Engineering Research Center for
Collaborative Adaptive Sensing of the Atmosphere

CASA DFW
Urban Demonstration Network

Cedar League, University of Colorado Colorado Springs
Brenda Philips University of Massachusetts

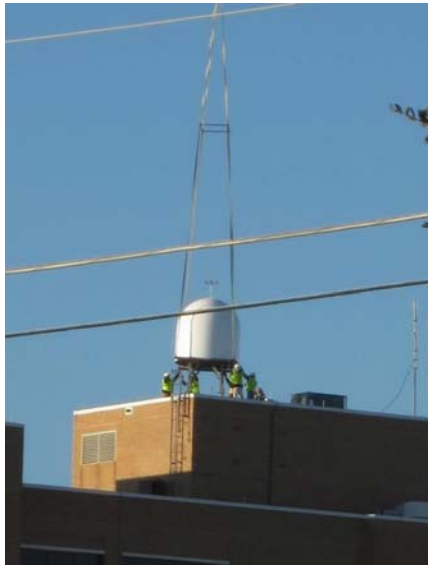
Integrated Warning Team Meeting
March 6, 2013

University of Massachusetts Amherst
University of Oklahoma
Colorado State University
University of Puerto Rico Mayaguez

CASA is primarily supported by the Engineering Research Centers Program of the National Science Foundation under NSF award number 0313747.

Cutting Edge Radars for North Texas

University of Texas Arlington Installation



Multi-Sector Partnership

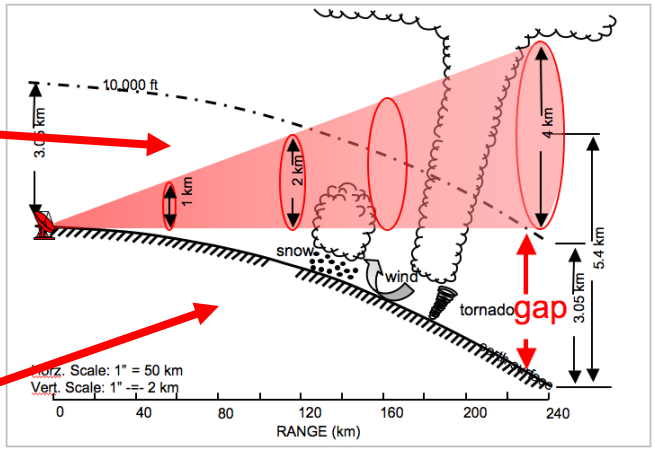
- CASA Engineering Research Center
- North Central Texas Council of Governments, Emergency Preparedness' CASA WX Executive Board
- National Weather Service Office of Science and Technology, Southern Region Headquarters, Fort Worth Forecast Office

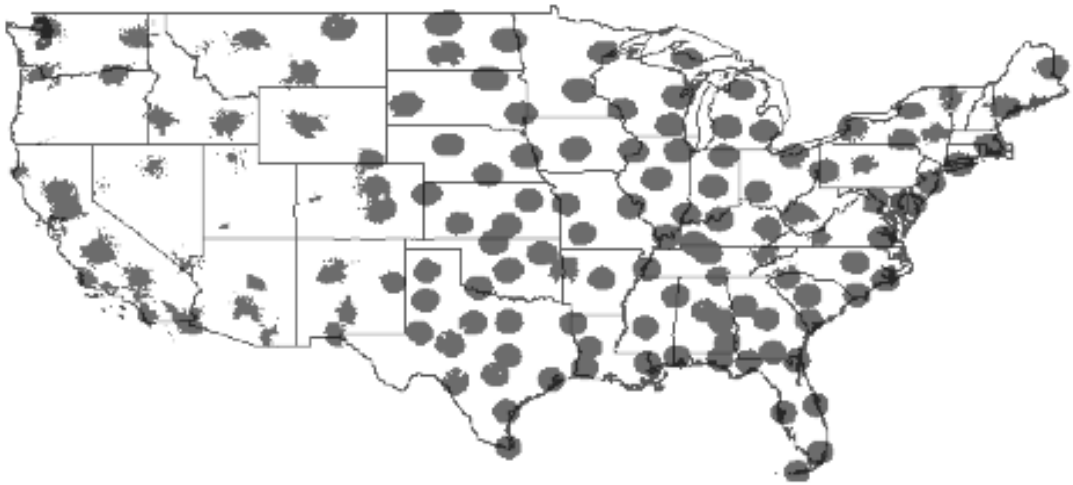
CASA Engineering Research Center

- National Science Foundation Engineering Research Center, 10 year, $40 million grant 2003 - 2013
  - Academic, Government and Private Sector Partners
  - Interdisciplinary research
- CASA's Focus: End-to-end, X-band radar systems for improved hazard response
- Research to operations, and user-driven focus
- 10-year research project, last year!
- Test beds in Oklahoma and Puerto Rico for research and validation, now the DFW metroplex

What are the gaps in the current US radar system (NEXRAD)?

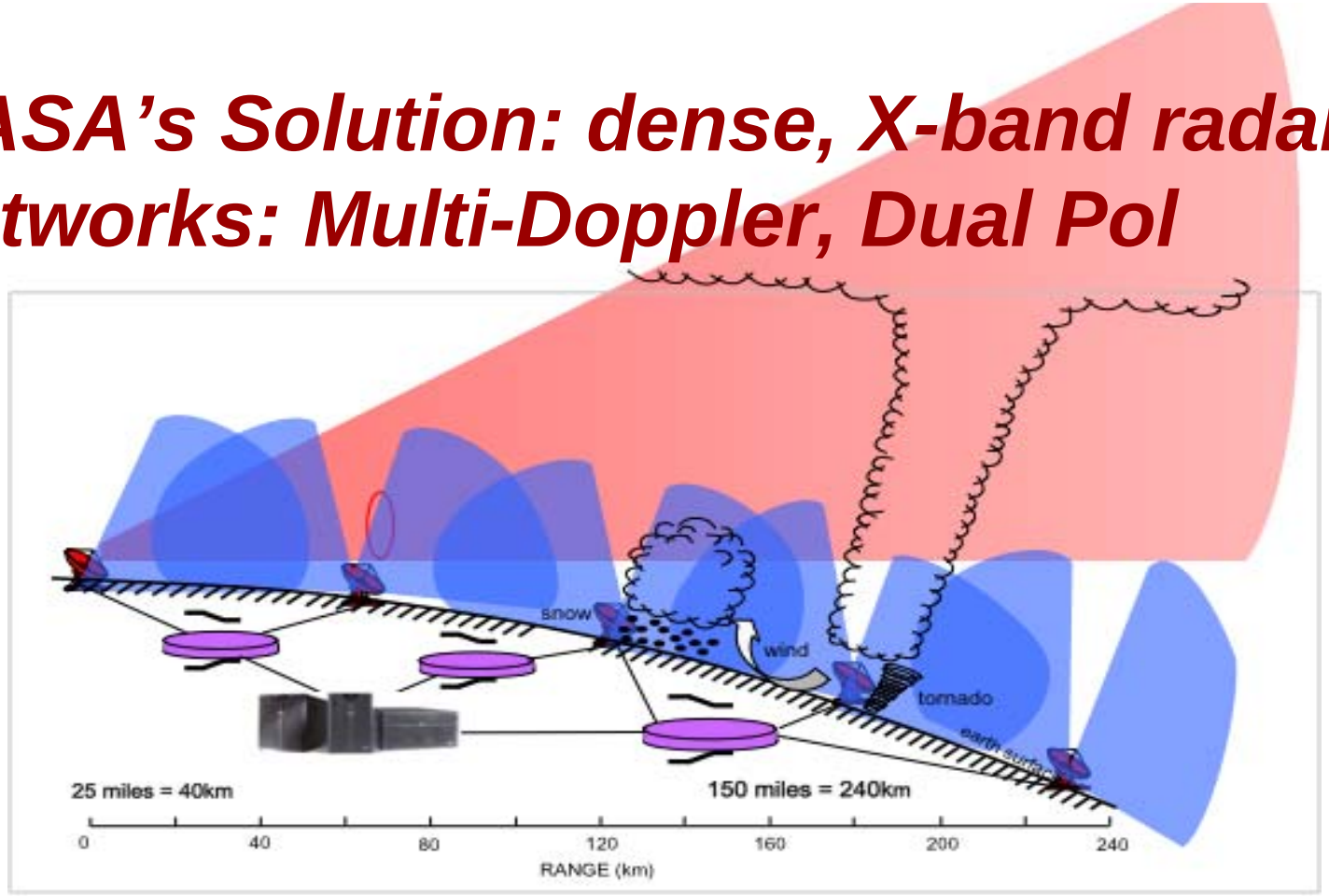
NEXRAD coverage at 3 km (10,000 ft).



