A High Resolution Communication Analysis of the Integrated Warning Team During the 26 December 2015 Sunnyvale/Garland/Rowlett TX Tornado

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National Weather Service

26 December 2015 Tornado Outbreak Overview

1 – EF4: Garland, Rowlett, Sunnyvale

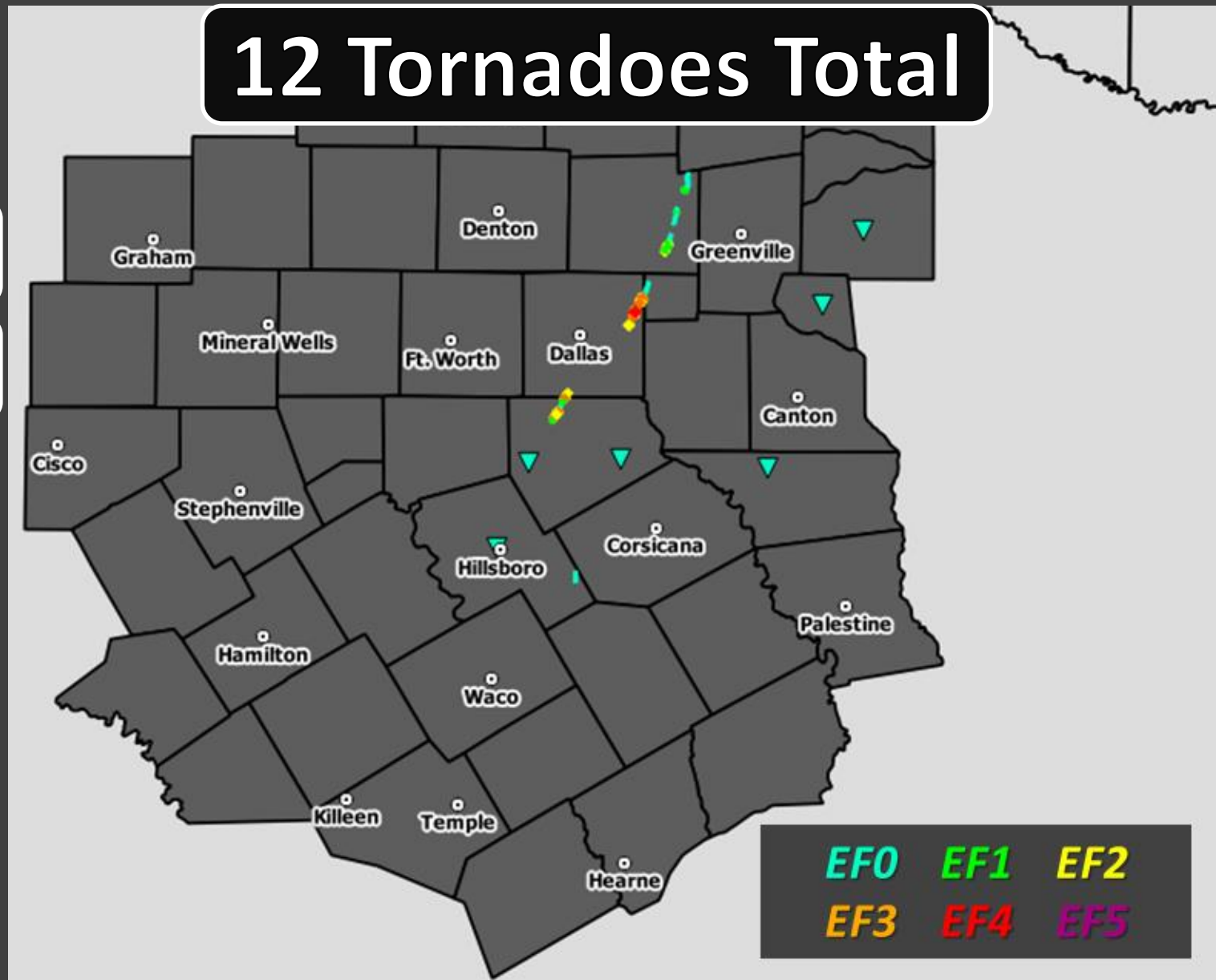
1 – EF3: Ovilla / Red Oak

1 – EF2: Lavon/Copeville

12 Fatalities

633 Injuries

est. $1 billion




45°
10:07
NEWS
6abc

Warning Systems

We're all trying to get people in harm's way to DO SOMETHING!!

TAKE PROTECTIVE ACTION!!

Available Information

EAS
Emergency Alert System

Watch

Storms will develop soon or are already developing.

Be ready to take action if a warning is issued.

Warning

Severe weather is occuring or will occur shortly at your location.

Take action now!

Wireless Emergency Alerts

SIGN UP FOR

Severe Weather Alerts

“There was no warning… we had no idea it was coming.”

From AAR presentation “Pay Attention to Me!”
-- Mollie Rivas (Garland, TX OEM)

“Trying to process information during the storm can be like trying to take a drink from a fire hydrant”

From AAR presentation “Pay Attention to Me!”
-- Mollie Rivas (Garland, TX OEM)

Warnings don't have intrinsic value!

