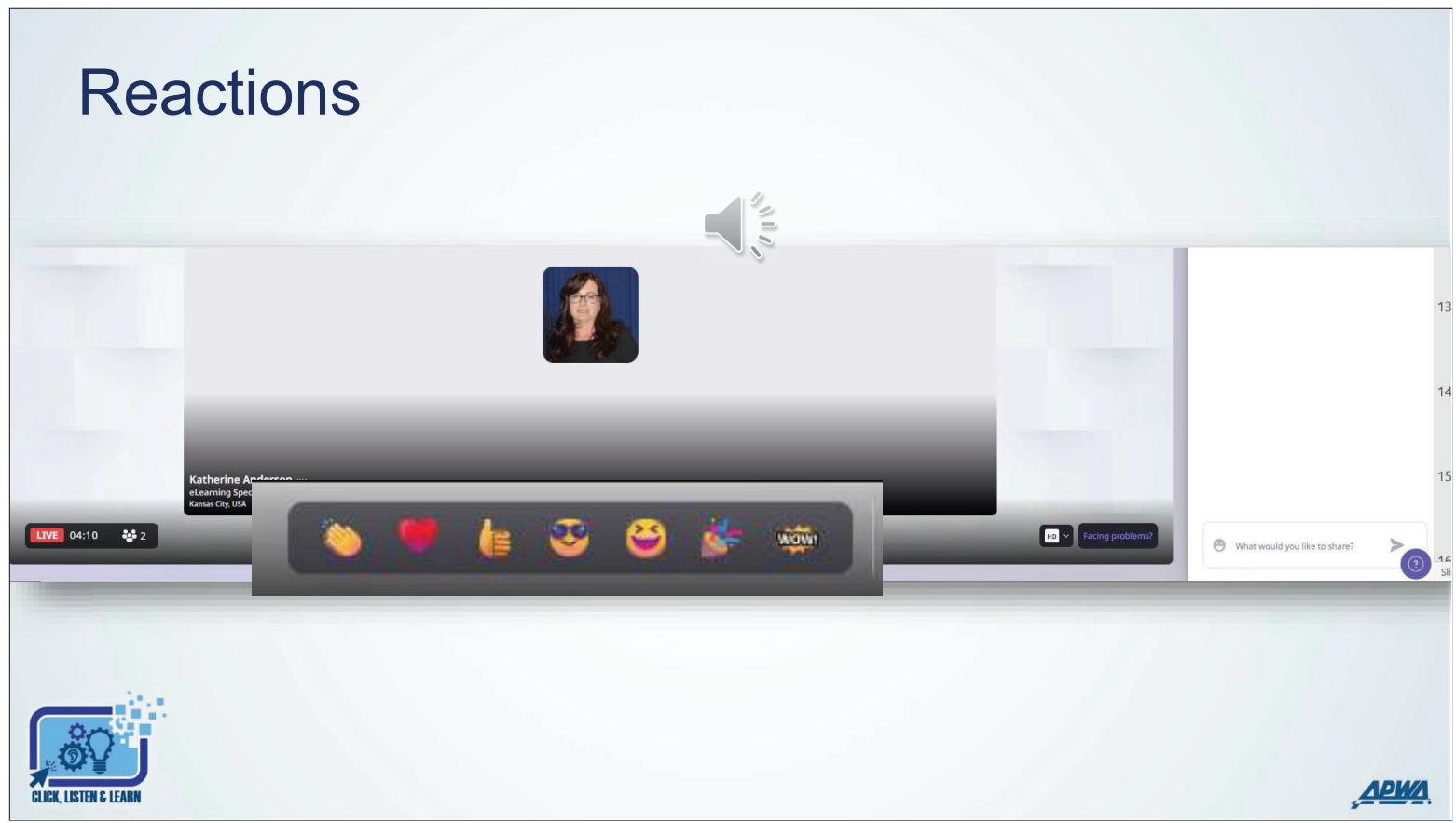
You Mascot, APWA · 2 days ago

Anyone else here from Kansas City?

CLICK, LISTEN & LEARN

APWA

Reactions



Katherine Anderson eLearning Spec... Kansas City, USA

LIVE 04:10 2

13 14 15

What would you like to share? 16

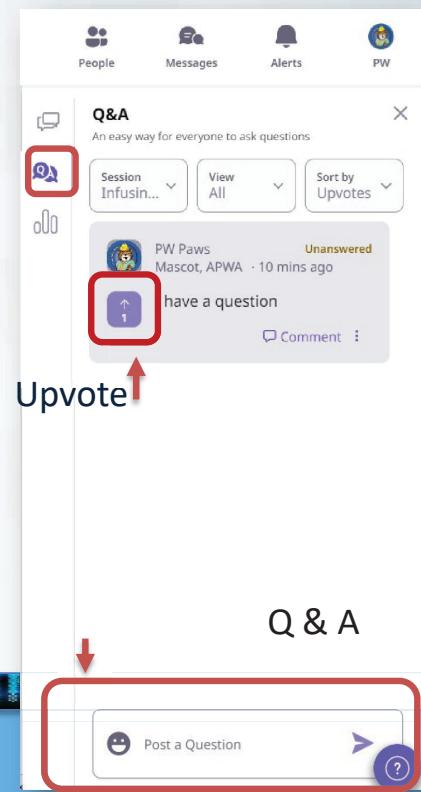
CLICK, LISTEN & LEARN

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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.



The screenshot shows a digital interface for asking and answering questions. At the top, there are navigation icons for 'People', 'Messages', 'Alerts', and a profile picture. Below that is a header for 'Q&A' with the subtext 'An easy way for everyone to ask questions'. There are dropdown menus for 'Session Infusin...', 'View All', and 'Sort by Upvotes'. A question card is displayed for 'PW Paws', a 'Mascot, APWA', posted 10 mins ago. The card shows an upvote icon with the number '1' and a comment icon. A red box highlights the upvote icon, and a red arrow points to it with the label 'Upvote'. At the bottom of the interface is a red-bordered input field with a smiley face icon and the placeholder text 'Post a Question', and a help icon with a question mark.

Today's Moderator:



Shane McQuillan
City Forester
Des Moines, Iowa

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.



MAKE A DIFFERENCE.

Nominate yourself or someone else to serve on an APWA national committee, council, or as the APWA representative on an external organization!



NOMINATIONS
are now being accepted for APWA
committees and external appointments.
To learn more about the open positions, go to the
nominations portal at <https://my.apwa.org/s/nominations>.

Nominations are due March 31, 2026.

