Pano AI

Actionable Intelligence For Wildfire Management

Demo Day – October 19th, 2021

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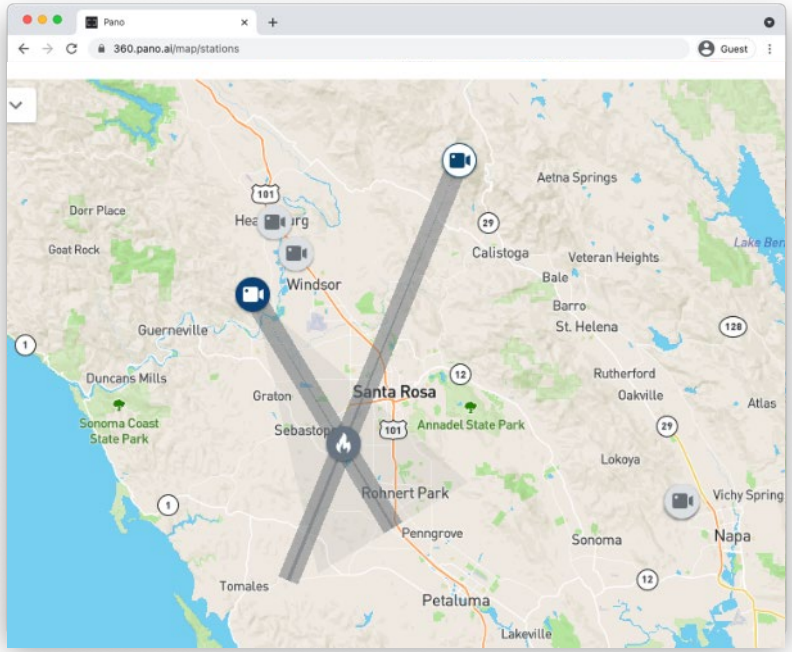
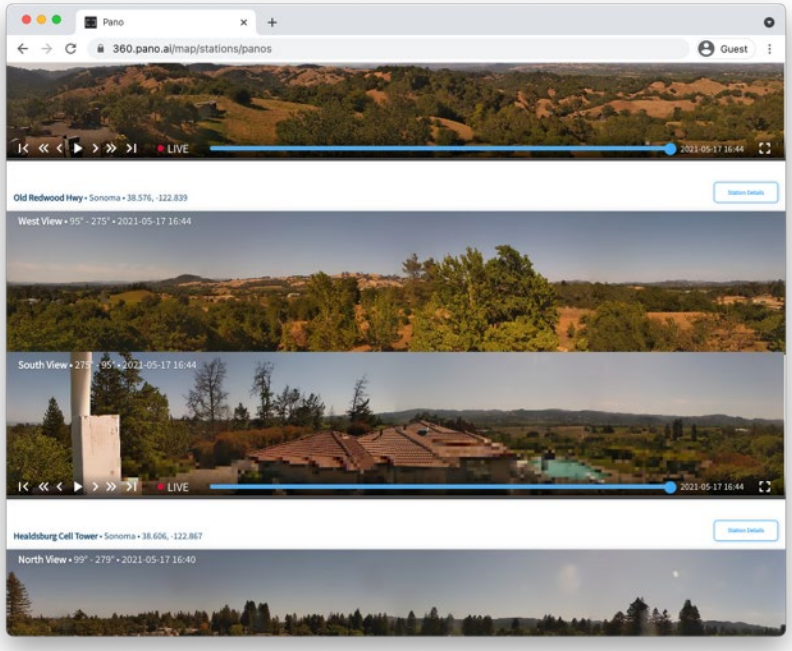
About the Need & Opportunity