To have value, a warning must be

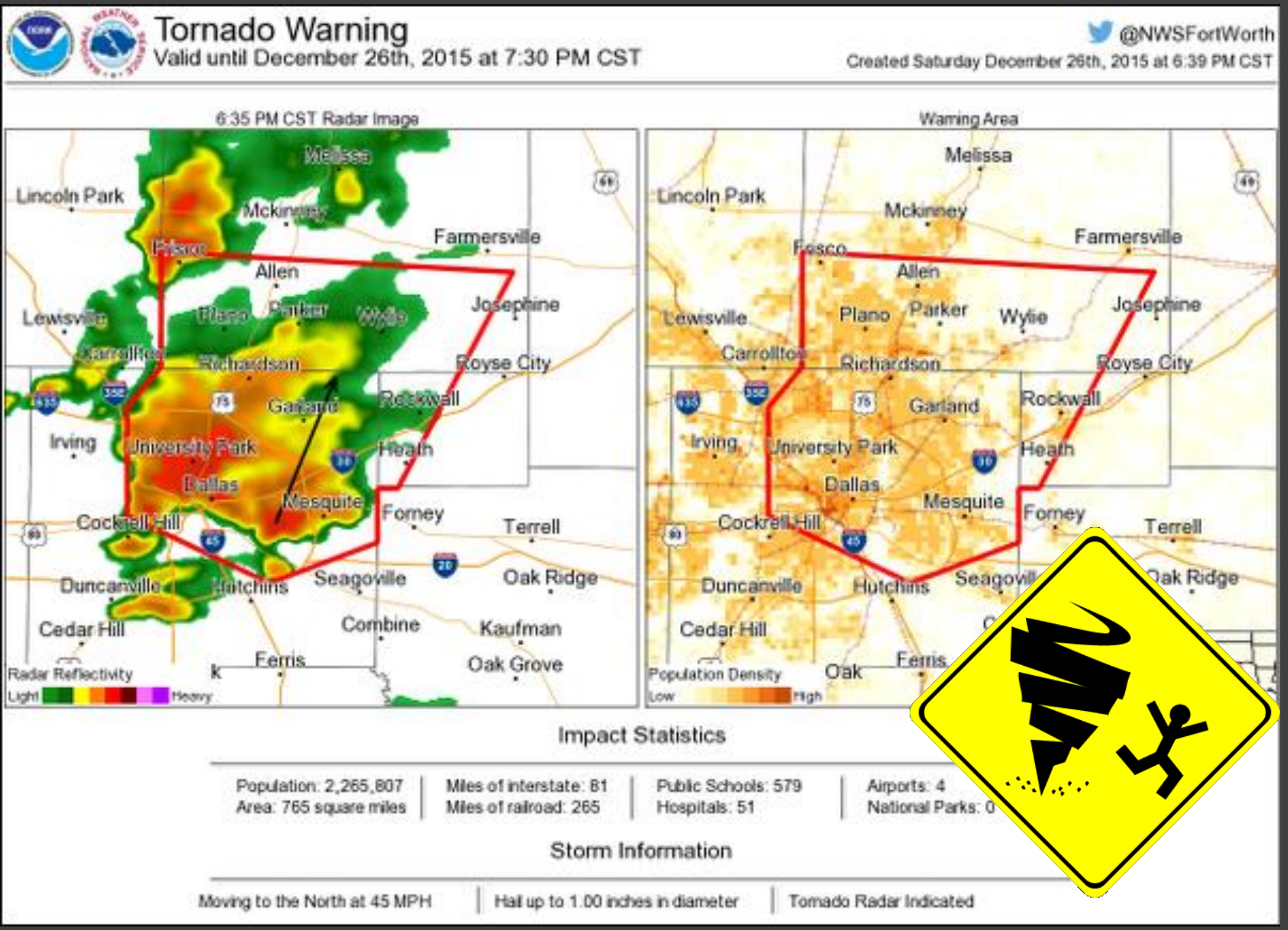
Received

Understood

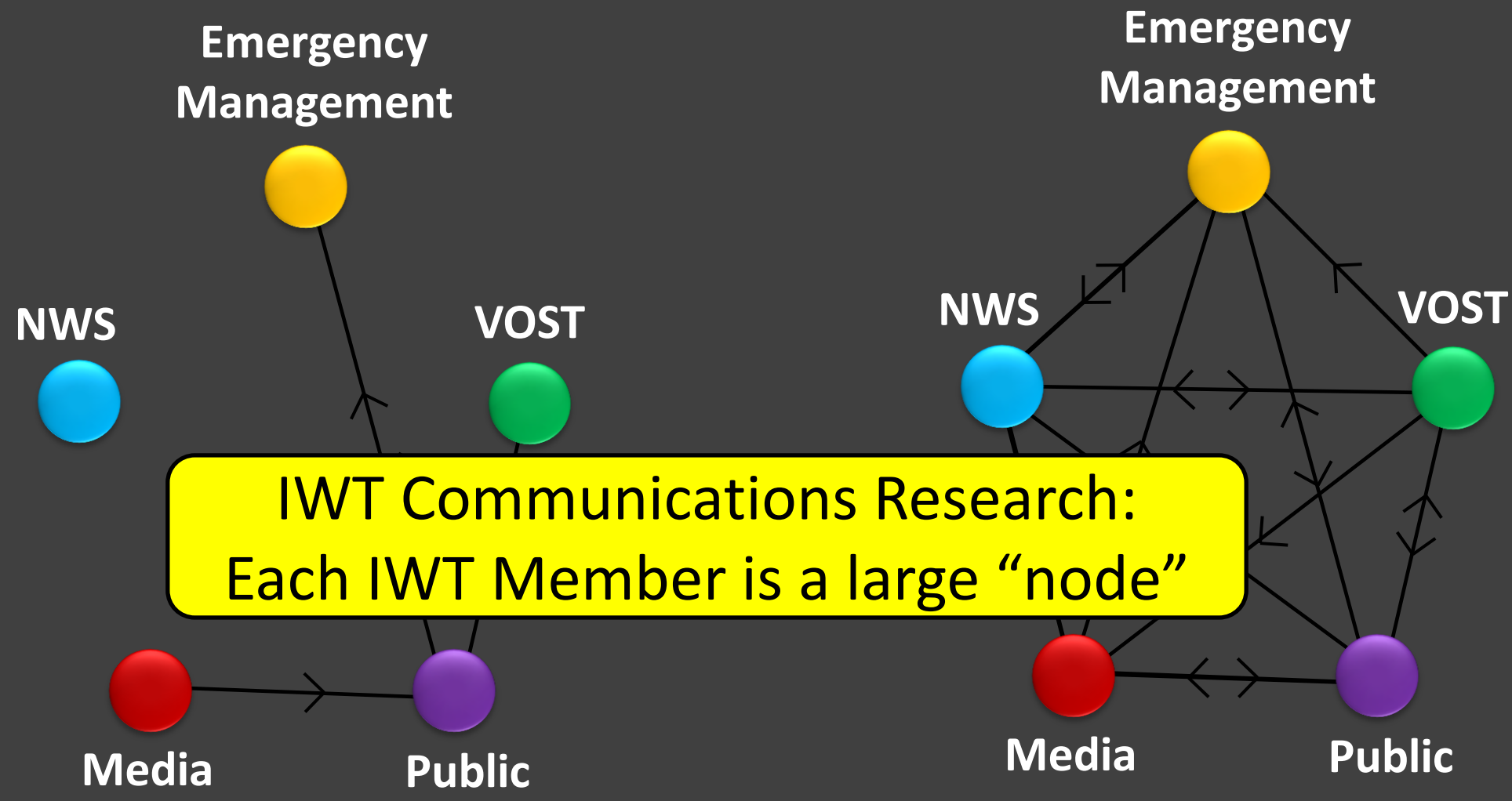
Believed

NWS Perspective

WarnGen



Previous Research: May 15th, 2013 Granbury/Cleburne tornadoes



Summary

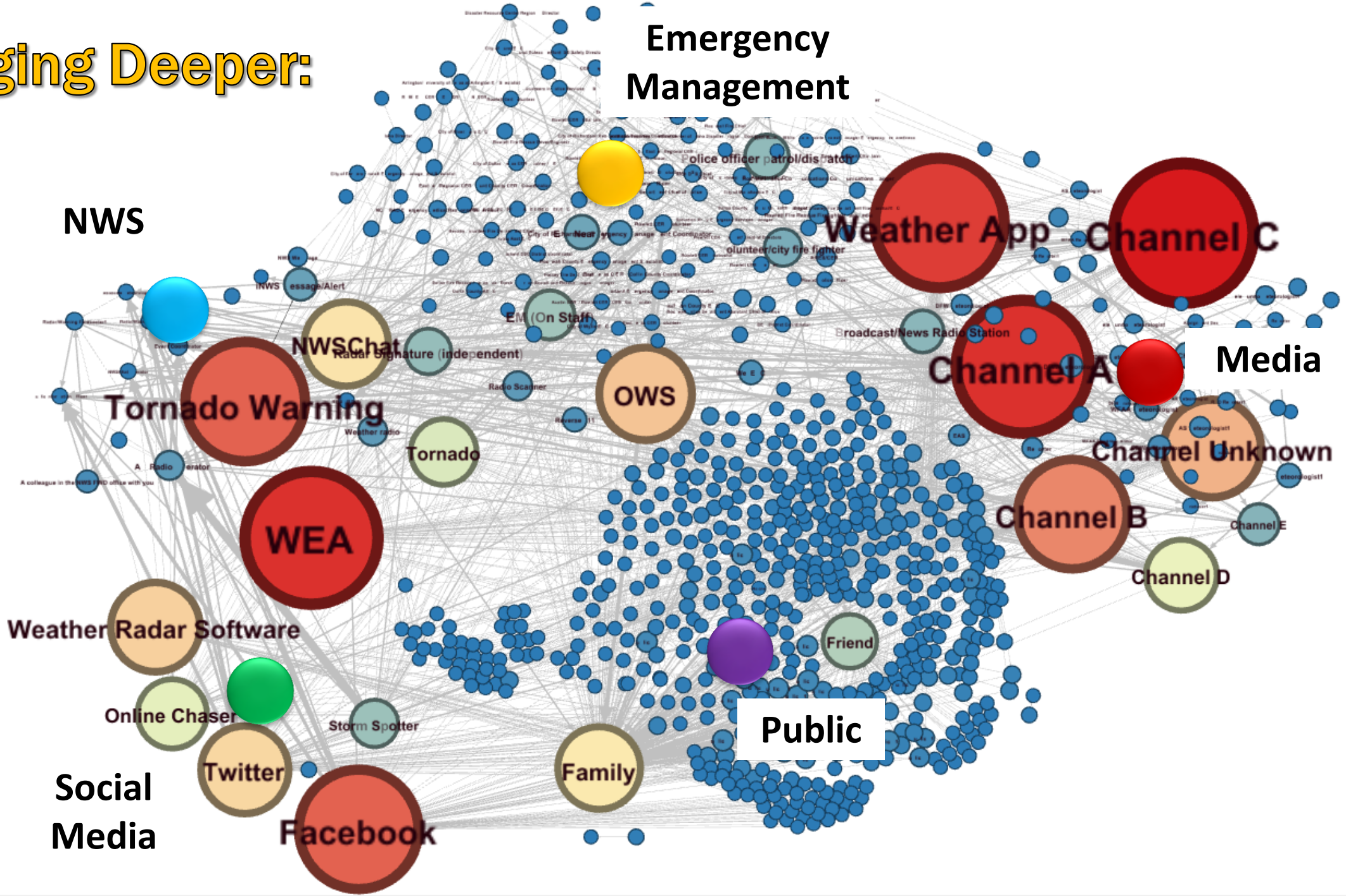
No IWT member is the sole communicator of hazard information.

IWT members must communicate with each other to increase the likelihood that a message will reach the public**.**