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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

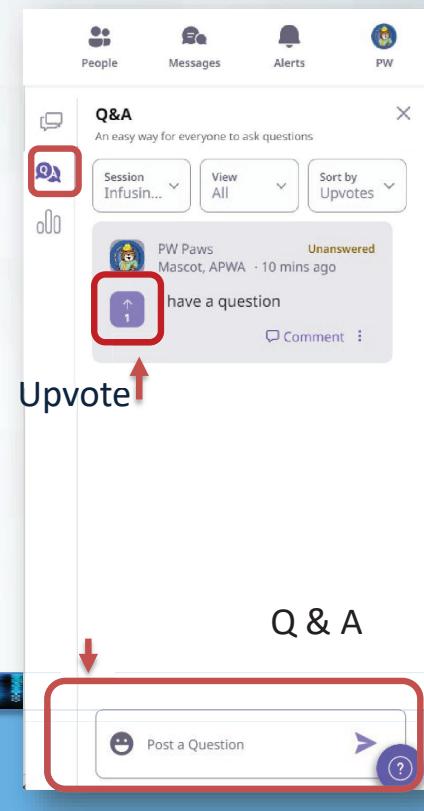


Josh Behounek
Business Development Manager
Davey Resource Group

Q & A

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



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Q & A



Please join us in
the virtual lounge
for continued
discussion



Tech-Driven Trees: Advancing Urban Forestry with Technology



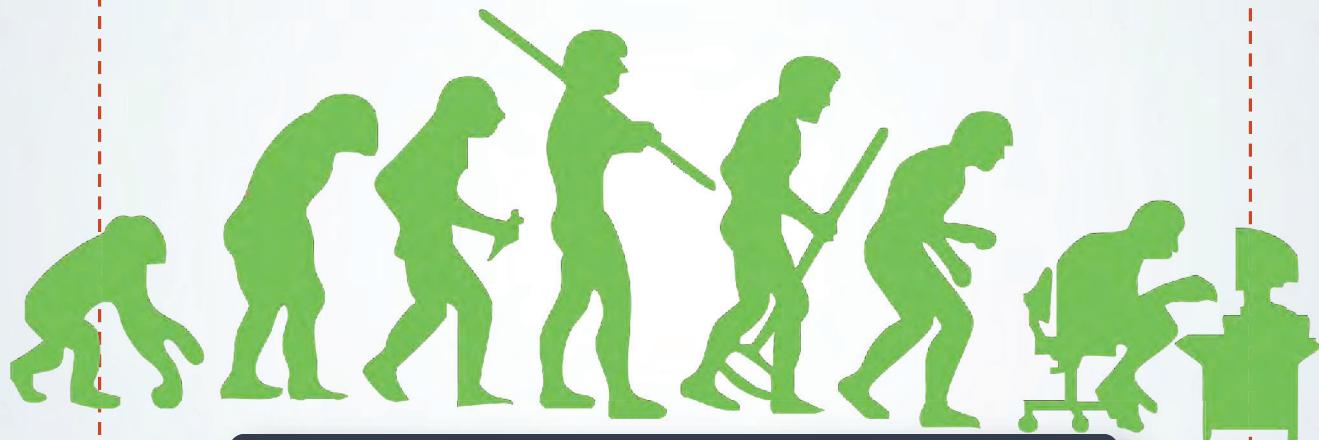
Josh Behounek
Davey Resource Group



Shane McQuillan
City of Des Moines



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?

When will I
RETURN
to this tree?

Should I
MONITOR
this tree?



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Current Process

Guess

Act

Pray



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Poll Question

How current is your Tree Inventory?

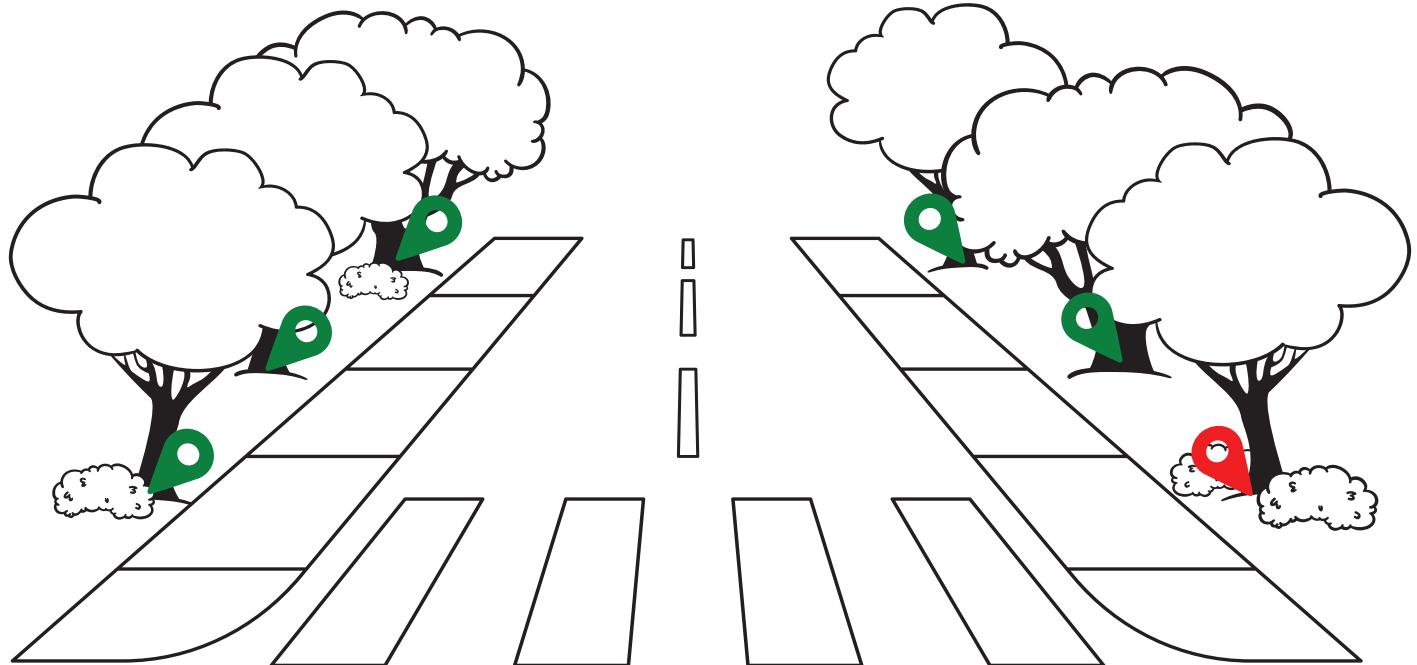
- Don't have one
- > 10 years
- 5 – 10 Years
- 1 – 5 Years
- < 1 Year

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Traditional GIS-Based Tree Inventories



Unnecessary & Limited Data Collection with Standard Fields



Subjective



Poll Question

How would you rate this tree?

