Weather & Incident Forecasting Tool Offers a Better Customer Experience

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2023 Chartwell Power-Up Conference

Avista Corporation

SPOKANE, WA

We are an energy company involved in the production, transmission and distribution of energy as well as other energy-related businesses. Avista Utilities is our operating division, providing electricity to 406,000 customers and natural gas to about 372,000 customers across 30,000 square miles and four northwestern states. Alaska Energy and Resources Company, an Avista subsidiary, provides retail electric service in the city and borough of Juneau through its subsidiary Alaska Electric Light and Power Company.

Spokane (Rhymes with Spo-Can)

- Spokane is the smallest city to host a World's Fair (1974)

- Spokane has the 2nd Largest Urban Waterfall in the US
- Spokane is within a one-hour drive of 76 lakes
- Spokane is has 6 Ski Resorts within a three-hour drive
- Spokane is the birthplace of Father's Day.
- Spokane is home of Gonzaga University.
- Spokane hosts the world's largest 3-on-3 Basketball Tournament – aka Hooptown, USA
- Spokane accesses the Centennial Trial—a 37-mile path stretching from the Idaho state line to Nine Mile Falls, WA, built for walking, running, skating, or biking.

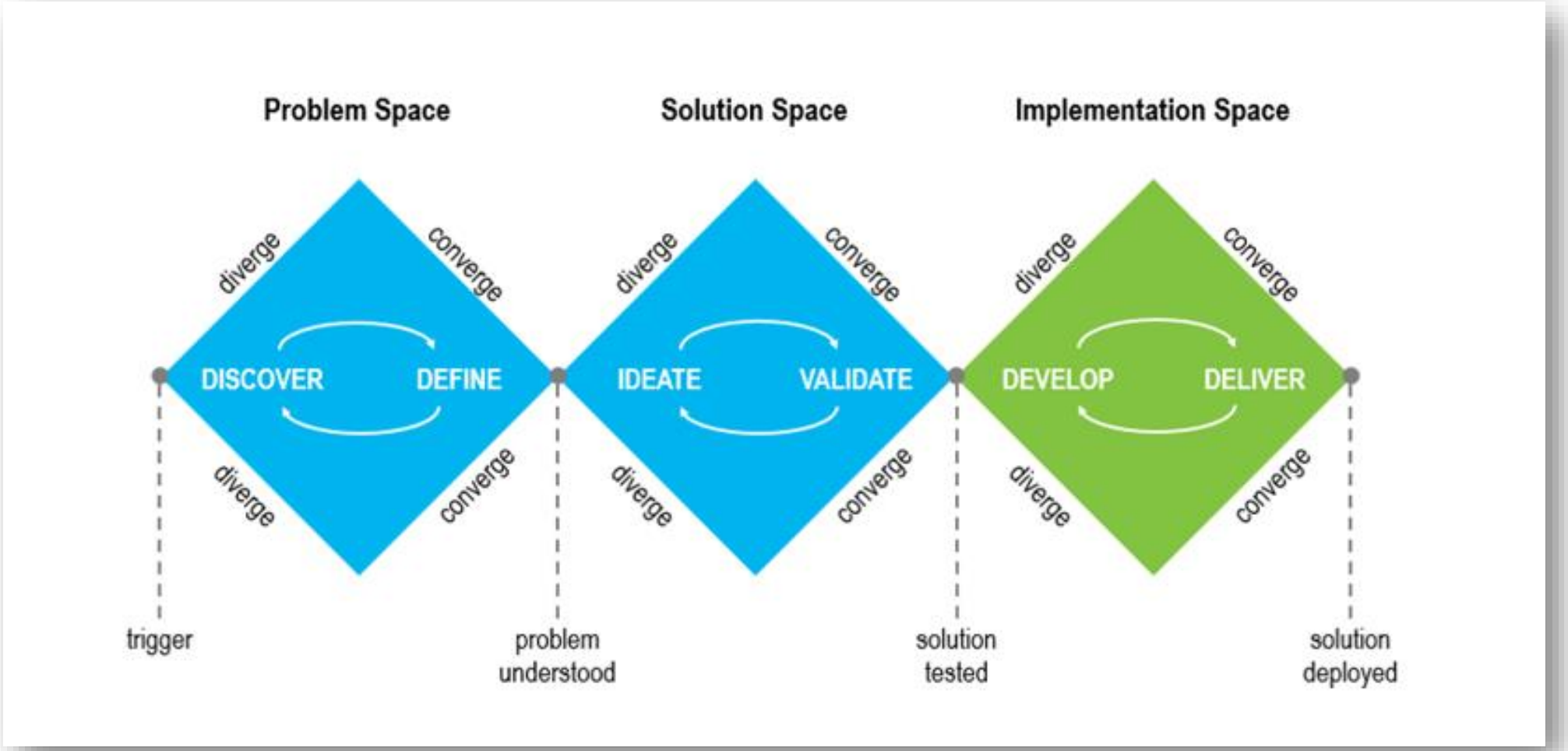
Washington Water Power (WWP)

The Spokane River, its falls, and the neighboring city are all named after the Spokane tribe that is indigenous to the area. The waterfall was cherished by the tribe, and it also served as a gathering place for other Native American tribes for everything from fishing to religious ceremonies.

Spokane Falls boasts two distinct sections, the Upper Falls and Lower Falls. In 1889, Washington Water Power was founded to harness the falls' potential for hydroelectricity by building a generator facility. The power created by the cascading river brought the city to life, and it is still used today. It has even continued to be managed by Washington Water Power, though the company has changed its name to Avista.

