

Design and Implementation of an Automated Statewide Weather Threat Matrix for Emergency Management Decision Support

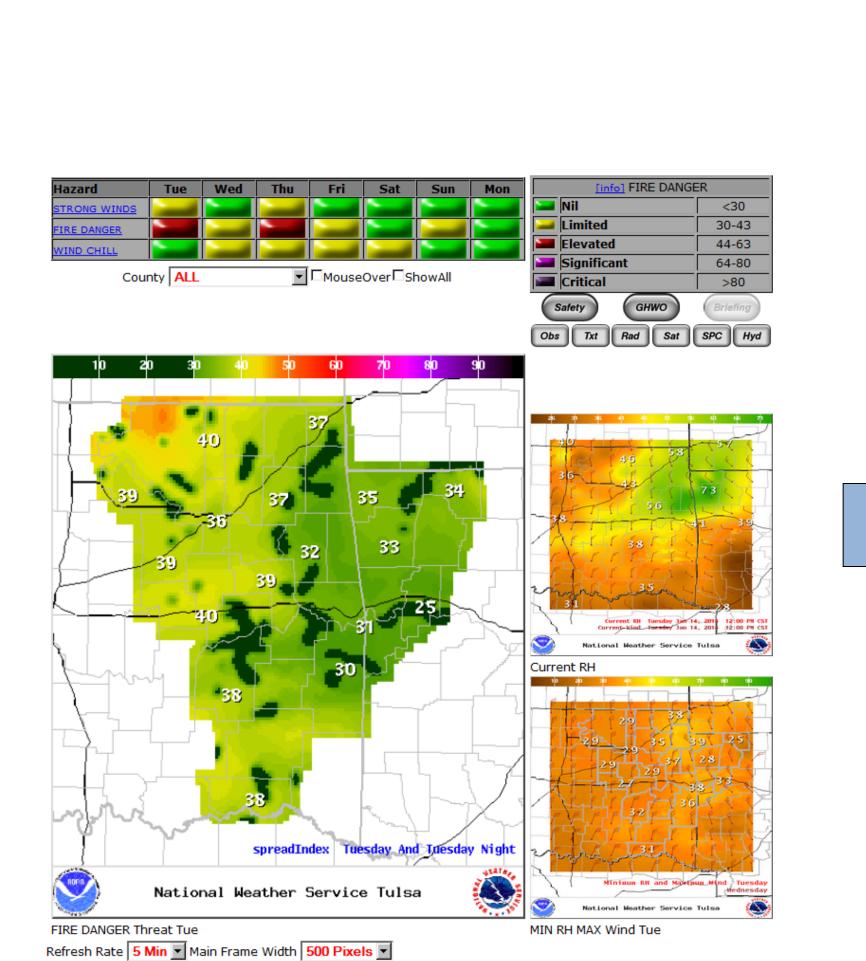
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Introduction

- •Result of a service concept vision between the North Dakota Department of Emergency Services (NDDES) and the National Weather Service (NWS) offices in Bismarck and Grand Forks.
- Began as a manually-composed weekly weather intelligence briefing for NDDES.
- •Eventually automated and released to all emergency managers and government agencies serving North Dakota.
- •First statewide graphical weather threat matrix incorporating forecasts from more than one NWS office.
- •Supports Weather Ready Nation Roadmap by providing partners with a dashboard situational awareness tool that is easily understandable, yet scientifically robust.



PARTNER RESPONSE

Association, partners evaluated the Weather Threat Matrix.

