Communication during the Warning Process: Observations of Performance

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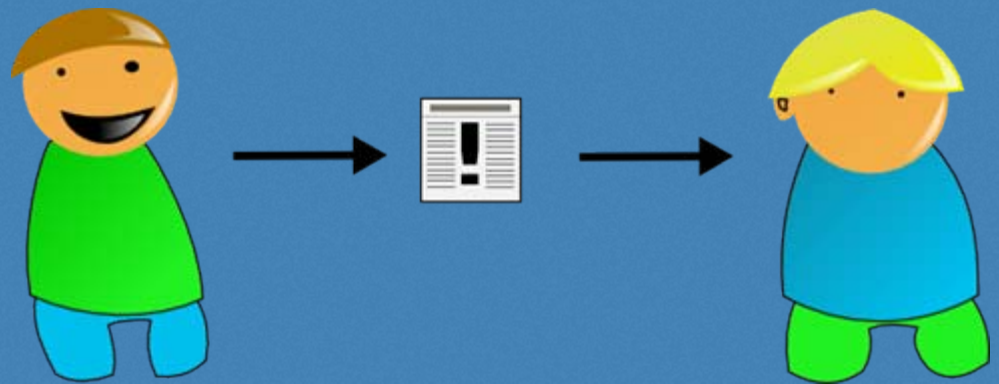
Do We Broadcast Information or Communicate?

com·mu·ni·cate *verb* \kə-myü-nə-kāt\

2: to transmit information, thought, or feeling so that it is **satisfactorily** received or understood
<two sides failing to *communicate* with each other>

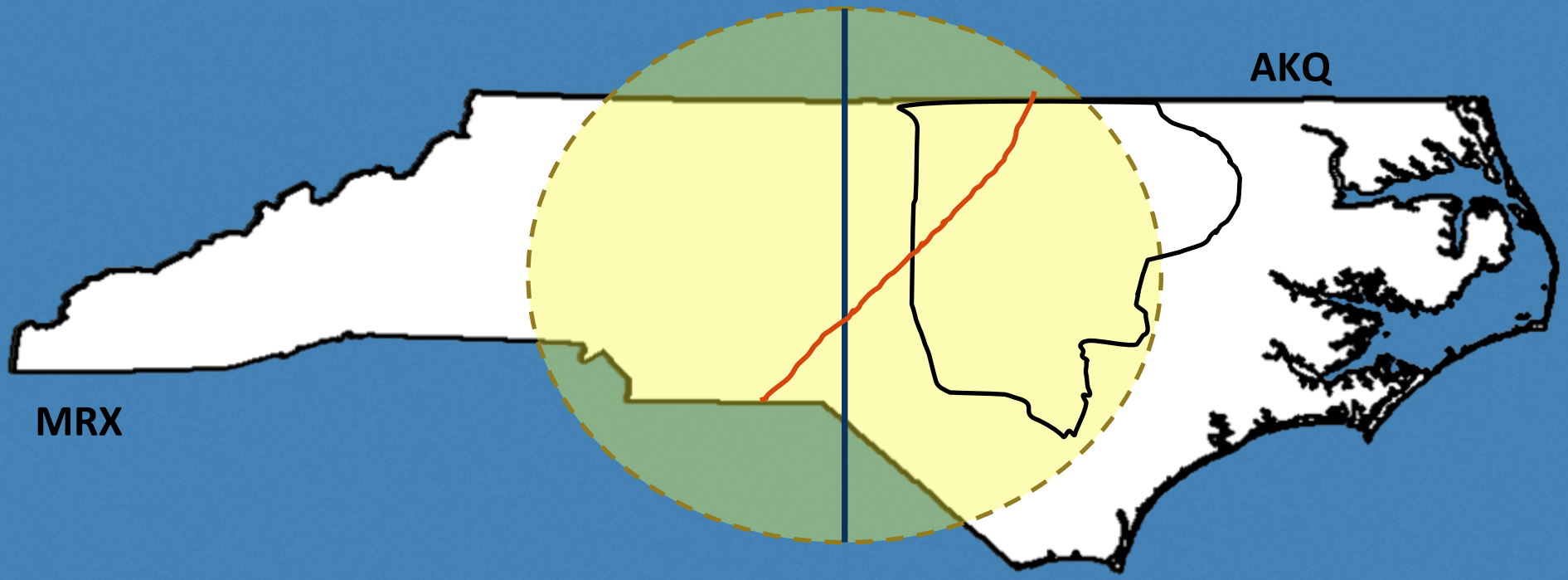
--Webster's New Collegiate Dictionary (emphasis added)