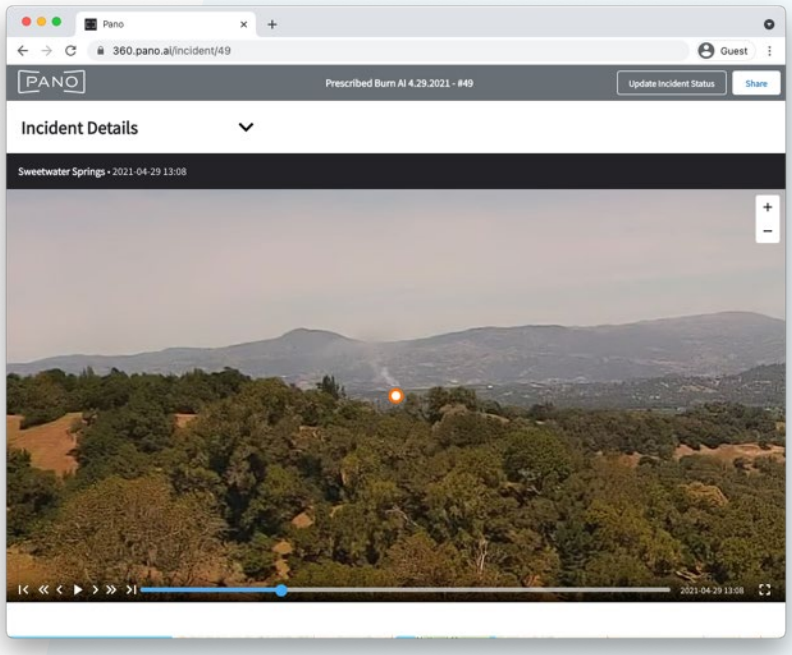
This pilot project is intended to demonstrate the viability of terrain viewing cameras and machine learning algorithms to support utility wildfire resilience with **early identification and ongoing situational awareness of wildfire threats**.

About the Technology

Pano's Rapid Detect platform uses continuously rotating ultra-HD mountaintop cameras, AI, and intuitive software to improve wildfire situational awareness. Using the Pano 360 web interface, multiple users can simultaneously view **360-degree live panoramic imagery, respond to AI-generated smoke alerts,** and **triangulate a fire's location.**