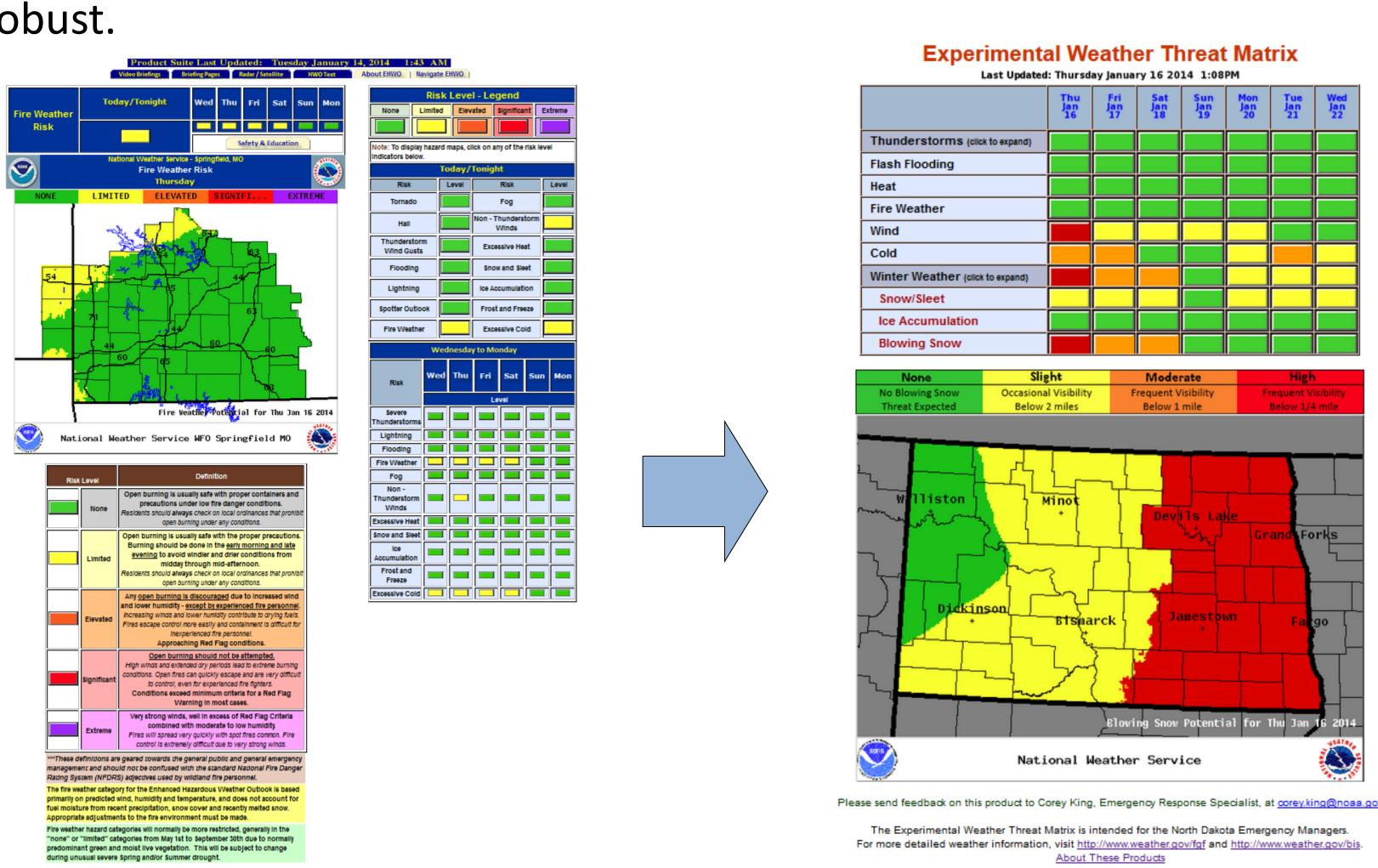
Frequent updates to maintain consistency with NWS

• Threat levels capture planning triggers very well.

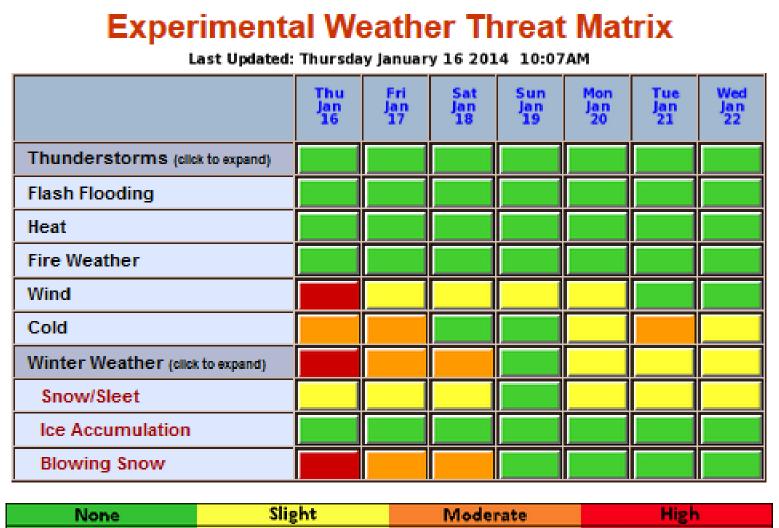
• Potential weather impacts are identified well.