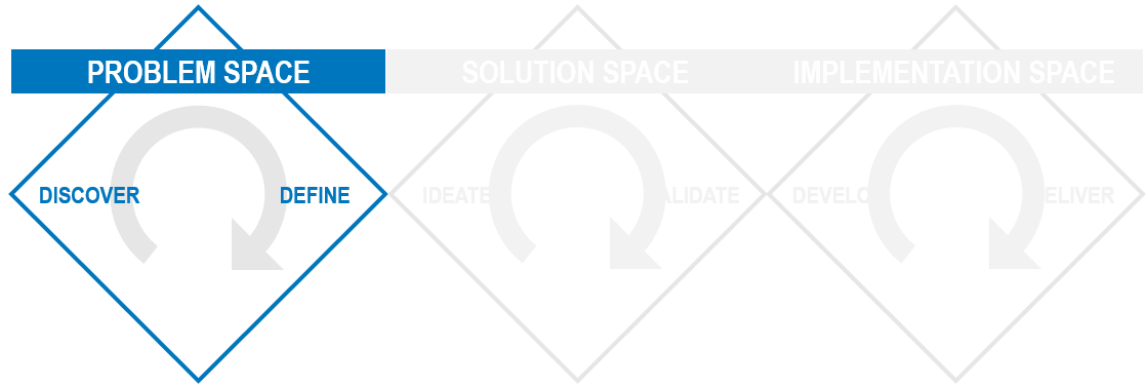
Where Do We Start?

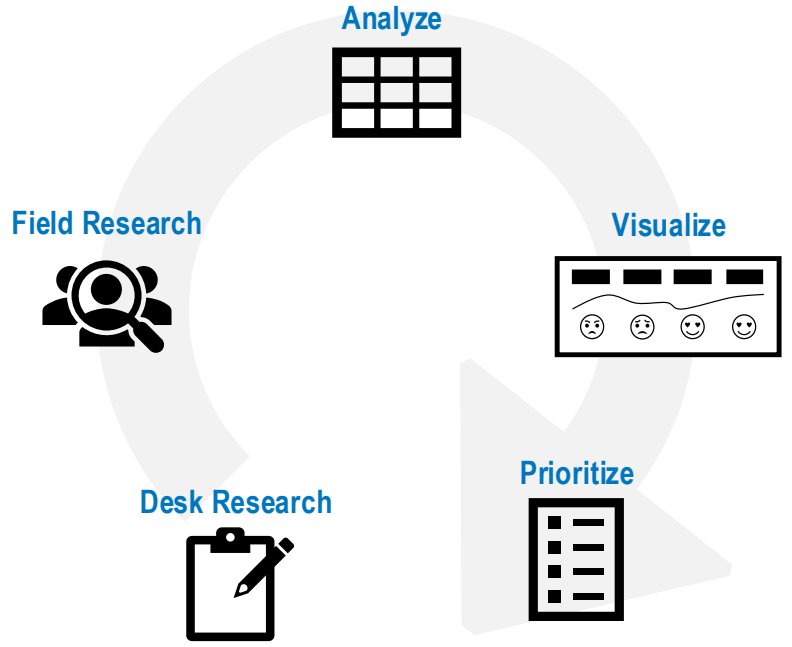
Applying the Experience Design (XD) Framework



Problem Space - Discover

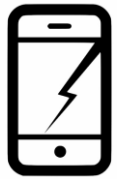
- Analyzed **110** customer outage calls
- Completed **45** employee Interviews
- Reviewed utility best practices
- Surveyed **450** customers
- Evaluated historical performance during past events
- **5** weather related EOP events in 2020
- **6**, 1 hour interviews with residential customers
- **3**, 1 hour interviews with business customers.





Top Opportunities

Operations Process & Strategy



Storm Assessment Process & App

AMI/Smart Meter Technology

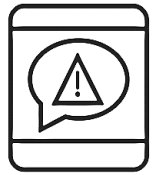
Automated Customer Communications Lifecycle

Readiness Planning & Process

OMT Operational Support & Outage Processing

Top Opportunities

Operations Process & Strategy



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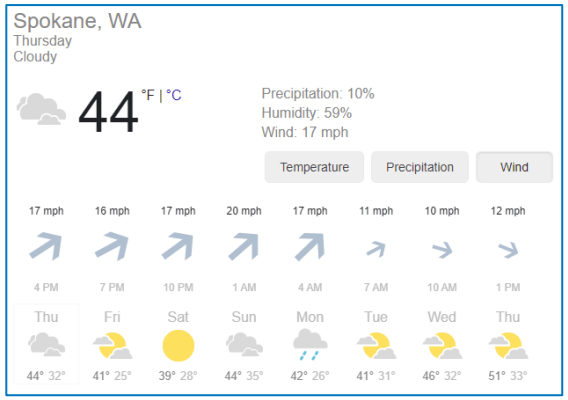
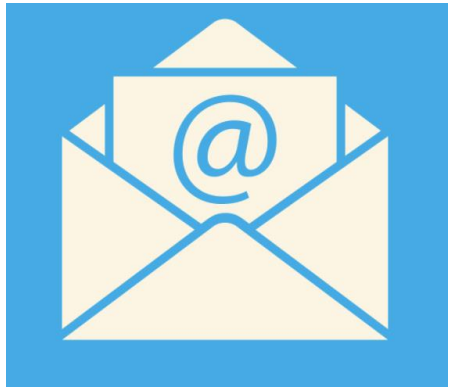
Can We Leverage Forecasts to Improve Pre-planning?





Opportunity

Send automated notifications to Avista stakeholders when specific triggers are met:

- Minimum threshold for outage risk (thresholds) met
- Minimum threshold for estimated/predicted outages (incidents) met
- Minimum threshold for estimated/predicted customer impact met