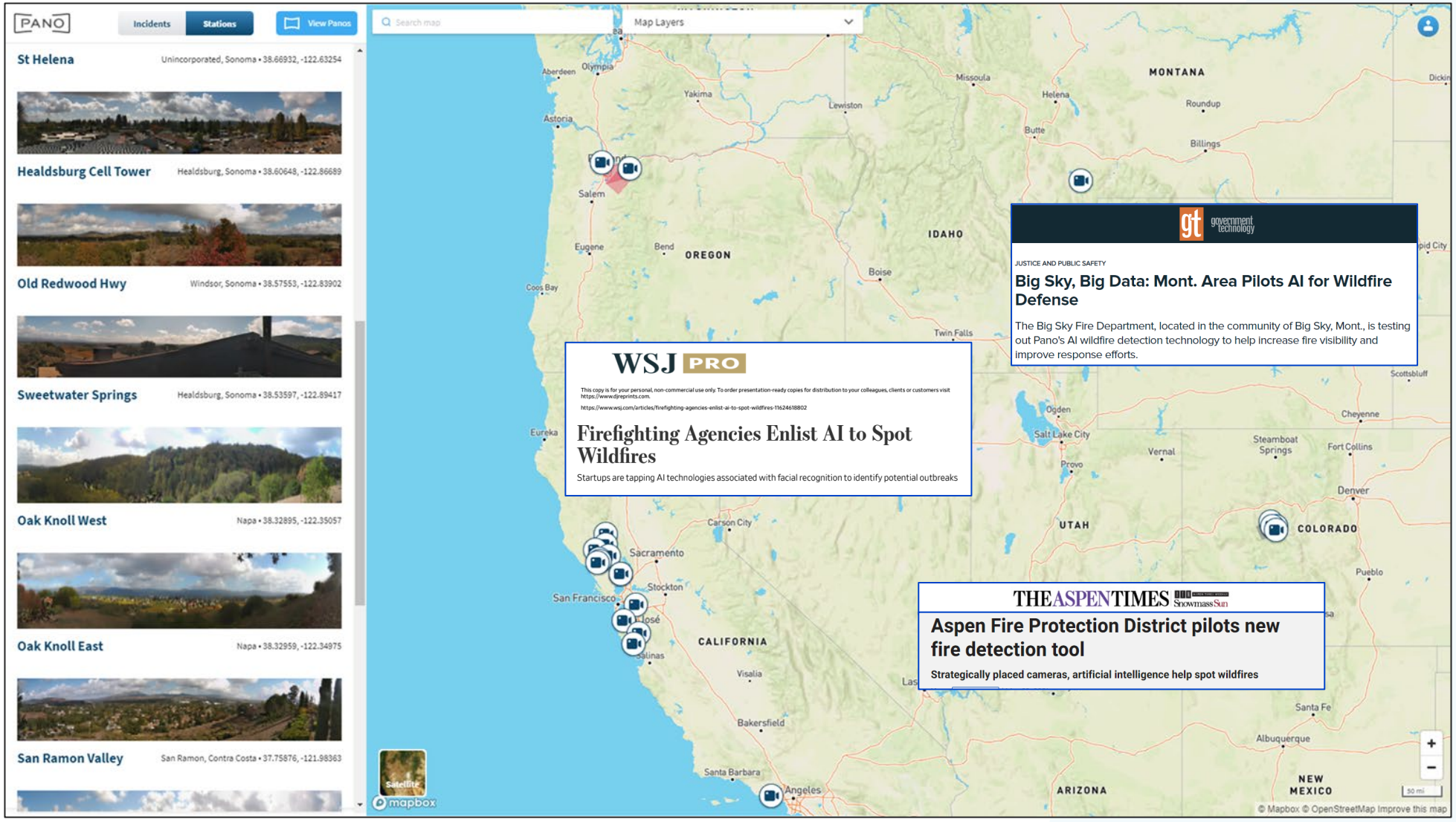


Project Phases

	PHASE 1 **Use Case Identification, Metrics Definition & User Onboarding**	PHASE 2 **System Testing & Evaluation**	PHASE 3 **Read-out And Next Steps**
	June 14 - July 31	August 1 - October 6	October 6 through end of fire season
Key question to answer	**What pain points exist in current situational awareness processes and how can the Pano tool address these?**	**How well does the Pano system do at addressing these pain points?**	**What are the final results, and what are the implications for how the Pano system can support utility situational awareness more broadly?**
Primary activities	1. **Utility workshops** to assess current methods of wildfire detection and monitoring 2. **User workflow & training module development**, designed to address identified pain points in detection and monitoring 3. **Alignment on key success metrics** based on identified pain points	1. **System operations / demonstration** (ongoing use of Pano system) 2. **Feedback collection & progress tracking** (user interviews/surveys, data logging, etc.) 3. **Program management & metrics read-outs** (weekly check-ins to review progress and results)	1. **Performance evaluation** (synthesis of data/feedback collected, analysis to inform key takeaways) 2. **EPRI demo day & final results read-out**, including potential for system scalability 1. **Next steps** (continued use and evaluation through end of fire season for participating utilities)

An Overview of Pano's 2021 Pilot Deployments

23 Pano Stations across four states were deployed this fire season



Example Pano Station Deployments

Cloverdale, California Deployment

Portland, Oregon Deployment

Aspen, Colorado Deployment

Rapid Deployment Occurred Across Multiple States

W1 W2 W3 W4 W5 W6 W7

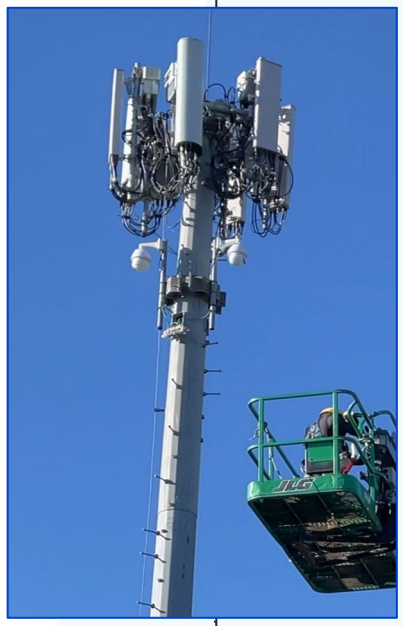
Site identification

Site analysis & selection

- Drone audit
- Mounting assessment
- Connectivity & power check
- Permitting & access