It is very understandable.

In a survey by the North Dakota Emergency Management



Program Logic and Specifications



 Program code is based on the innovative NWS Springfield, Missouri Experimental Enhanced Hazardous Weather Outlook (http://www.crh.noaa.gov/sgf/?n=hwo)

- Design is based on both NWS Springfield, Missouri page and NWS Tulsa, Oklahoma page (http://www.srh.noaa.gov/tsa/dsp/dsp.php)
- Cold Potential for Thu Jan
 - Web-based, dynamically updated display.
 - Prominently displayed on North Dakota Partner Briefing web pages.





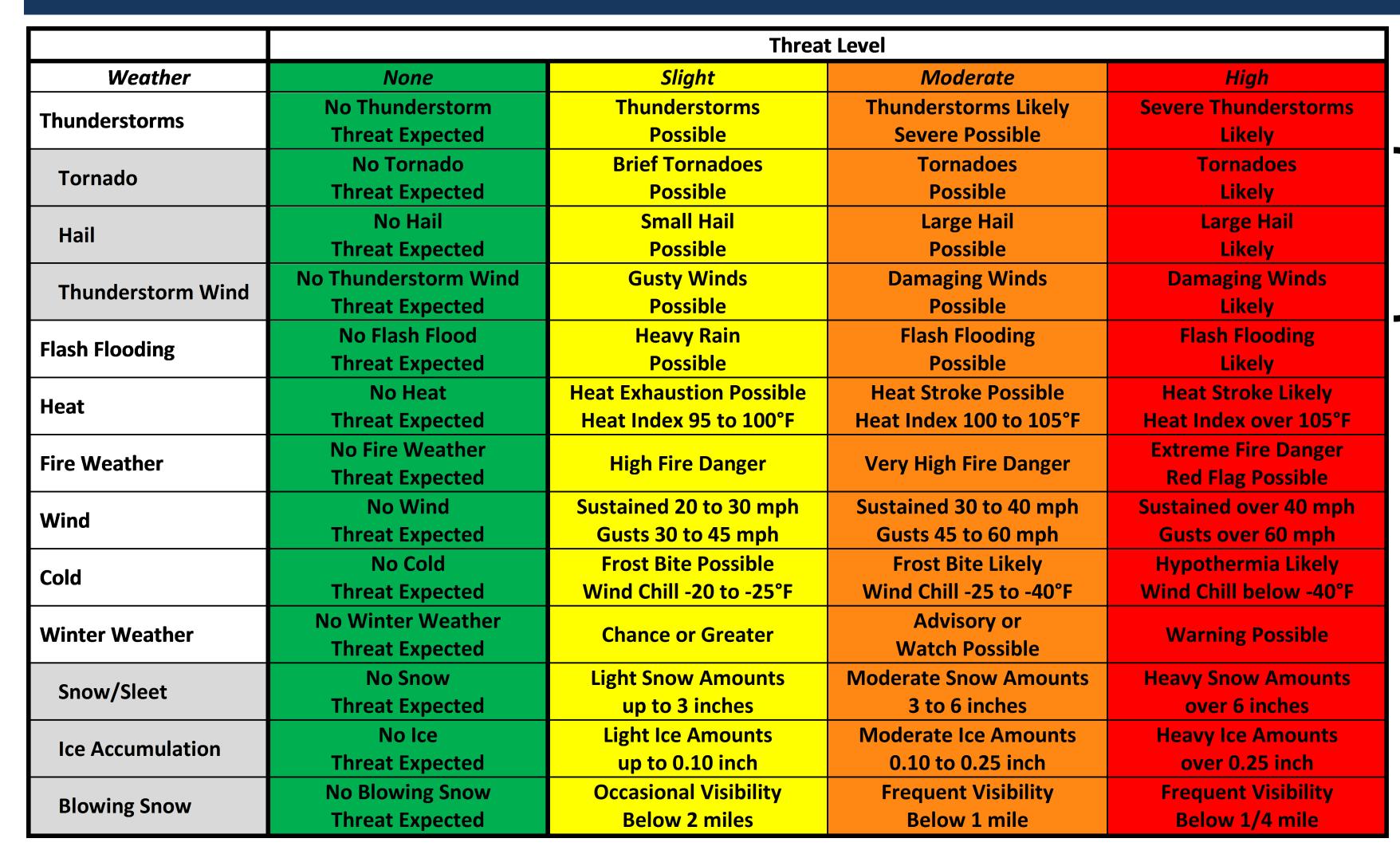
- Complex logic works in the background to combine gridded forecasts from each NWS office with watches, advisories, and warnings to assign threat level.
- Updates every 3 hours to maximize consistency among NWS forecasts while minimizing computational expense.

