

# Automating Draft Local Storm Reports (LSRs) using Generative AI

R&D Prototype Project

May 2025

# Opportunities to Advance NWS' Mission using AI

Saving Lives, Protecting Property, Enhancing the Economy



**Numerical  
Weather  
Prediction**



**Probabilistic  
Impact-  
Based Decision  
Support  
Services**



**Product and  
Service Delivery**



**Operational  
Efficiencies**



**Software &  
Hardware  
Efficiencies**



**Community and Workforce Training**

**Data Management**



**Technology Infrastructure**

# Leveraging and Expanding Partnerships

## Strategic Focus

Proactively building AI-focused partnerships  
Enhancing public-private collaboration

## Engagement Opportunities

High interest from private sector in AI/ML with NWS  
Models include: no-cost prototypes, pilot projects, shared use cases

## Benefits of No-Cost Prototypes

1. Promote experimentation with minimal risk
2. Test new tools rapidly
3. Build business case for scaling innovation
4. Emphasizes public-private collaboration for innovation in weather services

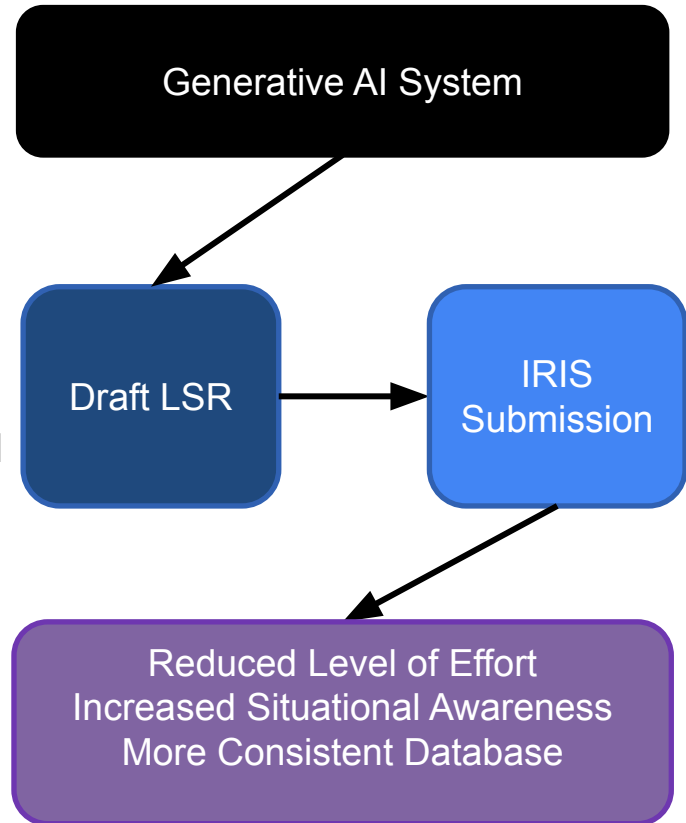
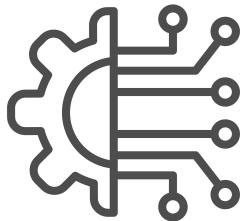