Shipping & installation

- Procurement of any custom mounting items
- Equipment installation (incl. leveling, internet hook-up, etc.)
- System testing & configuration



User onboarding

- Creation of website logins
- User training

Illustrative timeline

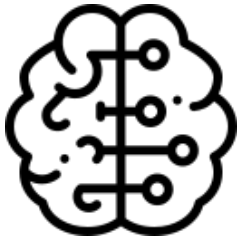
Pilot Evaluation Metrics

Time to detection:

- Time to detection histogram of Pano detections
- For each incident that has smoke visible in Pano's stations, time to detection by Pano relative to:
  - Smoke visible in camera
  - Earliest known detection time
  - IRWIN alerts used by utilities

Accuracy of detection:

- Demonstrate accuracy of detection for wildfires caught during the 2021 fire season



Incident intelligence:

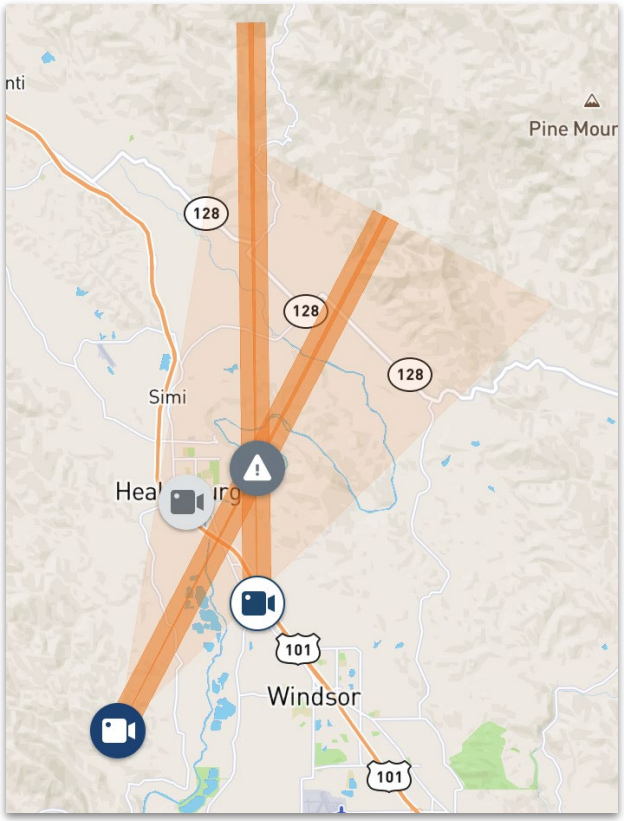
- Number of page views of Pano incidents
- Time per user spent on Pano 360
- Qualitative - other intelligence derived from Pano feed

Software functionality

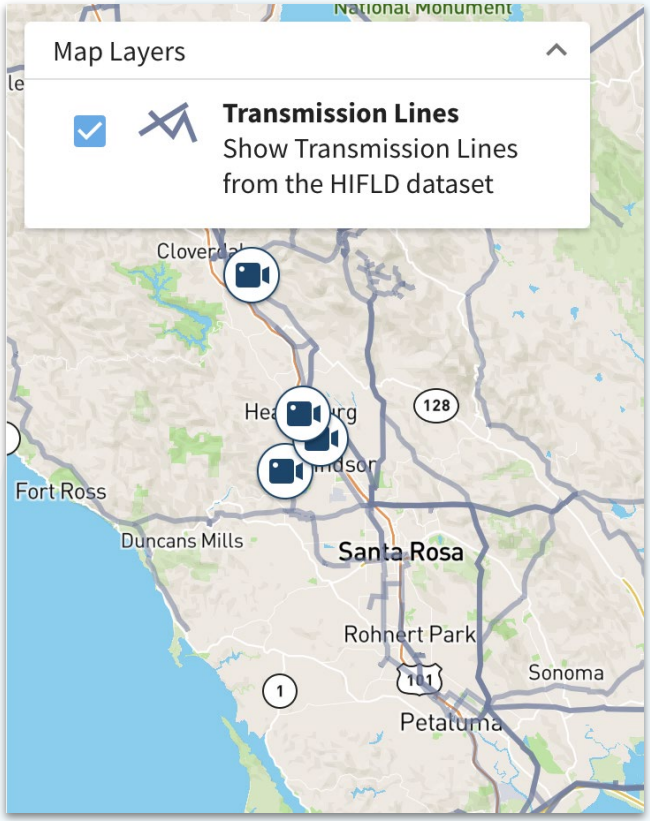
- Triangulation accuracy
- Intuitiveness of the platform
- Ongoing improvements to functionality and performance based on partner feedback

