



Next-Generation Warning Concepts in the HWT

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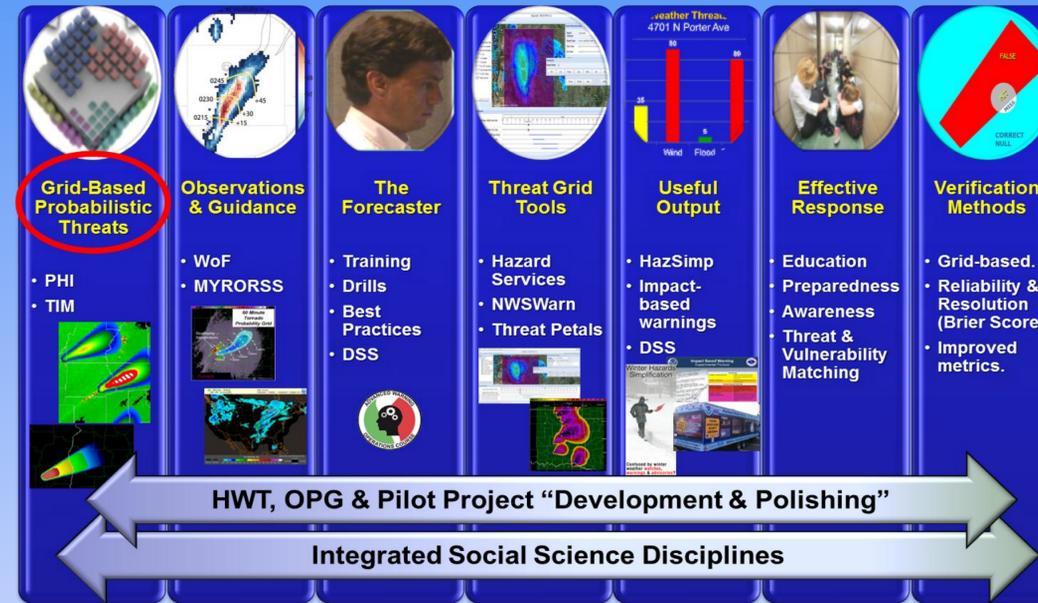
Abstract

With the exception of introducing storm-based polygon methodology in 2007, National Weather Service (NWS) hazardous **weather warnings have changed little in more than 40 years**. An investigation of the warning system is underway through NOAA's Weather Ready Nation initiative. NOAA's 20-Year Weather Research and Development Vision also lists "reinventing the severe weather warning system" as one of the agency's "Grand Scientific Challenges." A **next-generation warning concept is introduced** here to help address these initiatives and challenges. The concept, called **Forecasting a Continuum of Environmental Threats (FACETs)**, is simultaneously (a.) a paradigm change for warnings and (b.) a framework to focus and direct efforts related to next-generation warning science, technology and tools. The Hazardous Weather Testbed (HWT) will be a vital instrument in testing elements of FACETs.

Grid-Based Threat Forecasts & FACETs

At the heart of the FACETs paradigm is a shift to a grid-based threat forecasting methodology known as **Probabilistic Hazard Information (PHI)** (Kuhlman, et al. 2008). PHI moves from the binary, yes/no warning practice currently employed by the NWS to a grid-based approach from which **legacy watches and warnings (of all types) can still be derived** – along with a host of new information for effective decision making. Since this new paradigm will have significant impacts (and opportunities) "downstream" of the warning process, a holistic approach is needed to ensure successful implementation. **FACETs serves as an overarching framework to organize the interrelated warning improvement (and R&D) activities** initiated by the fundamental change to grid-based threat forecasts. It can also prepare the NWS for planned Warn on Forecast technologies.

The Seven Facets of the Paradigm



1. Grid-Based Probabilistic Threats

- Hazard threat probabilities assigned to gridpoints ("initialized" by guidance tools – see Facet #2).
- Legacy watches and warnings derived from gridded probabilities at pre-determined thresholds.

2. Storm-Scale Obs & Guidance

- All data used by forecaster to make a decision.
- Examples: Warn on Forecast probabilistic (storm-scale NWP) output will enable FACETs.

3. The Forecaster

- Forecasters over the grids. Essential to the warning process.
- New paradigm = new training needed!

4. Threat Grid Tools

- GSD's Hazard Services tool = WarnGen/RiverPro for grids.
- Simplify grid interaction with new, intelligent apps.

5. Useful Output

- Improved info (e.g., user-specifiable thresholds, localized decision support, continuous flow, etc.)
- Copious opportunities for private sector partners.

6. Effective Response

- Tune entire system to maximize desired response.

7. Verification

- Forecasts & obs on same coordinate system.
- Enables standard reliability/resolution analyses.

Role of the HWT

- PHI and other FACETs components will require considerable, collaborative development work between NWS, OAR and their academic, emergency management and private sector partners.
 - Forecaster/Researcher interaction crucial at all phases of development.
 - Integration of multiple social science disciplines is essential across all facets of the paradigm.
- The HWT is the sandbox (and logical place) in which these activities can take place.
- When ready, FACETs innovation(s) can be delivered to Proving Ground, NWS operations, or other development partners.

Summary

FACETs is...

- A new warning paradigm (grid-based threats);
- A framework intended to organize and guide reinvention efforts.

FACETs is intended to...

- Be a unifying vision, framework and concept for an effective, future warning paradigm;
- Guide warning R&D work;
- Address issues identified in Weather Ready Nation community meetings;
- Anticipate and adapt to the trajectories of science, technology and society;
- Develop and implement the underlying paradigm change.

The HWT is an essential tool in making FACETs successful.

References

Kuhlman, K. M., T. M. Smith, G. J. Stumpf, K. L. Ortega, and K. L. Manross, 2008: Experimental probabilistic hazard information in practice: Results from the 2008 EWP Spring Program. *Extended Abstracts, 24th Conf. on Severe Local Storms*, Savannah, GA, Amer. Meteor. Soc., 8A.2.