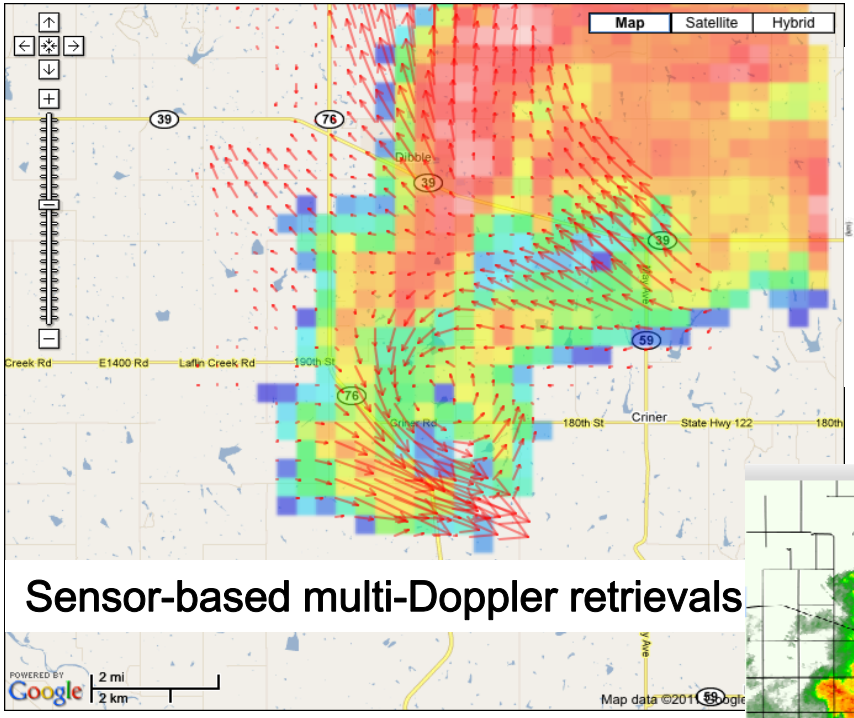


NEXRAD coverage at 1 km (~3200 ft) AGL.

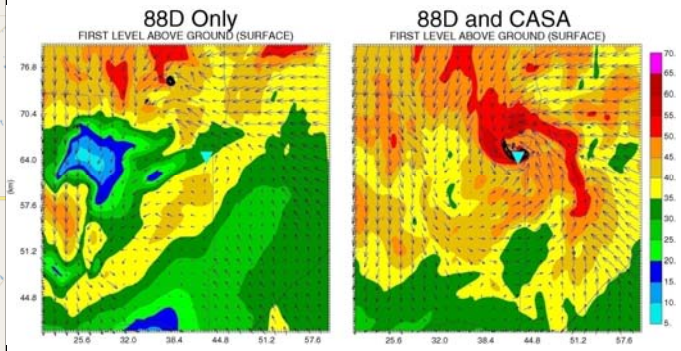
CASA's Solution: dense, X-band radar networks: Multi-Doppler, Dual Pol



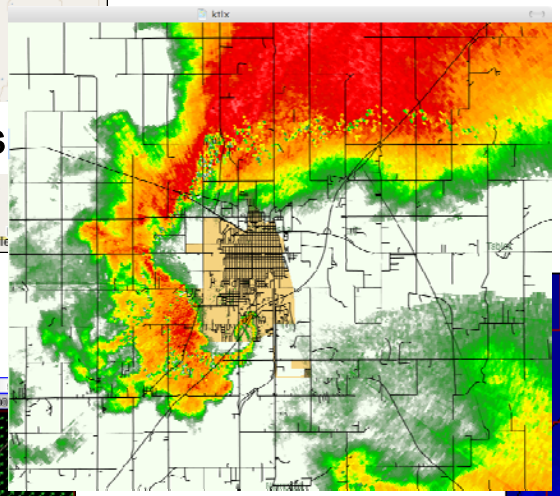
	CASA	NEXRAD
Low level sensing	Coverage below 1km	30% coverage below 1km
Data Granularity	100m to 250m	1km – 4km
Update rate	1 minute	5 minutes
Radar Scanning Strategies	Smart Scans, adaptive, optimized each minute	Autonomous 360 degree scans