- Dead
- Poor
- Fair
- Good
- Excellent



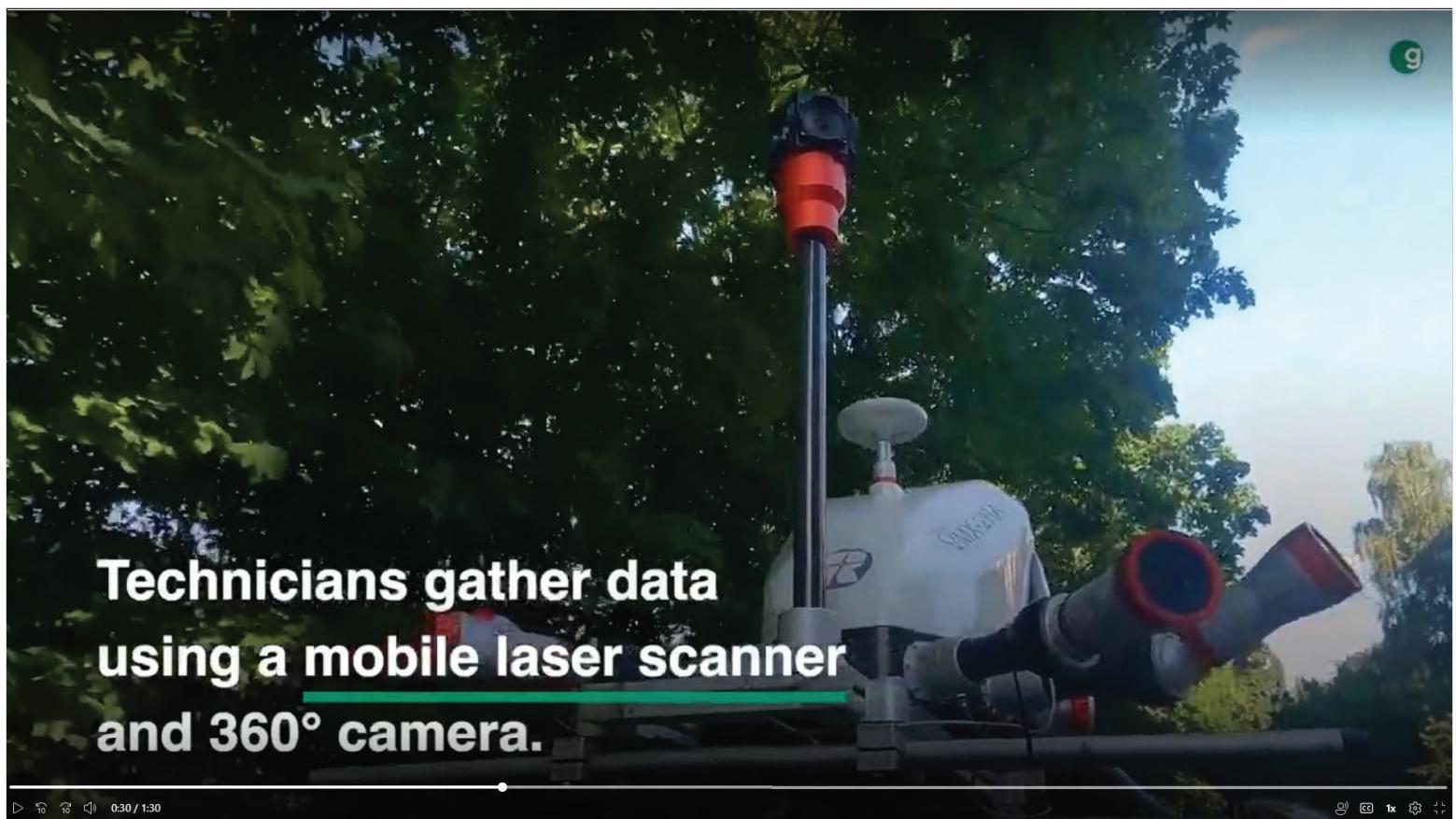
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Feedback Loop - Buffalo, NY Inventory Update

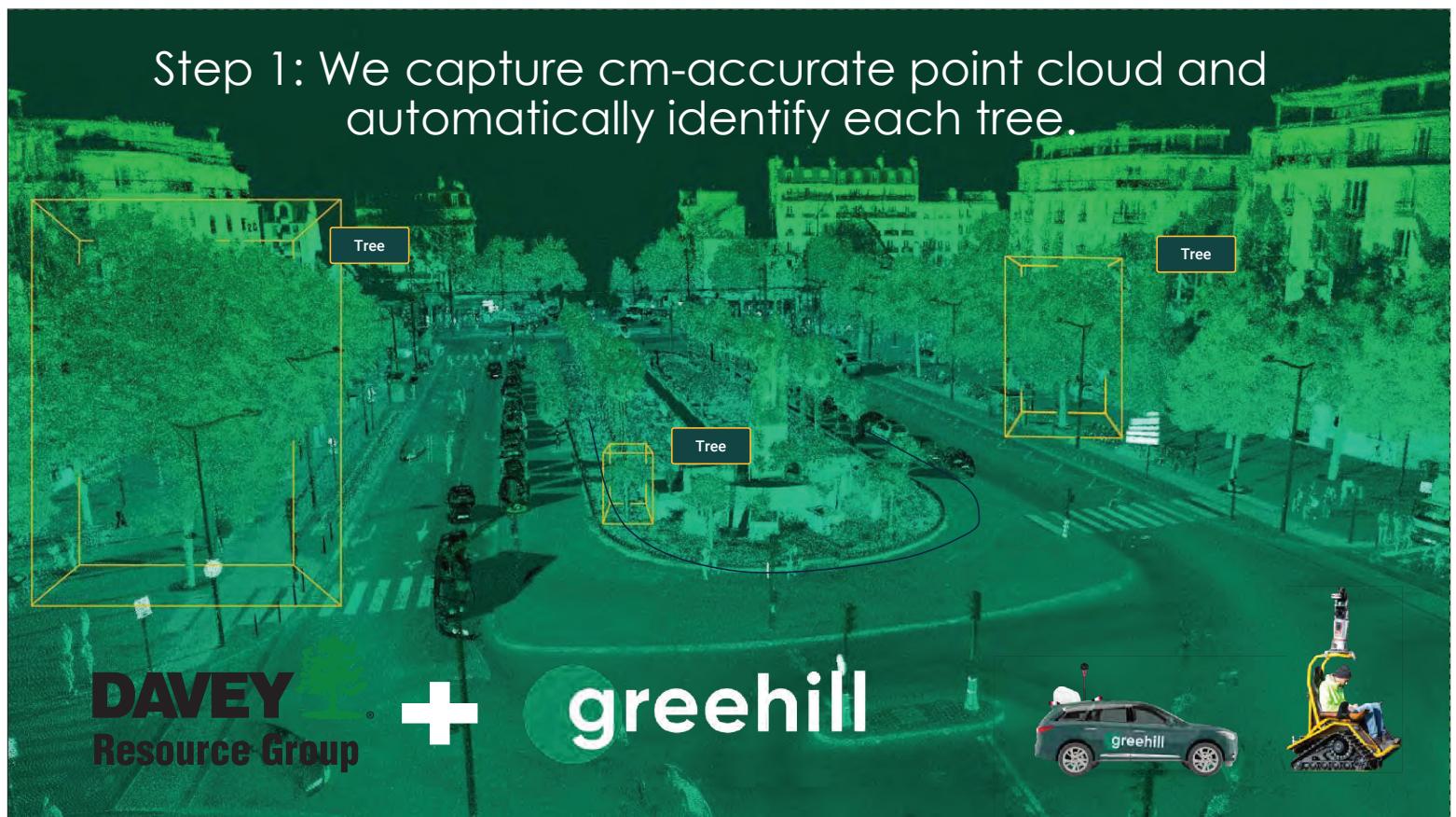
	2001	2014	Difference
Sites	124,445	127,080	2,635
Total DBH	871,173"	817,627"	-53,546"
Average DBH	7"	6"	-1"
# Species	281	247	-34
# Removals	668	2,707	2,039
# Planting Sites	48,761	44,619	-4,142