Key Software Functionality Evaluated

Automated **smoke detection** and **alerting**



Multi-camera incident location **triangulation**



Utility infrastructure overlay

Key Software Functionality Co-Developed

Weekly feedback sessions with PG&E, PGE, and EPRI resulted in new features deployed during the pilot

Feature 1:

Deployed - Bearing scale on the image player that shows the compass direction

Feature 2:

Deployed: Viewshed compass widget that updates in real time as the full screen player change's view

Feature 3:

Email incident updates to provide additional situational awareness.

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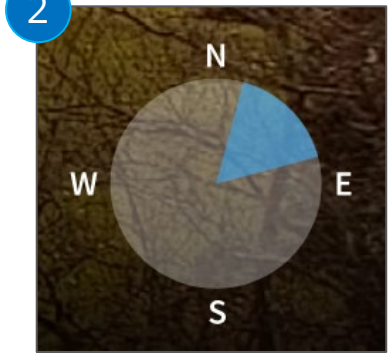

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Incident Update: Fremont Fire Oak Knoll West, Napa, CA Inbox ×

Pano Incidents <incidents@pano.ai> Wed, Sep 22, 3:09 PM

to me, PG&E

The recently notified incident has been named the Fremont Fire and is now over 40 acres. Moving to the east; no structure threat as of now.

Please view the Incident here: https://360.pano.ai/i/5o5tdiq

Key Software Functionality Co-Developed

Weekly feedback sessions with PG&E, PGE, and EPRI resulted in new features deployed during the pilot

Feature 4:

Map view widget on top of the full screen player, which shows the map viewshed in context to the 360 imagery

Feature 5:

Incident Timelapse, 3-hr lookback, and click-able player scrubber

Feature 6:

Incident Details and Station Details header update

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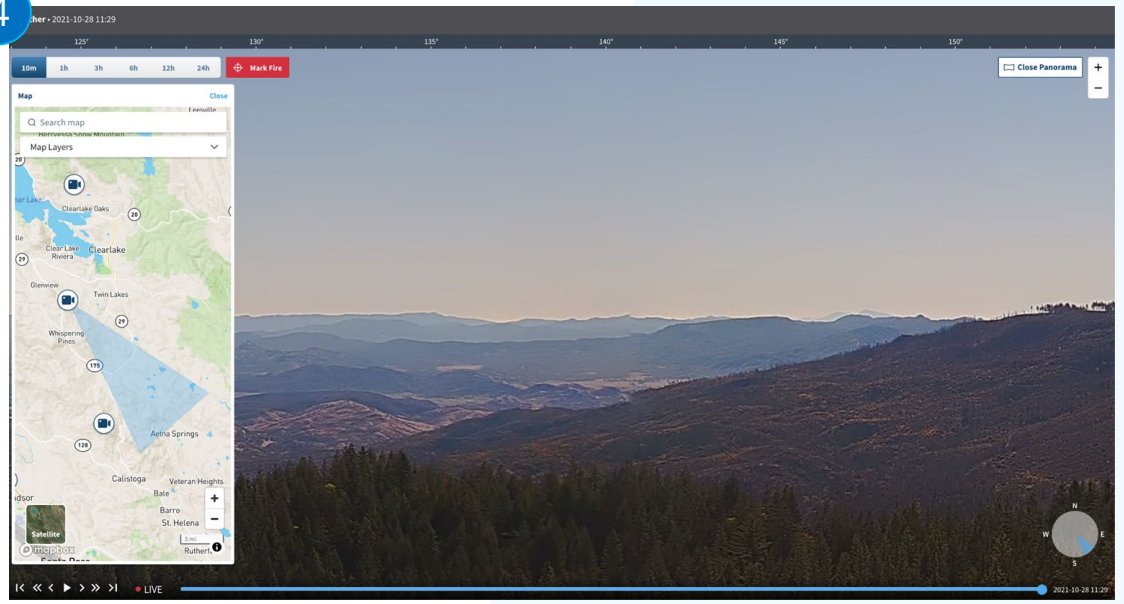