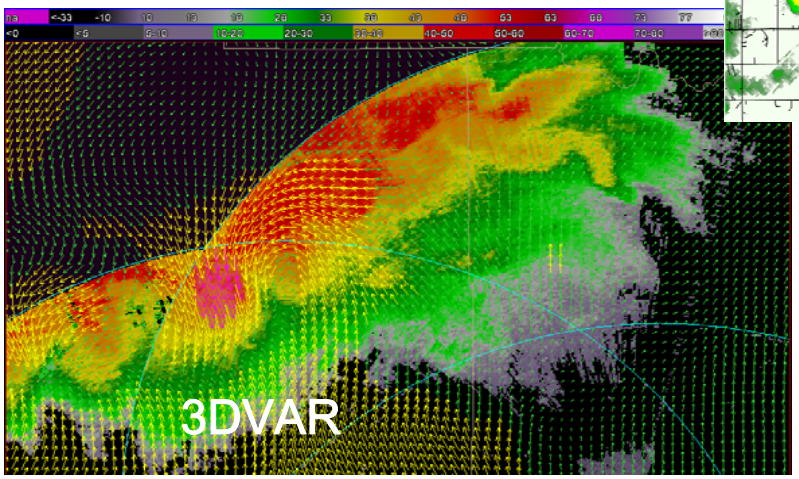


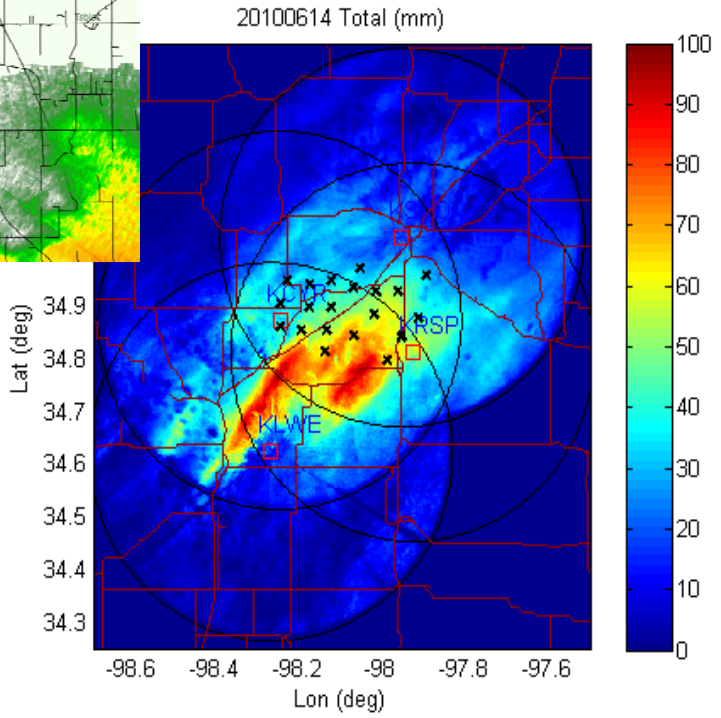
Sensor-based multi-Doppler retrievals

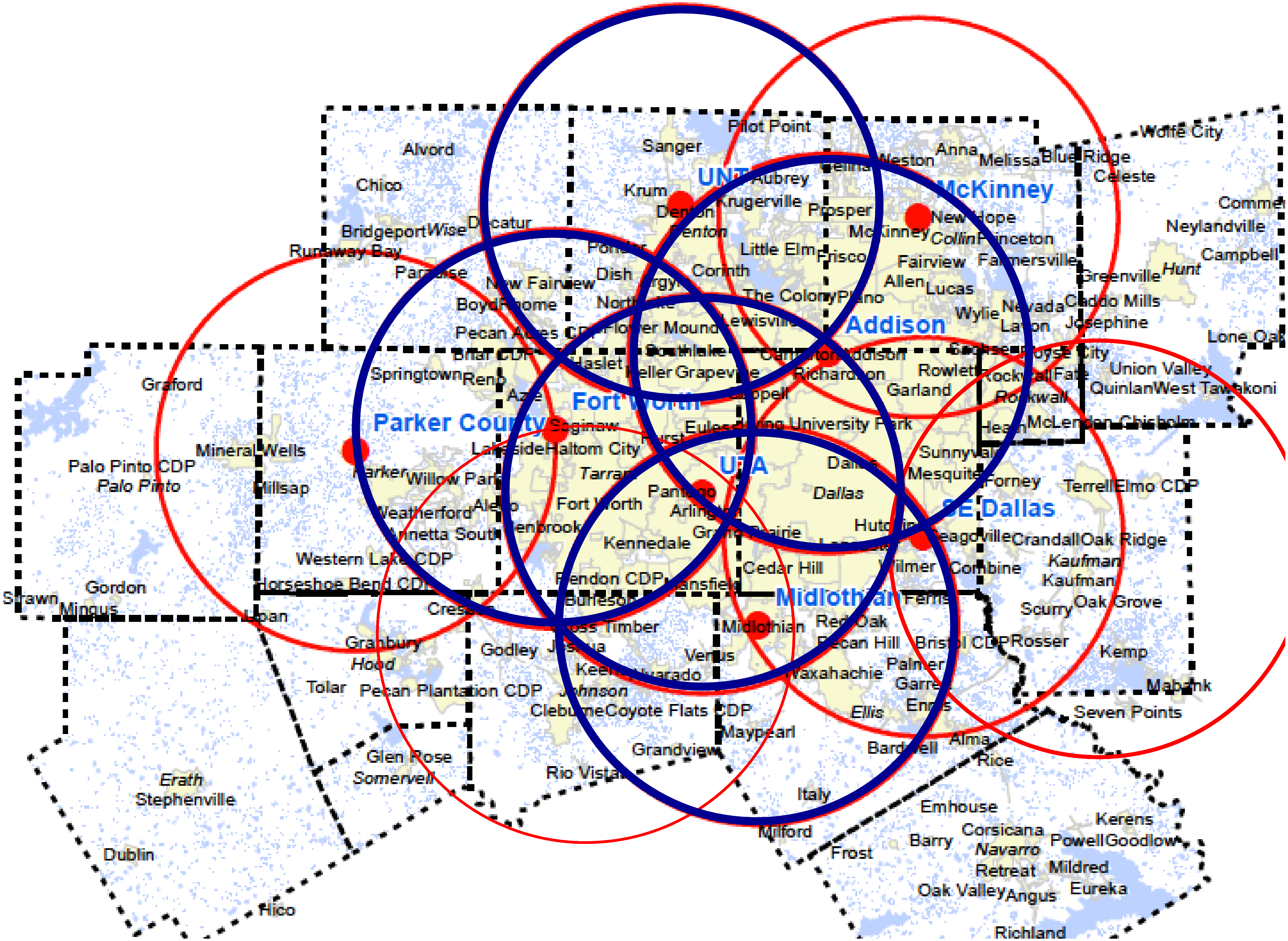


80 minute tornado forecast

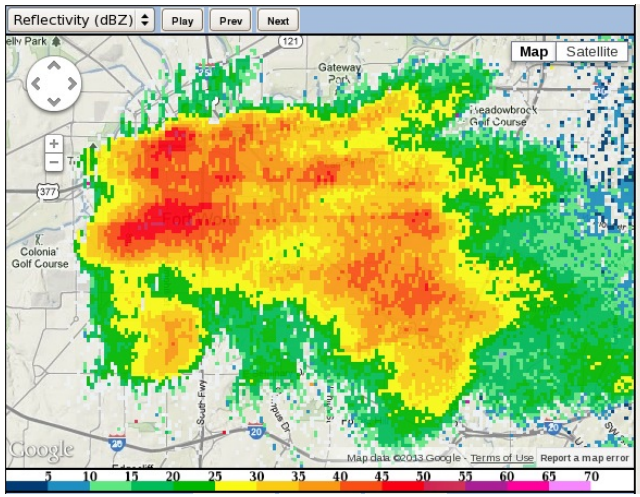


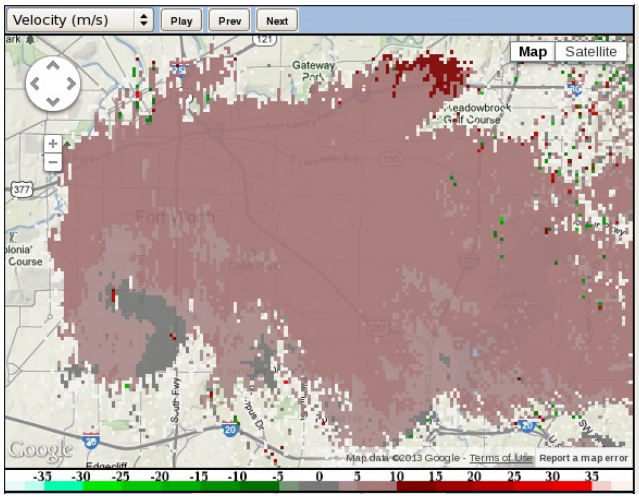


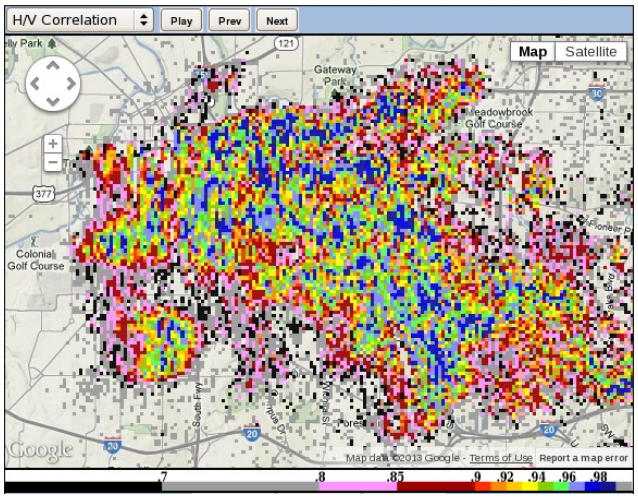



UNT
McKinney
Addison
Parker County
Fort Worth
UTA
SE Dallas
Wolfe City
Pilot Point
Sanger
Alvord
Chico
Anna
Melissa
Celeste
Krum
Krugerville
Prosper
New Hope
Neylandville
Bridgeport
Wise
Runaway Bay
Little Elm
Frisco
Corinth
Fairview
Farmersville
Campbell
Hunt
Greenville
Dish
Allen
Lucas
The Colony
Plano
Wylie
Nevada
Caddo Mills
Josephine
Lone Oak
Boyd
Graford
Springtown
Rowlett
Union Valley
Richardson
Garland
Haltom City
Mineral Wells
Palo Pinto CDP
Palo Pinto
Millsap
Willow Park
Sunnyvale
Mesquite
Forney
Dallas
Weatherford
Kennedale
Western Lake CDP
Cedar Hill
Wilmer
Combine
Crandall
Oak Ridge
Kaufman
Gordon
Strawn
Mingus
Rendon CDP
Horseshoe Bend CDP
Granbury
Hood
Tolar
Godley
Pecan Plantation CDP
Coyote Flats CDP
Midlothian
Red Oak
Pecan Hill
Rosser
Scurry
Oak Grove
Kemp
Waxahachie
Palmer
Mabank
Seven Points
Ellis
Glen Rose
Somervell
Erath
Stephenville
Grandview
Rio Vista
Maypearl
Italy
Alma
Rice
Emhouse
Kerens
Corsicana
Barry
Navarro
Powell
Goodlow
Frost
Milford
Dublin
Hico
Retreat
Mildred
Eureka
Oak Valley
Angus
Richland

January 10, 2013: First Data from Univ. of Texas Arlington Radar!







Integrated Warning System

- National Weather Service : Southern Region Headquarters, Fort Worth Forecast Offices
  - Data integrated into AWIPS
  - Geographically Specific Warnings
- Local Broadcast Media
- Emergency Managers
- Hospitals
- Public Response
- Weather Impacted Industry

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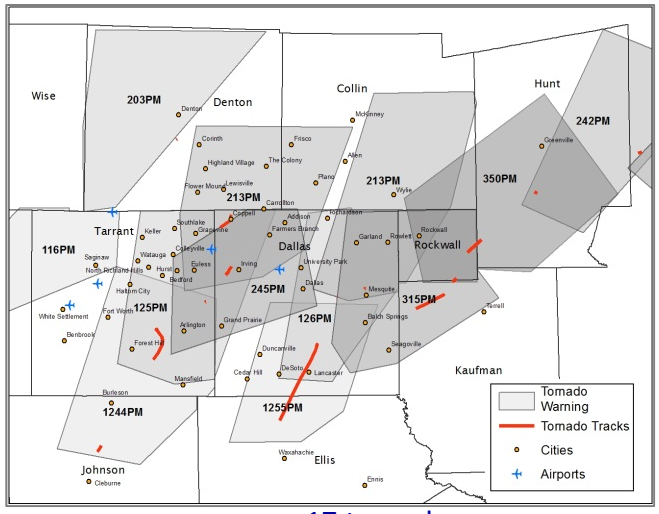
Integrated Warning System Research - DFW

- Focus Groups
  - July 2011 – EM Decision-Making
  - June 2012 – EM and NWS Response to April 3
- Post Event Survey
  - April 3 Tornado Outbreak
  - Summer 2012
  - 51 EMs completed survey
  - Summary of results included in registration packets
- IWT Registration Survey
  - Communication among IWT on April 3
  - 116 completed surveys

