



Expertise and Effective Office Warning Strategies

Advanced Warning Operations Course
IC Core 3

Lesson 4: Significant Event Management

Warning Decision Training Branch



Overview of Expertise and Effective Office Warning Strategies

- Lesson 1: Expertise
- Lesson 2: Cognitive Task Analysis of expert warning forecasters
- Lesson 3: Learning from post-mortems
- Lesson 4: Significant event management: Planning, Strategy, Expertise, and Innovation

This is the 4th lesson in the Expertise and Effective Office Warning Strategies instructional component.

Lesson 4: **Significant Event Management**

Planning, Strategy, Expertise, and Innovation

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Learning Objectives

1. Understand meaning of the term “Significant Event”
2. Identify four elements important to managing Significant Events

The learning objectives for this lesson are testable and address the meaning of the term “significant event” and the four elements which are important to managing the event.

Performance Objectives

1. Given a hypothetical Significant Event, cite appropriate actions in each of the four elements

Keep this performance objective in mind with regard to an event you worked, or one that unfolds in the future.

What is a Significant Event?

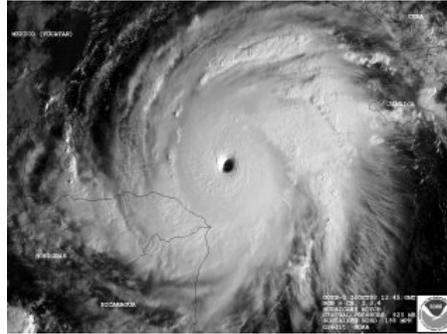
Significant event: Manmade or natural circumstance, often hazardous, dependent upon or sensitive to weather. Significant events usually affect large numbers of people, generate media interest, and their nature is such that the WFO has, or can quickly develop, meteorological expertise to provide service or mitigate hazard.



While virtually every event can be considered significant in some sense, the term is defined here to encompass more than traditional hydrometeorological events. Also, an increased level of external interest in, and scrutiny of, NWS performance accompanies significant events.

What is a Significant Event?

- Severe convective storms
- Tropical storms
- Winter storms
- Flooding
- Wild fires
- Extreme heat, cold, drought



Typical hydrometeorological causes of significant events.

What is a Significant Event?

But also...

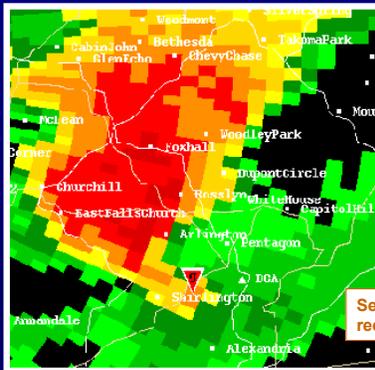
- Homeland security / terrorist acts
- Hazmat situations
- Accidents / disasters with national impact or mass casualties
 - Rescue and recovery



Though not as common, these non-traditional significant events require additional skill sets and are often unanticipated. Preparing for the possibility of such an event at a local office requires attention to four management elements described shortly.

Significant Event Management

The ability of you and your office to identify and manage a significant event has far-reaching consequences personally and to the agency.



One of the characteristics of a significant event is the scope of its reach. This factor alone will generate interest outside the norm and as a result in increase in workload and stress.

Management Elements

- Planning
 - *Think about and plan for the possibilities.*
- Strategy
 - *What is most important and how do we work efficiently?*
- Expertise
 - *The most important thing humans do!*
- Innovation
 - *Rare or high-impact events have special needs.*



Mount Saint Helens
USGS Photo by Austin Post

Planning sets the vision for an office to respond to a significant event, while strategy provides the details to accomplish that vision. Individual or office expertise defines the decisions and actions that provide valuable information to those at risk, and innovation addresses the ability to respond in often unique ways to unique circumstances.

Significant Event Management

The management elements rely on an ability to develop, maintain, and apply situation awareness.



In other domains, significant events are expected and come with a higher level of mitigation efforts. The need for SA in these environments has led to technological solutions and operational practices aimed at keeping the big picture.



Significant Event Examples

and

Elements Important to Their
Management



We will look at four examples of significant events. Two of these are meteorological in origin while the other two are not.