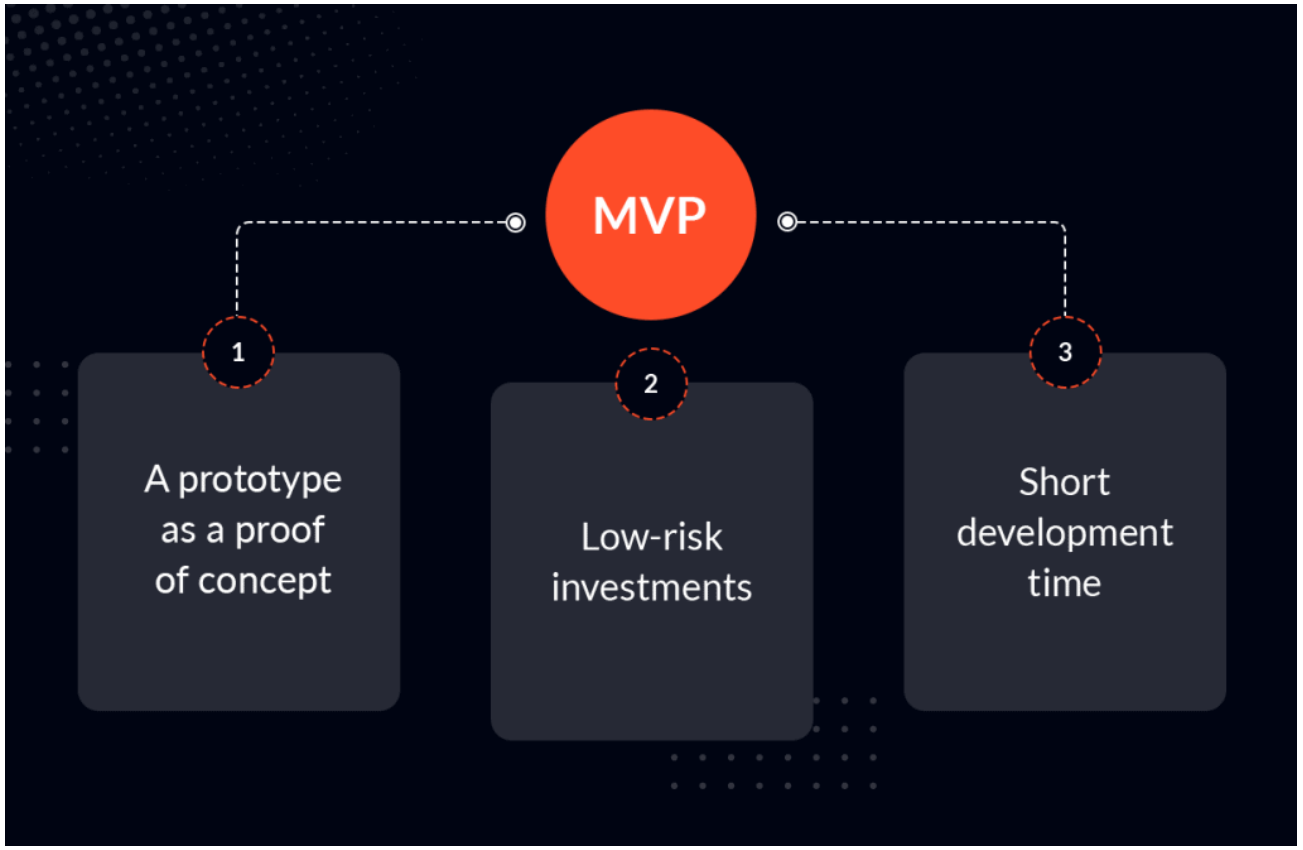
IVMS - Intelligent Vegetation Management System

Avista's was already utilizing AiDash's Intelligent Vegetation Management System which allows access to satellite imagery of our utility infrastructure for insights that help us mature grid hardening and fire management.

"Lightbulb Moment"

Taking advantage of satellite imagery of existing infrastructure and merging that with historical storm data, forecasted weather data, a predictive model capable of providing incident forecasts was born.

MVP – Minimum Viable Product



In 2022, a minimum viable product (MVP) version of the Weather & Incident Forecasting Tool was deployed (Pilot/Phase I).

Project Goals:

Allows for a more significant and consistent window of planning/preparation.

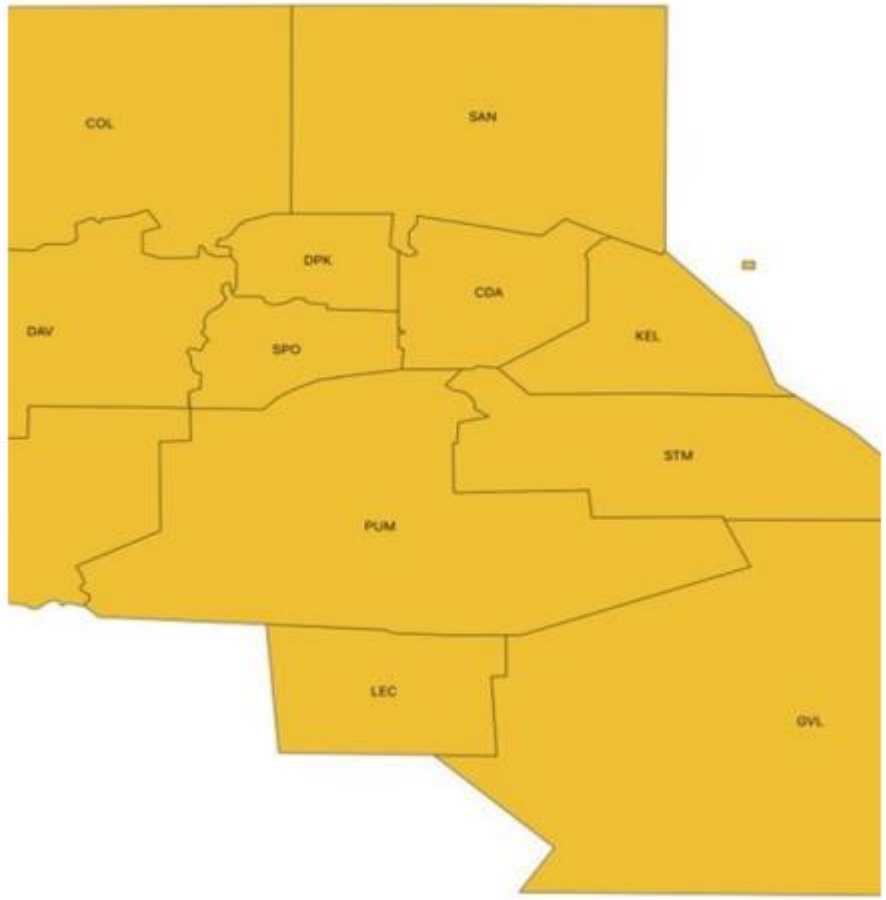
Removes the need for individual(s) to monitor the weather daily to understand the weather risk to Avista's system.

Reduces the risk that a weather event is missed or insufficiently prepared due to staffing/vacation/holiday schedules.

Pilot Summary (Phase 1)

Executive Summary:

The objective of the pilot was to predict storm impact and estimate storm-related incidents on Avista's 12 primary office areas around headquarters 72-, 48-, 24, 12-, and 6- hours prior to any storms during the pilot period.