More IWT communication = **More opportunities to provide threat confirmation**

For the NWS … Warning DOES NOT STOP after hitting "Send"!

Digging Deeper:



How was the research done?

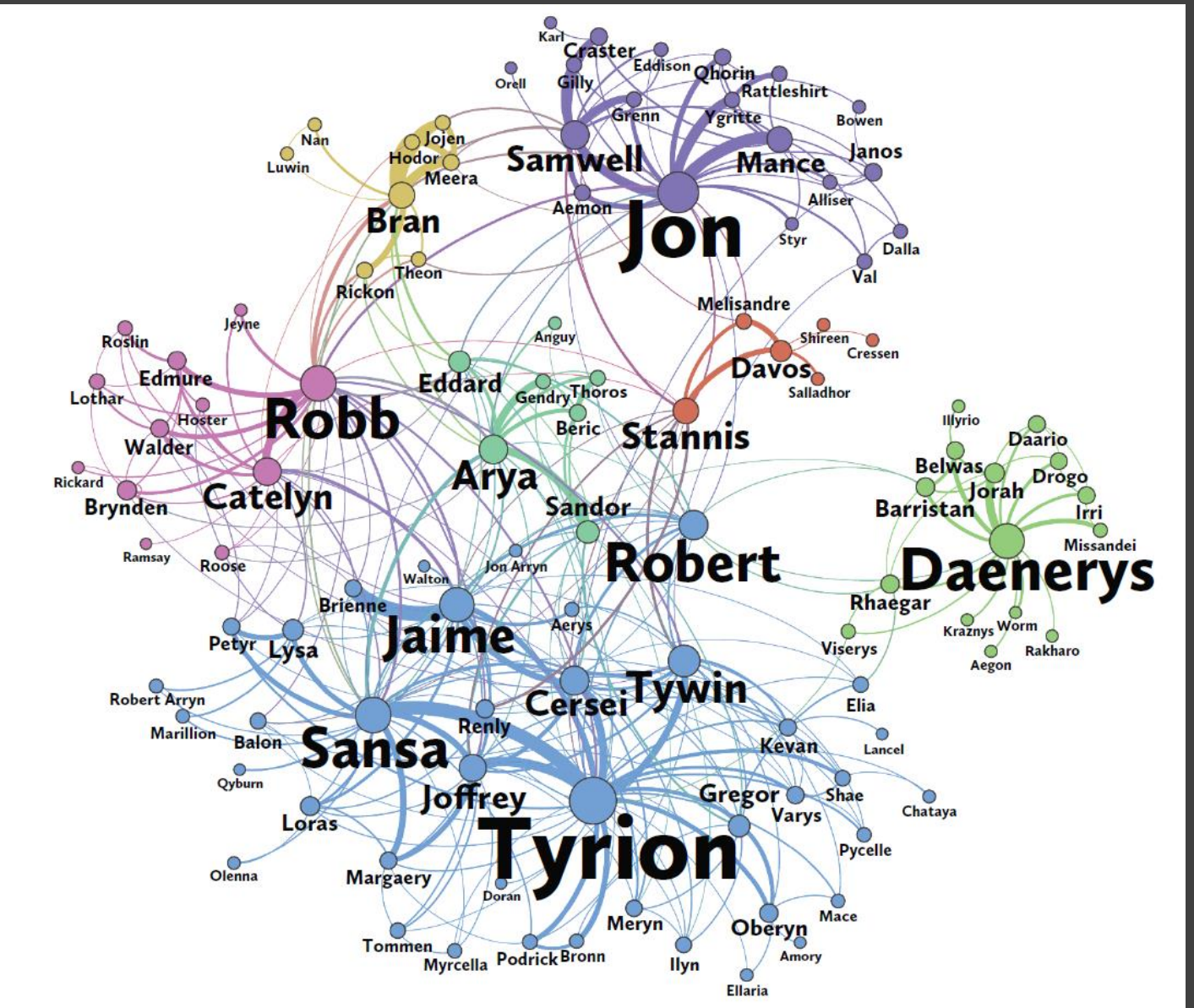
Survey results from

- Public (549)
- Emergency Managers (94)
- NWS staff and amateur radio (11)
- Local Media (22)
- Resulted in 3,139 documented communications

Asked

- Where they found out about the tornado from first
- Who they told
- Where they got additional information about the storm

