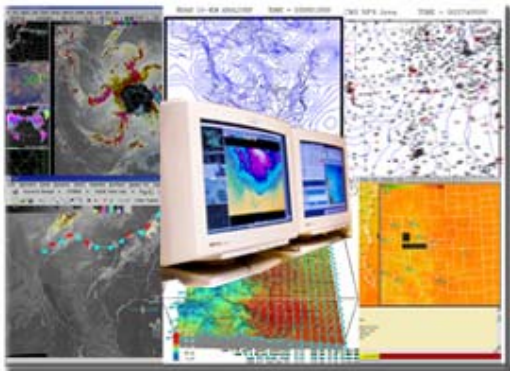




# Supporting Real-Time Forecast & Warning Operations



Carl Bullock



# NWS Modernization

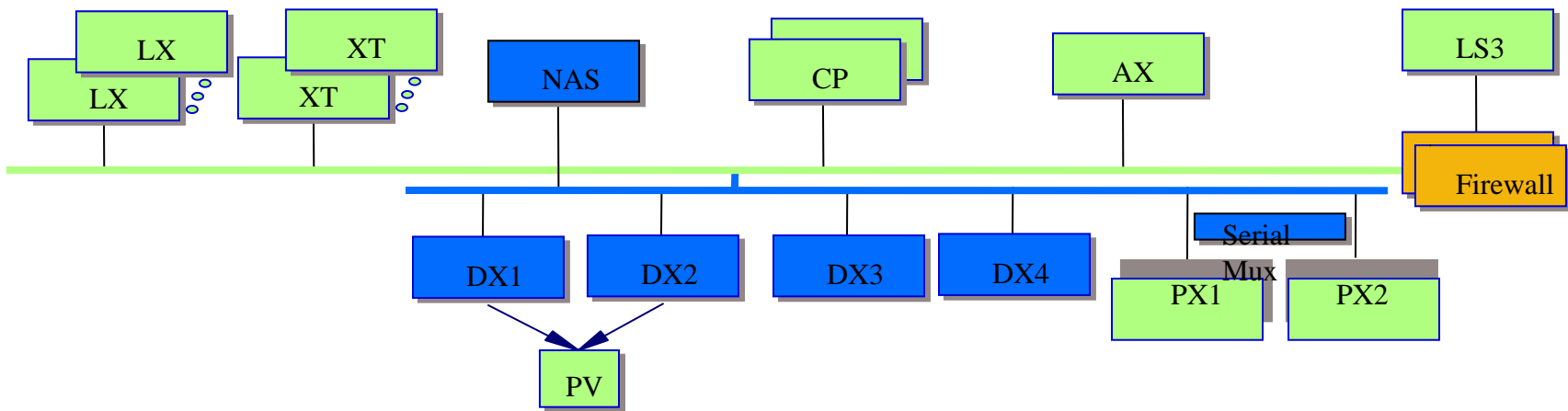


## Key Technology Components

- New GOES satellite
- ASOS (Automated Surface Observing System)
- Doppler Radar (WSR-88D)
- Next Generation NWP Models
- AWIPS (Advanced Weather Interactive Processing System)