Results:

•AiDash was successfully able to predict and capture all storm events and storm related outages across Avista's network in 2022 with an accuracy of > 80%.

All predictions and results have been successfully validated.

Pilot Summary (Phase 1) – Establish Storm Intensity Thresholds

Executive Summary: By utilizing over 15 years of storm outage data, Avista developed Storm Intensity Thresholds to aid in evaluating the collective outage risk within our network or office vicinity

	In-house Resources			Contracted Support			Mutual Aid Considered		
	Small			Medium			Large		
Office	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)
Colville	13	26	12-24	27	78	25-72	79	NA	72+
Deer Park	12*	23*	12-24	24*	70*	25-72	71*	NA	72+
Spokane	45	54	12-24	55	276	25-72	277	NA	72+
Davenport	7	14	12-24	15	35	25-72	36	NA	72+
Othello	4*	6*	12-24	7*	12	25-72	13*	NA	72+
Pullman-Moscow	10	19	12-24	20	62	25-72	63	NA	72+
Lewiston-Clarkston	9*	15*	12-24	16*	30*	25-72	31*	NA	72+
Grangeville	5*	7*	12-24	8*	12*	25-72	13*	NA	72+
CDA	18	30	12-24	31	139	25-72	140	NA	72+
Sandpoint	15	28	12-24	29	84	25-72	85	NA	72+
Kellogg	8	13	12-24	14	62	25-72	63	NA	72+
St. Maries			12-24			25-72		NA	72+
Total System Master Incidents	25	75	12-24	76	500	25-72	501	NA	72+

Pilot Summary (Phase 1) - STORM EMAIL ALERT

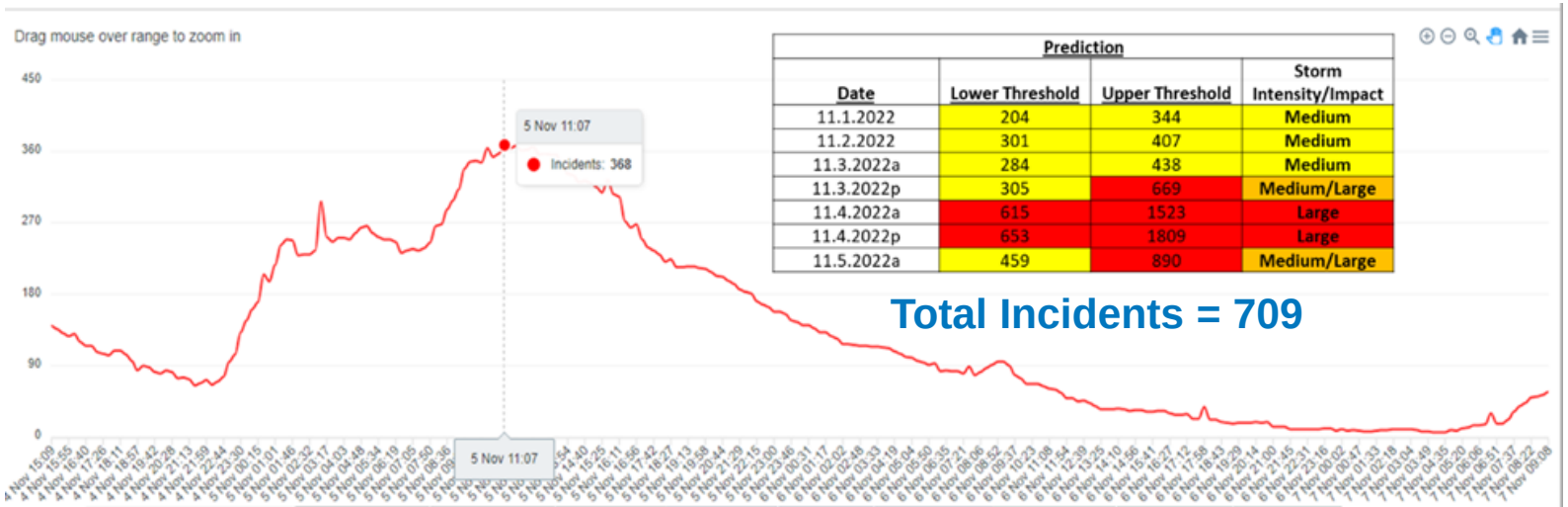
Executive Summary: The objective of the pilot was to predict storm impact and estimate storm-related incidents on Avista's 12 primary office areas 72-, 48-, 24-, 12-, and 6- hours prior to any storms during the pilot period.

Below is the MVP email alert from AiDash.

Forecast Issuance Time		6 Jan 4:00 PM		
NETWORK LEVEL BUCKET		MEDIUM		
HOURS PRIOR		12		
OFFICE_AREA	**Incident Count Lower**	**Incident Count Predicted**	**Incident Count Upper**	**Storm Peak Time**
COL	0	15	33	7th Jan 7:30 AM
PUM	17	22	29	7th Jan 12:30 PM
SPO	67	82	100	7th Jan 8:00 AM
OTH	2	2	2	-
DPK	17	20	24	7th Jan 8:00 AM
KEL	6	7	8	7th Jan 10:30 AM
CDA	32	34	36	7th Jan 9:00 AM
LEC	2	5	13	7th Jan 1:00 PM
GVL	4	5	7	7th Jan 01:00 PM
DAV	6	8	10	7th Jan 7:00 AM
SAN	0	10	16	7th Jan 9:00 AM
STM	4	4	4	7th Jan 11:00 AM
Total Network	**157**	**214**	**282**	

November ’22 - Sever Weather Event

Avista placed its Weather & Incident Forecasting Tool to the test during a severe weather event comprised of high-wind storms. Following a very mild September & October, weather transitioning in quickly, resulting in the fifth coldest November and sixth snowiest in Spokane’s history. More significantly, the milder temperatures resulted in more trees retaining foliage, posing an increased grid threat as the November wind and snowstorm approached.