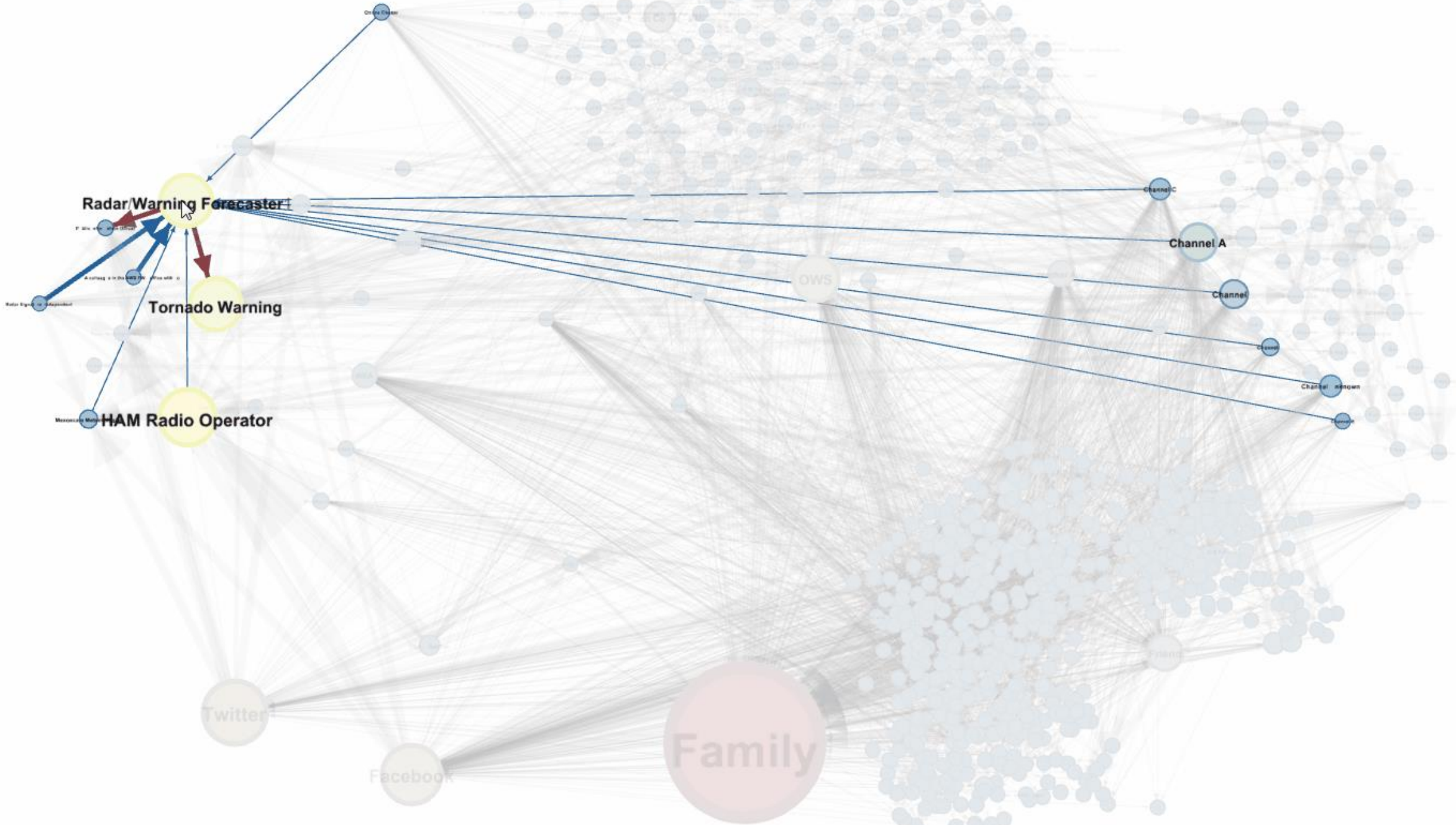
Social Network Analysis



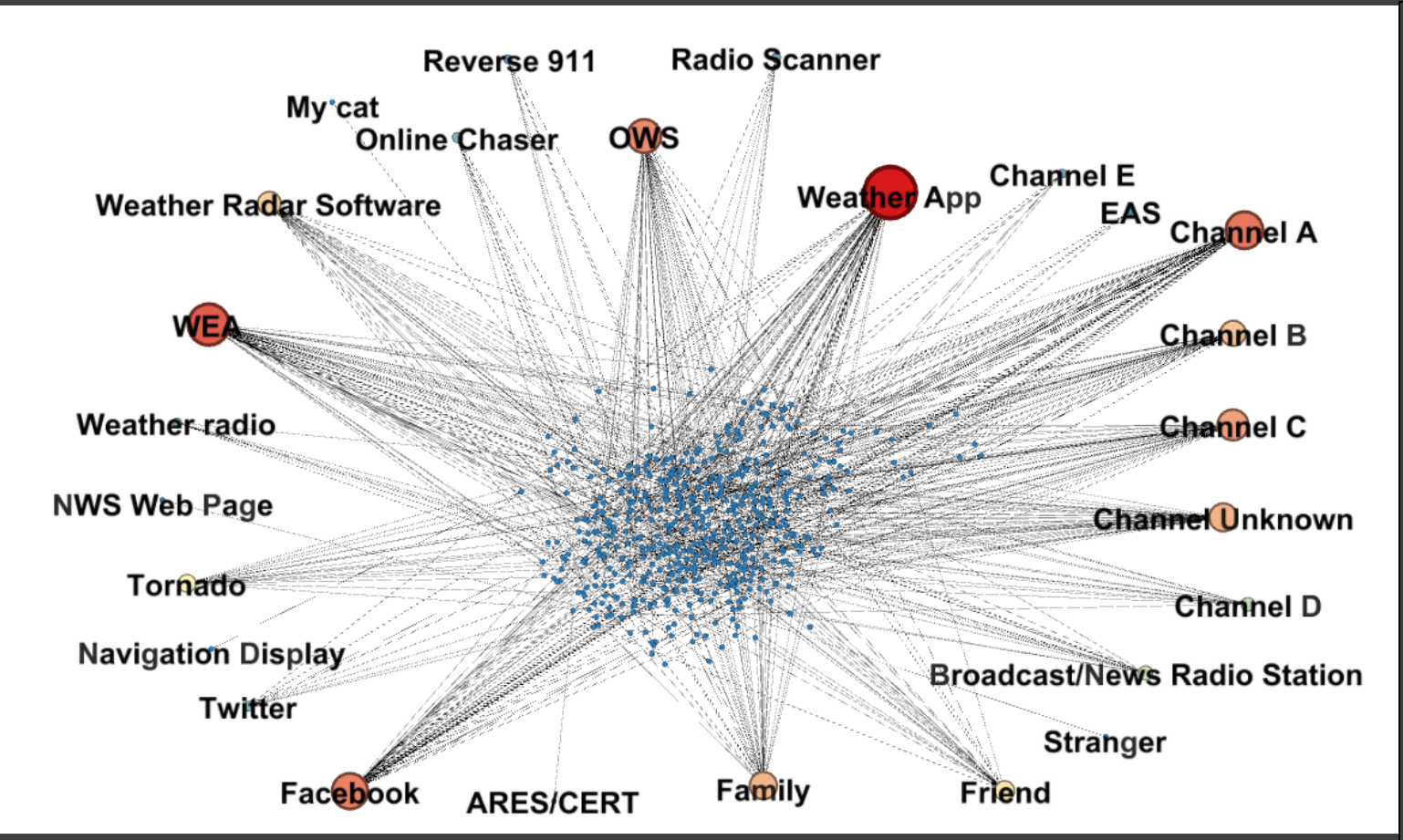
Analyzes a network of people and relationships to understand the flow of information

Each person represents a node with edges connecting them to show their relationship

This can show where potential breakdowns in communication and potential weak points in the IWT did or could occur


Radar/Warning Forecaster
Tornado Warning
HAM Radio Operator
Channel A
Channel
Twitter
Facebook
Family

Public Only: How did you first receive a warning?