# Automating Draft Local Storm Reports

**Challenge:** Manual process of writing LSRs takes significant time and is inconsistent

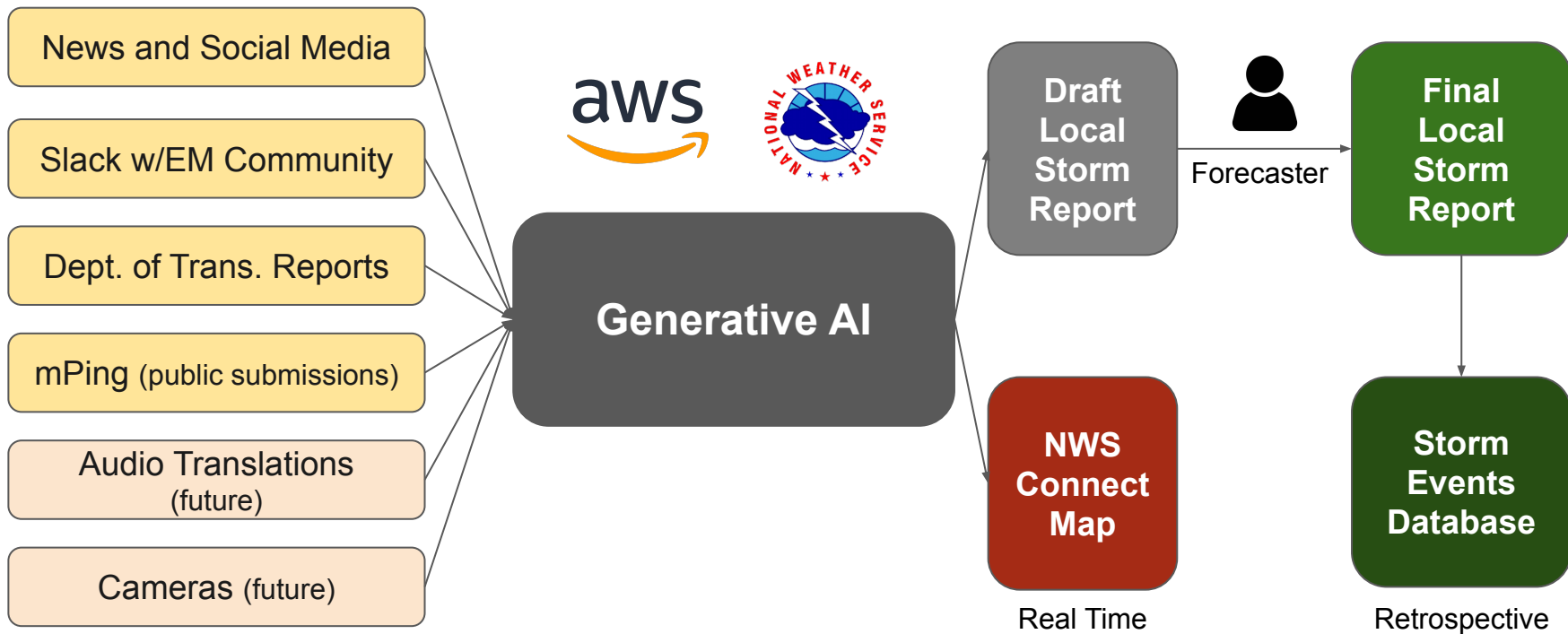
**Solution:** Create a Generative AI system to automatically draft LSRs from common sources

**Status:** R&D proof-of-concept prototype is being developed at no cost under an MOU with AWS' Generative AI Innovation Center



# Proof-of-Concept Overview

GenAI system will be developed at no cost under an MOU with AWS' Generative AI Innovation Center





# POC Objectives and Milestones

## Objectives

**Design text and  
metadata extraction  
system**

**Design and  
implement event  
cross-referencing**

**Location resolution**

**Generate LSR with  
associated  
confidence score**

**Future objective: multimodal event extraction**

## Milestones

- 1) Review data, feature definition and prompts**
- 2) System design review**
- 3) Initial implementation of system and review of results/generation**
- 4) Review UI and packaging of solution into IaC or container**
- 5) Integration with NWS Connect**

GenAIIIC will build a light demo UI/UX, a final end-user UI/UX is out of scope



# NWS Data Collection

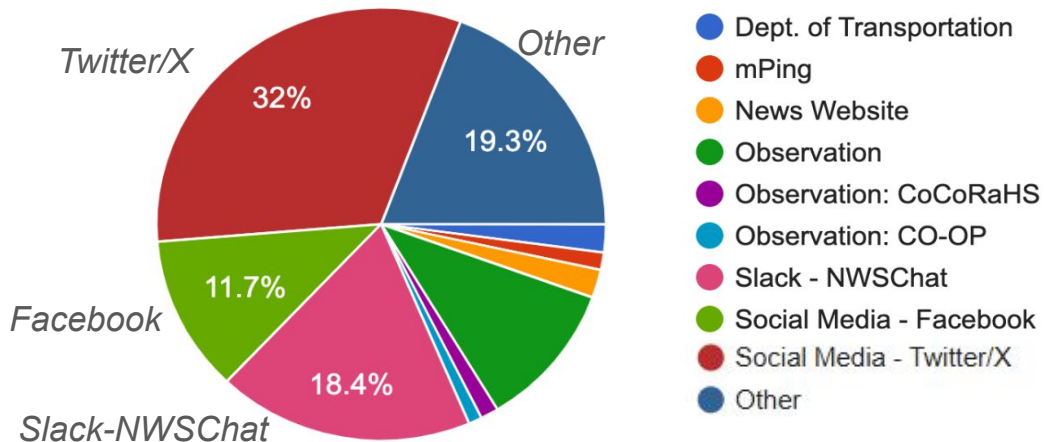
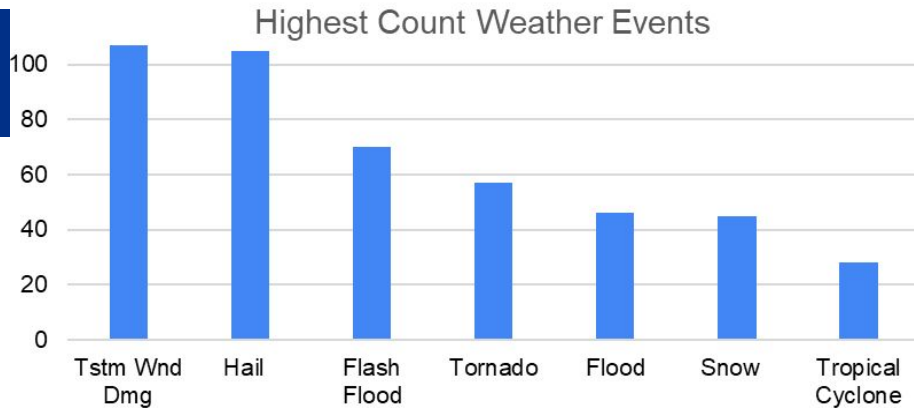
Input/output pairings for LSRs based on 6 months of IRIS data