Prediction			
Date	Lower Threshold	Upper Threshold	Storm Intensity/Impact
11.1.2022	204	344	Medium
11.2.2022	301	407	Medium
11.3.2022a	284	438	Medium
11.3.2022p	305	669	Medium/Large
11.4.2022a	615	1523	Large
11.4.2022p	653	1809	Large
11.5.2022a	459	890	Medium/Large

Total Incidents = 709

	In-house Resources			Contracted Support			Mutual Aid Considered		
	Small			Medium			Large		
Office	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)
Total System Master Incidents	25	75	12-24	76	500	25-72	501	NA	72+

Phase II - Weather & Incident Forecasting Tool

Avista continues to partner with AiDash to add supplemental features to its Weather & Incident Forecasting Tool in Phase II, which is scheduled for completion in September of 2023.

For example, AiDash is working to incorporate a customized user interfaces, which will include Refined Storm Intensity Thresholds, Detailed Maps, Weather Impacts, Incident / Customer Impacts, ERTs, Resources, SMS/Email Notifications, and a Retrospect Model that depicts similar historical storms.

Storm Intensity/Impact	Small		
Office	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)
Total System Master Incidents	25	100	< 24
Estimated Customers Impacted	1625	6500	
Storm Intensity/Impact	Medium		
Office	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)
Total System Master Incidents	100	300	24-48
Estimated Customers Impacted	6500	19500	
Storm Intensity/Impact	Large		
Office	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)
Total System Master Incidents	300	700	48-84
Estimated Customers Impacted	19500	45500	
Storm Intensity/Impact	Extreme		
Office	Lower threshold (Incident Count)	Upper Threshold (Incident Count)	Estimated Restoration Duration (hours)
Total System Master Incidents	701+	-	84+
Estimated Customers Impacted	50000+	-	

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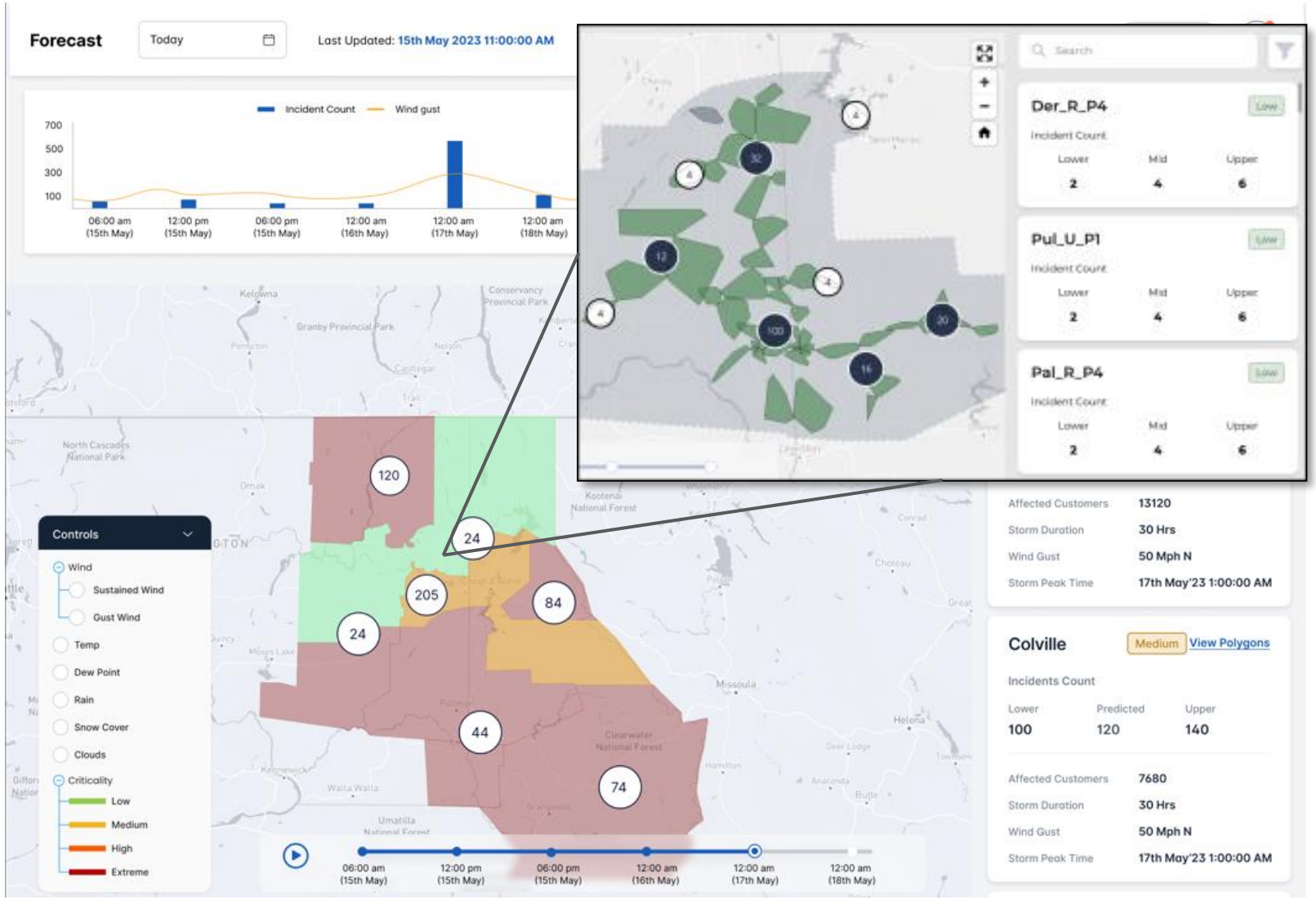