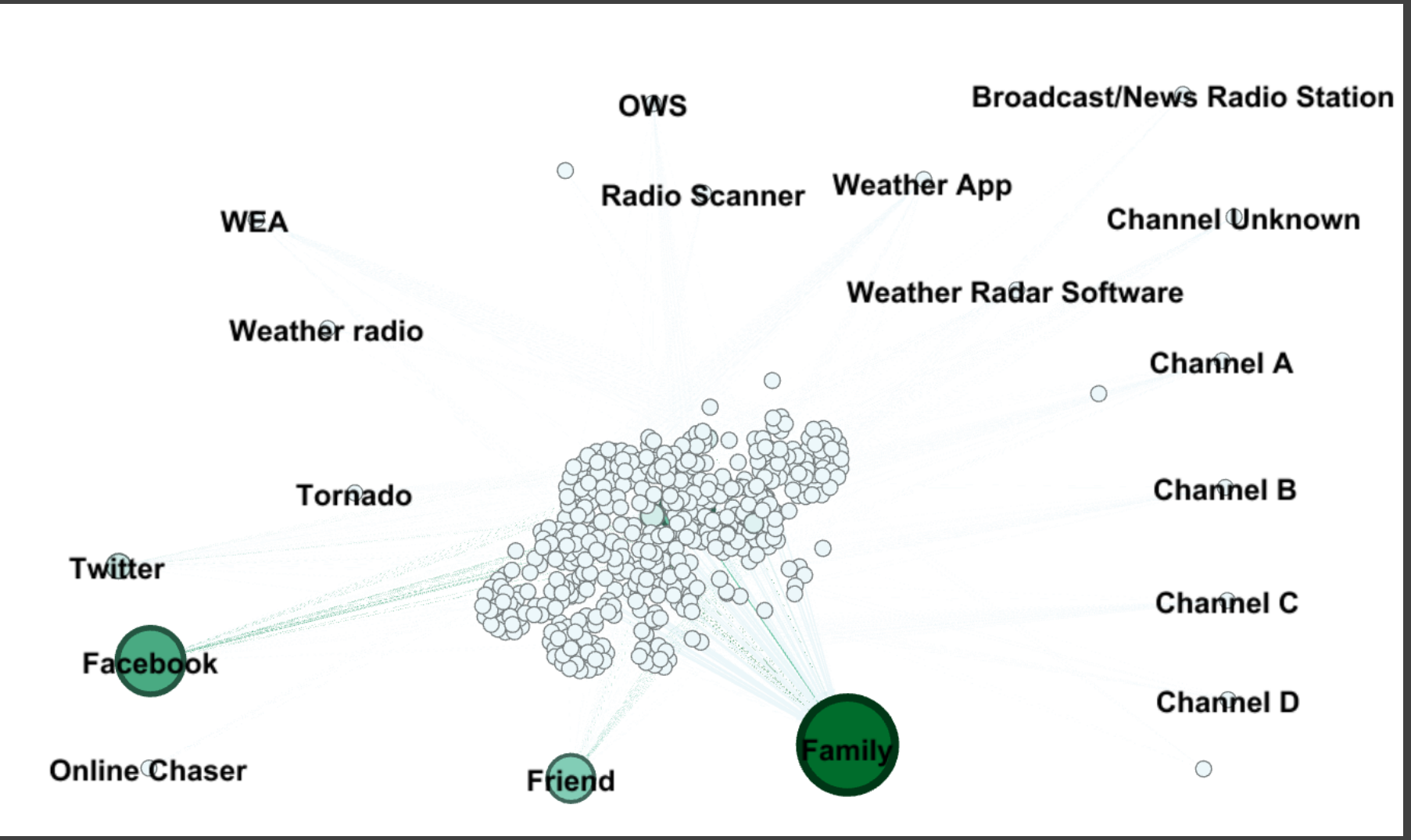
** Facebook is very likely biased too high because many respondents learned about the survey from Facebook.*

** Weather Radar Software is probably over represented as weather enthusiasts may be more likely to answer the survey*

Ranking (536 total responses):

1. TV (aggregate) -- 168 (31%)
2. Weather App – 68 (13%)
3. WEA – 53 (10%)
4. Facebook – 45 (8%)
5. OWS – 42 (8%)
6. Family – 33 (6%)
7. Weather Radar Software – 27 (5%)
8. Friend – 22 (4%)
9. Tornado Itself – 19 (4%)
10. News/Radio Broadcast – 14 (3%)

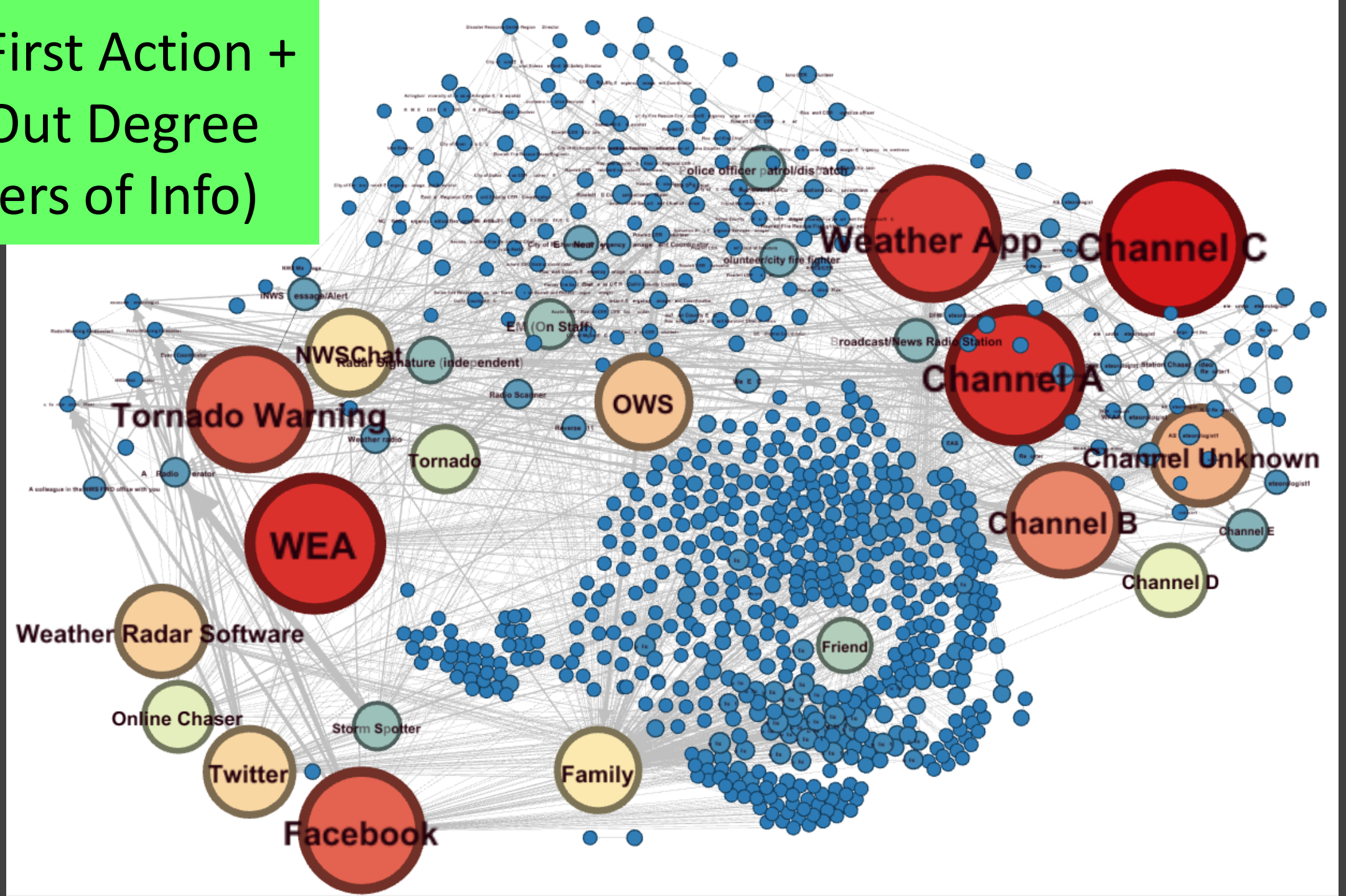
Public Only: Who did you tell after receiving?