Example – Homeland Security April 19, 1995

- Unprecedented Terrorist Bombing
 - Destroyed Federal Building in OKC
 - Mass casualties
 - MDT risk of severe storms
 - Weather critical to rescue and recovery
 - Recovery about 1 month



Photo: www.whitehouse.gov

April 19th, 1995 began as a day where the possibility of severe weather was of prime concern to the local WFO. Within minutes, new priorities emerged, and requests for operational weather support for emergency responders were received.

Planning... *what was done*

The Oklahoma Department of Civil Emergency Management
After Action Report

Alfred P. Murrah Federal Building Bombing
19 April 1995 1995 in Oklahoma City, Oklahoma
Detailed Summary of Daily Activity

WEDNESDAY, APRIL 19, 1995

* 0902 HRS: An explosion occurs in downtown Oklahoma City at the Alfred P. Murrah Federal Building. Oklahoma City Fire Station One responds immediately, reacting to the sound. Fire, emergency medical, and law enforcement personnel, American Red Cross Disaster workers, and civilians, enter the bombed structure without delay as they immediately initiate a massive search and rescue effort.

* 0904: The explosion is reported to the Oklahoma Department of Civil Emergency Management (ODCEM) by staff in the field. State agency liaison officers are requested to report to the SEOC immediately.

* 0920: The ODCEM Disaster Recovery Manager is dispatched to the scene. State agency liaison officers begin arriving at the SEOC.

* 0925: The SEOC is fully operational and State Director Tom Feuerborn orders 24-hour operations until further notice. Selected staff are sent home to report for the second shift beginning at 2400. Agencies initially represented in the SEOC include:

- ODCEM
- The Oklahoma Department of Public Safety
- The Oklahoma Military Department
- The Oklahoma Department of Human Services
- The Oklahoma Department of Health
- The Oklahoma Department of Education
- The National Weather Service
- The Civil Air Patrol

✓ Well established
relationship with
state EOC

NWS offices typically have excellent working relationships with local emergency management officials. Developing those same relationships with state officials is an important aspect of responding to larger-scale or prolonged events. It wasn't long into the events of April 19th, that the NWS was called to be a part of the operations center.

Planning... *what could be done*

- Strengthen relationships with all levels of EM
- Have disaster plan to cooperate with external organizations and agencies

- Planning
- Strategy
- Expertise
- Innovation

4/19/95

Federal Emergency Management Agency
Directives Management System

FEDERAL PREPAREDNESS CIRCULAR

U.S. Department of Homeland Security
Washington, D.C. 20472



	Date	Office
FPC 65	June 15, 2004	Office of National Security Coordination

TO: HEADS OF FEDERAL DEPARTMENTS AND AGENCIES

SUBJECT: FEDERAL EXECUTIVE BRANCH CONTINUITY OF OPERATIONS (COOP)

1. **PURPOSE:** This Federal Preparedness Circular (FPC) provides guidance to Federal Executive Branch departments and agencies for use in developing contingency plans and programs for continuity of operations (COOP). COOP planning facilitates the performance of department/agency essential functions during any emergency or situation that may disrupt normal operations.

Emergency management organizations are one of several groups with whom offices work during significant events. Attending multi-jurisdictional and regional planning meetings will help promote awareness of NWS services and capabilities, and an understanding of the needs of other agencies and groups in the event of a disaster.

Strategy... *what was done*

- Modified staffing on-the-fly to send senior forecaster to EOC
- Established email link to EOC

- Planning

- Strategy

- Expertise

- Innovation

4/19/95

In some cases, local officials may want an NWS staff member on site to provide briefings and to answer specific questions. In extreme cases, this may last several days or weeks. On April 19th, an NWS forecaster was on-site at the Multi-Agency Command Center around the clock for nearly 2 weeks.