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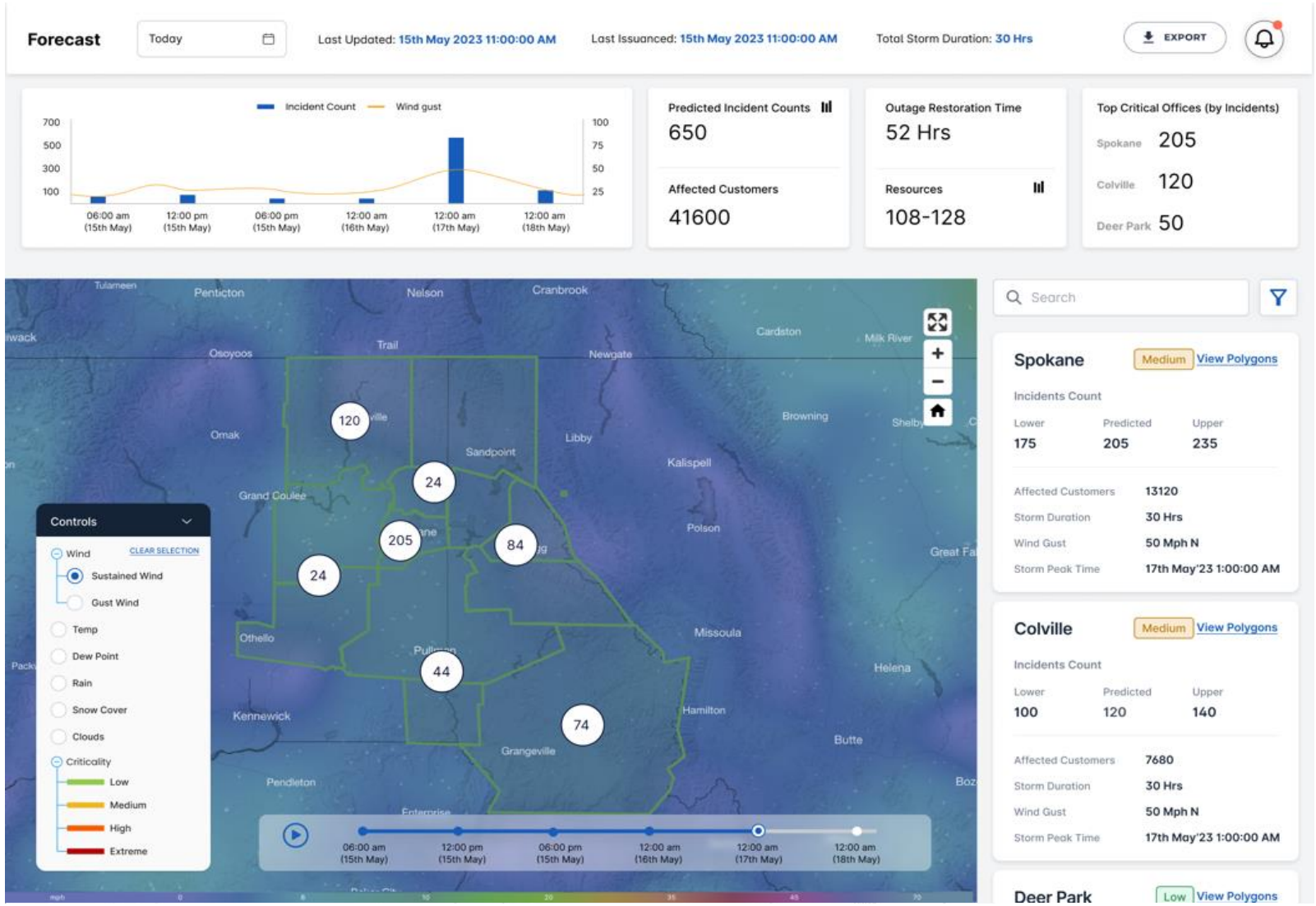

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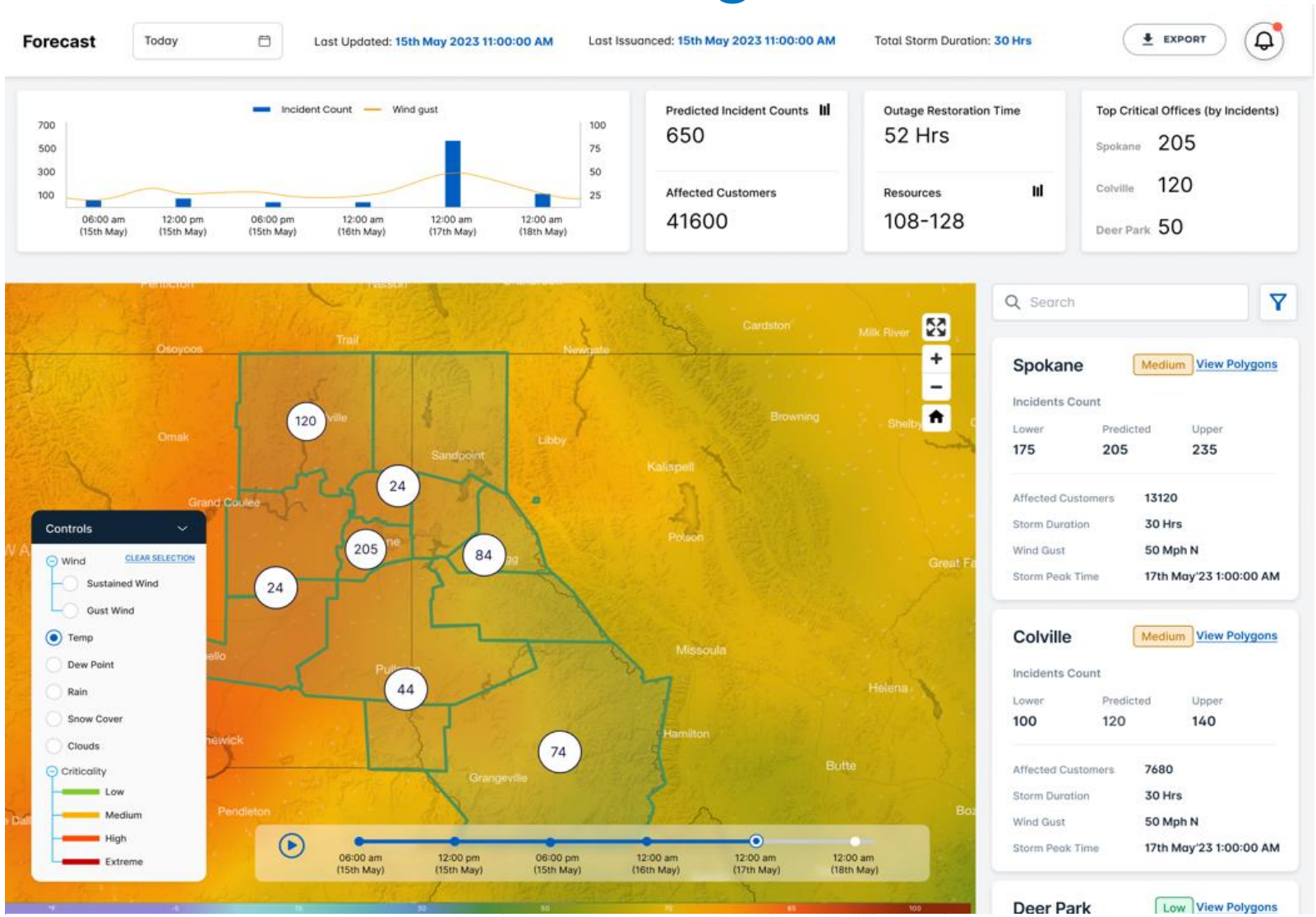