Feedback Loop - Condition Change Assessment

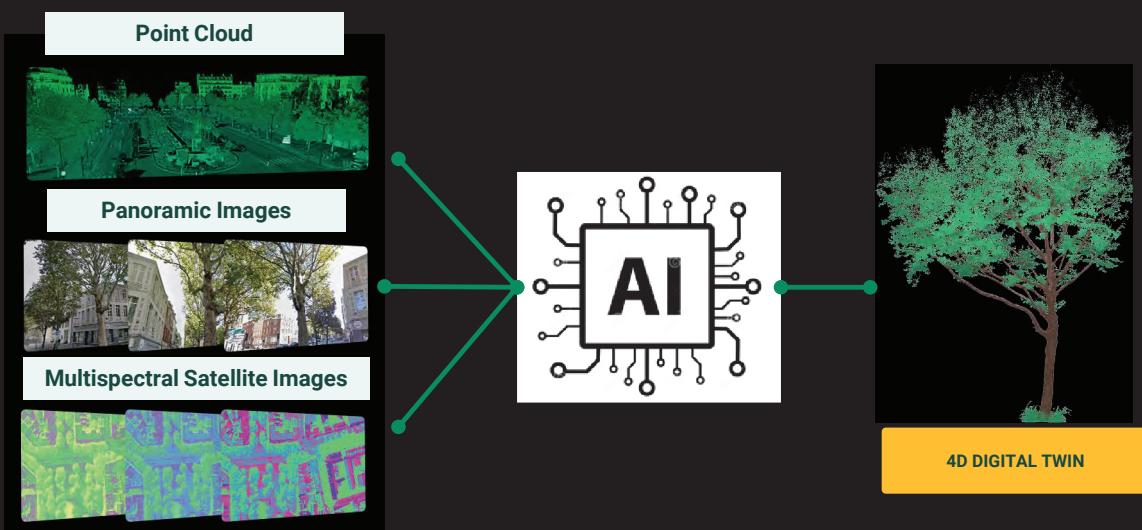
2001 Inventory	5,698 Poor	38,199 Fair	25,632 Good
2014 Inventory	3 Dead 145 Poor 11 Fair 0 Good 293 Plant 5,246 New	298 Dead 3,445 Poor 26,830 Fair 962 Good 1,365 Plant 5,299 New	259 Dead 717 Poor 8,952 Fair 9,783 Good 1,878 Plant 4,043 New



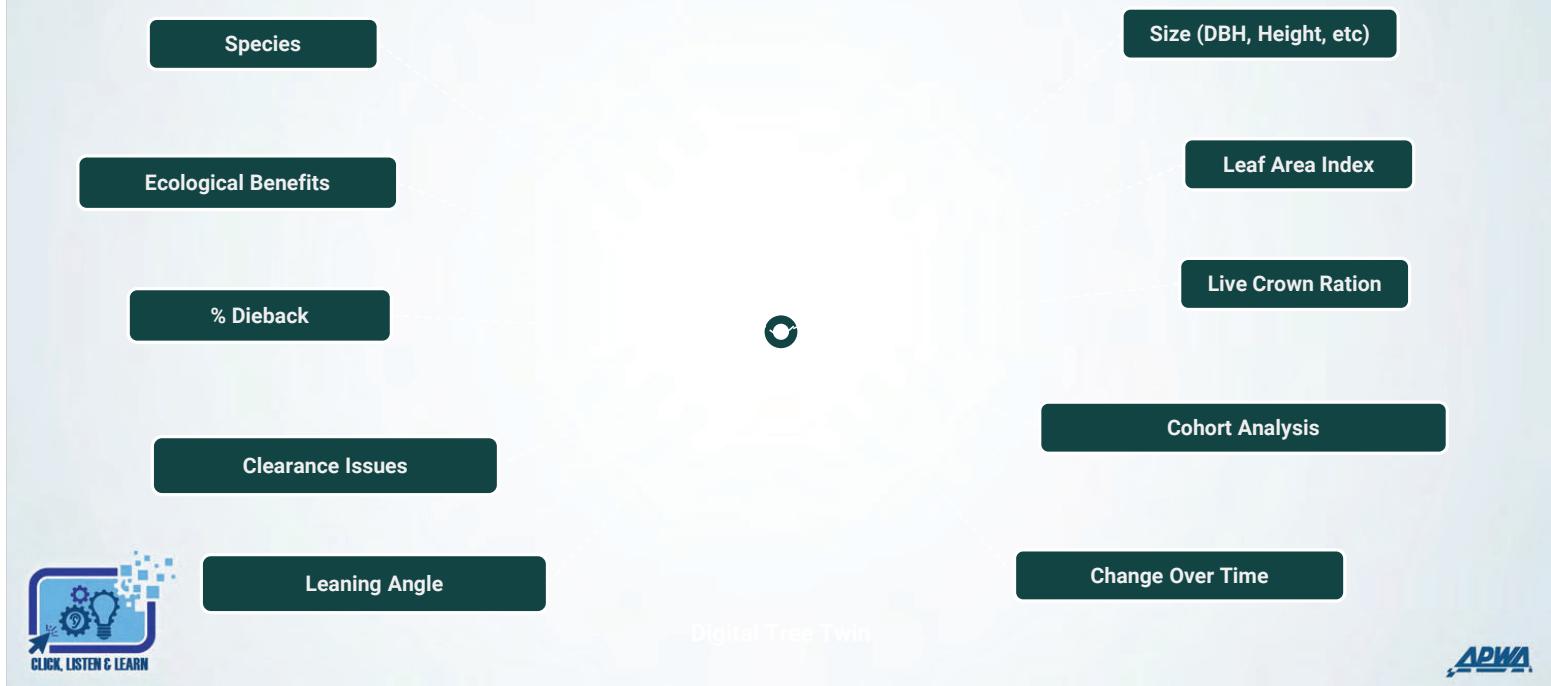
Step 1: We capture cm-accurate point cloud and automatically identify each tree.