Strategy... *what could be done*

- Have standing team/pool of forecasters ready for disasters
- Staffing policy in place
- Redundant means of communication in place

- Planning
- Strategy
- Expertise
- Innovation

4/19/95



Expertise... *what was done*

- Onsite briefings concerning weather elements important to rescue and recovery
- Personal phone briefings 24 x 7 for FEMA onsite coordinator



- Planning
- Strategy
- Expertise
- Innovation

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Expertise... *what could be done*

- Interagency training to integrate forecasters into emergency management command structure
- Training and exercises to improve our understanding of EM needs

• Planning

• Strategy

• Expertise

• Innovation

4/19/95

Innovation... *what was done*

- Establish email link to EOC
- Segment the NOW to contain section in support of rescue recovery efforts
 - On NWR
 - Very specific and quantitative
 - Updated very frequently

• Planning

• Strategy

• Expertise

• Innovation

4/19/95

Innovation... *what could be done*

- Specialized numerical modeling
- Graphical forecasts / warnings
- Deliver information friendly to mobile technologies
- Develop portable workstation and briefing computer

• Planning

• Strategy

• Expertise

• Innovation

4/19/95

Example – Killer Tornadoes May 3, 1999

- Record outbreak of violent tornadoes
 - Most costly in U.S. history
 - 42 fatalities
- Day began with SLGT risk



The May 3rd Outbreak only became an “outbreak” in hindsight. As the day unfolded, it only gradually turned into a significant event.

Planning... *what was done*

- Well established spotter networks and EM contacts
- Extensive preparedness and outreach efforts

- Planning
- Strategy
- Expertise
- Innovation

An Introduction to Storm Observation and Reporting

National Weather Service Norman, Oklahoma

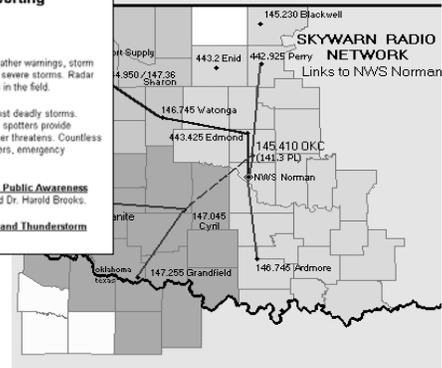
Even with all the technology used by the National Weather Service to prepare severe weather warnings, storm spotters still give us the most complete picture of what's really happening in and around severe storms. Radar simply cannot tell us everything we need to know. Storm spotters are the eyes and ears in the field.

For more than 60 years, storm spotters have been the Nation's first line of defense against deadly storms. Working with their local communities and with the local National Weather Service office, spotters provide invaluable assistance and critical information to decision makers when hazardous weather threatens. Countless lives have been saved because of this unique partnership between volunteer storm spotters, emergency management and the National Weather Service.

For more information on the history of storm spotters, please read **Storm Spotting and Public Awareness Since the First Tornado Forecasts of 1948** by Dr. Charles Doswell III, Alan Moller, and Dr. Harold Brooks.

For basic information on becoming a spotter, please read **Getting Started in Tornado and Thunderstorm Spotting** by Dr. Keith Brewster.

5/3/99



Planning... *what could be done*

- Improve WARNGEN templates for high end outbreaks
- Establish coordinator staffing
- Identify methods to convey unusually high threats

• Planning

• Strategy

• Expertise

• Innovation

5/3/99

Strategy... *what was done*

- Sectored warning operations
- Focused on severe weather information flow almost exclusively
- Called in off duty personnel
- Monitored one TV channel

- Planning

- **Strategy**

- Expertise

- Innovation

5/3/99



Sectored operations helped distribute workload and was an important strategy which allowed forecasters to focus on information flow to the public.

Strategy... *what could be done*

- Develop technology and behaviors to improve SA
 - Product management
 - Manage information important to decision making
- Identify means to streamline preparation of routine products

• Planning

• Strategy

• Expertise

• Innovation

5/3/99

Expertise... *what was done*

- Extensive training related to severe storm identification and warning operations

- Planning

- Strategy

- Expertise

- Innovation

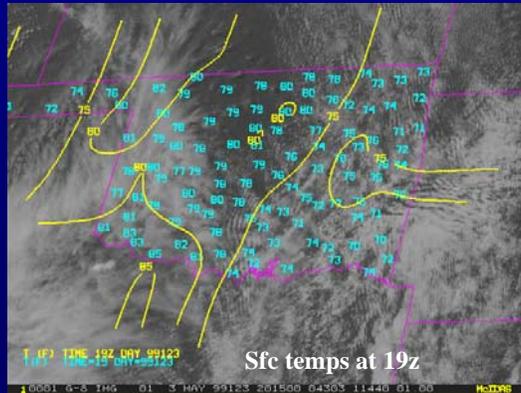
5/3/99

Expertise... *what could be done*

- More specific information regarding path, timing, degree of threat
- Incorporate more near storm environment