## Generative AI Training Data

Event specific input/output pairings from a variety of sources to reflect LSRs of different weather types



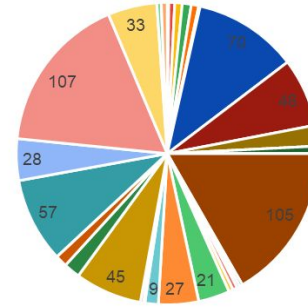
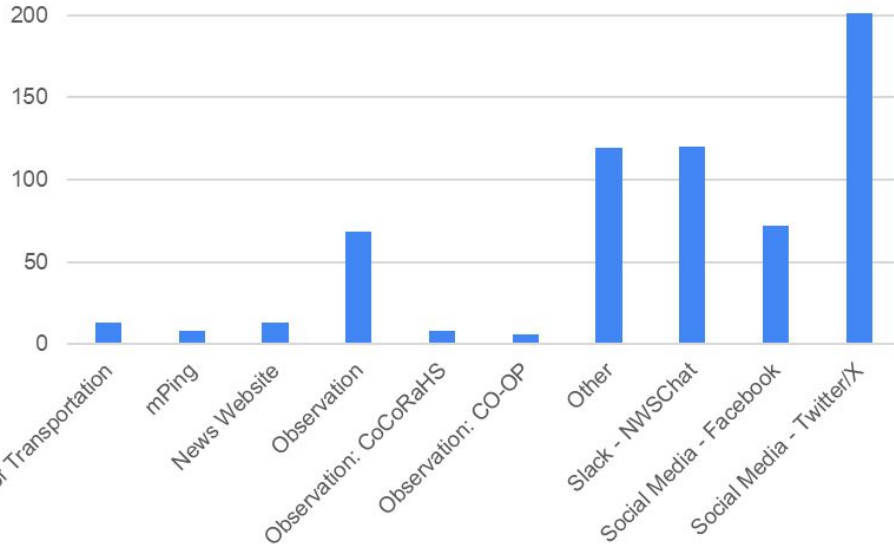
Volunteers used a Google Form to enter pairings, >600 responses collected from 54 volunteers



10 LSR source types, 29 weather events

# Input Data

Count of LSR Source



- Avalanche
- Blizzard
- Blowing Dust (Magnitude Units: mi)
- Coastal Flood
- Dust Storm (Magnitude Units: mi)
- Extreme Cold (Magnitude Units: F)
- Flash Flood
- Flood
- Freezing Rain (Magnitude Units: inch)
- Funnel Cloud
- Hail (Magnitude Units: inch)
- Ice Jam Flooding
- Landslide
- Lightning
- Marine Tstm Wind (Magnitude Units: mph)
- Non-Tstm Whd Dmg
- Non-Tstm Whd Gst (Magnitude Units: mph)
- Rain (Magnitude Units: inch)
- Rip Currents
- Sleet (Magnitude Units: inch)
- Snow (Magnitude Units: inch)
- Snow/Ice Dmg
- Storm Surge
- Tornado
- Tropical Cyclone
- Tstm Whd Dmg
- Tstm Whd Gst (Magnitude Units: mph)
- Waterspout
- Wildfire (Magnitude Units: acre)