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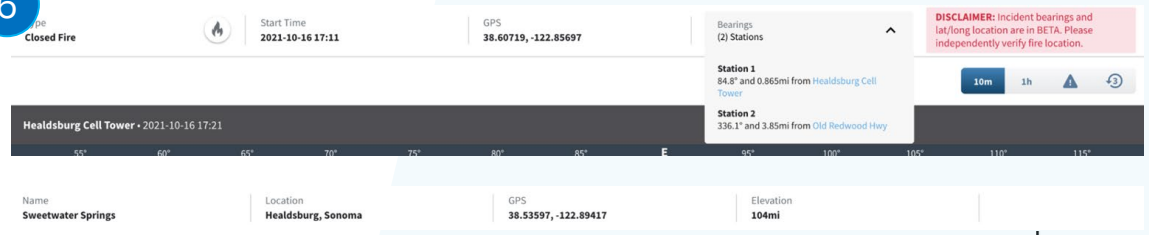
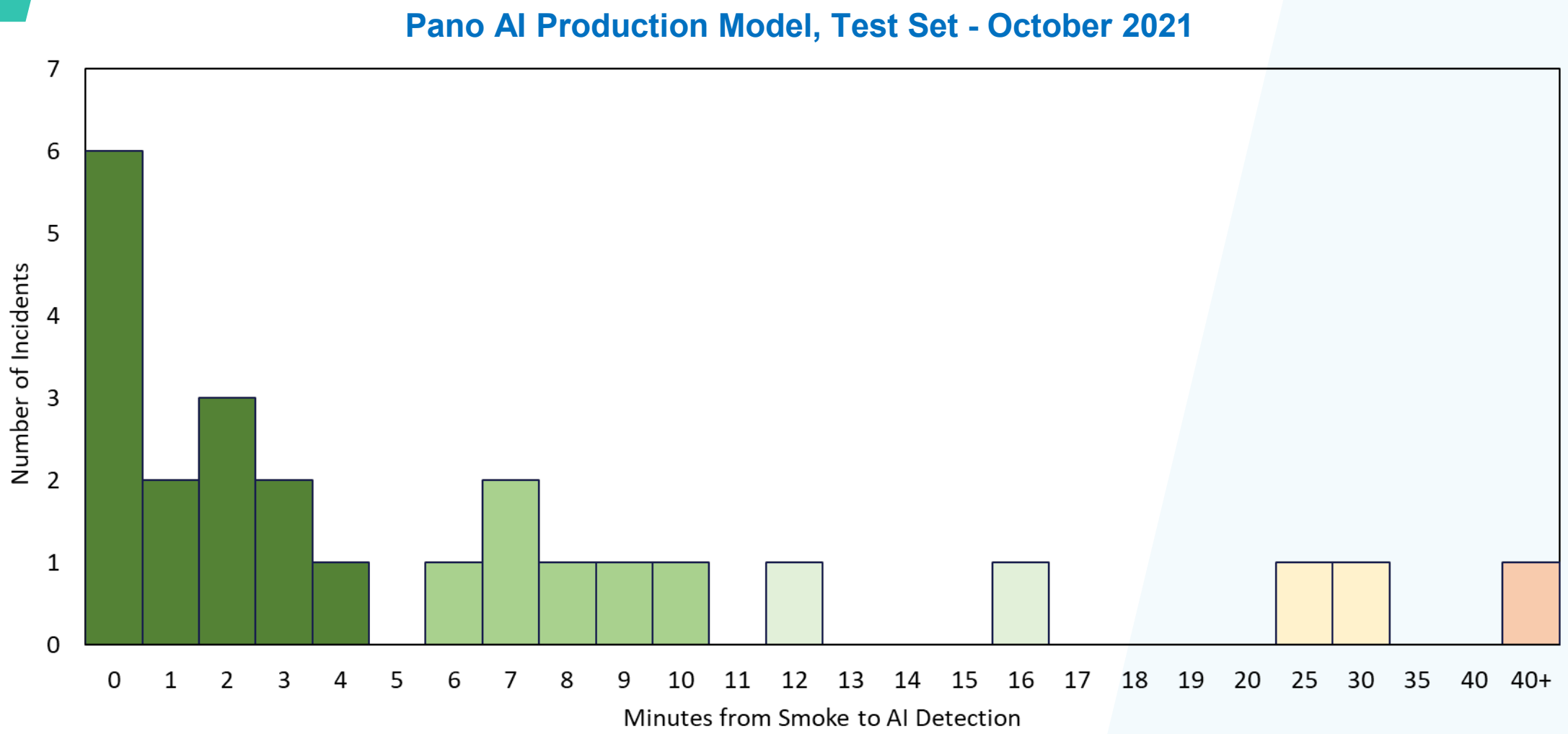
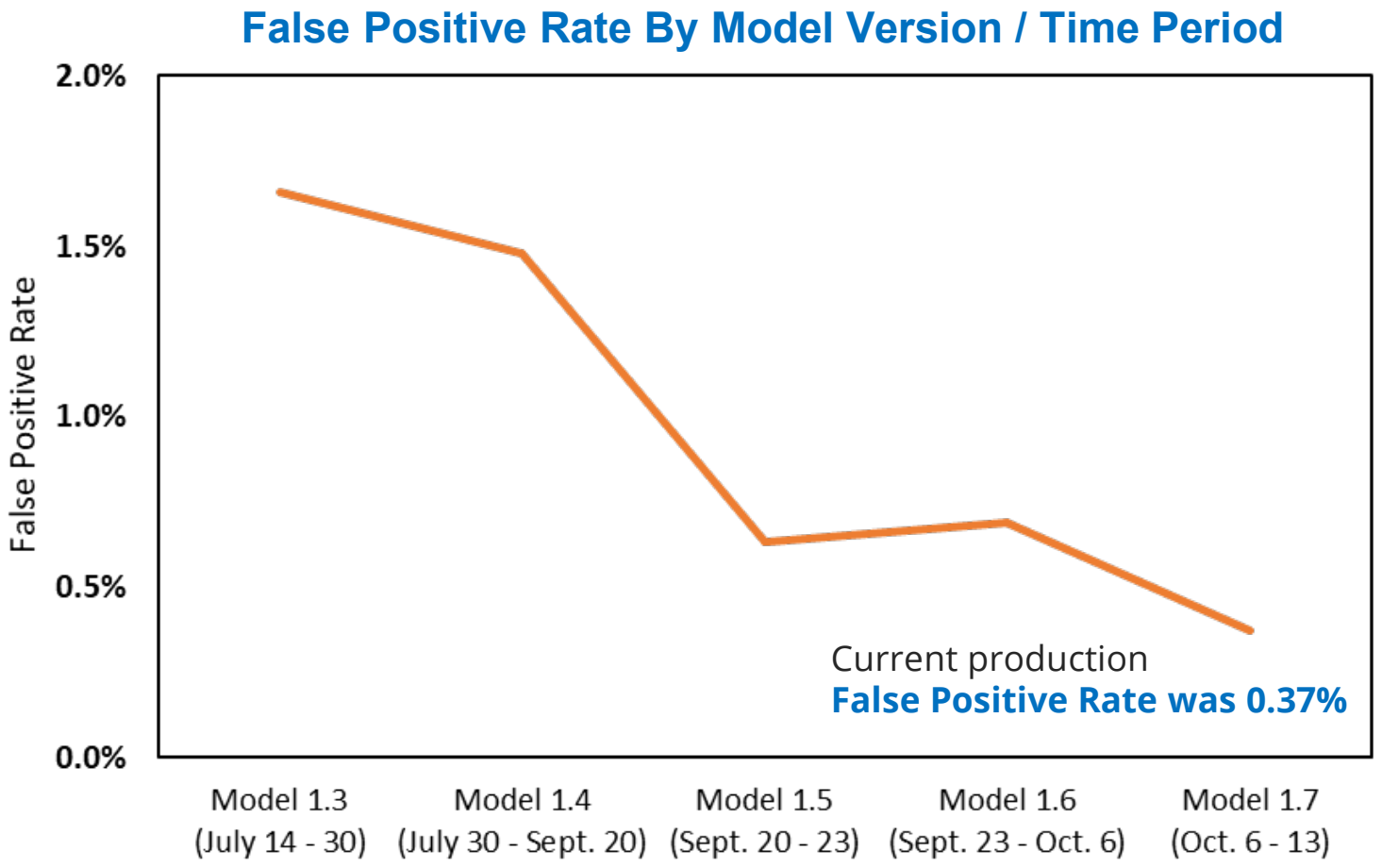