IMPLEMENTATION CHALLENGES

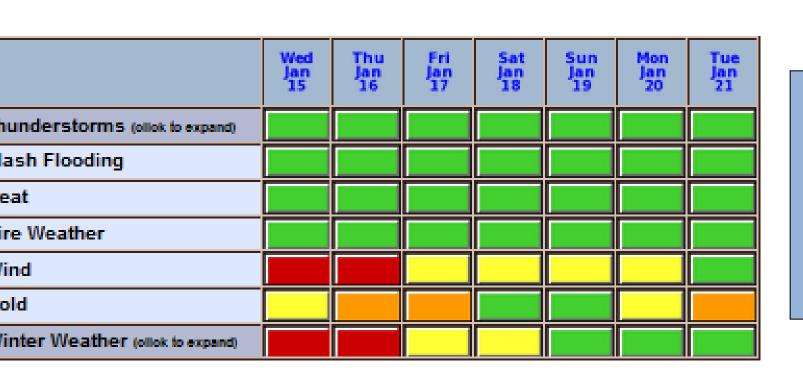
LOGIC EXAMPLE (FLASH FLOODING)

- 1.Use Wx grids in GFE to assign level.
- Green: no heavy rain or thunderstorms with heavy rain Yellow: heavy rain or thunderstorms with heavy rain
- . Upgrade with Weather Prediction Center excessive rainfall grids. No upgrade for WPCProb = 0%
- Yellow: 0% < WPCProb ≤ 5% Orange: 5% < WPCProb ≤ 10%
- Red: WPCProb > 10%
- . Upgrade using areal flood watch. • No upgrade if no areal flood watch is in effect.
- Orange: areal flood watch is in effect and heavy rain or thunderstorms with heavy rain.
- Downgrade to green if PoP < 15% (This handles clearing counties behind precipitation with no updated percentiles
- from WPC. 4. Upgrade using flash flood watch.
- No upgrade if no flash flood watch is in effect.
- Red: Flash flood watch is in effect.