- Planning
- Strategy
- **Expertise**
- Innovation

5/3/99



Innovation... *what was done*

- Established ad-hoc coordinator
- Conceived and sent statements with unique phrases to draw attention to unusually high threat

- Planning
- Strategy
- Expertise
- Innovation

5/3/99

SEVERE WEATHER STATEMENT
NATIONAL WEATHER SERVICE NORMAN OK
731 PM CDT MON MAY 3 1999
...LARGE DAMAGING TORNADO MOVING THROUGH OKLAHOMA CITY METRO...
A LARGE TORNADO HAS CAUSED EXTENSIVE DAMAGE IN SOUTHERN PORTIONS OF THE OKLAHOMA CITY METRO AREA. AT 731 PM THE TORNADO WAS ENTERING SOUTHERN OKLAHOMA COUNTY JUST EAST OF INTERSTATE 35 AND SOUTH OF CROSS ROADS MALL. PERSONS IN SOUTHEAST OKLAHOMA CITY AND MIDWEST CITY ARE IN DANGER! IF YOU LIVE NEAR THESE AREAS TAKE IMMEDIATE TORNADO PRECAUTIONS! THE TORNADO WAS MOVING NORTHEAST.
THIS IS AN EXTREMELY DANGEROUS AND LIFE THREATENING...

Innovation... *what could be done*

- Develop technology to improve SA (TV, environment, warnings, etc.)
- Develop product to convey specialized information to advanced customers (media, EM)
- Develop means to graphically convey threat on storm scale
- Improve ability to disseminate information to mobile users

- Planning
- Strategy
- Expertise
- Innovation

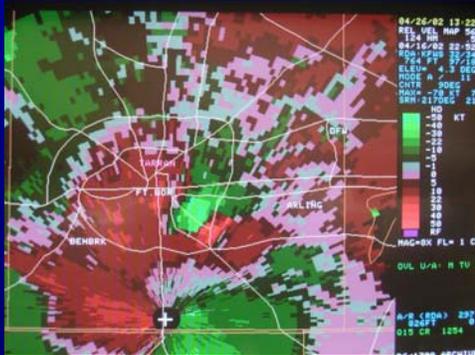
5/3/99

Technology

- Situation Awareness Display System
 - Off-the-shelf hardware
 - Local software
 - TV, mapping, product status, objective analyses
 - Configured through AWIPS GUI
 - Cost about \$15K



Example: F3 Tornado April 16, 2002



- F3 tornado in east Fort Worth
- Early morning expectations: mainly morning thunder; no severe thunderstorms
- SPC risk: general thunder (high risk in central and northern plains)
- Main challenges: modify initial conceptual model, ramp up warning operations, tornado in a highly populated area

Like many severe weather events, this one unfolded in a dramatically different fashion than initially anticipated. Experience suggests that forecasters must be willing to modify or change conceptual models as events unfold. Having the proper conceptual model influences not only the forecast and warning process, but also staffing decisions and work assignments.

Planning... what was done

- Good working relationships with local emergency officials
- Good information flow via phone, pagers, Internet, and weather radio

• Planning

• Strategy

• Expertise

• Innovation

4/16/02

Planning... what could be done

- Continued training on recognizing subtle clues to developing severe weather potential
- Develop even faster ways to communicate with local officials (instant messaging, hotline phones or radio systems)

• Planning

• Strategy

• Expertise

• Innovation

4/16/02

Strategy... what was done

- Once threat determined, rapid spin up for warning operations accomplished
- Coordinator appointed immediately
- Local television monitored for live video
- Very frequent SVSs updating position and damage
- Live broadcasts on weather radio updating storm location

- Planning
- Strategy
- Expertise
- Innovation

4/16/02

Strategy... what could be done

- Develop software to automate many internal tasks (logging calls, reports, briefings, etc.)
- Develop SA display to provide basic information to all members of warning team
 - Storm information (radar)
 - Warning information (AWIPS local warnings plot)
 - Report information (AWIPS plot or local software)