DFW Metroplex
Tornado Outbreak April 3, 2012
Time & Space

April 3
Tornado
Warnings
and Tracks



17 tornadoes
0 fatalities
29 injuries
>$700 million damages

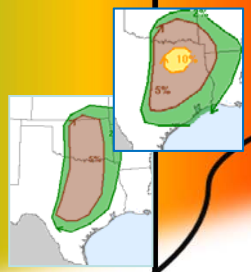
75,000 sq mi
50,000 sq mi
25,000 sq mi
0 sq mi
25,000 sq mi
50,000 sq mi
75,000 sq mi

E-W Space Scale N-S

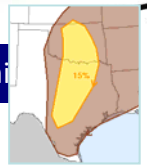
Area (mi^2)

12am
4am
8am
12pm
2pm
4pm
6pm
8pm

APRIL 2
APRIL 3
Time Scale



Day 1 Prob. Tornado Outlooks 5-10%



Day 2 Conv. Outlook 15%

SVR watch issued 9:20am

TOR watch issued 12:10pm

1st TOR warning issued 12:44pm

18 TOR &
55 SVR warnings issued

Last TOR warning issued 5:36pm

Last SVR warning issued 8:14pm

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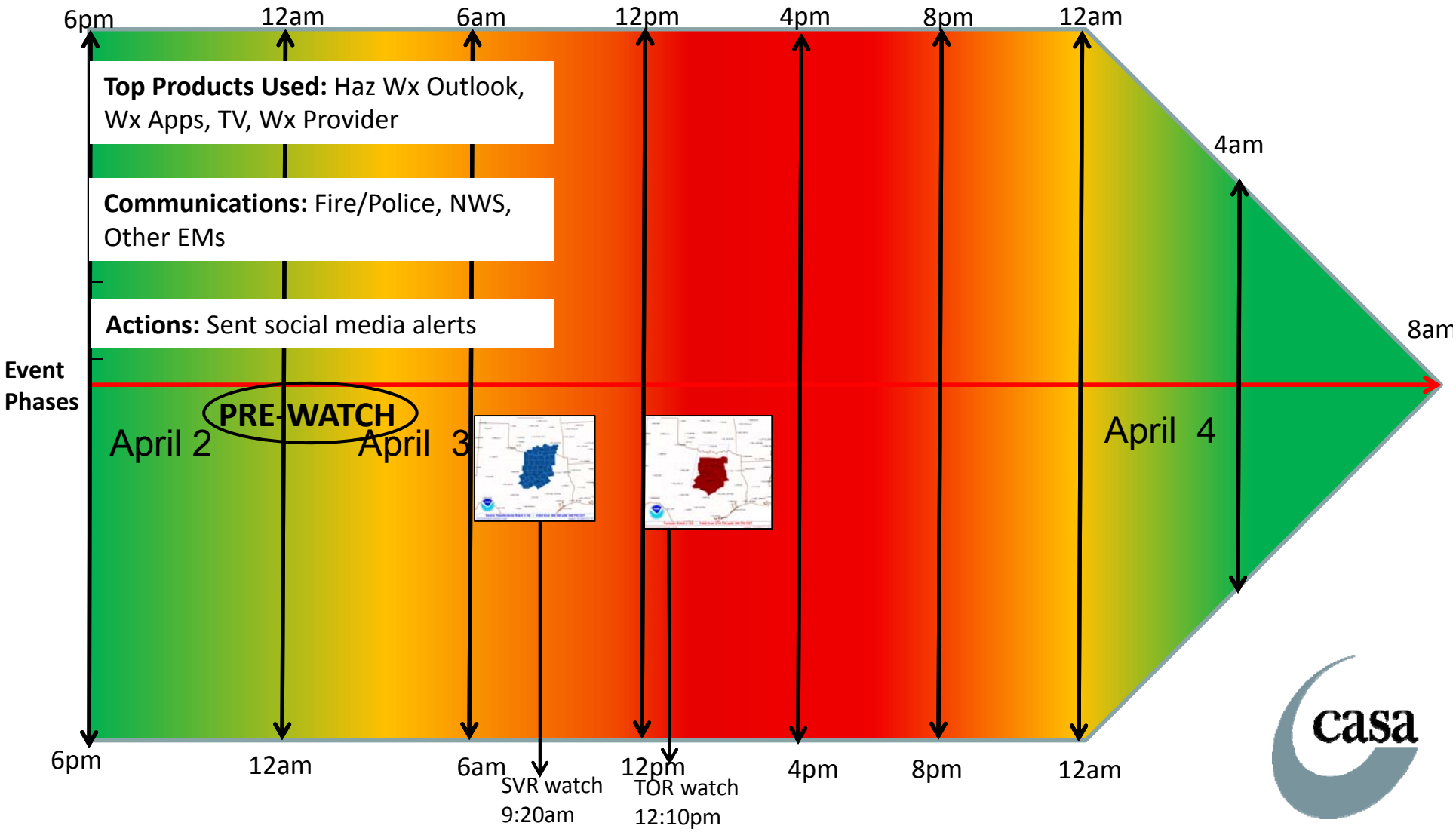
DFW Metroplex
Tornado Outbreak April 3, 2012
Emergency Manager Timeline



DFW Metroplex
Tornado Outbreak April 3, 2012
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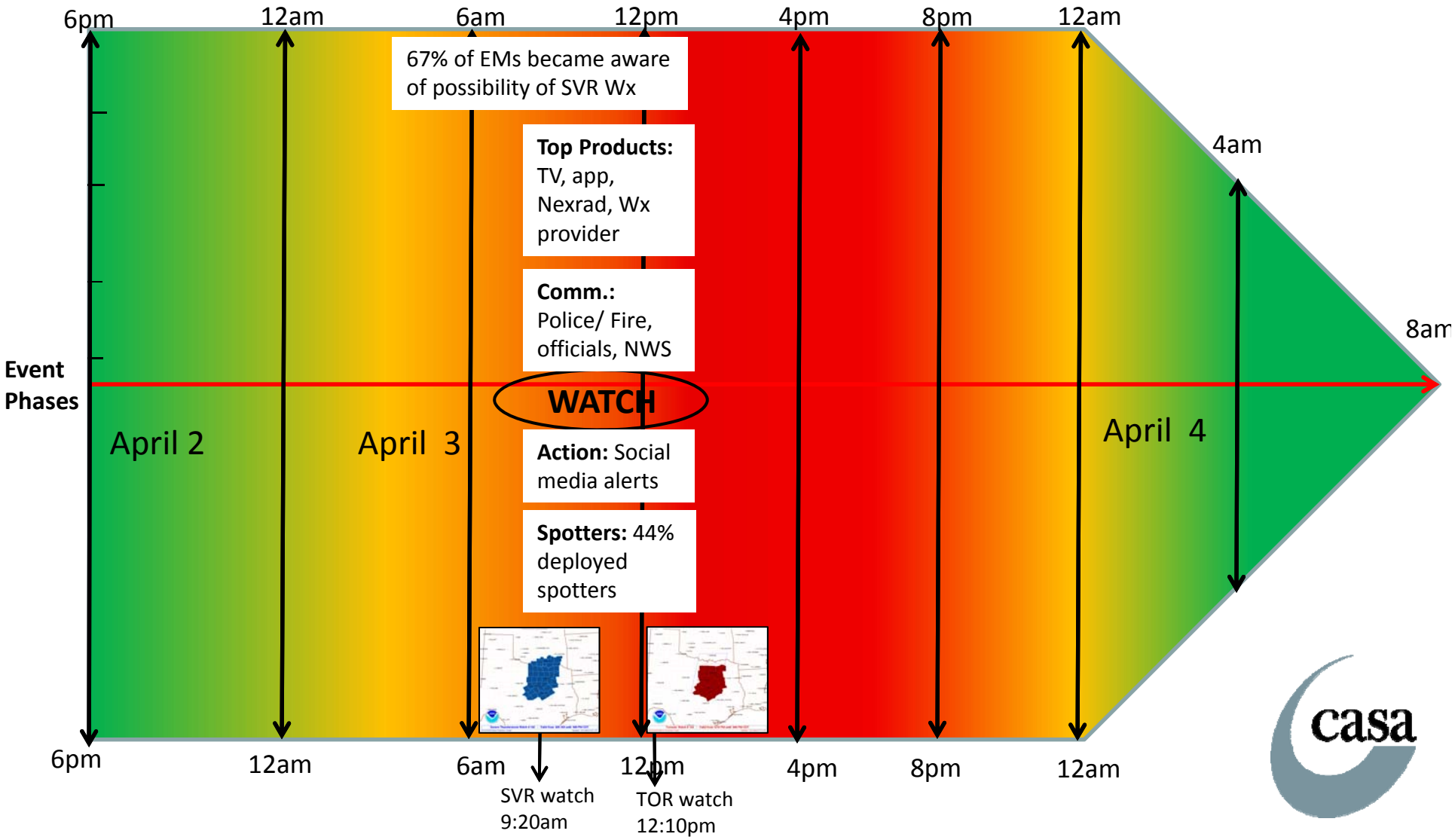