- How to Judge Satisfaction?
  - NWS focuses on self-assessment
- Implies Relationship

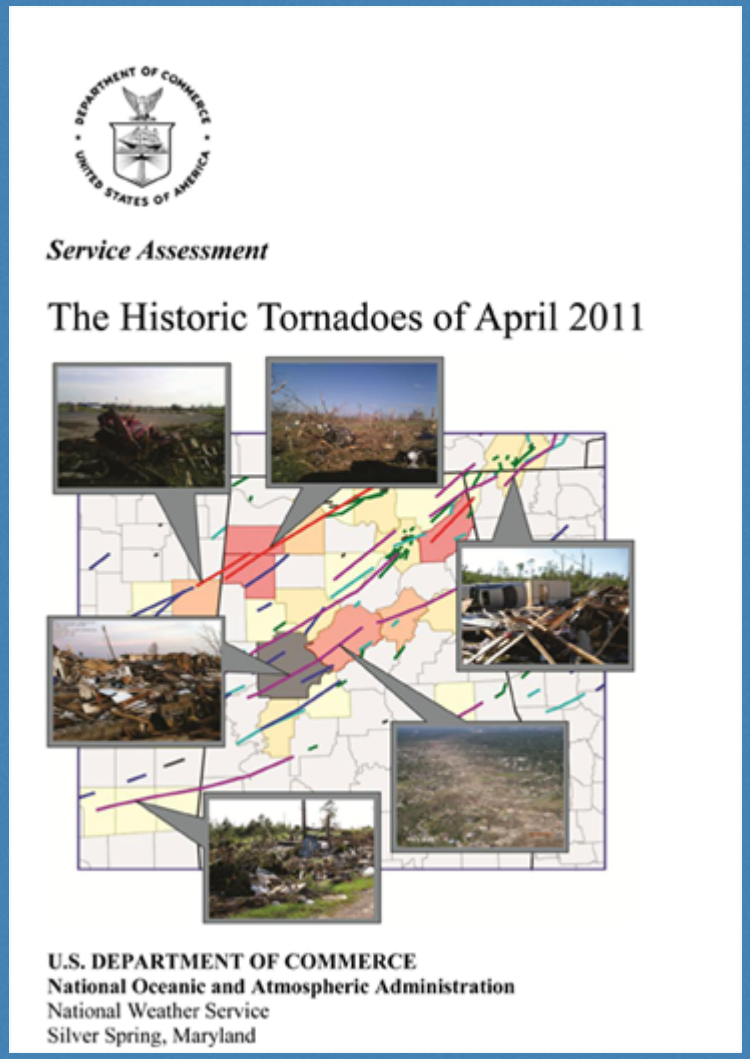


Flood Watch: Is This Clear?

RAINFALL AMOUNTS BETWEEN 3 AND 5 INCHES ARE EXPECTED ACROSS THE **WESTERN SECTIONS OF CENTRAL NORTH CAROLINA. ACROSS THE EASTERN SECTIONS OF CENTRAL NORTH CAROLINA**...GENERALLY EAST OF THE U.S. 1 CORRIDOR...RAINFALL AMOUNTS BETWEEN 4 AND 8 INCHES ARE EXPECTED WITH LOCALLY HIGHER AMOUNTS UP TO 10 INCHES POSSIBLE.