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



Step 3: We analyze each tree and extract information



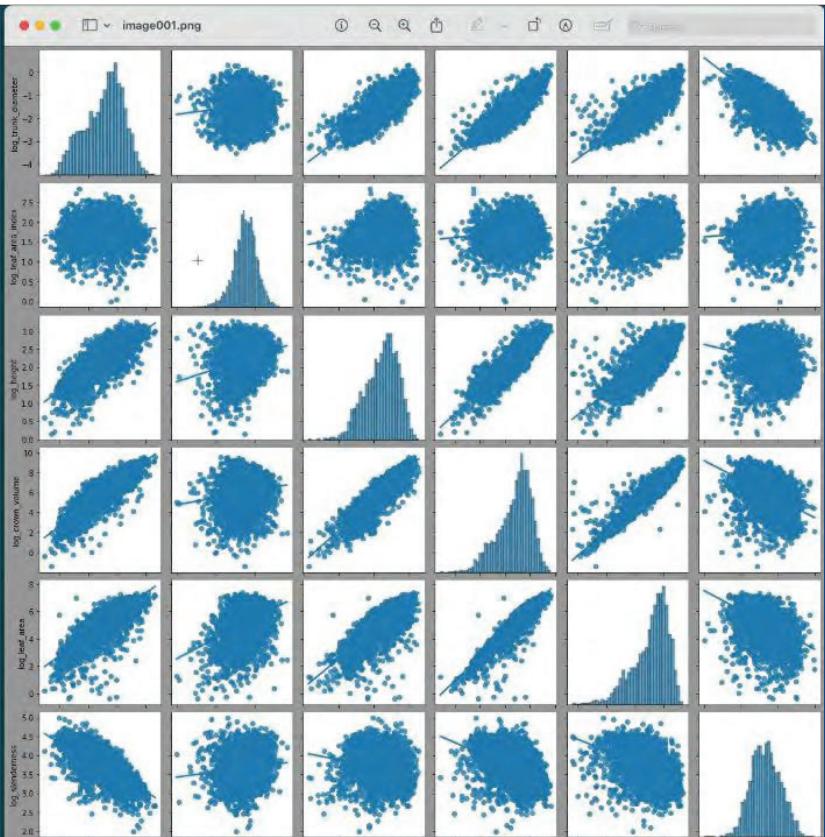
Step 4: Define outliers

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



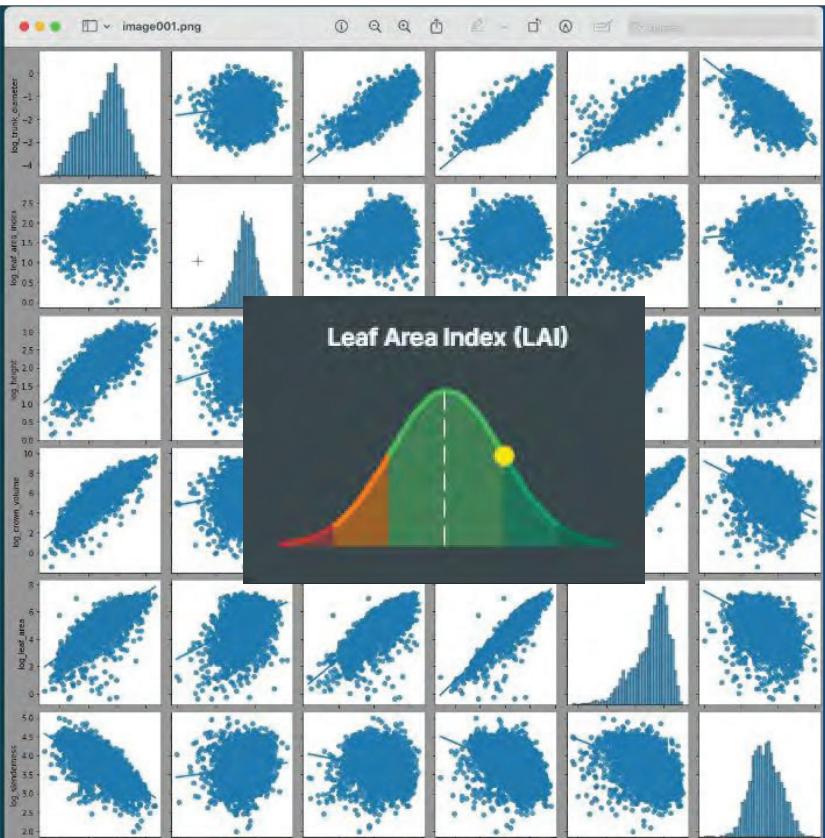
Step 4: Define outliers

Absolute Outliers (cohorts)

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Relative Outliers (filtering)

- Trees $> x''$
- Trees in certain neighborhoods
- Certain species of trees
- Trees $> 40\%$ dieback



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

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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

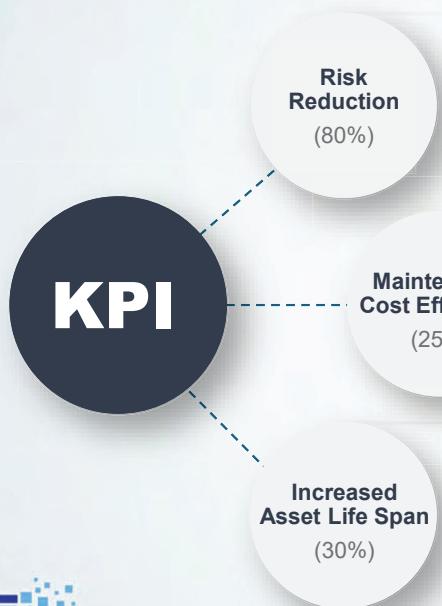
URBAN FOREST MASTER PLAN
 20-year Vision
 Urban Tree Canopy Analysis
 Stakeholder Input

2 Year Cycle

~5 Year Cycle

DAVEY RESOURCE GROUP

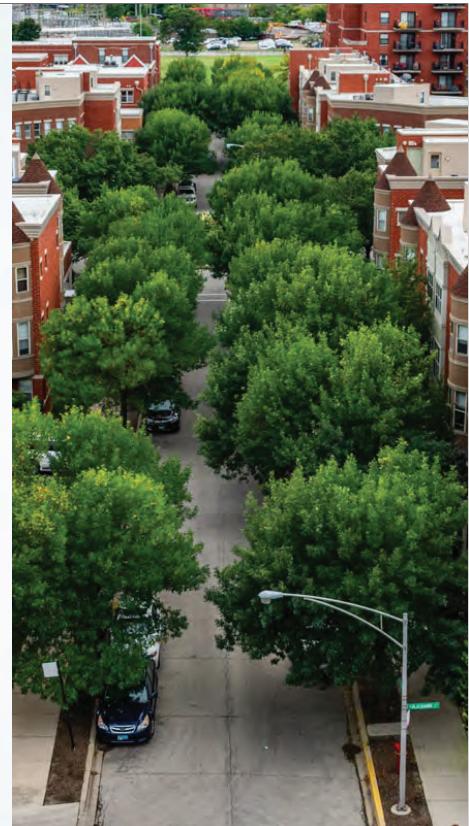
Key Performance Indicators



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

- Better preventative maintenance
- Better tree planting selection

- More ecosystem services
- Fewer annual removals



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TreeKeeper 360

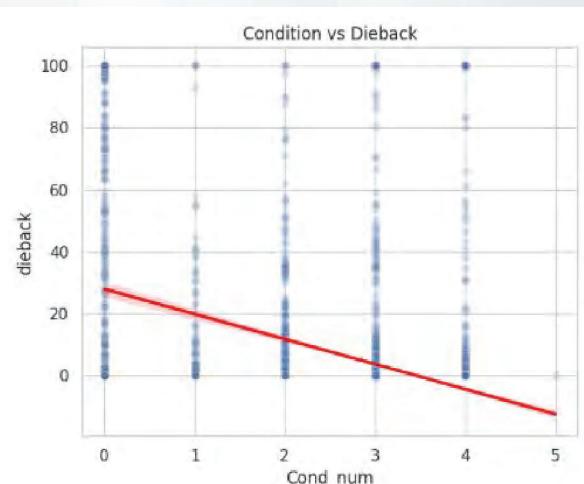
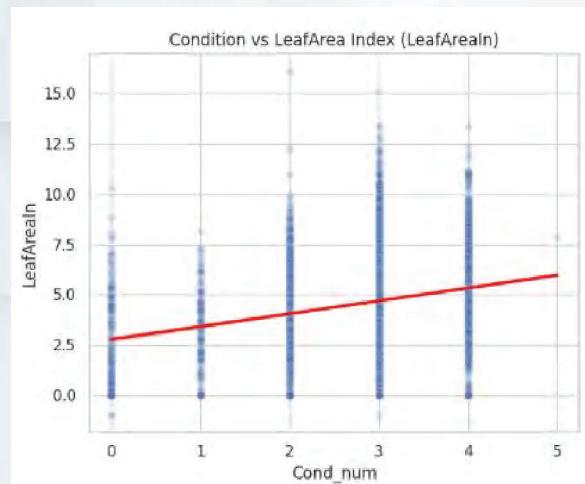
The screenshot shows a software interface for TreeKeeper 360. At the top, there is a navigation bar with a search bar and a user welcome message: "Welcome, Josh Behounek (DRG)". On the left, there is a sidebar with a tree icon and a map. The main area is divided into several sections:

- Reports:** A list of reports including "Dashboard - Smart Tree - Condition Breakdown", "Dashboard - Smart Tree - DBH Breakdown", "Dashboard - Smart Tree - Risk Breakdown", "Dashboard - Smart Tree - Species Breakdown", and "Dashboard - Smart Tree - Work Breakdown".
- Charts:** A list of charts including "Smart Tree - Condition Breakdown", "Smart Tree - Condition Chart" (which is selected and highlighted in green), "Smart Tree - DBH Breakdown", "Smart Tree - Risk Breakdown", and "Smart Tree - Species Breakdown".
- Preview Selected Chart:** A pie chart titled "Smart Tree - Condition Chart". The chart shows the following data:

Condition	Percentage
Not Assessed	~1%
Poor	~1%
Critical	~1%
Unassessed	~1%
Good	~1%
Dead	~1%
Very Good	~94%
- System Reports:** A list including "Project Tracking" (which is selected and highlighted in green), "Species List Assignments", "Work Order Tracking", "Document Review", "User Security and Layer Rights", and "Custom Reports (Smart Tree)".