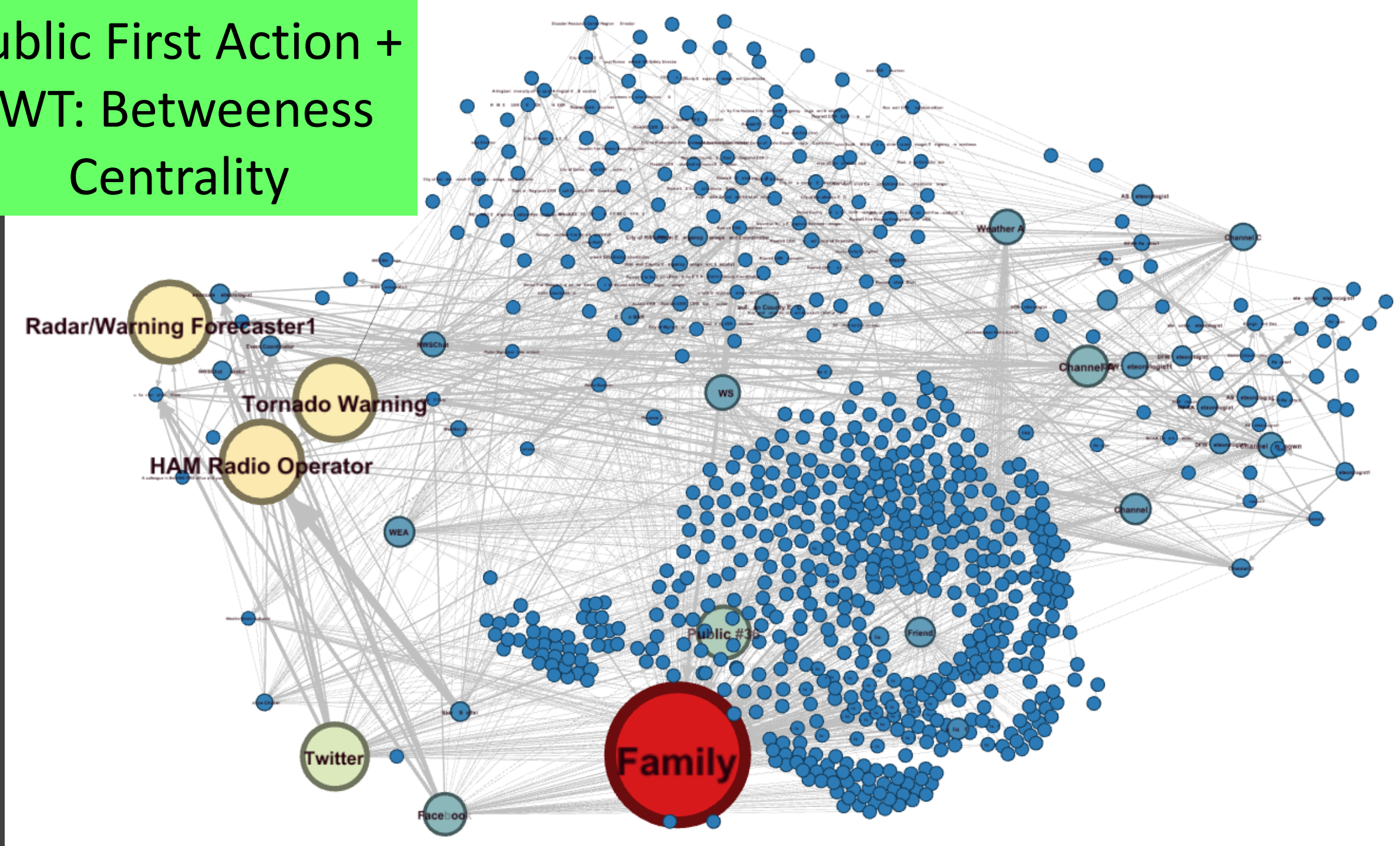
255 of the 536 respondents, or 48%, told someone else!