Time to Detection by Pano Relative to Visible Smoke



Pano's False Positive Rate

The false positive rate significantly decreased throughout the pilot as Pano's AI model learned from previous false positive data collected from our 23 Station Deployments



Accuracy rate of Pano email + text alerts to utilities was **90%+** throughout the pilot

Example of false notifications included: Geysers, Industrial Smoke, Prescribed Burns, etc.

Accuracy of Detection: The Round Fire Example

Labor Day, Pano AI detected, provided real time visibility, accurate location information and timely situational updates for the Round Fire

The Round Fire, a RV fire that eventually spread to vegetation, was called in at 1:15pm and detected by Pano AI at **1:14pm**

1

New Pano Incident - Clearlake Oaks Inbox

Pano Incidents Yesterday
to Pano, bcc: pge_notifica...

Pano has detected smoke from Clearlake Oaks station.

Please view the Incident here:
https://360.pano.ai/i/mwhvv3y

Please email support@pano.ai

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Incident Update - Round Fire - Clearlake Oaks, Lake, CA Inbox

Pano Incidents Yesterday
to Pano, PG&E

The recently alerted incident was for a vehicle fire at Round Mtn Rd and Red Rock Rd. It is currently at 3 acres with a moderate rate of spread, moving Northwest.

Pano will continue to monitor the incident and close it ntained.

t here:

3

Incident Update - Closed - Round Fire - Clearlake Oaks, Lake, CA Inbox

Pano Incidents Yesterday
to Pano, PG&E

Final incident acreage is 10.7 acres. Resources committed to mop up through tomorrow.

Please view the Incident here: https://360.pano.ai/i/mwhvv3y

Please email support@pano.ai for assistance.

Pano 360 Application: Pilot User Groups

During the Summer 2021 Pilot season, Pano 360 has been used by Utility and Government groups

Electric and Water Utilities

PG&E

PGE

SAN JOSE WATER

CALIFORNIA WATER SERVICE CO.

PORTLAND WATER BUREAU

Fire Agencies

Aspen FPD
Clackamas FPD
Big Sky FPD
Felton FPD
Hoodland FPD
Napa FD
Scotts Valley FPD
Sonoma FPD
South Lake County FPD
Woodside FPD
CALFIRE
ODF - Bullrun Fed Lands
USFS (Colorado, Oregon, California, Montana)

Government

Gallatin County, MT
Gresham County, OR
LA County, CA
Pitkin County, CO
Madison County, MT
Santa Clara County, CA
San Mateo County, CA
Santa Cruz County, CA
Sonoma County, CA

City of Aspen
City of San Bruno
City of Malibu
Redwood City
City of Portland
USDA
CaliforniaParks

Our Team

Utility Representatives:

Yen Ha (PG&E) - Sr. Business Process Analyst, Wildfire Safety Operations

Jay Landstrom (PGE) - Sr. Manager, Wildfire Analytics R&D

Pano Representatives:

Sonia Kastner - CEO

Arvind Satyam - Chief Commercial Officer

Stephen Murdock - Director, Business Development

EPRI Representative:

Doug Dorr - Program Manager & Erik Steeb I.E. Leadership

Thought Leadership Contributors:

Ben Almario, Damien Inglin and James Ridgway (PG&E)

Sandra Johnson and Darren Karnes (Excel Energy)

Anthony James (SCE)