Geographic Clarity and Specificity



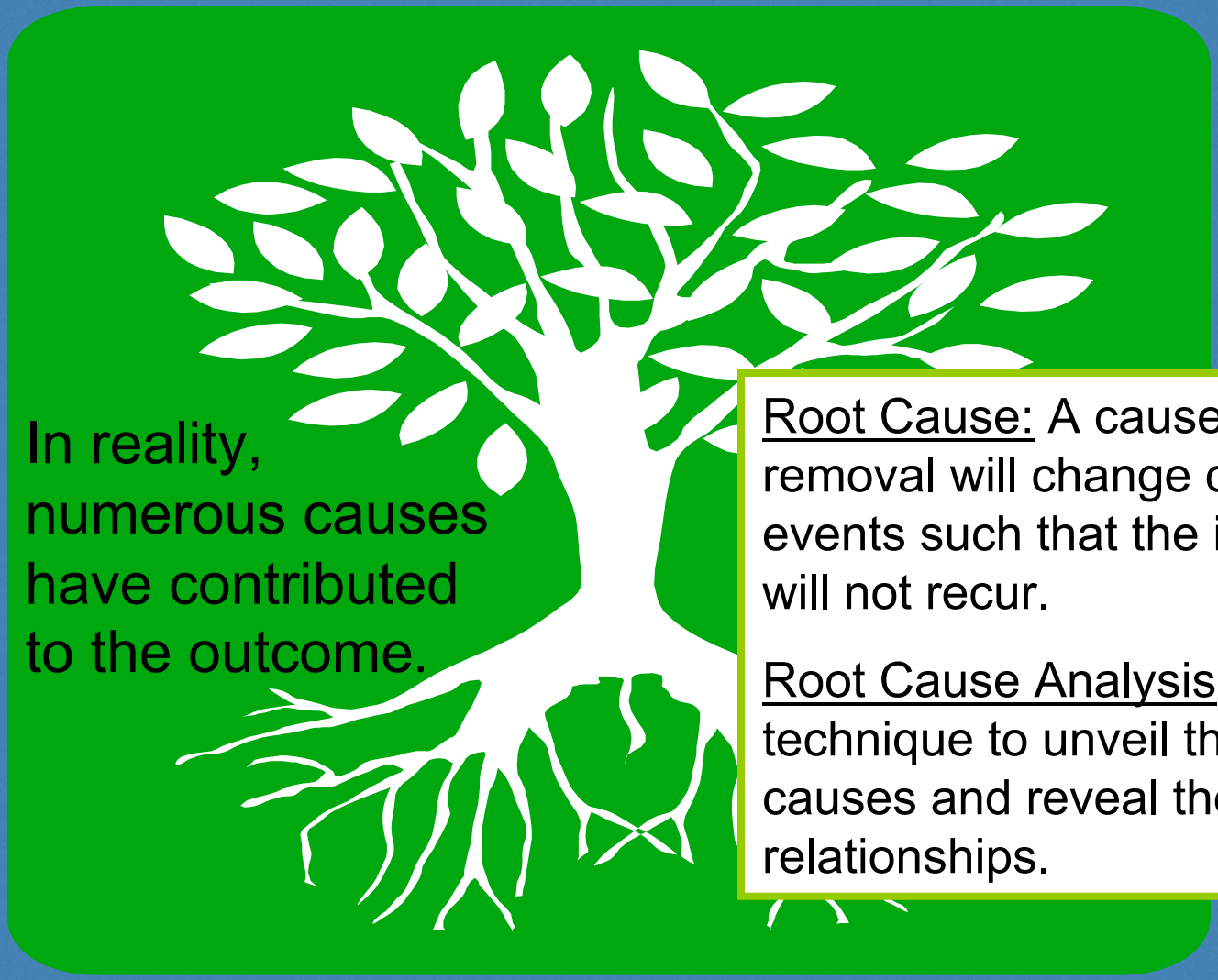
Many people "wanted exact information about ...specific neighboring towns, streets, or landmarks ... close enough to require them to act."

"Some people did not know the name of their county or the counties and towns surrounding them."

Does This Represent The Threat?

- Automated dissemination system
- Forecasters often don't know how information is presented to users

Root Cause Analysis



In reality, numerous causes have contributed to the outcome.