Objective

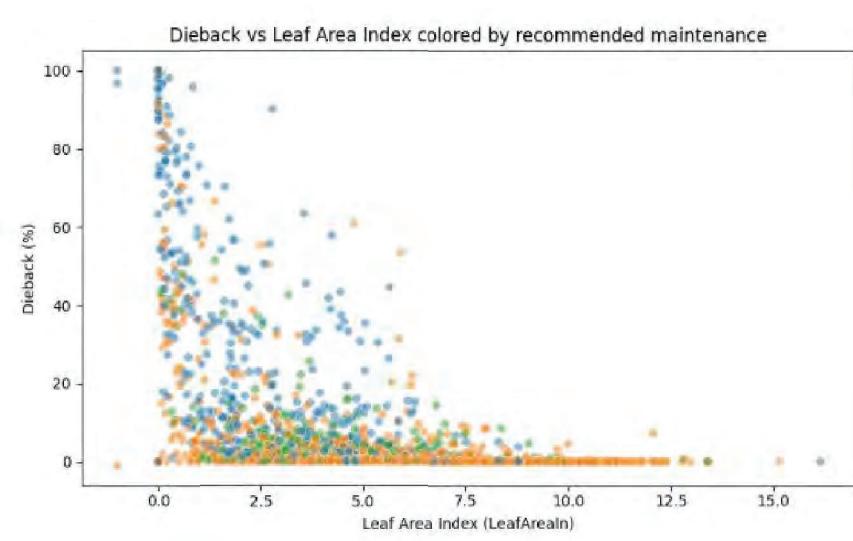
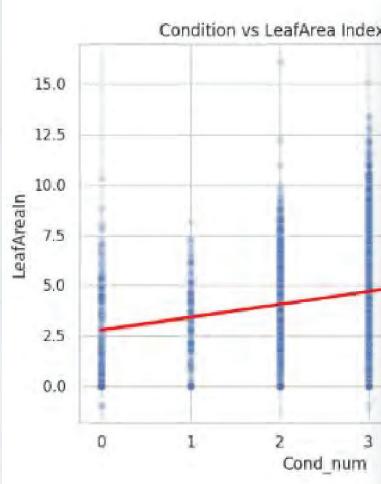
Leaf Area Index & Percent Decline



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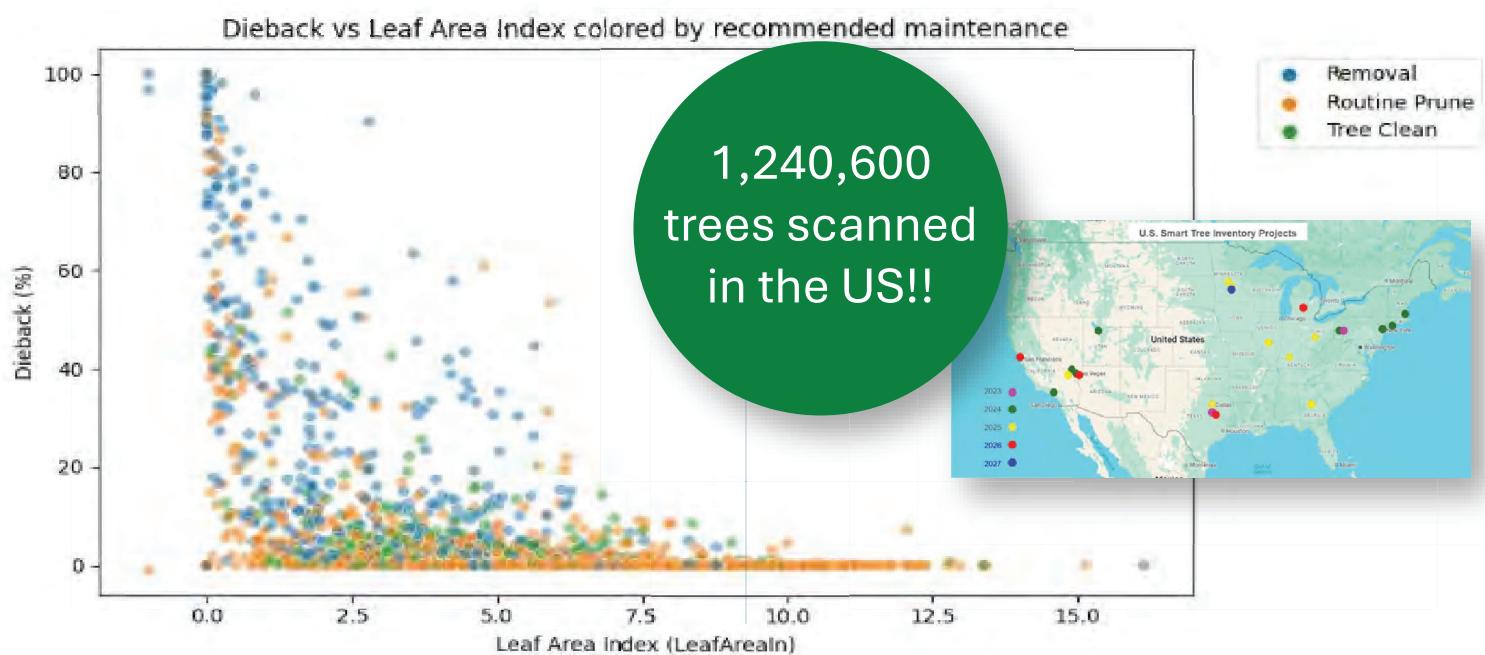
Objective + Predictive