# AWIPS Architecture

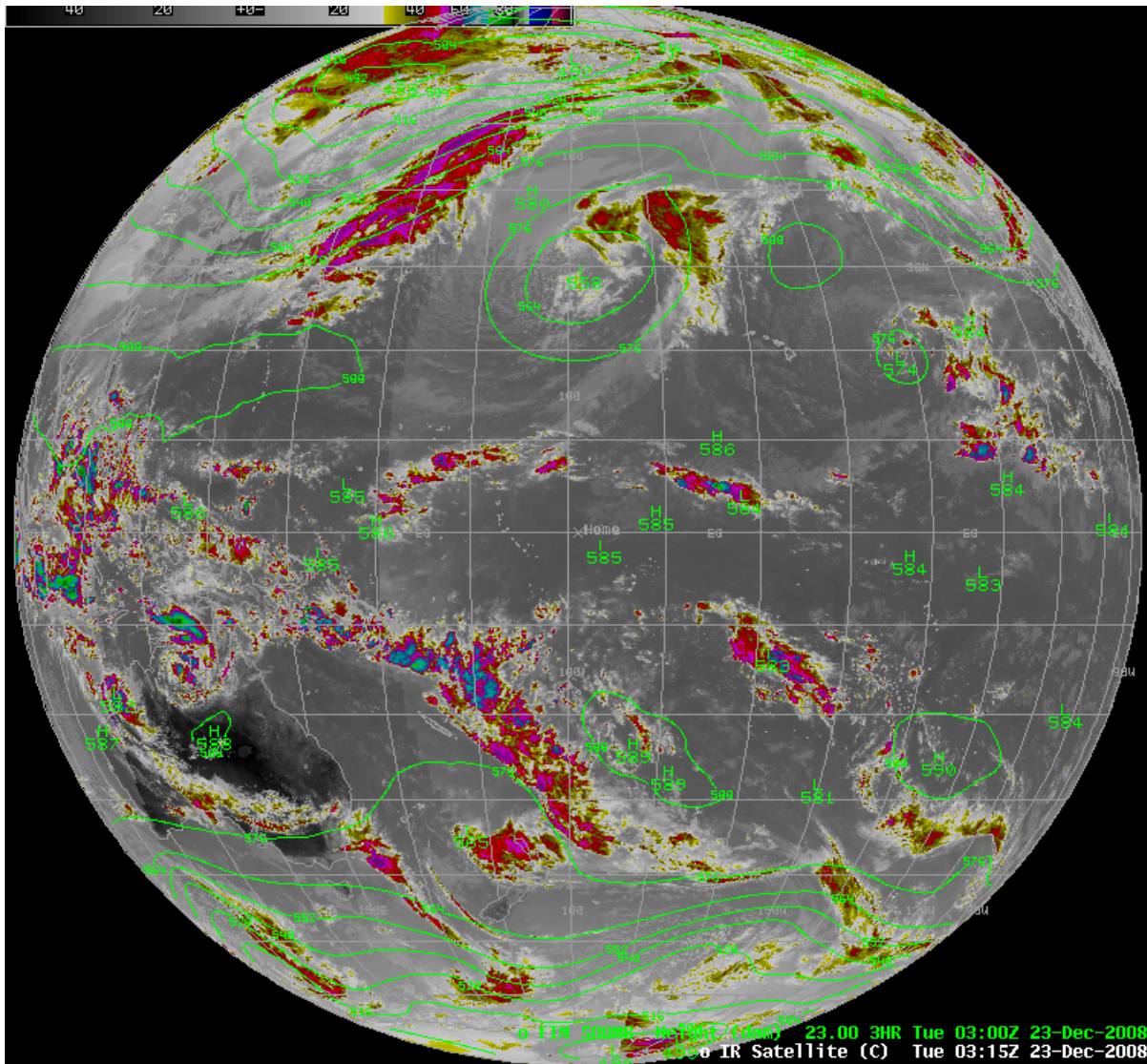


# AWIPS Workstation





# AWIPS display



# AWIPS - Warning Sequence



Forecast Systems Laboratory D-2D (cbullock)

File View Options Tools Volume Obs NCEP/Hydro Local Upper Air Satellite kftg tden tbwi Radar SCAN MADIS Maps Help

Valid time seq WFO Clear Frames: 13 Mag: 1.5 Density: 1

WarnGen: Operational

Backup Track type Edit

FSL One Storm Box

Line of Storms Track

Box and Track

Redraw Box on Screen from: Warned Area Visible:

Track Warned/Hatched Area Dam Break Threat Area

Product type

Flash Flood UPDATE LIST

Severe Thunderstorm

Tornado

Other: Extreme Wind Warning

Time range

Duration: 30 min

19:47 Tue 23-Dec to 20:17 Tue 23-Dec Change...

Optional bullets:

\*\*\*\*\* BASIS FOR WARNING (CHOOSE 1) \*\*\*\*\*

Doppler radar indicated

Trained spotters reported

public reported

local law enforcement reported

\*\*\*\*\* THREAT (CHOOSE up to 1 each wind/hail) \*\*\*\*\*

60 mph wind

70 mph wind

80 mph wind

Penny size hail

Nickel size hail

Quarter size hail

Golf ball size hail

Baseball size hail

pathcast???

\*\*\*\*\* CALLS TO ACTION (CHOOSE 1 OR MORE) \*\*\*\*\*

Instructions:

Adjust Centroid in any Frame

Adjust box around Warning Area

Create Text Restart Close

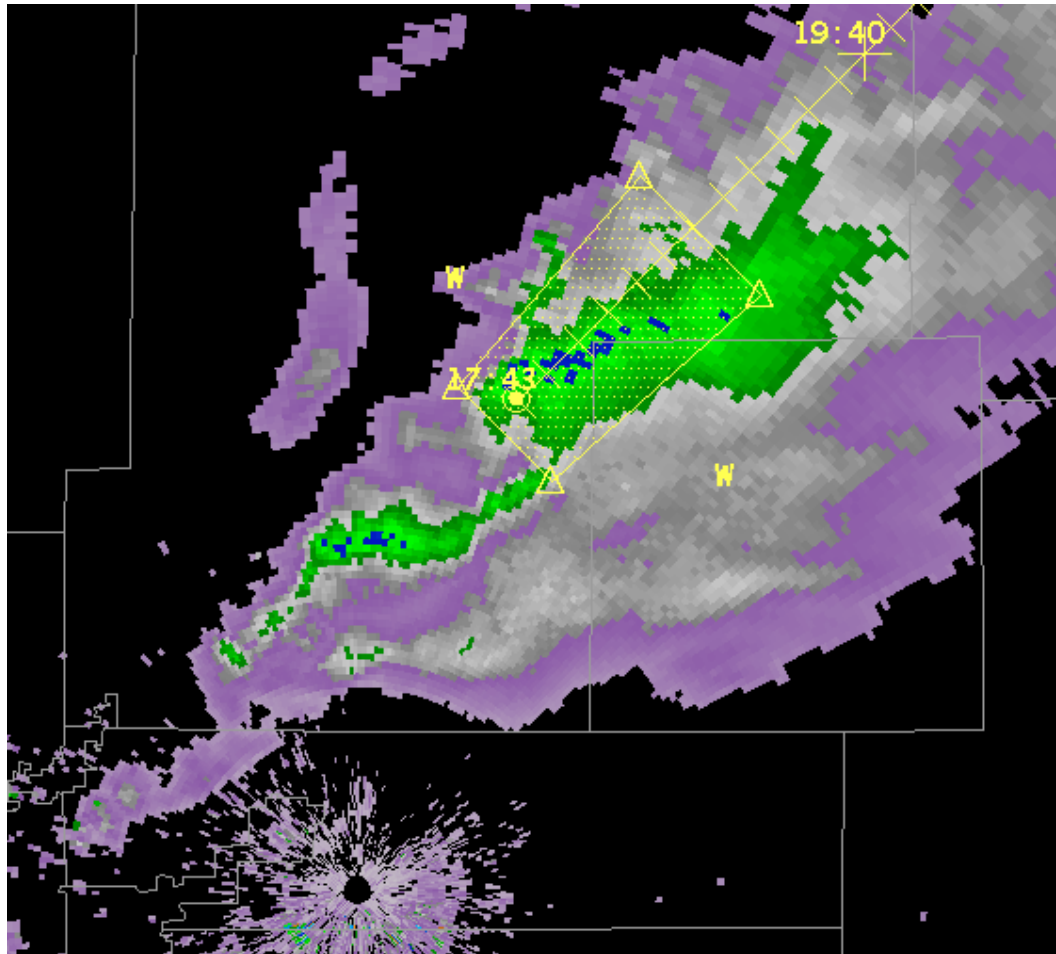
Interactive WarnGen (Editable) Tue 17:43Z 23-Dec-08

kftg 0.5 Z 8bit Tue 17:43Z + kftg 0.5 V 8bit Tue 17:43Z 23-Dec-08

Status: Radar: Frames: 13 Time: 19:49 Z 23-Dec-08



# AWIPS - Warning Sequence







# AWIPS - Warning Sequence

Redraw Box on Screen from: Warned Area Visible:

Track Warned/Hatched Area Dam Break Threat Area

Text 1: WRKKG0

File Edit Options Version Tools Scripts Products Help

AFOS Browser Load History WMO Search Enter Editor  Accum  Update Obs Clear

AFOS Cmd: WMO TTAaii CCCC: AWIPS ID:

```
ZCZC DENSVRBOU DEF
TTAA00 KBOU 231951

COC087-123-232015-
/O.NEW.KBOU.SV.W.0148.081223T1951Z-081223T2015Z/

BULLETIN - EAS ACTIVATION REQUESTED
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE DENVER CO
1251 PM MST TUE DEC 23 2008

THE NATIONAL WEATHER SERVICE IN DENVER HAS ISSUED A

* SEVERE THUNDERSTORM WARNING FOR...
NORTHWESTERN MORGAN COUNTY IN NORTHEAST COLORADO...
CENTRAL WELD COUNTY IN NORTHEAST COLORADO...

* UNTIL 115 PM MST

* AT 1240 PM MST...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A
SEVERE THUNDERSTORM. THIS STORM WAS LOCATED 25 MILES NORTHEAST OF
KEOTA...OR 30 MILES NORTHWEST OF STERLING...AND MOVING NORTHEAST AT
23 MPH.

* OTHER LOCATIONS IN THE WARNING INCLUDE BUT ARE NOT LIMITED TO
BUCKINGHAM

LAT...LON 4073 10405 4057 10384 4033 10420 4045 10437
TIME...MOT...LOC 1951Z 225DEG 20KT 4094 10360

$$
```