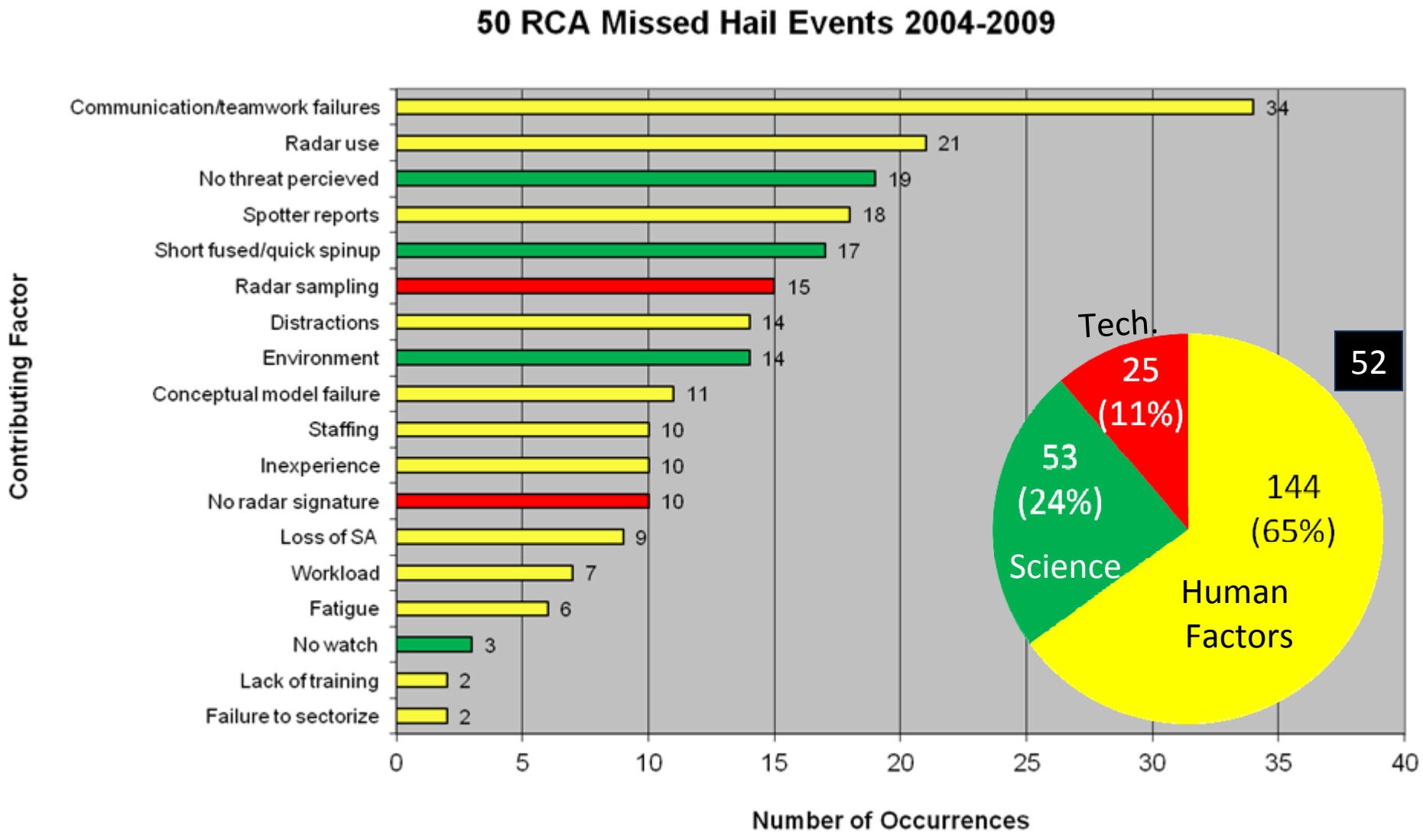
Root Cause: A cause whose removal will change or control events such that the incident will not recur.

Root Cause Analysis: A technique to unveil these causes and reveal their relationships.