Leaf Area Index & Percent Decline



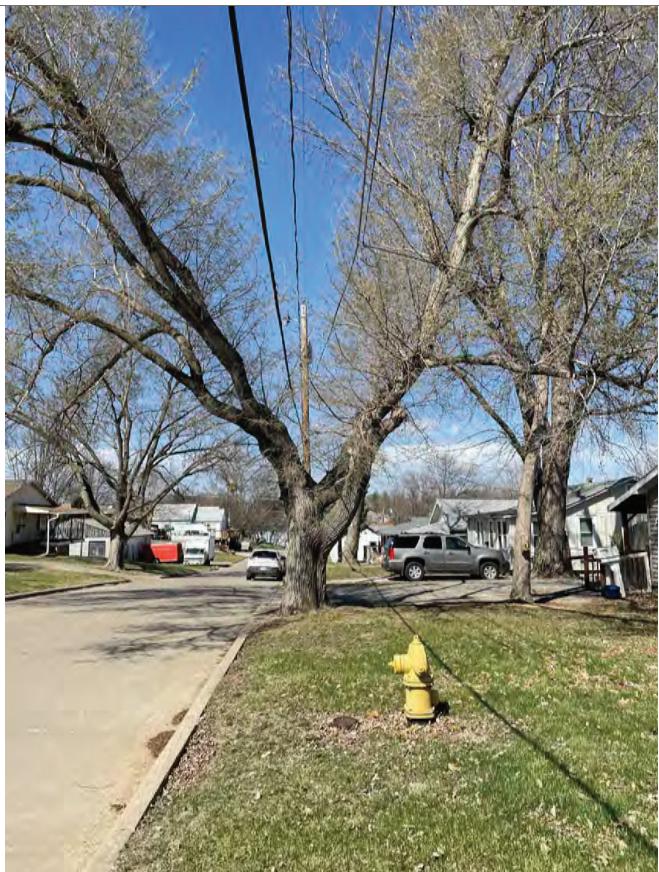
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Objective + Predictive



PARTNERS IN COMMUNITY FORESTRY CONFERENCE 2025

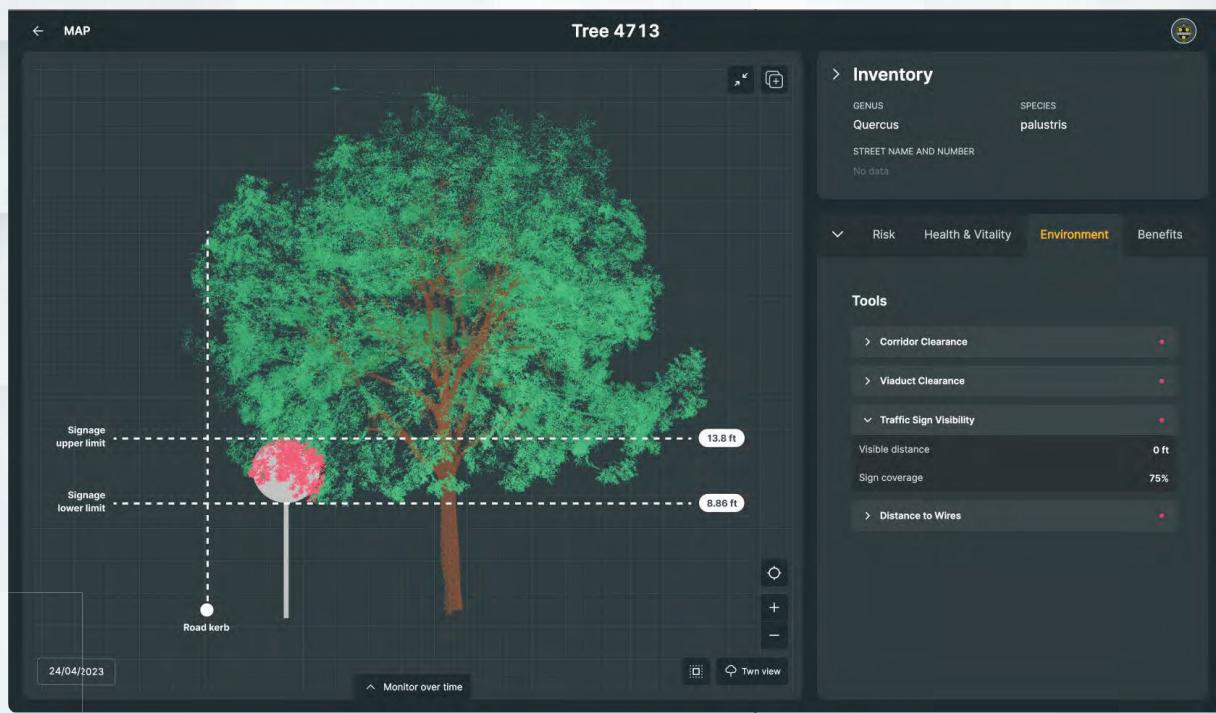




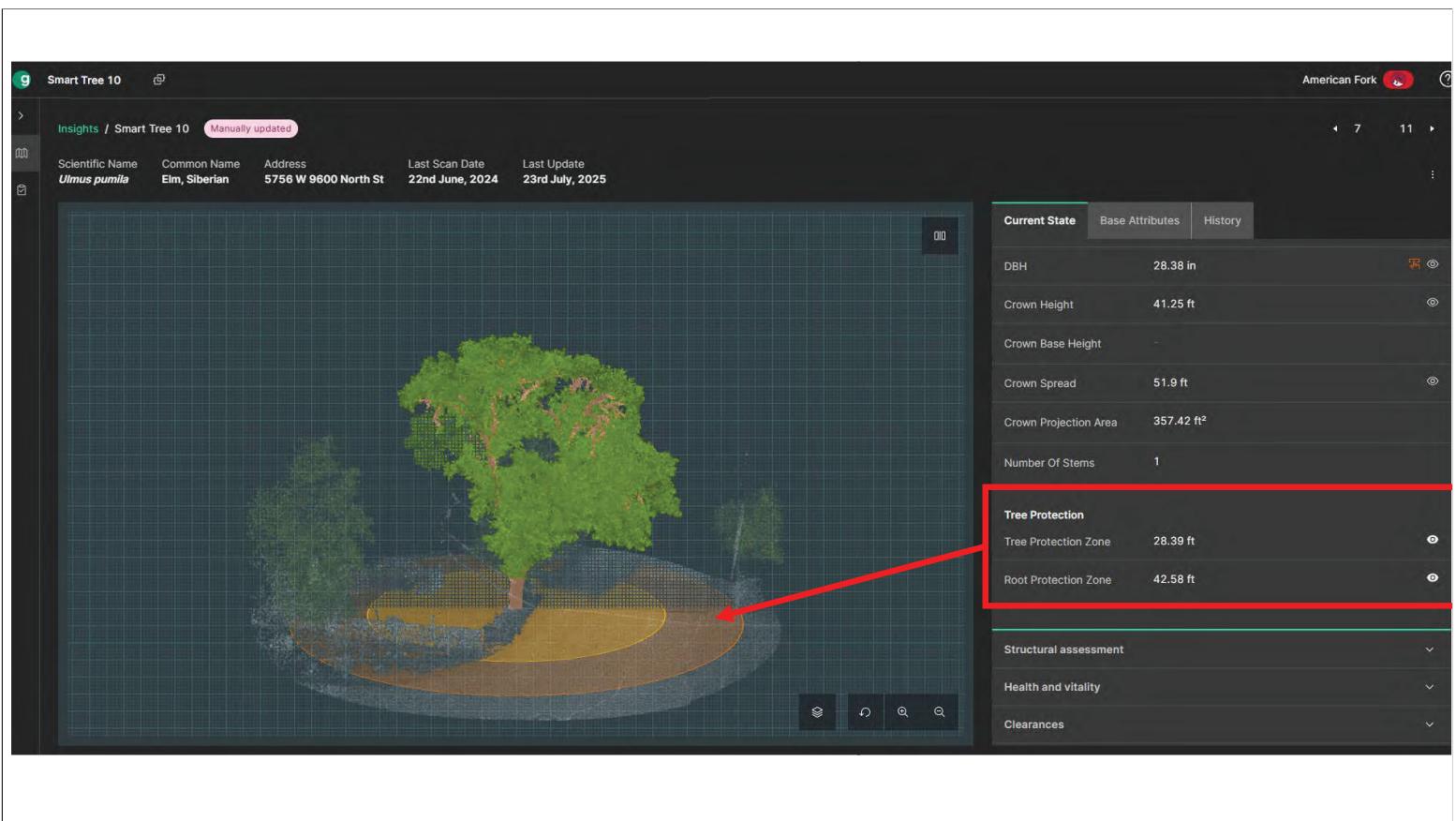


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Traffic Sign Clearance



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Smart Tree 10

Insights / Smart Tree 10 Manually updated

Scientific Name: *Ulmus pumila* Common Name: Elm, Siberian Address: 5756 W 9600 North St Last Scan Date: 22nd June, 2024 Last Update: 23rd July, 2025