# Project Status

## Pre-POC Completed

### ***Discovery Workshop***

Workshop Part 1: September 26, 2024, Workshop part 2: November 08, 2024

Finalized Discovery Workshop Readout document

### ***NWS Data Collection Completed***

Created S3 bucket within VLab Cloud Sandbox Account to store data

Create user accounts for AWS staff in VLab Cloud Sandbox Account

## Kick Off Meeting with AWS and NWS - May 16

Data exploration and walkthrough completed

Basic preliminary results provided



## Project Meetings on Weekly Basis

Bi-weekly meeting with larger stakeholder group

# Very Early Results

**Simple prompting:** "You're an expert in creating LSRs for the NWS, examine the image, extract information necessary, distinguish dates and times between the time of the event and the time it was reported, and don't include any preamble"

## Future analysis will include:

- Comparing latitude and longitude
- Verify descriptions and source
- Verify city, county, state
- Timestamps

## LLM Output

StormReport(event='Tstm Wnd Dmg', magnitude='None', magnitude\_unit='None', date='2025-03-16', time='None', latitude='40.85', longitude='-74.83', city='Hackettstown', county='Warren', state='NJ', source='Broadcast Media', remarks='Downed trees and gas station sign knocked over from storm.')

## Human-generated LSR

Preliminary Local Storm Report

National Weather Service Mount Holly NJ

1259 PM EDT Mon Mar 17 2025

..TIME...	...EVENT...	...CITY LOCATION...	...LAT..LON...
..DATE...	...MAG....	..COUNTY LOCATION..ST..	...SOURCE....
..REMARKS..			

1149 PM

03/16/2025

Tstm Wnd Dmg

Hackettstown

Warren

40.86N 74.82W

Broadcast Media

A few photos relayed of damage to trees and a couple signs blown down in and near Hackettstown. A gas station sign was blown down in downtown at Valentine Street and Main Street. Several trees sustained damage near Crane Road and Willow Grove Street. Time estimated from radar.



Follow



HACKETTSTOWN, NJ (Warren County) - Here are some photos of downed trees and a gas station sign that was knocked over from last night's storm. #NJwx @wrnjradio @WeatherWorks @NWS\_MountHolly





# Proof-of-Concept Engagement Schedule

## Engagement Kickoff

### Week 1

- Logistics
- Q&A

## Basic Functionality

### Week 2

- Data Exploration
- Evaluation Metric Development
- Basic Functionality

## Evaluation & Refinement

### Weeks 3-4

- Algorithm Refinement
- Evaluation

## Application Infrastructure

### Weeks 5-6

- Architecture & Services
- Infrastructure as Code
- Development Deployment
- Basic Front-End

## Enterprise Readiness

### Week 7

- Performance Optimization
- Runbook & Documentation

## Preparing for Production

### Week 8+

- Code Delivery
- Technical Walkthrough
- Additional Support

Spring Cadence  
Milestone based



# Recognizing NWS Participants

Monica Youngman – Chief Scientist, Office of Science and Technology Integration  
Kenneth Sperow – Senior Science Advisor for Cloud Computing  
Armani Cassel – Meteorologist, SHV  
Chris Maier – National Warning Coordination Meteorologist  
Daniel Zumpfe – Science and Operations Officer, MSO  
Eric Allen – Meteorologist, ER  
Gina Selig – Project Manager  
Gordon Strassberg – Meteorologist, PEB  
Jamie Enderlen – Service Assessment & Service Evaluation Program Manager  
Jason Burks – Cloud Consultant  
Jarrod Loerzel – Social Behavioral & Economic Sciences Program  
Jeremy Michael – Science and Operations Officer, RLX  
Ji Sun Lee – Social Behavioral & Economic Sciences Program Director  
JJ Brost – Operations Proving Ground Director  
Keith Sherburn – Meteorologist, AFS Fire Weather  
Mark Willis – MDL Weather Information Applications Division Chief  
Mike Churma – Meteorologist, MDL Decision Support Division  
Mike Sowko – Meteorologist, PEB  
Nate Smith – IT Specialist, MDL Weather Information Applications Division  
Randy Bowers – Meteorologist, AFS Severe

Additional support  
from 53 NWS  
volunteers who  
supported the  
generation of the  
training data