- Planning
- Strategy
- Expertise
- Innovation

4/16/02

Expertise

- Forecaster ability to recognize imminent potential for storms despite current expectations
- Need to transfer this expertise to all WFO staff through post-mortems, WES cases, and other training

• Planning

• Strategy

• Expertise

• Innovation

4/16/02

Innovation



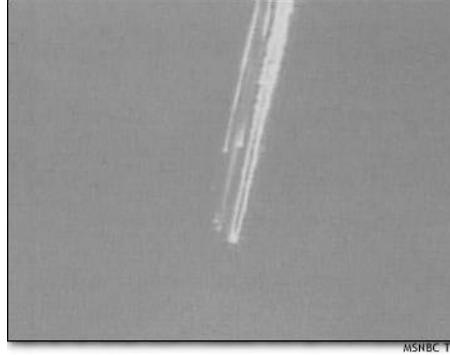
- SA Display that can be viewed from within operations area
- Provides “big picture” overview of state of warning operations
- Effective as a briefing tool and also for media interviews

- Planning
- Strategy
- Expertise
- Innovation

4/16/02

Example: Shuttle Columbia Disaster – Feb. 1, 2003

- Space Shuttle Columbia breaks up en route to landing in Florida
- No significant weather forecast
- Routine shift staff on duty
- Challenge: what should Lead Forecaster do upon hearing the news?



Our last example occurred on a weekend with routine weather staffing.

Planning

- Lead forecasters given authority to use judgment and discretion in unusual situations

• Planning

• Strategy

• Expertise

• Innovation

2/1/03

Planning... What could have been done

- Develop guidelines and recommendations for office actions during non-weather significant events
- Conduct training to develop expertise in responding to these events and understand needs of emergency responders

• Planning

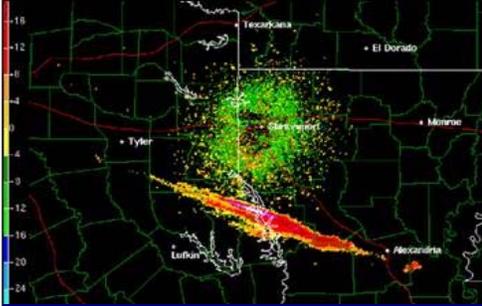
• Strategy

• Expertise

• Innovation

2/1/03

Strategy



- Planning
- **Strategy**
- Expertise
- Innovation

2/1/03

- Lead forecaster treated situation as a severe weather event
- Extra staff called in
- Media briefings
- Supplemental sounding
- CEM issued due to danger from debris
- Phone and on-site support for 3 weeks

Expertise

- Recognition that a tragic event was unfolding and that the WFO was now part of this event

Civil Emergency Message
NWS Fort Worth TX
11 am CST Sat Feb 1, 2003

The following information is being transmitted at the request of the Texas Division of Emergency Management.

Citizens are advised not to touch or remove any debris from the space shuttle that may have landed in their area. Some of the debris contains materials that may be hazardous. If you find debris from the shuttle, contact local law enforcement immediately.

- Planning
- Strategy
- Expertise
- Innovation

2/1/03

Innovation

- Recognition that supplemental sounding may assist in predicting debris trajectories and keeping HMT past shift to release balloon



- Planning
- Strategy
- Expertise
- Innovation

2/1/03

Innovation ...what has been done

- Prepare WFO staff to respond to hazmat or homeland security events through:
 - Incident Command System training
 - Dispersion forecasting and modeling (including available tools)
 - Weather information needs of first responders
 - Dispersion characteristics in urban or complex terrain areas
 - Media interview training

- Planning
- Strategy
- Expertise
- Innovation

2/1/03

Most of these skill sets have traditionally not been provided to WFO forecasters. By learning the “language” of emergency responders and understanding their information needs, a WFO is better positioned to respond to any crisis.

Significant Events: Operational Actions

- **Anticipation**
 - Correct conceptual model, updated continuously
 - Early transition to event operations (including staffing)
- **Coordinator position**
 - Removed from specific tasks; maintains “big picture SA”
- **Appropriate staffing**
 - Sectorized warning operations
 - Workflow management using defined roles and responsibilities
- **Use of all available information**
 - Workstation displays, integration of all datasets into decision process
 - SA display systems

Through many discussions with WFO staffs nationwide, operational problems during significant events can often be traced to improper anticipation, slow transition to event operations and staffing, or workflow and information management. It is important to recognize these key decision areas, and to develop strategies that ensure proper response.