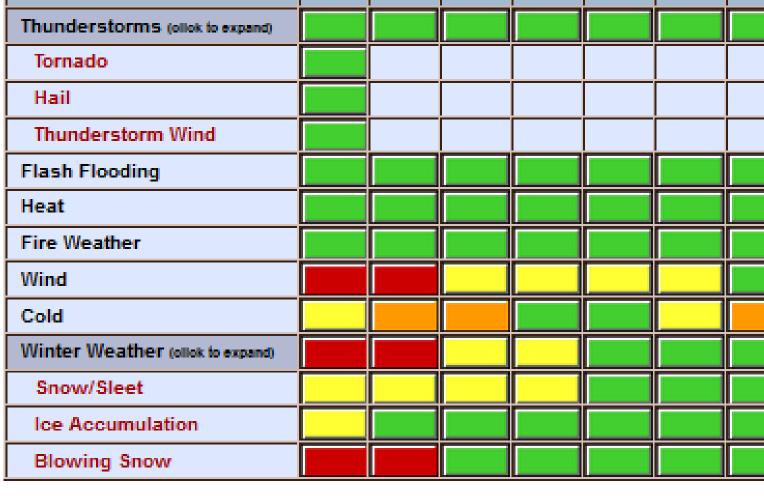
Threat Categories



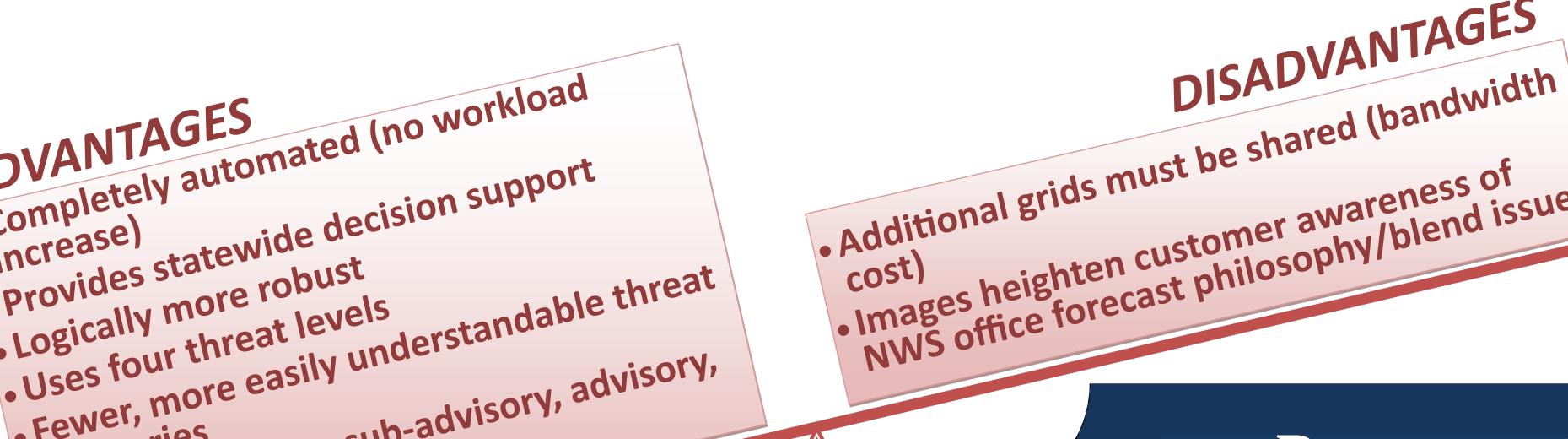
Valid only for Day 1 because they are based on NWS Storm Prediction Center convective



On-click expandable Thunderstorms and Winter Weather categories allow users to decide the level of detail.



How Does it Measure Up?



PARTNER QUOTES

"[It] really enhances our situational awareness, and has led to much more proactivity in our operations."

"I check it twice a day—every day."

"I use it daily. If it is taken away, I'll lose a great resource. Please continue to maintain it!"

ACTIONS TAKEN

Aligning forecast philosophies between NWS forecast offices.	Increasing communication between forecast offices.
Developing a seamless forecast across NWS office borders.	Designed and implemented graphical forecast editor color tables with the same break points as the weather threat matrix to facilitate collaboration and help forecasters recognize differences across borders.

Agreeing on the best way to translate probabilistic Facilitating considerable scientific debate that guidance into meaningful threat categories (i.e., do included interaction with North Dakota Department users understand what a 5% chance of a tornado of Emergency Services and a focus group of occurring within 20 miles of a point is?). emergency managers.

Finding the best way to automate the product based on two different offices' grid methodologies without increasing work load.