1. Family (131)
2. Friend (52)
3. Facebook (36)
3. Twitter (36)

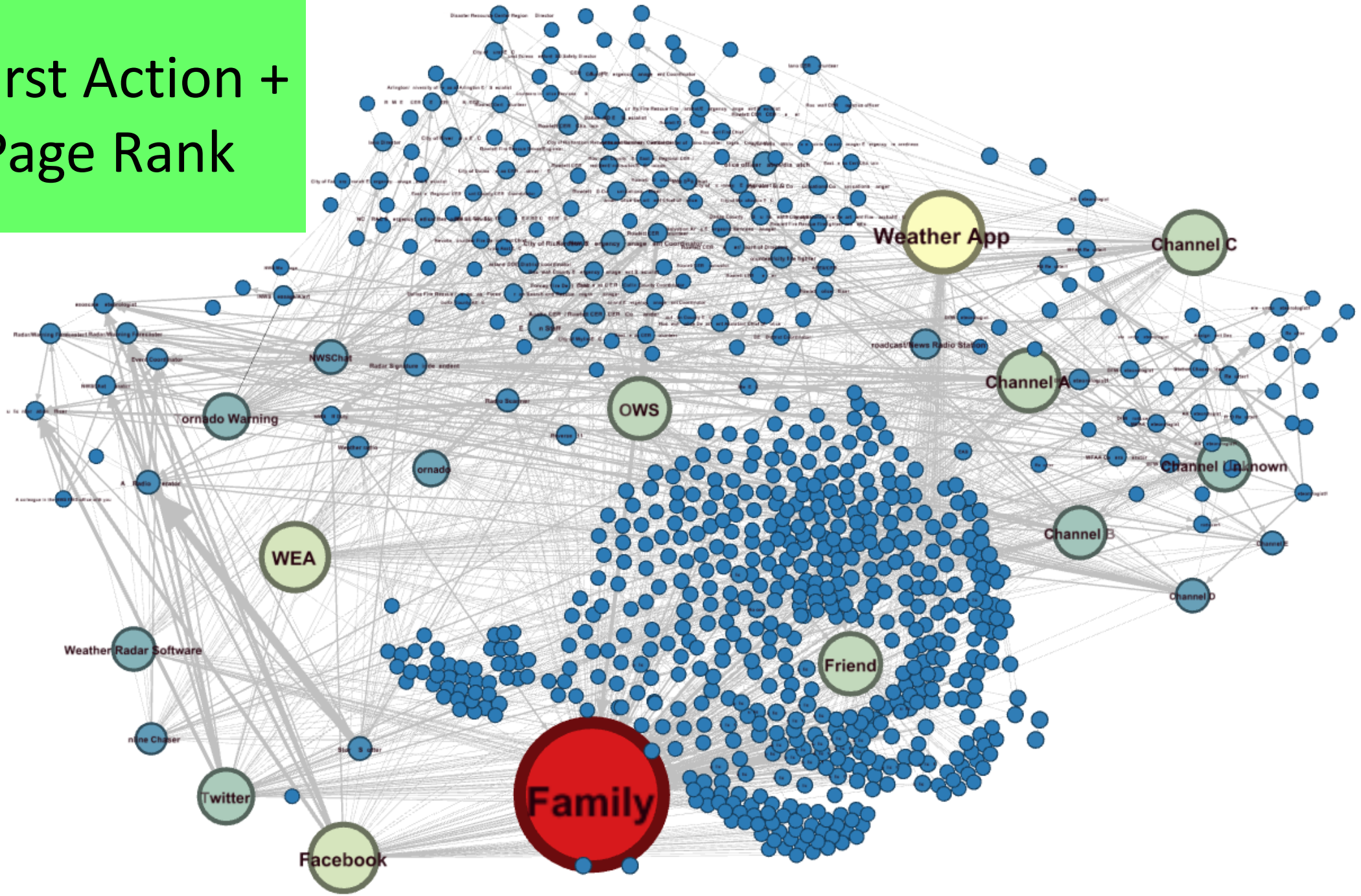
Public First Action + IWT: Out Degree (Senders of Info)



