

WEATHER EVENT SIMULATOR BEST PRACTICES

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1. INTRODUCTION

The National Weather Service (NWS) has recently focused greater attention on the decision making process in the issuance of hazardous weather warnings. The rapidly changing scientific and technological environment, the relative rarity of warning events, and the fact that we cannot fully understand the warning decision process independent of its context, all complicate training and research on warning decision making (Kindley, 2002).

During the Fall of 2001, all NWS offices received a Weather Event Simulator (WES). The WES is a low-cost PC running the Linux operating system, AWIPS display software, and a special set of scripts that hides and then reveals the data as if in real time (Magsig and Page, 2002). The simulator allows forecasters to practice issuing warnings with operational software while experiencing a sense of urgency as data continue to update. Upon delivery, the simulators included one WES-ready AWIPS case. Subsequently, the Warning Decision Training Branch (WDTB) and Cooperative Program for Operational Meteorology, Education, and Training (COMET) Branch have distributed several additional cases. In addition, local offices have begun archiving their own events for both simulation and case review on the WES.

This paper will present a general description of the various ways NWS offices are using the WES to both research and train on the warning decision process.

2. SIMULATION GUIDES

Education research has shown that simulators can be great training tools, but learning is *highly* dependant on the content and quality of the simulation (Schank, 1997). Local training officers in National Weather Service offices often have limited time to design simulations. To assist local training officers, the Warning Decision Training Branch (WDTB) and COMET have developed and delivered several simulation guides. Each guide contains examples of several different simulations using the same event. Each simulation includes guidance on potential training objectives, training methodologies, and evaluation criteria (Ferree et al, 2002). Local training officers can

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also use the guides as effective templates for developing local WES simulations.

Feedback on the simulation guides has been positive, and WDTB and COMET are planning future guides to accompany winter weather, flash flood, fire weather, and other cases.

3. BEST PRACTICES

The WES and supporting simulation guides are tools that provide the operationally representative training environment for developing decision making skills. Local training officers have found additional benefits in carrying out training on the WES, and have corresponded with the authors on those benefits. We do not intend the following as a comprehensive list. As more individuals gain experience, we expect that innovative new ways of using the WES for training and research will continue to expand.

3.1 - Assessing Training Needs

Several local training officers have followed the recommendation to experience a simulation one-on-one with each member of the warning staff. Some have even spent an entire shift in a simulation with each staff member. Though this is a significant workload issue, these training officers all recognized important benefits from this experience. One benefit is a more thorough understanding of each individual's strengths and weaknesses. This understanding will help training officers target training to individual needs, and in some areas, to the entire office's training needs.

3.2 - Presenting Techniques and Research Findings

Some have found the WES handy for demonstrating warning techniques to staff in a presentation format. For a large group, they connect the WES to a data projector capable of projecting the high 1280x1024 resolution. For a small group, gathering in front of the monitor is adequate. Use in either displaced real-time mode or case review mode is dependent on the technique being demonstrated. Displaying examples of research findings illustrated in case data on the WES is more effective than summarizing research papers.

3.3 - Sharing the Experience

Pairing experienced warning forecasters with less experienced staff in one-on-one simulations has proven

helpful to both parties. Experienced warning forecasters can convey knowledge in a simulation that is not well documented and difficult to impart under the time pressure of an actual event. An experienced warning forecaster gains the additional benefit of discovering situations where intervention in an actual event may be necessary.

3.4 - Developing Strategies and Teamwork

Individual and warning teams are developing or modifying warning strategies using the WES. Simulations can provide additional time to modify individual strategies on product and overlay choice, use of screen real estate, color selection, procedures, etc. that would require valuable time during a real warning event. Some offices have found inefficiencies in warning operation by replicating a team warning environment.

3.5 - Gaining Experience on New Software

A warning event is not a good time to experiment with new software applications. Warning applications reaching the field are often not easily accepted due to a potential negative impact. The WES provides a risk-free environment to examine new software applications and test both the benefits and limitations of incorporating the new applications into the warning process.

3.6 - Post Event Assessments

Post event assessments can uncover critical aspects of a warning event that should be duplicated or avoided in subsequent events (Klein, 1988). Several offices are currently using the WES to review archived data from recent local events. The assessment can include a review of real-time issues and overall system performance. By using the WES in displaced real-time, one can learn the nature of relevant products and whether they were easily viewable with the system configuration and methodology used. A forecaster can in essence "re-create" their actions to see what lessons they can apply the next time. In addition, a forecaster can evaluate strengths and limitations of available data sets and overall system functionality by using the WES in case review mode.

4. RESEARCH USING THE WES

The WES can be used to playback locally archived events in a case review mode where all the data are available and the displaced real-time functionality is not used. Researchers often use the WES case review mode to study science and technology issues.

Less obvious, but just as important, the displaced real-time functionality of the WES provides a platform to accomplish valuable research on warning decision making processes. The WES offers a much more controllable warning environment than an actual event, and has the added benefit of being duplicatable. Research on human factors of new products or techniques may result in measurable improvements to warning decision making processes.

5. SUMMARY

The WES provides a tool for both training and research on warning decision processes. Simulation guides provided with several cases distributed throughout the NWS include many designed simulations. Each simulation contains training objectives, methodologies and evaluation criteria, and are designed for ease of use by local training officers. The simulations in these guides provide potential templates for developing local simulations.

Local training officers have found additional benefits of the WES. They have noted the ability to better assess individual and office training needs. Many are using the WES as a platform for local presentations on warning techniques and scientific research findings. Experienced warning forecasters are using the WES to mentor novice warning forecasters. Warning teams are developing and testing new team strategies using the WES. Use of new applications on the WES has helped to determine how to best incorporate these applications into actual warning events. Many offices are archiving local events and using the WES to assess warning operations.

The WES in case review mode provides a platform for research on science and technology issues associated with a case. The WES displaced real-time mode provides researchers the opportunity to study the warning decision process in a risk-free environment.

6. LINKS

NWS Warning Decision Training Branch
<http://www.wdtb.noaa.gov/DLCourses/wes/index.html>
COMET Branch Science and Training Resource Center
<http://www.comet.ucar.edu/strc/wes/index.htm>

7. REFERENCES

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