Create Text Restart Close

Interactive WarnGen (Ed

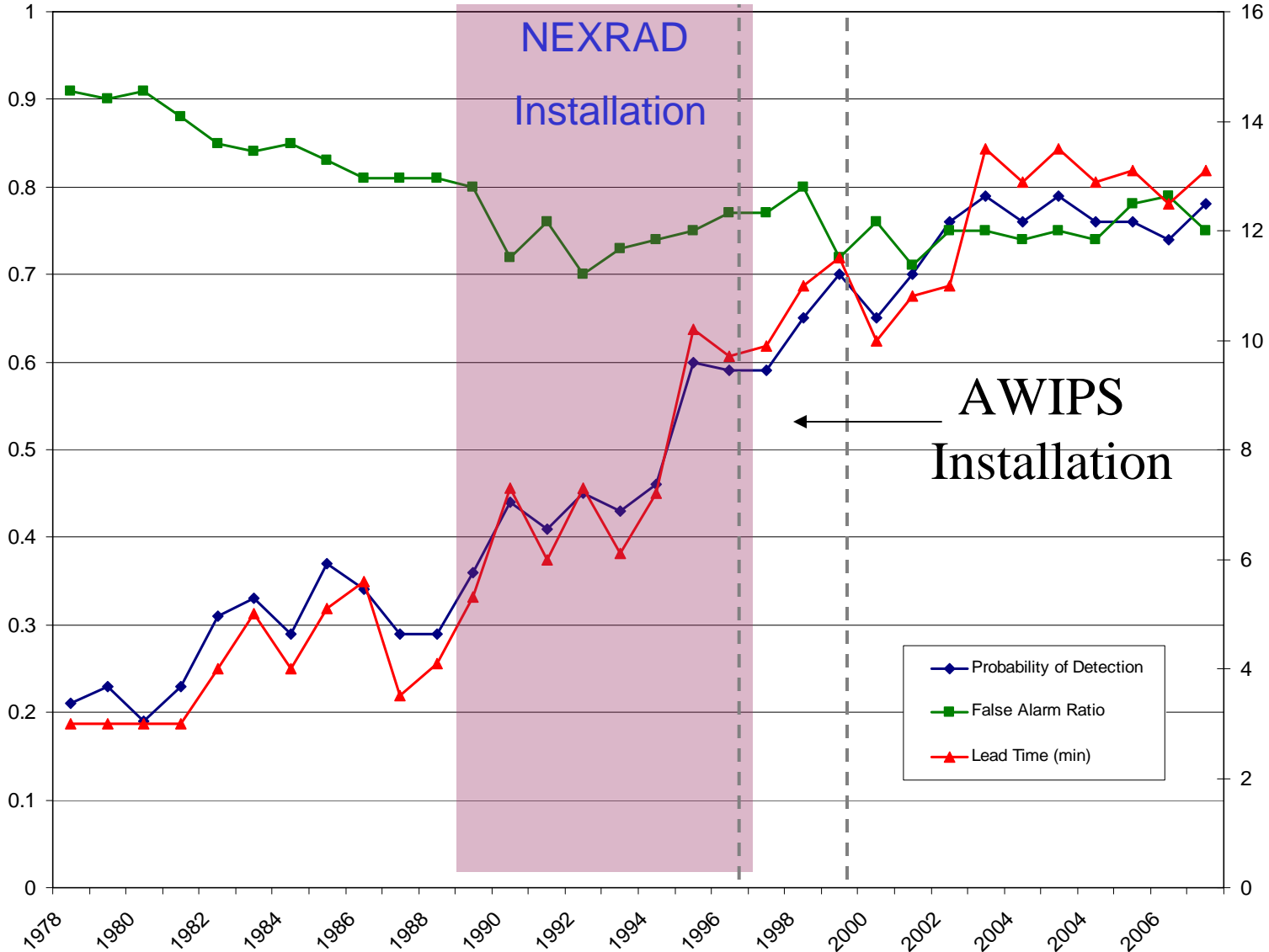
# Improvements



- Oklahoma City Tornado Case May 3 1999
  - Good lead time on all warnings (up to 1 hour)
  - Doppler radar and AWIPS were key
  - 44 deaths
  - Emergency managers estimated 400+ deaths for similar outbreak in past
- NWS overall
  - Over 300,000 warnings past 10 years
  - Performance has significantly improved



# NWS Tornado Warning Skill Scores



# AWIPS Spinoffs



- FX-net - Prototype thin client
  - Used for fire weather & some universities
- FX-Collaborate
  - NWS, FAA, DHS
- GFE - Taiwan, Australia, private industry
- ALPS - Advanced version of AWIPS
  - Current prototype platform
    - HMT, Probability