DFW Metroplex
Tornado Outbreak April 3, 2012
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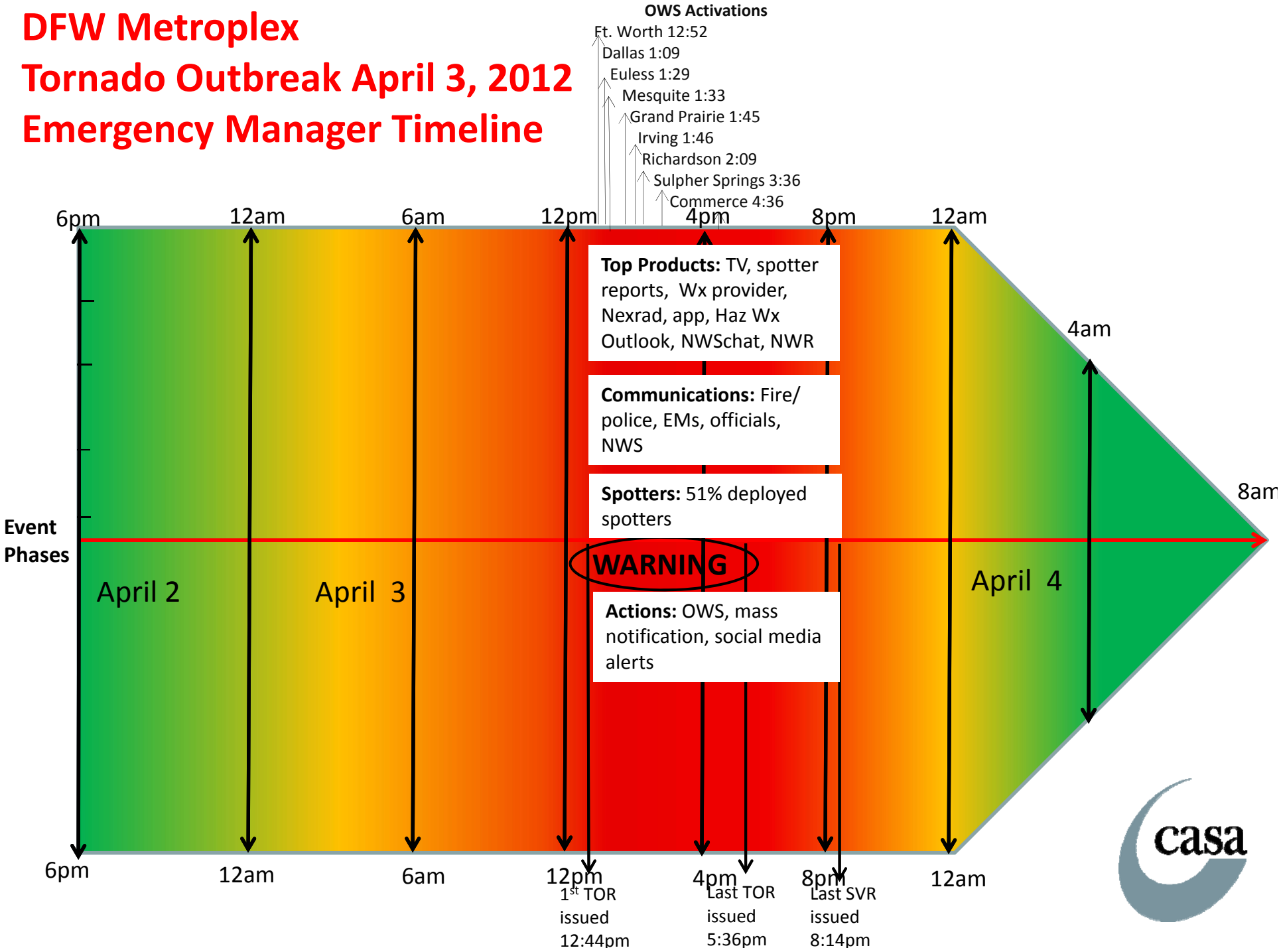
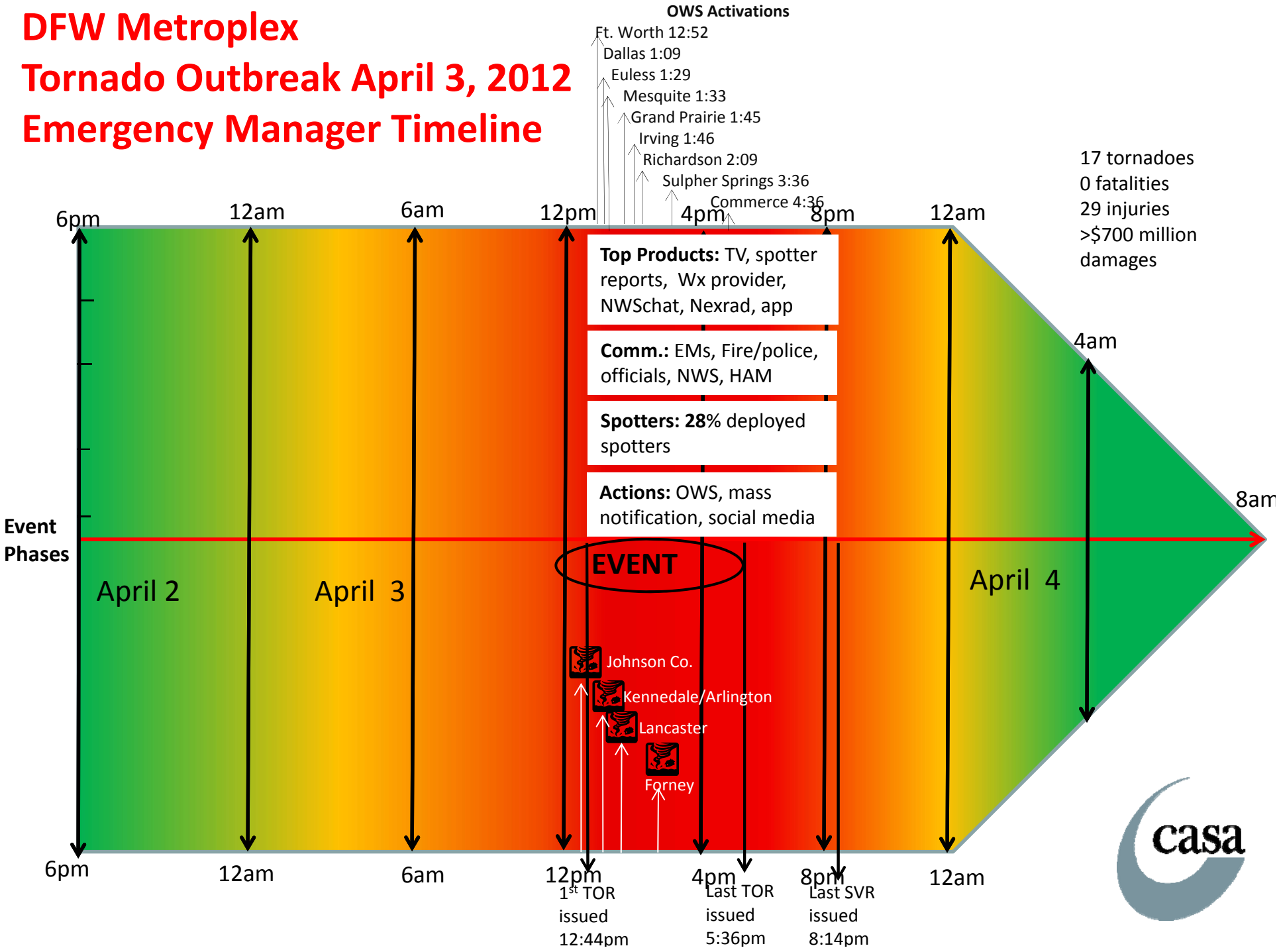