Current State

DBH	28.38 in
Crown Height	41.25 ft
Crown Base Height	-
Crown Spread	51.9 ft
Crown Projection Area	357.42 ft ²
Number Of Stems	1

Tree Protection

Tree Protection Zone	28.39 ft
Root Protection Zone	42.58 ft

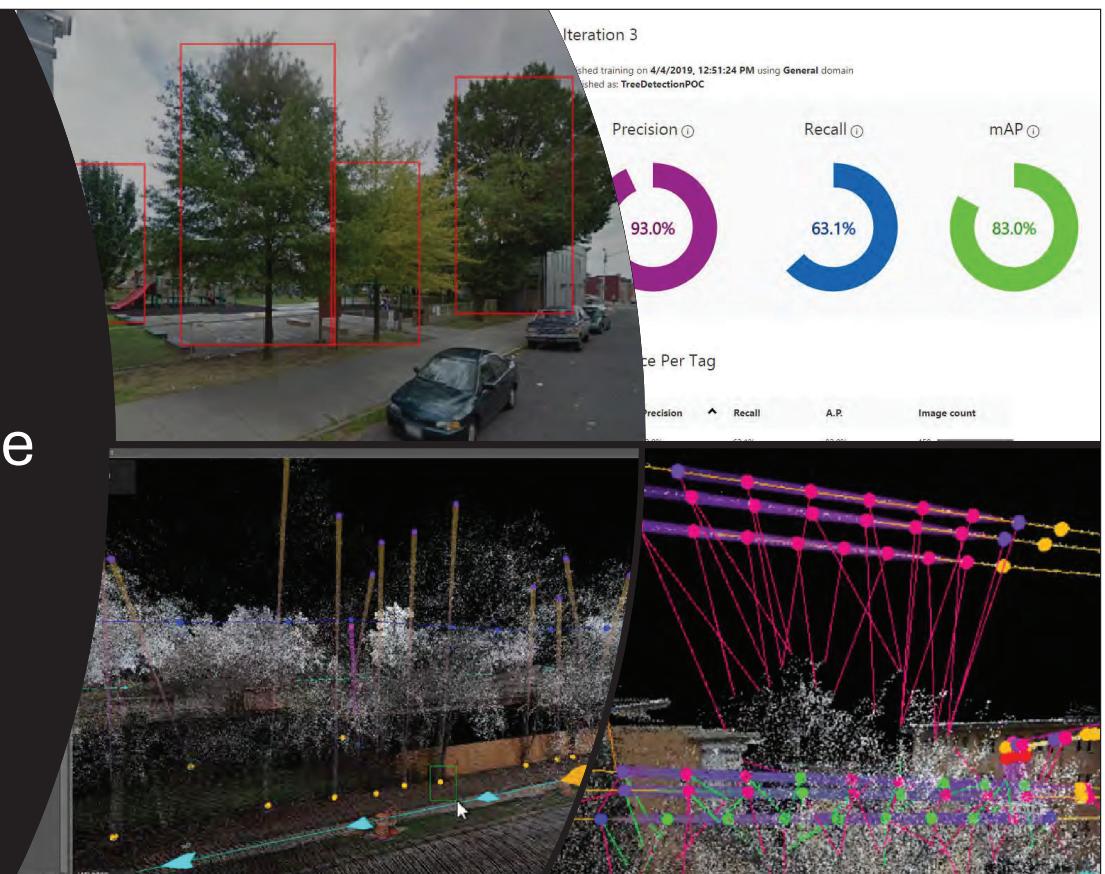
Structural assessment

Health and vitality

Clearances

Machine Learning Advantages

- Objective
- Repeatable
- Efficient
- Precise



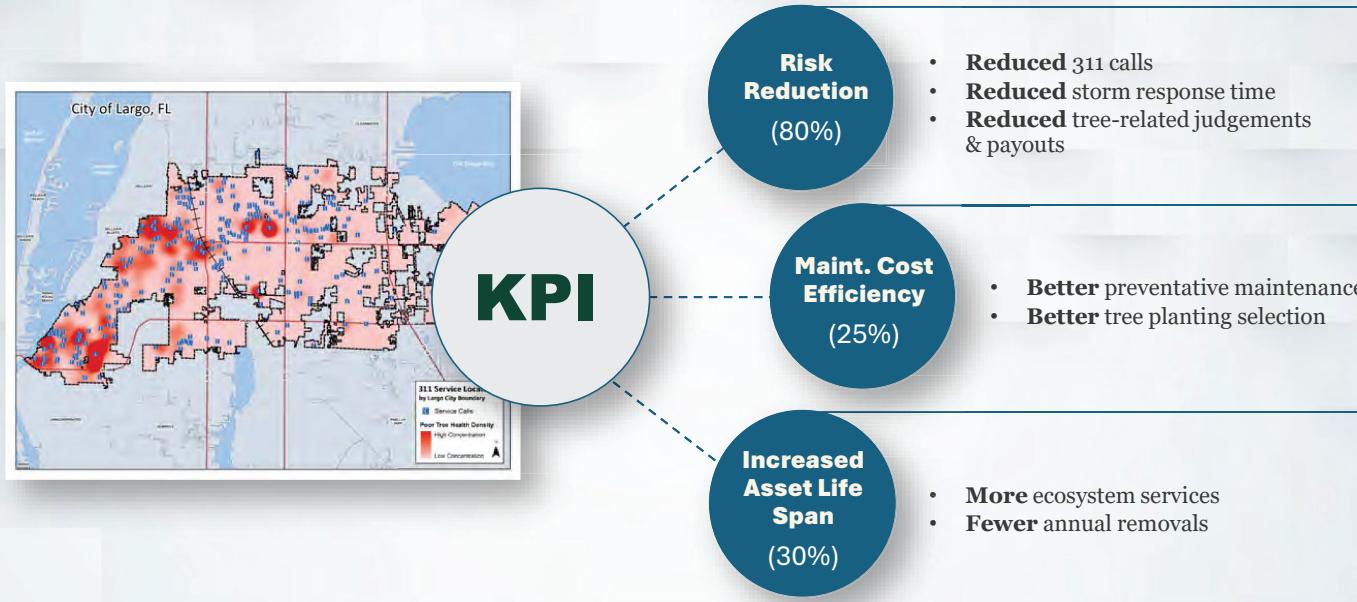
Iteration 3

Completed training on 4/4/2019, 12:51:24 PM using General domain
Published as: TreeDetectionPOC

Precision: 93.0% Recall: 63.1% mAP: 83.0%

3D point cloud analysis showing tree structure and object detection results.

“From Reactive to Proactive” + *Predictive*



APWA



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DAVEY 
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