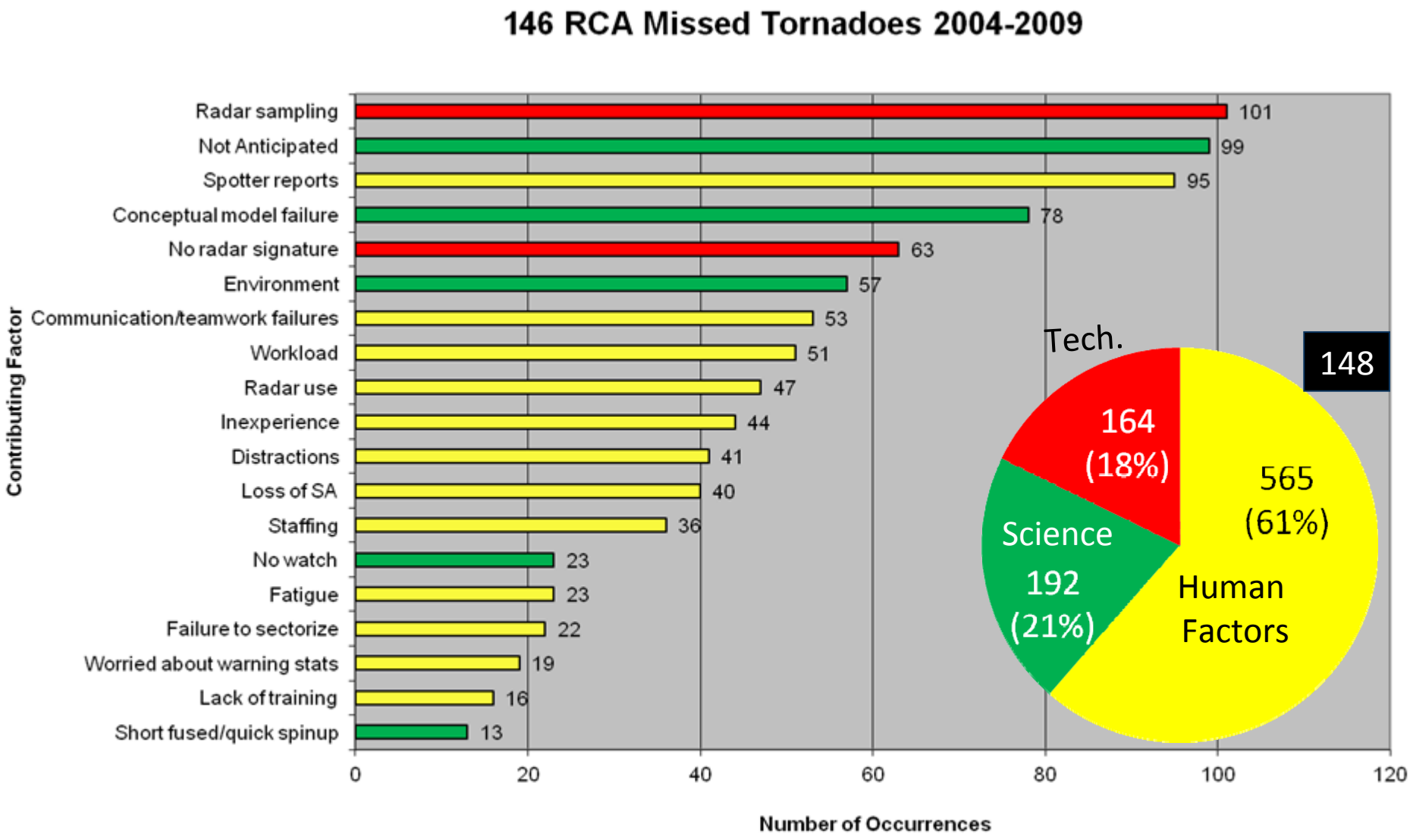
Database of RCA Submissions
Considerations & Caveats

- Self – reported
  - *Although assured anonymous*
- Most done once in 2004-2005
  - *Initial offering of Advanced Warning Operations Course*
  - *Forecasters, management staff*
- 2006-2009: mostly interns, still done once
- Student chose the event
- Not a formal large scale RCA
  - *More like Mini-LCA (Nelm's Latent Cause Analysis)*