DFW Metroplex
Tornado Outbreak April 3, 2012
Emergency Manager Timeline

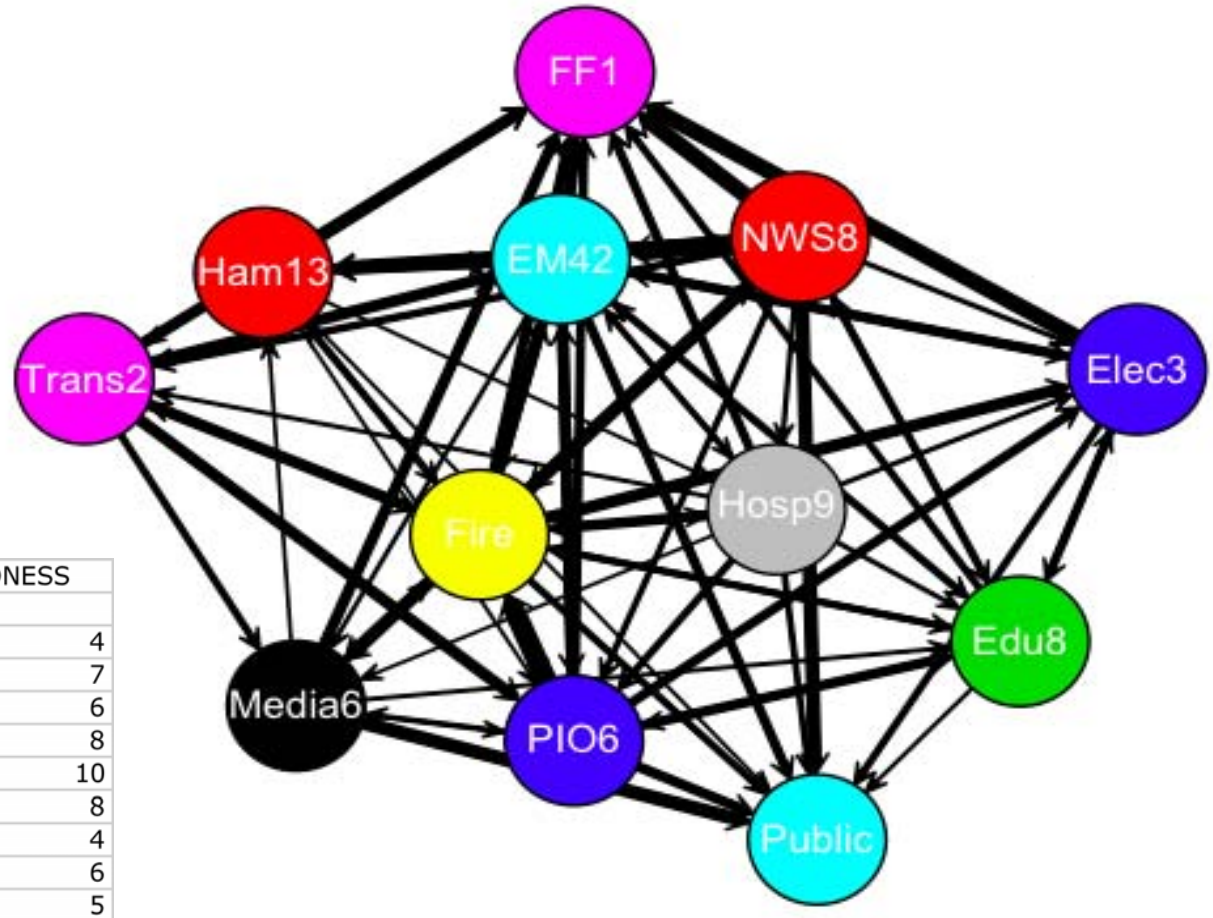


IWT Registration Survey – April 3

- During each phase of the event, who did you directly PROVIDE information to & RECEIVE information from?
- How did you receive/provide information
- Social Network Analysis of IWT

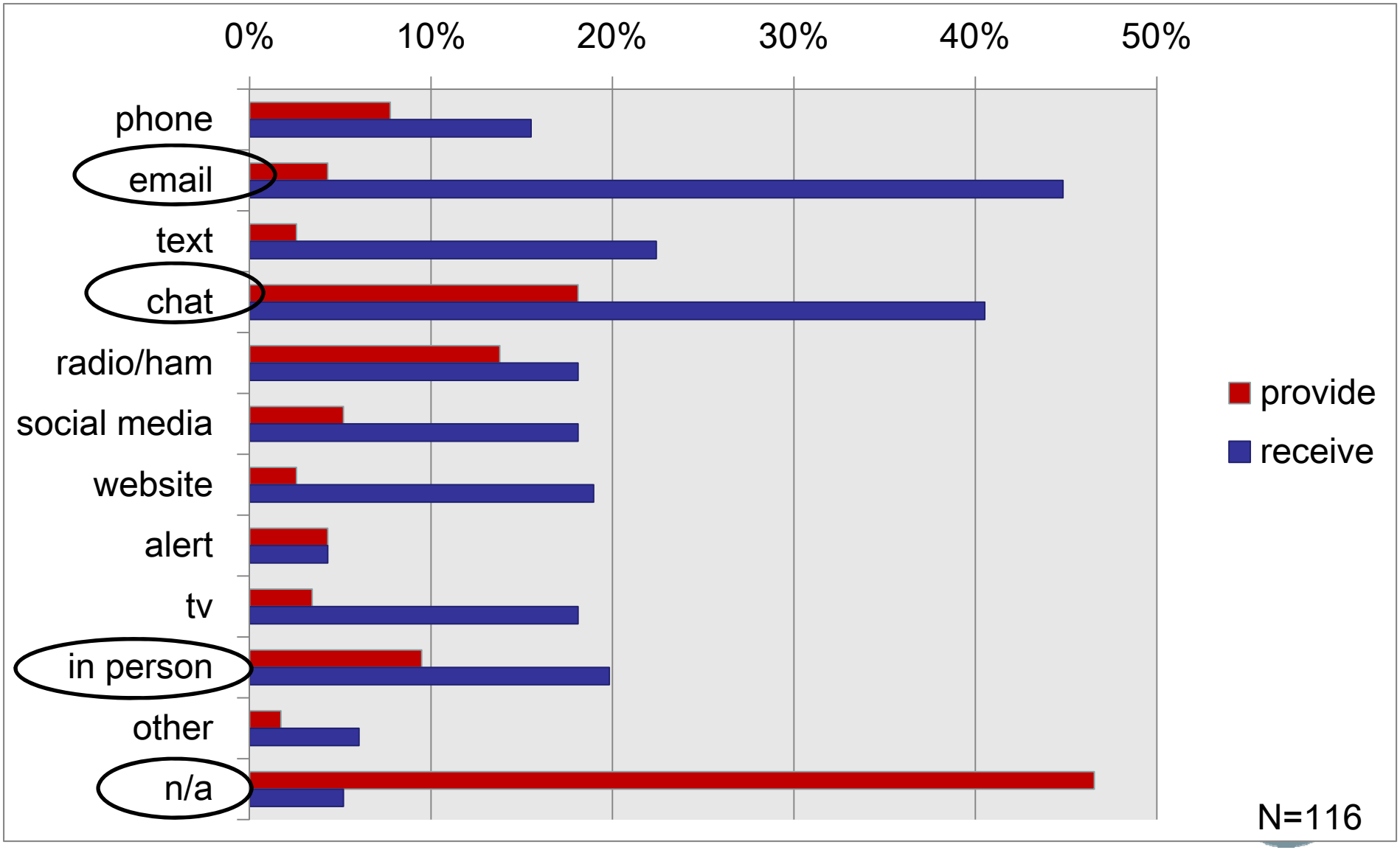
Integrated Warning System Communications