Public First Action + IWT: Betweeness Centrality

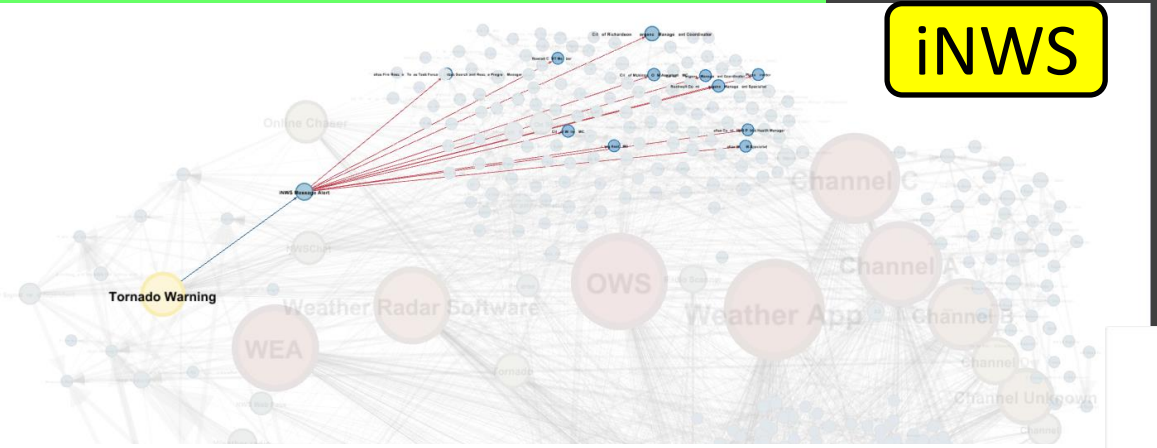


Public First Action + IWT: Page Rank

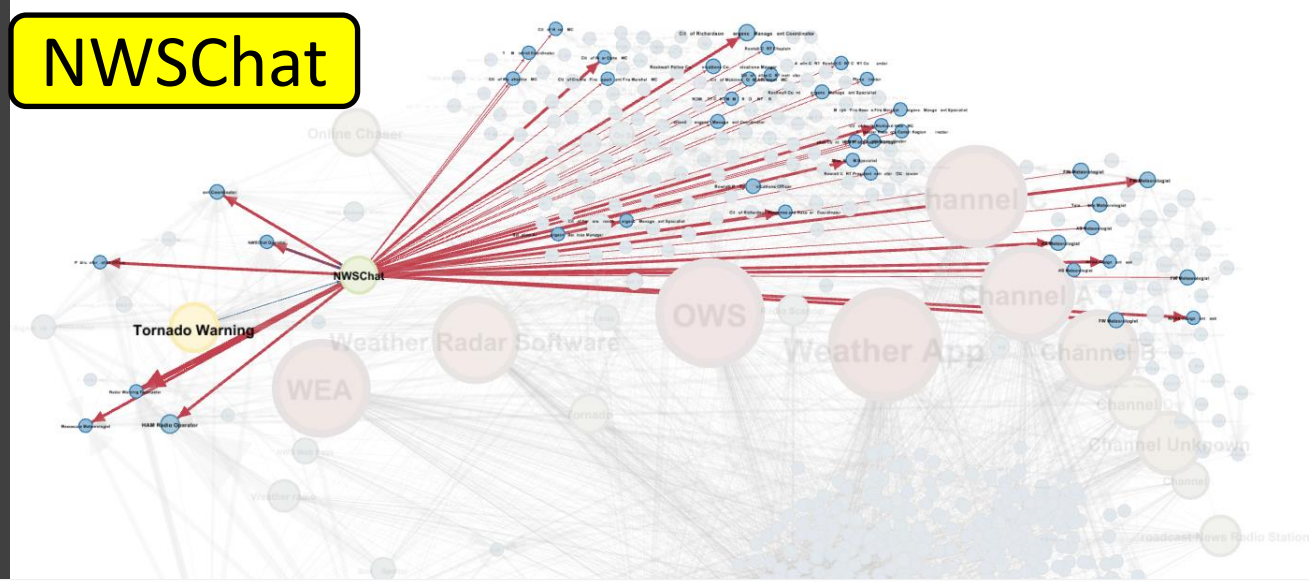


Communication Systems

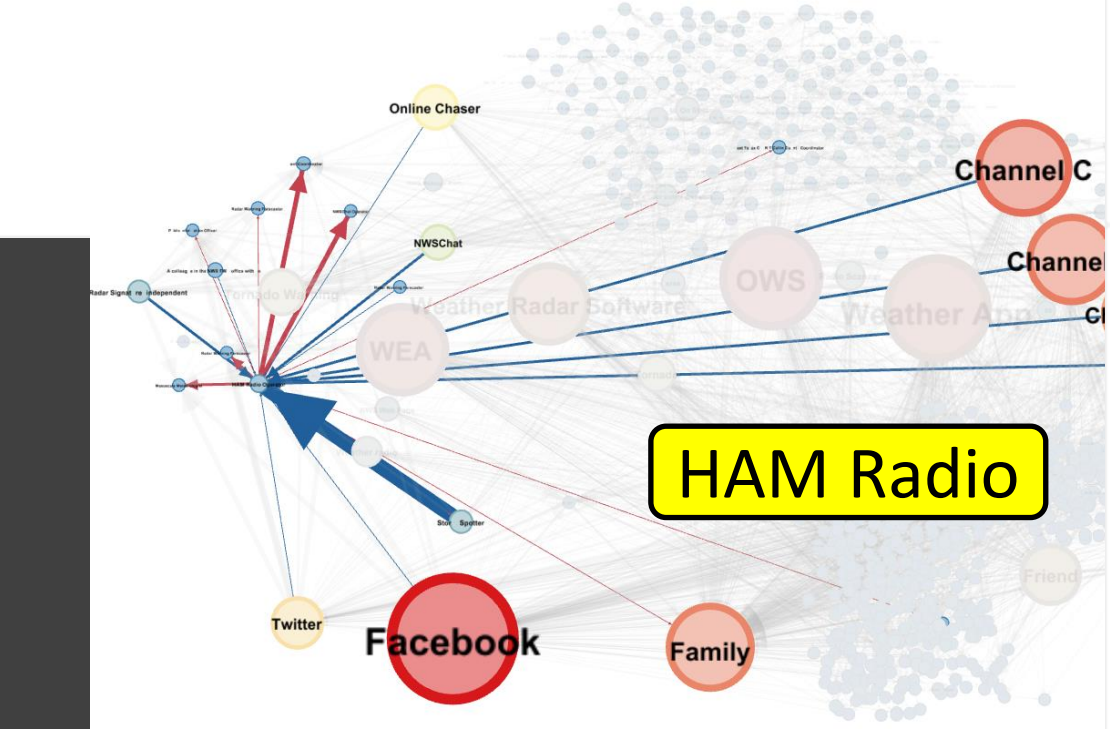
iNWS



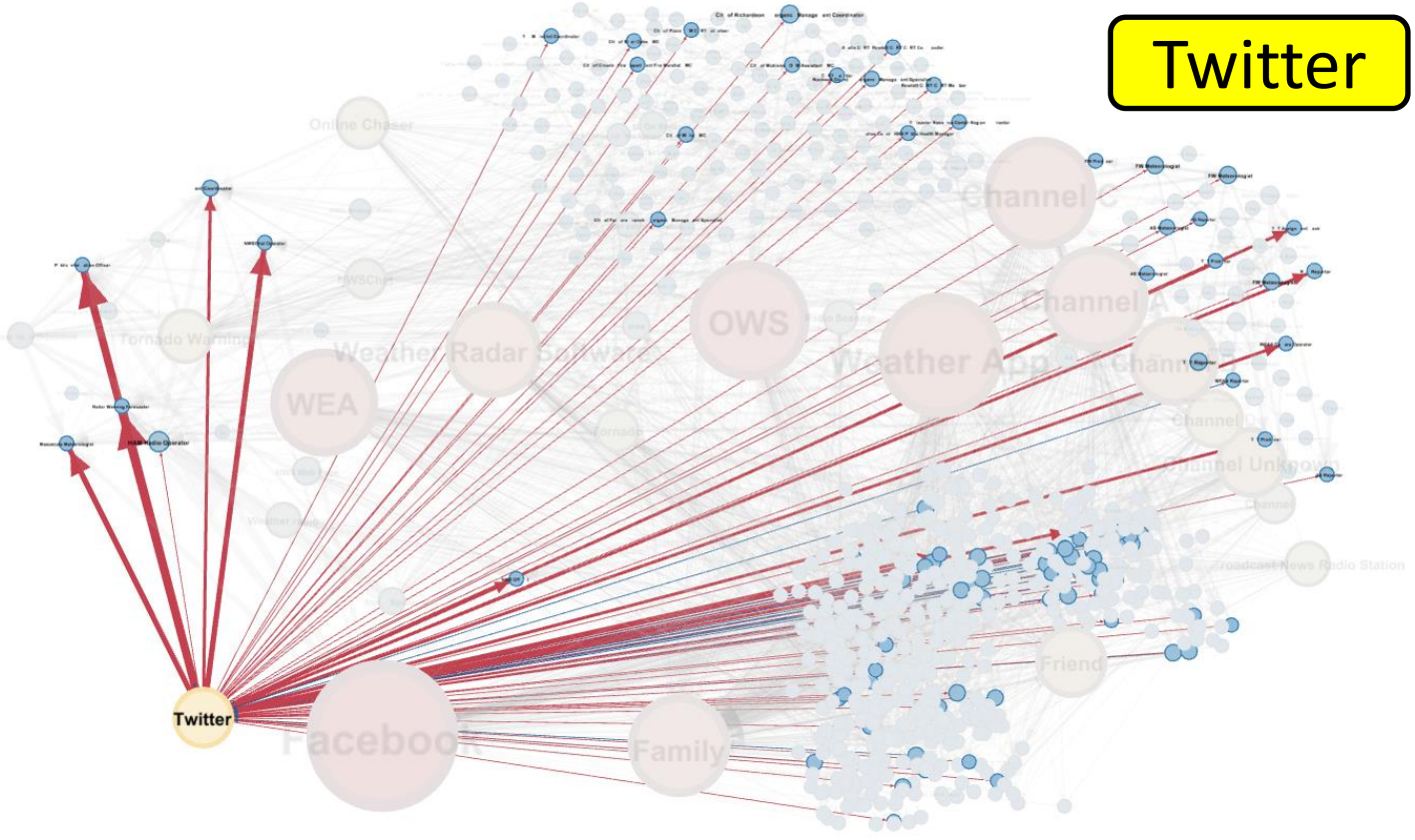
NWSChat



HAM Radio



Twitter



Modeling Public Behavior

Observed TV Viewing Habits

Actual ratings during the tornado (6-7 PM, DFW market)	Survey, initial information source	Survey, initial + updated information sources
Channel A: 396,614 Channel B: 347,038 Channel C: 226,637 Channel D: 198,307 Cable TV Weather: Unk.	Channel A: 47 Channel B: 38 Channel C: 30 Channel D: 13 Channel (?): 34 Cable TV Wx: 6	Channel A: 137 Channel B: 148 Channel C: 117 Channel D: 68 Channel (?): 85 Cable TV Wx: 42

http://www.unclebarky.com/dfw_files/archive-dec-2015.html

Limitations of Research

Could only “zoom in” on one tornado.

Over representation of Facebook/family/associated biases of how we advertised the survey.

Our survey design could have been improved and must be if this research is ever attempted again.

Survey anonymity prevented us from discovering specific communications dynamics within the public.

Conclusions

In the Future…

We'd like to publish our results in an AMS journal (maybe Weather, Climate, and Society again)

We'd like help getting the word out that we have scientific evidence supporting the IWT/WRN/iDSS philosophy of communicating hazardous weather info as a team.

Questions?

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