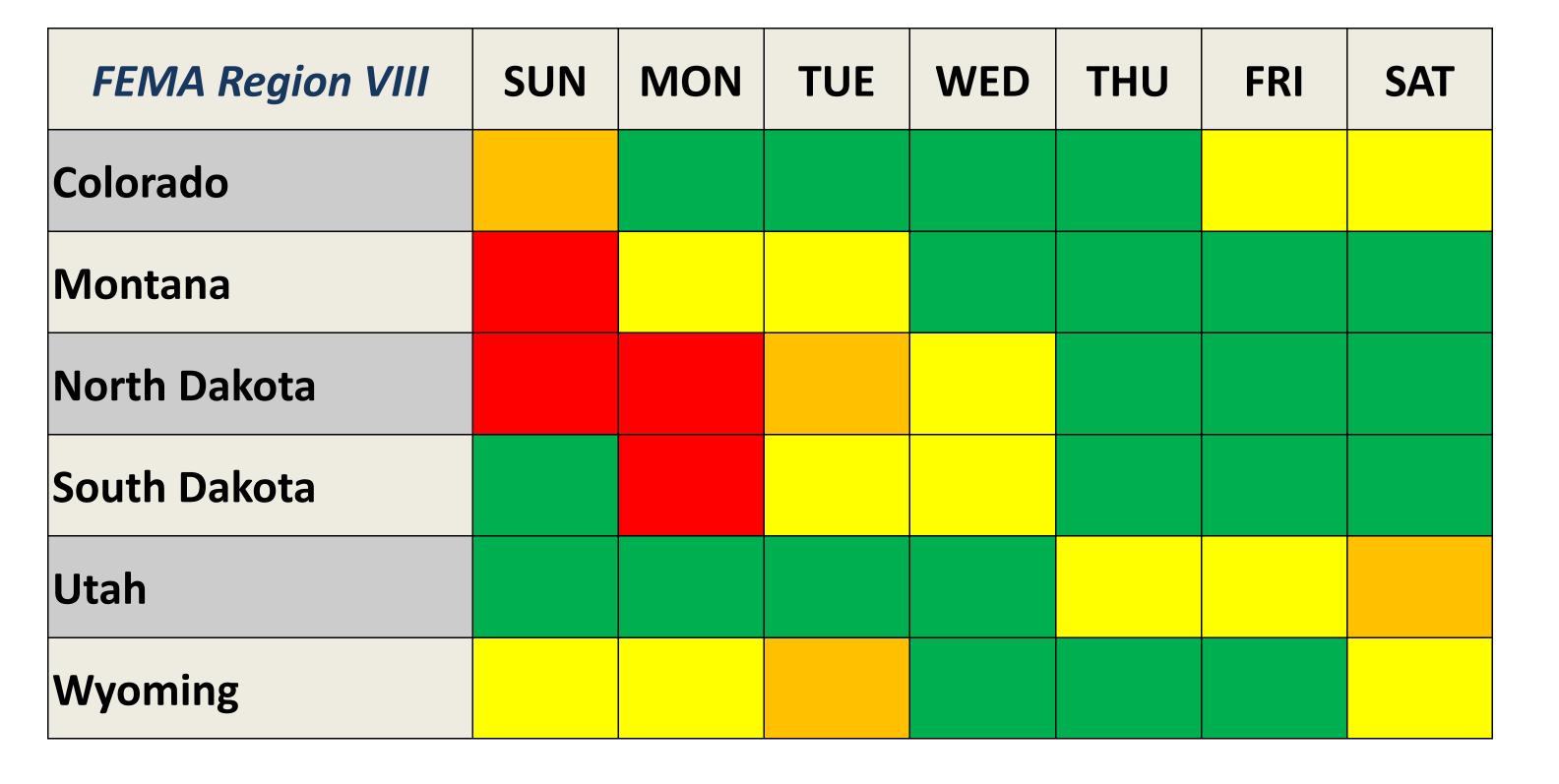
Developed innovative program logic and scripts that use standard forecast grids and numerical guidance.

Requiring a culture change from "my forecast grids" to "our forecast grids."

Continuously reinforcing the philosophy that we are one organization issuing a forecast for partners and customers who serve beyond individual forecast office borders.

A Version for FEMA?

- •It would be overwhelming to display threat levels for every category over an entire FEMA region because it is likely that high risks would occur too often, thereby decreasing the matrix utility.
- Instead, use an automated dashboard situational awareness matrix encompassing states in a FEMA region.
- States display the highest threat level for each day over the next week.
- Each state's row is linked to that state's weather threat matrix, which provides more detail.



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