Information Provided during all Phases of Event

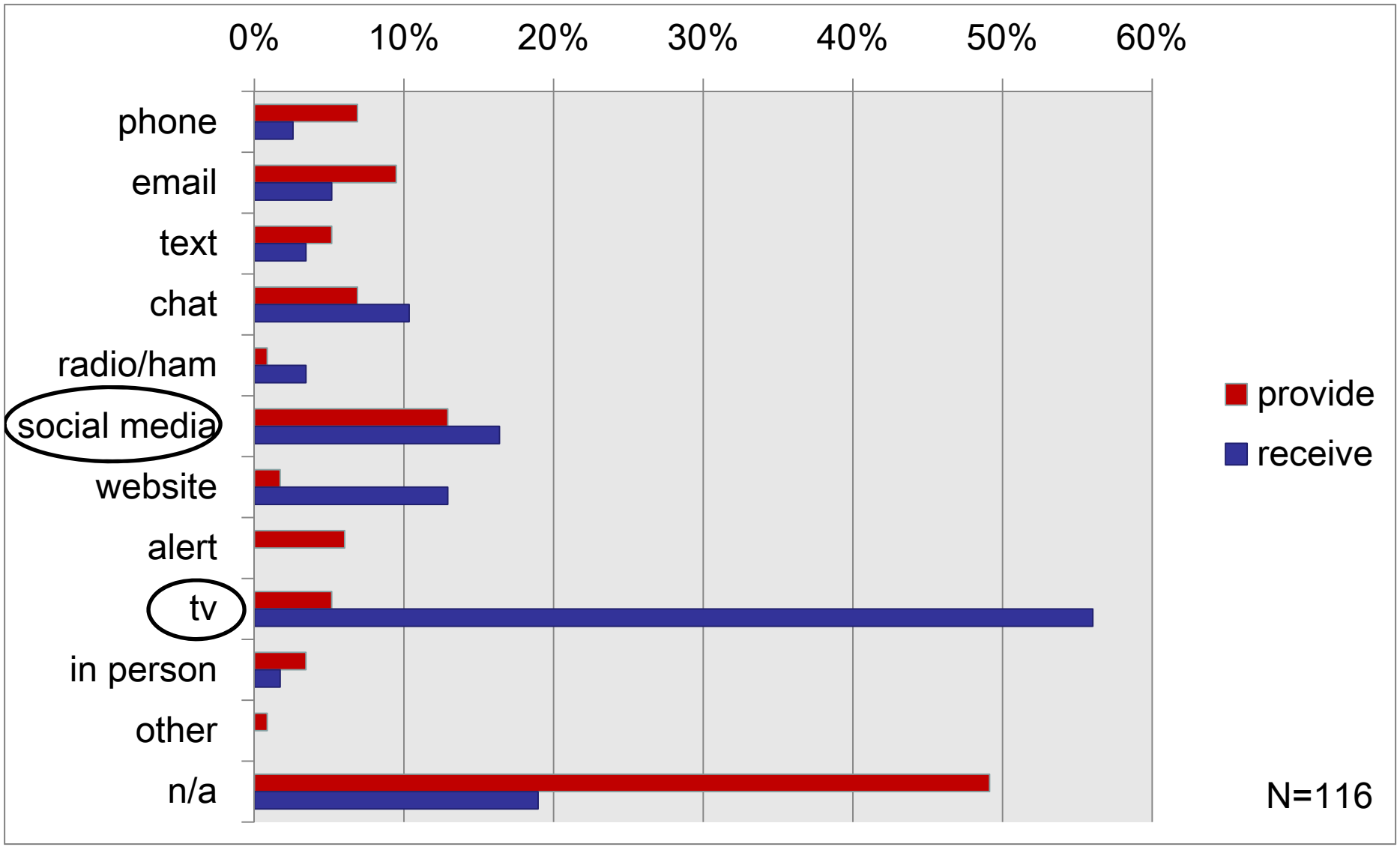


DEGREE > CONNECTEDNESS	
Ham	4
Education	7
Elected_Official	6
Emergency_Mgmt	8
FF	10
Fire	8
Hospital	4
Media	6
NWS	5
PIO	8
Public	9
Transportation	5

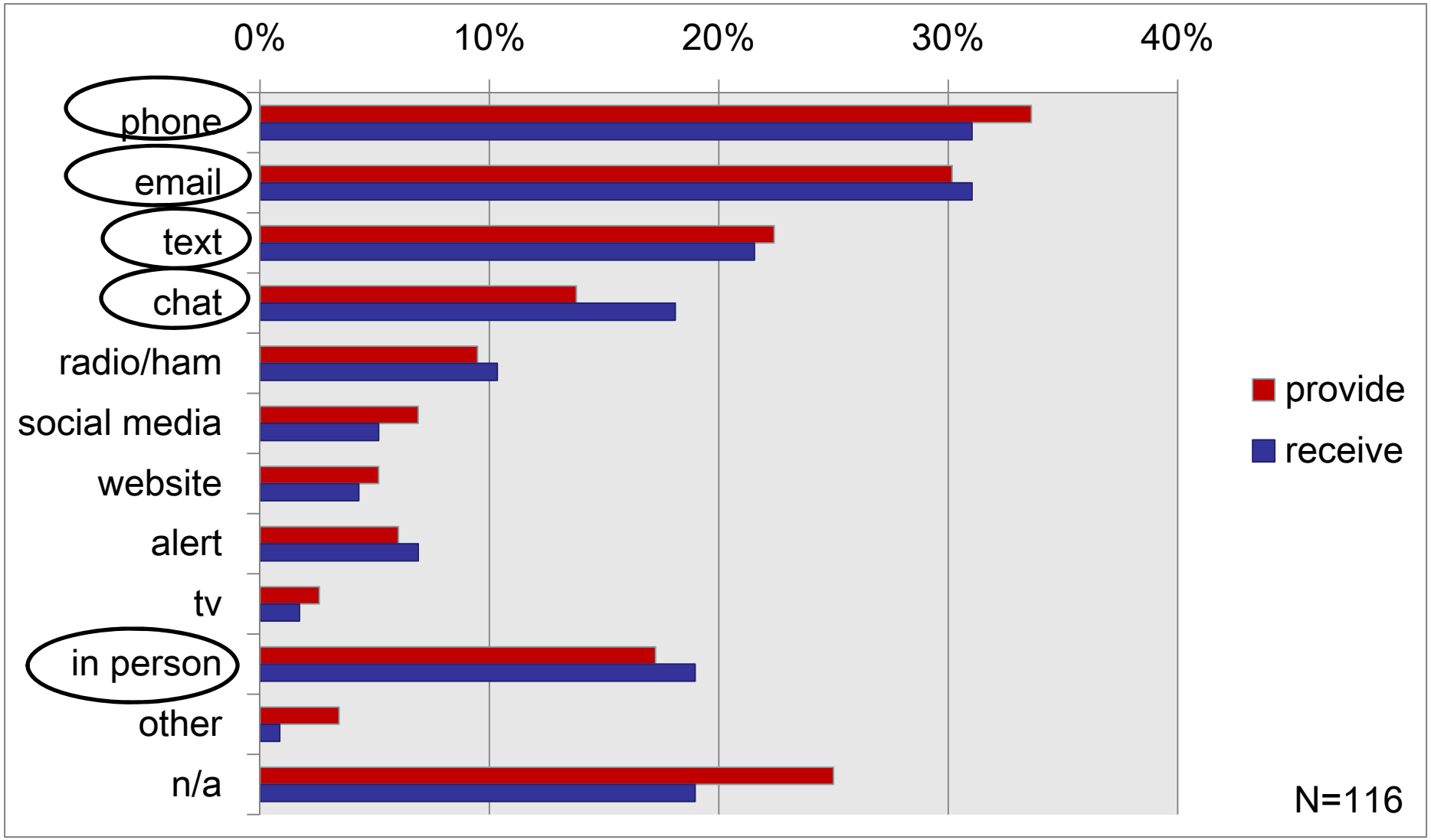
How did you PROVIDE/RECEIVE information to/from the NWS?



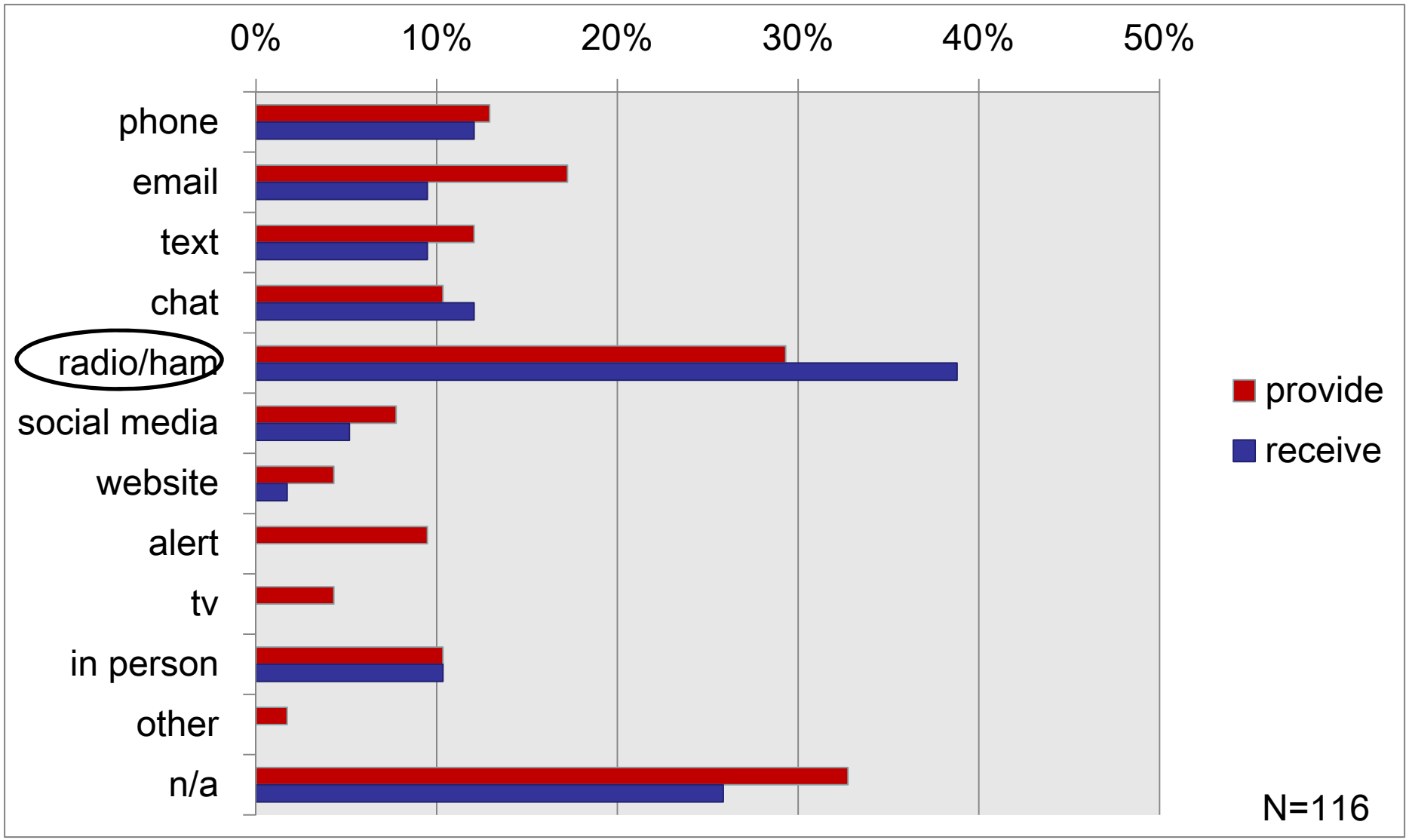
How did you PROVIDE/RECEIVE information to/from the Media?