Significant Events

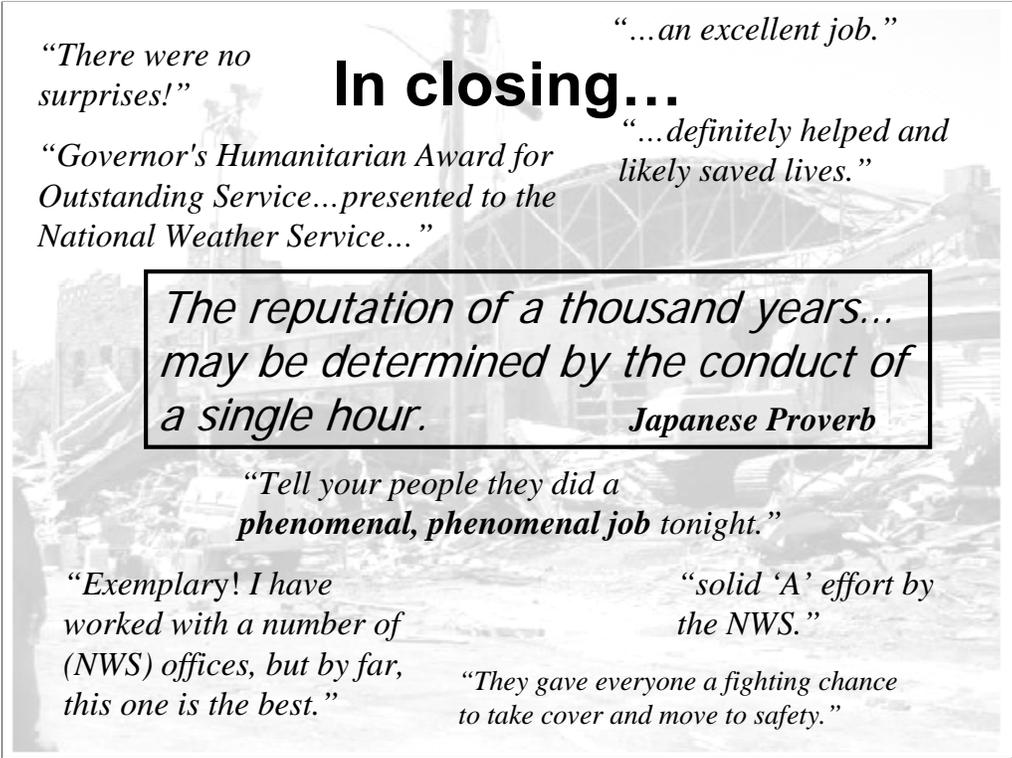
- Responding to significant events requires
 - Individual expertise and SA
 - Office organizational characteristics that foster good team SA and successful response
 - A willingness to learn from each event to reinforce what worked, and to identify solutions to problems that prevent optimum performance



IMET conducting a daily briefing.
(Photo courtesy WFO Missoula)



Earthquake response team.
(Photo courtesy FEMA)



“There were no surprises!”

“Governor's Humanitarian Award for Outstanding Service...presented to the National Weather Service...”

In closing...

“...an excellent job.”

“...definitely helped and likely saved lives.”

The reputation of a thousand years... may be determined by the conduct of a single hour.

Japanese Proverb

“Tell your people they did a phenomenal, phenomenal job tonight.”

“Exemplary! I have worked with a number of (NWS) offices, but by far, this one is the best.”

“solid ‘A’ effort by the NWS.”

“They gave everyone a fighting chance to take cover and move to safety.”

As is indicated by this proverb, years of doing a great job at routine operations can be completely overshadowed by actions in response to an unanticipated event in a short amount of time. The ability to recognize a significant and ramp up accordingly is a challenge continually faced at an FO. Hopefully, your actions will be reflected in these actual quotes, which are in stark contrast to the ones you saw in Lesson 3.

Questions?

1. Check with your AWOC facilitator (most often the SOO)
2. Send your questions to
iccore3@wdtb.noaa.gov