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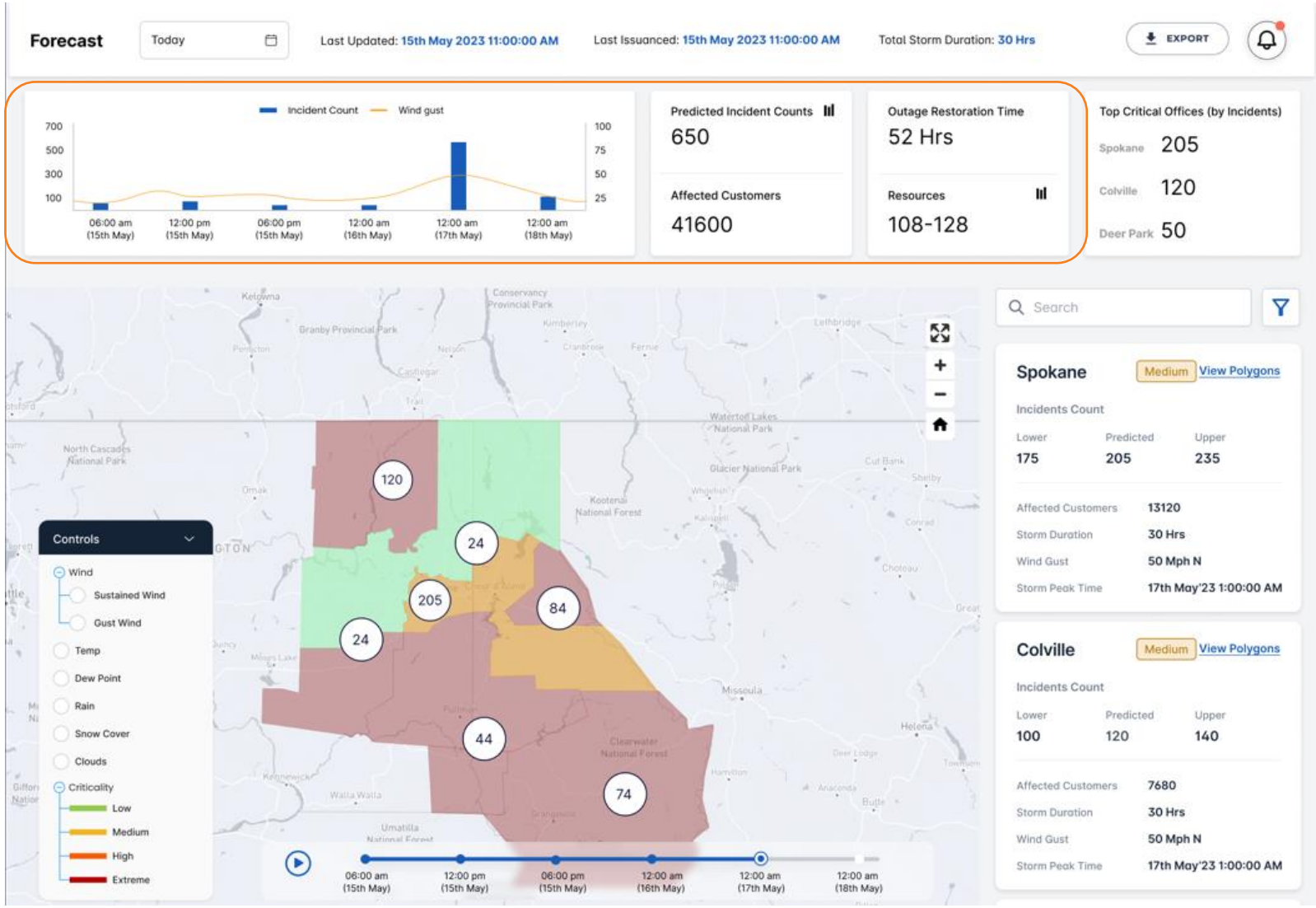