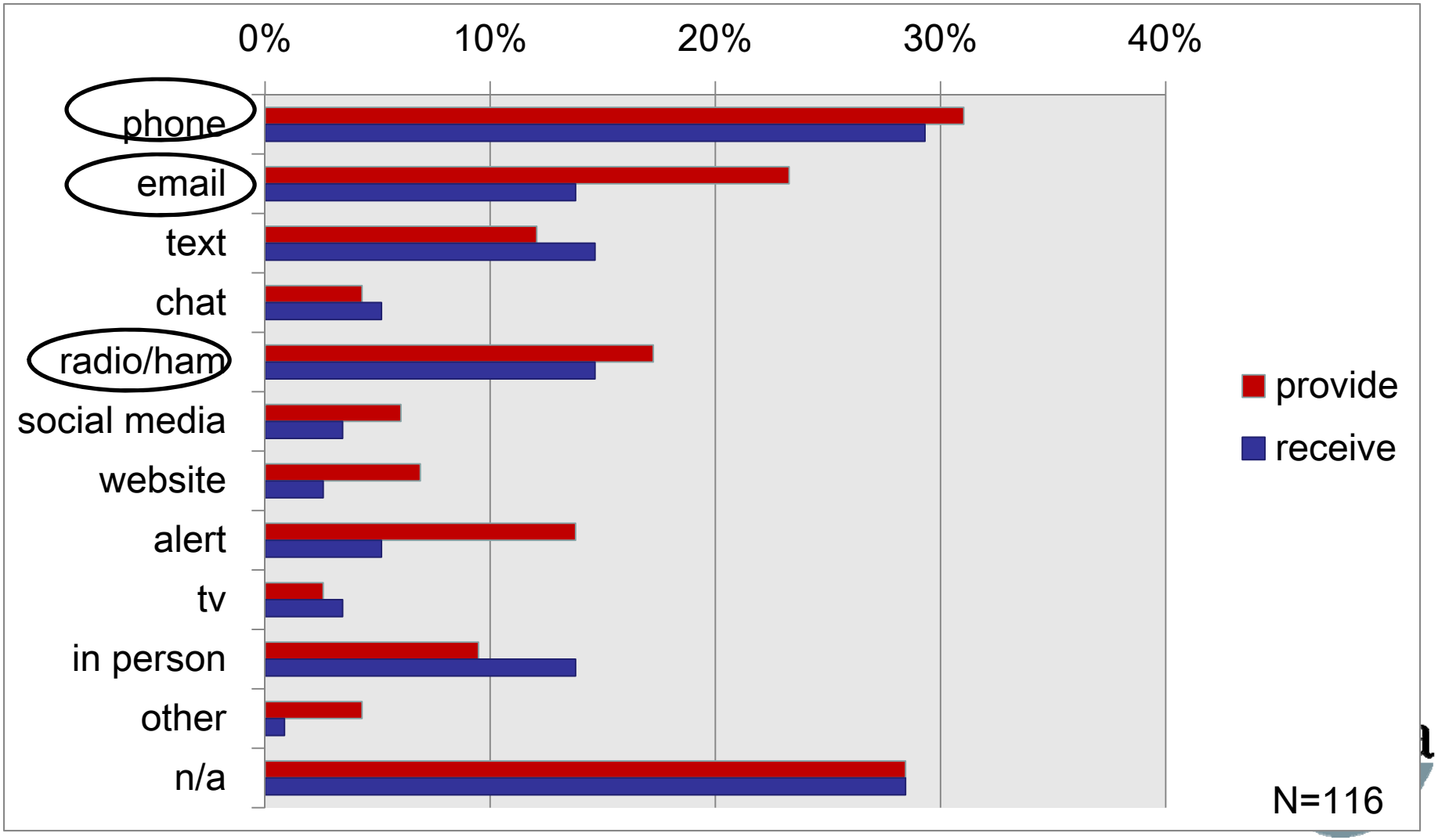
How did you PROVIDE/RECEIVE information to/from EMs?



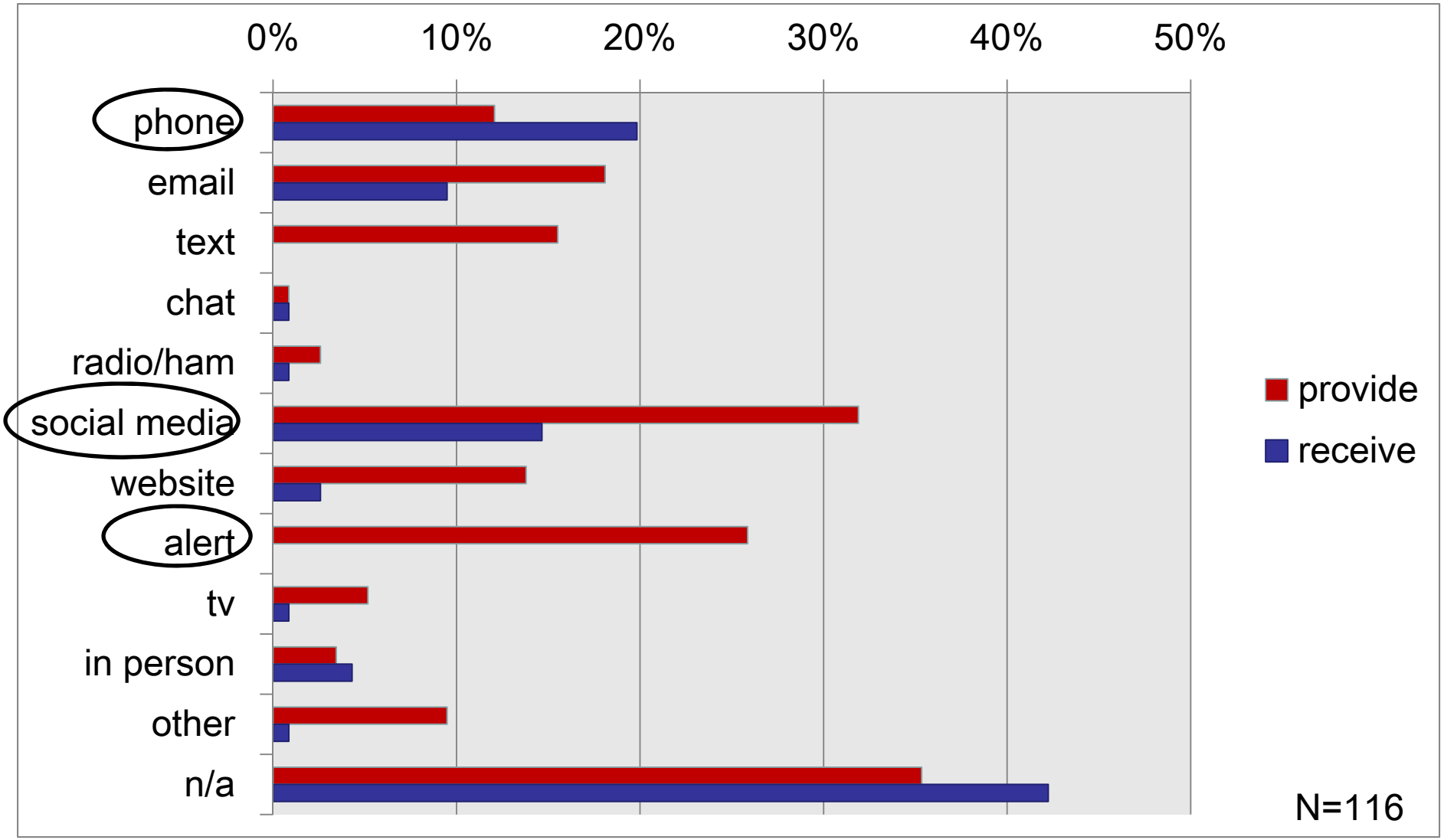
How did you PROVIDE/RECEIVE information to/from Amateur Radio Operators/Spotters?



How did you PROVIDE/RECEIVE information to/from Police/Fire/Dispatch?



How did you PROVIDE/RECEIVE information to/from the Public?



Next Steps

- Analyze network by communication method
- Analyze network by phase of event
- Geographic region, urban vs. more rural, warning in place.