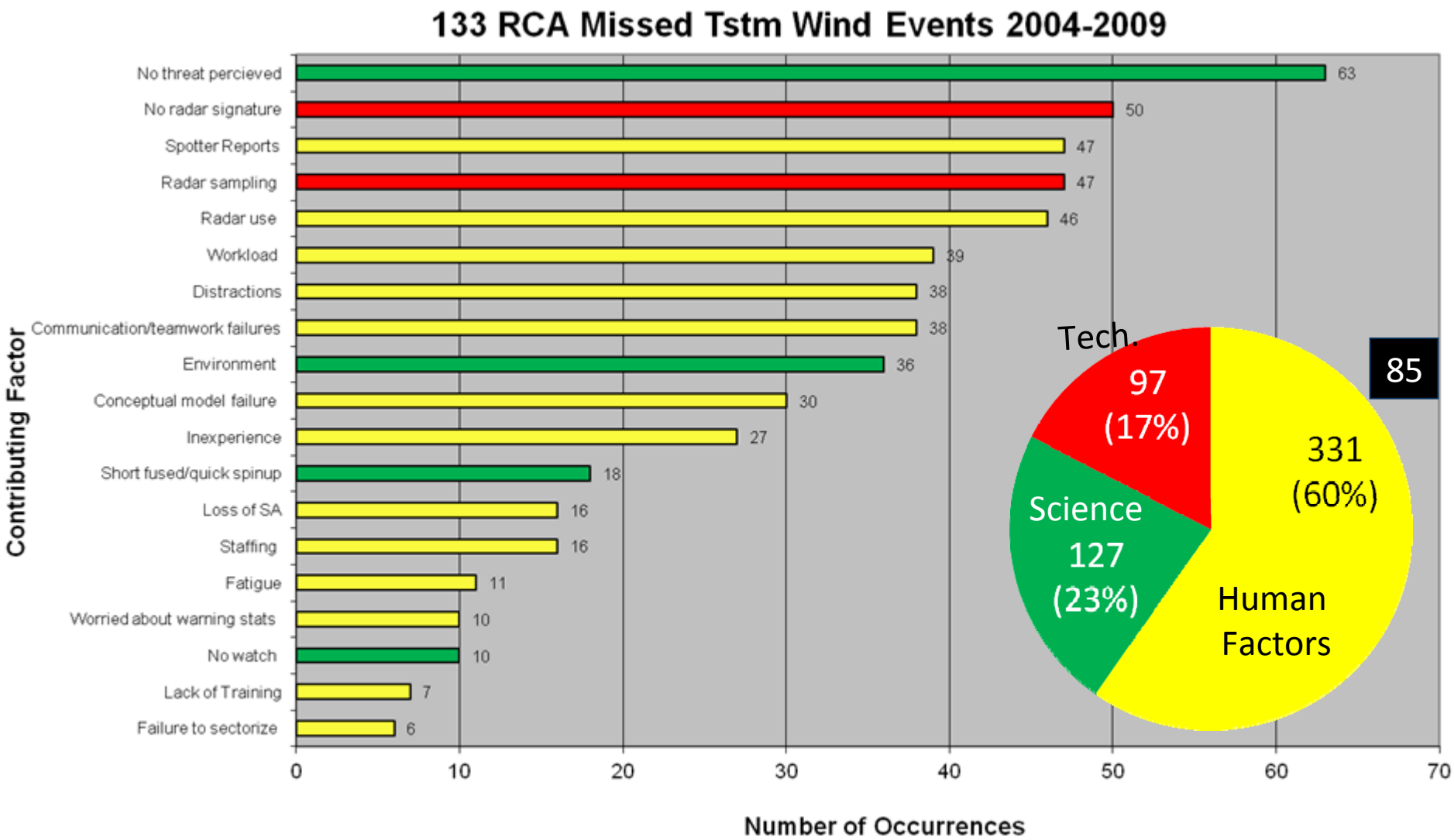
Missed Hail Events
2004-2009



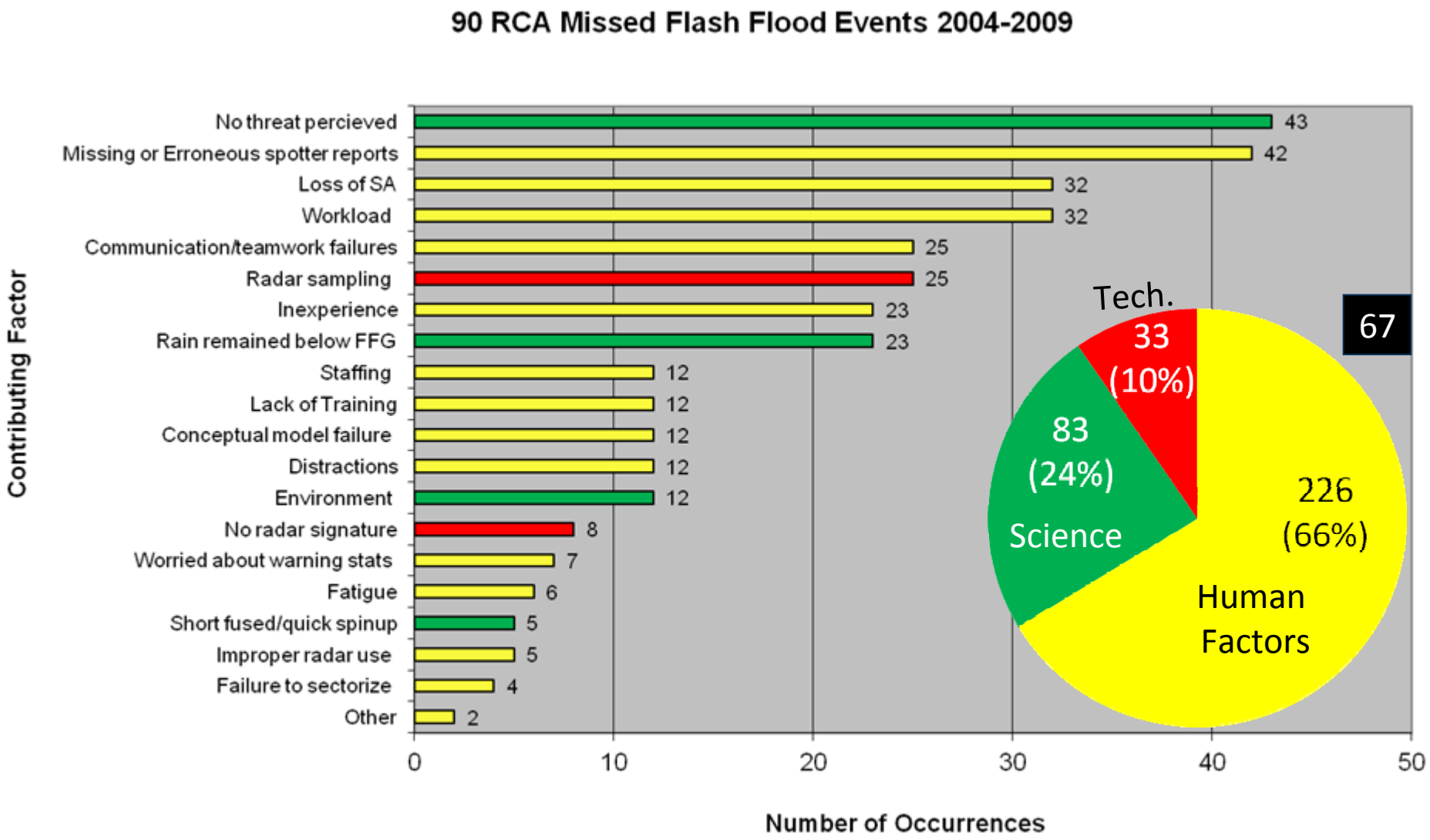
Missed Tornadoes
2004-2009



Missed Wind Events
2004-2009

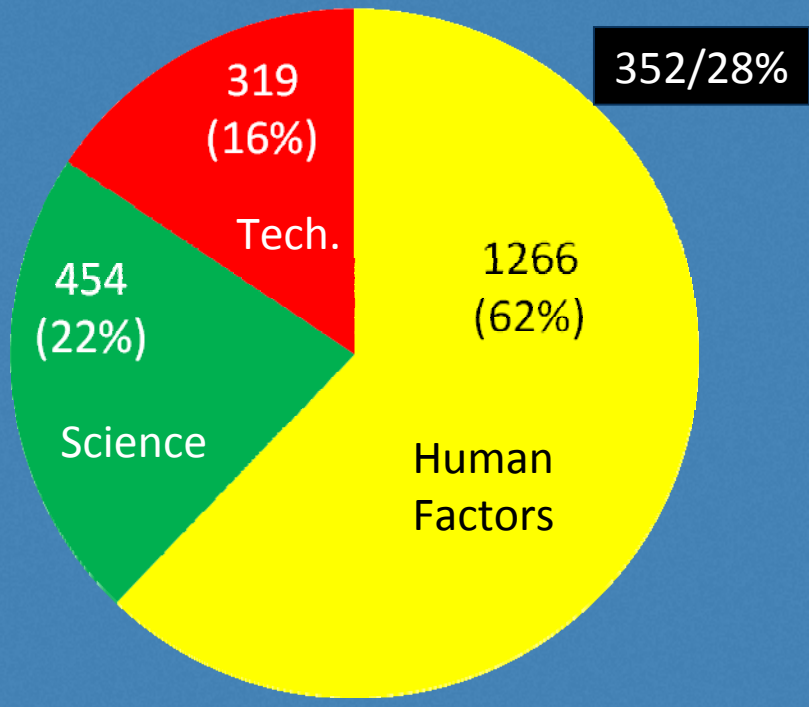


Missed Flash Flood Events
2004-2009



RCA Summary & Further Issues

- These are one-time efforts
  - No organized RCA effort in place
- When do results become outdated?
- How do you capture impacts of changes?
  - Software/Technology
  - New science
  - Process/Human Factors



Missed Wind, Hail, Tornado and Flash Flood Events (2004-2009)