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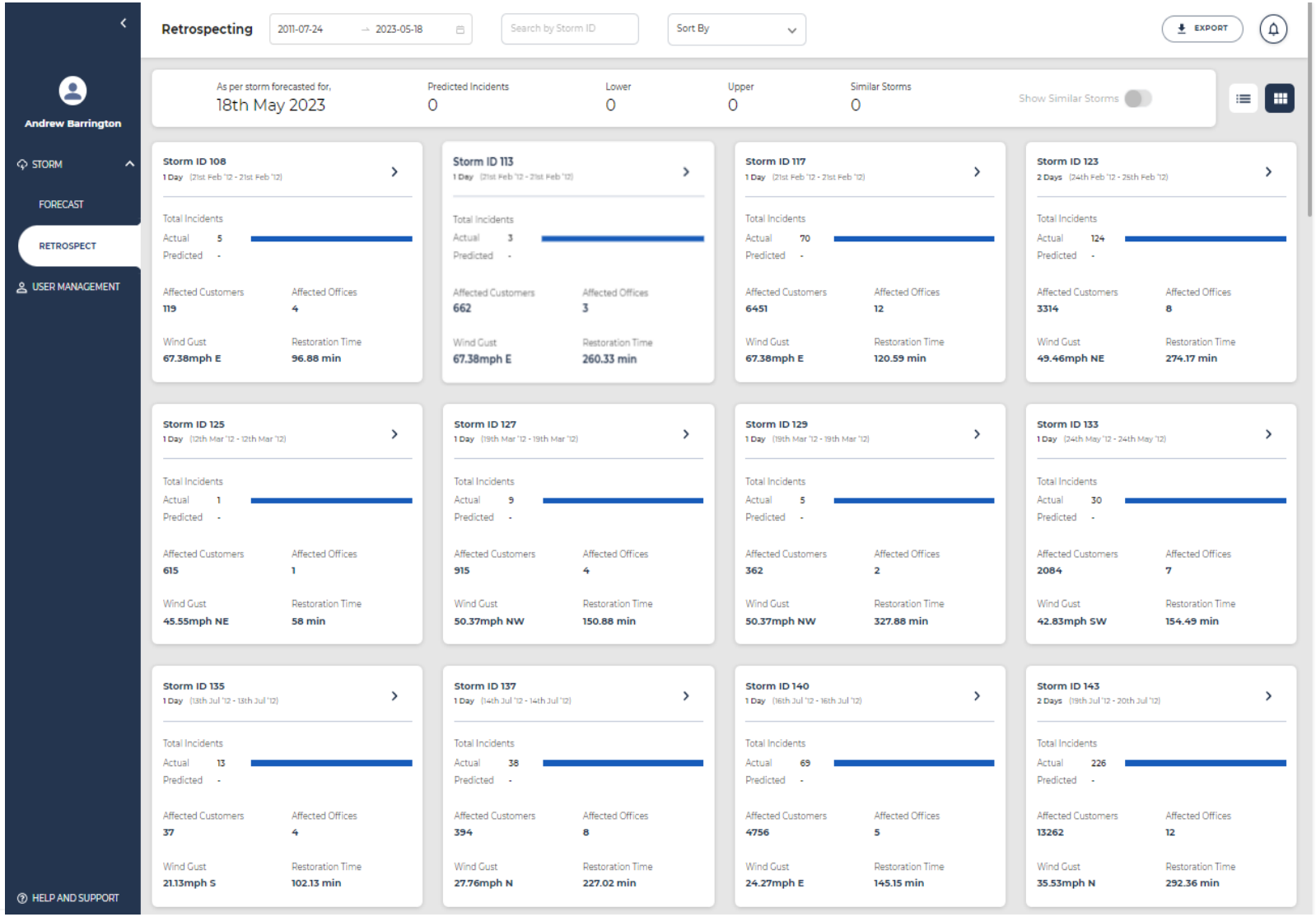

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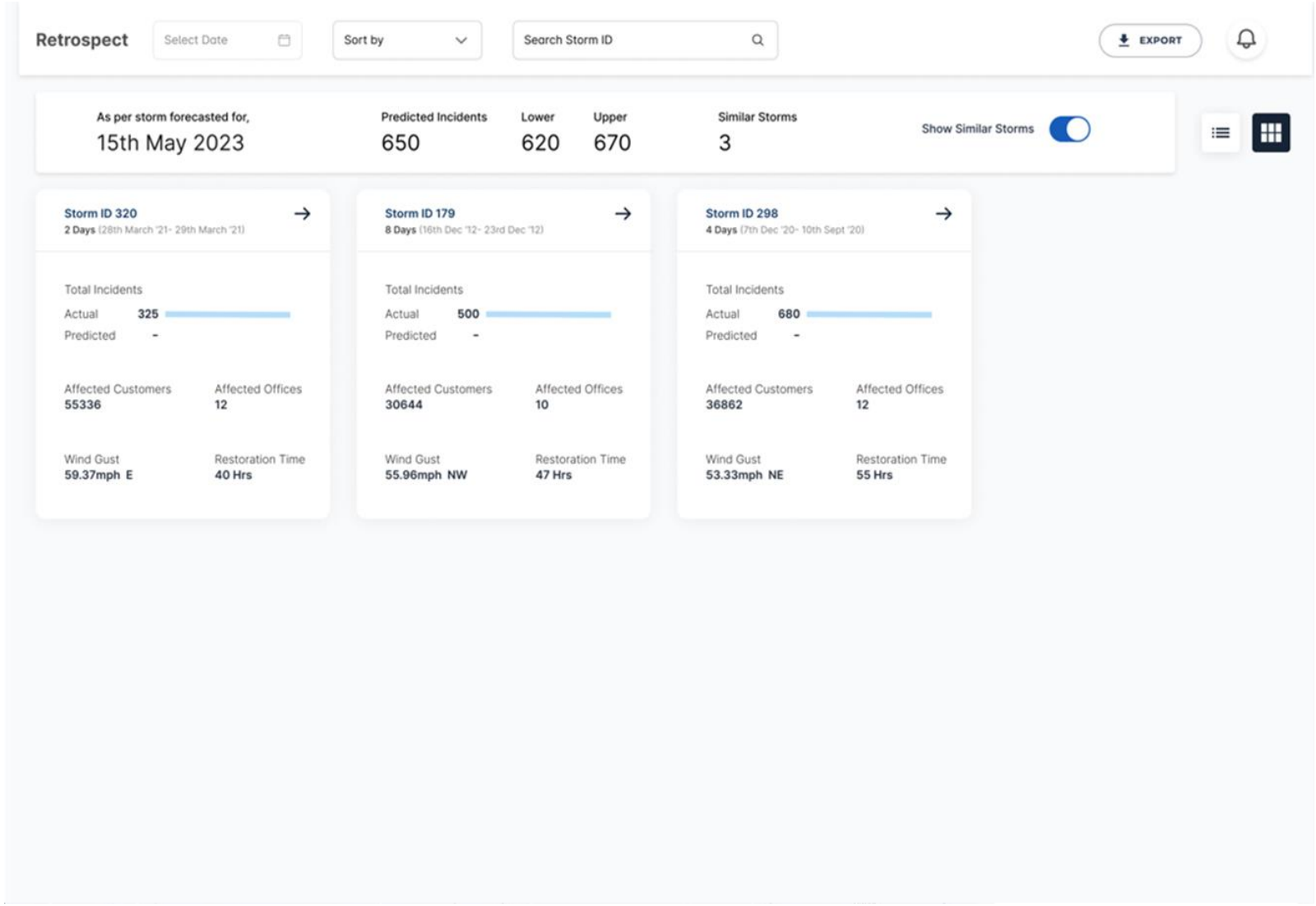

Q&A

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