Recurring Issues For The Past 20+ Years:

- **Communication**
  - Receipt/relay of information
  - Confirmation
- **Coordination**
  - Neighboring WFOs
  - Within NWS "enterprise"
  - EMs & decision makers
  - Media partners
- **Collaboration**
  - Real-time feedback
  - Awareness of mutual needs, capabilities, and processes

Collaborators:
- National Centers
- RFCs
- WFOs
- EMs
- Media outlets
- Other core partners

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Forecast/Warning Problem: Highly Distributed & Collaborative Decision-Making Process

Current & Future Simulation Capabilities

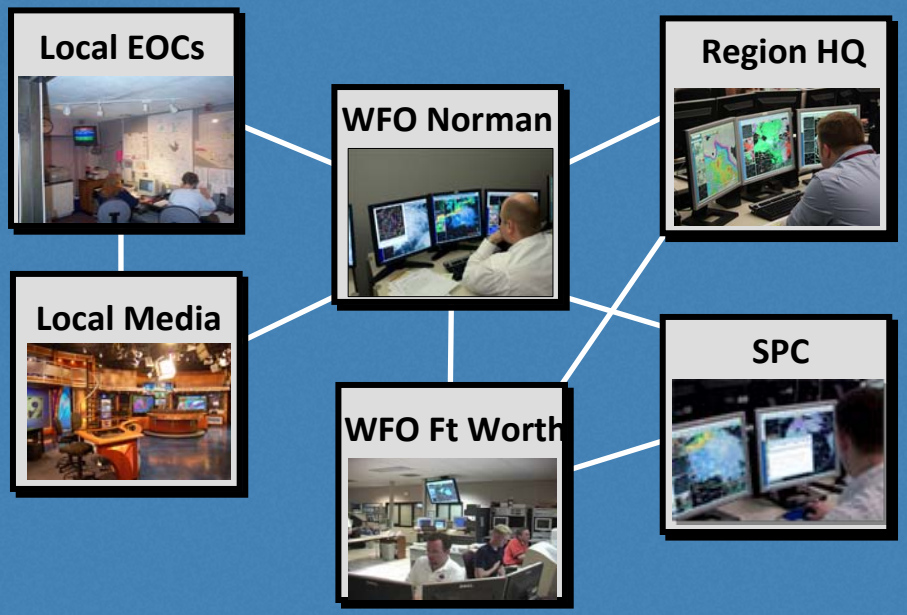
Current

- 2003 Gold Medal
- Incomplete AWIPS Functionality
- Science and Technology
- 4 simulations per year

Isolated Simulations

Future

- Preserve Existing Training Capabilities
- Science, Technology & Human Factors
- Routine Drills and Exercises with Partners
- Real World/Real Workplace
- Reveal Additional Issues



Distributed & Collaborative Exercises / Drills

Issues To Think About

- Geographic Clarity
  - Am I in the Warning or Not?
  - What if I Travel?
    - CMAS/IPAWS vs NOAA Weather Radio vs Commercial vs …

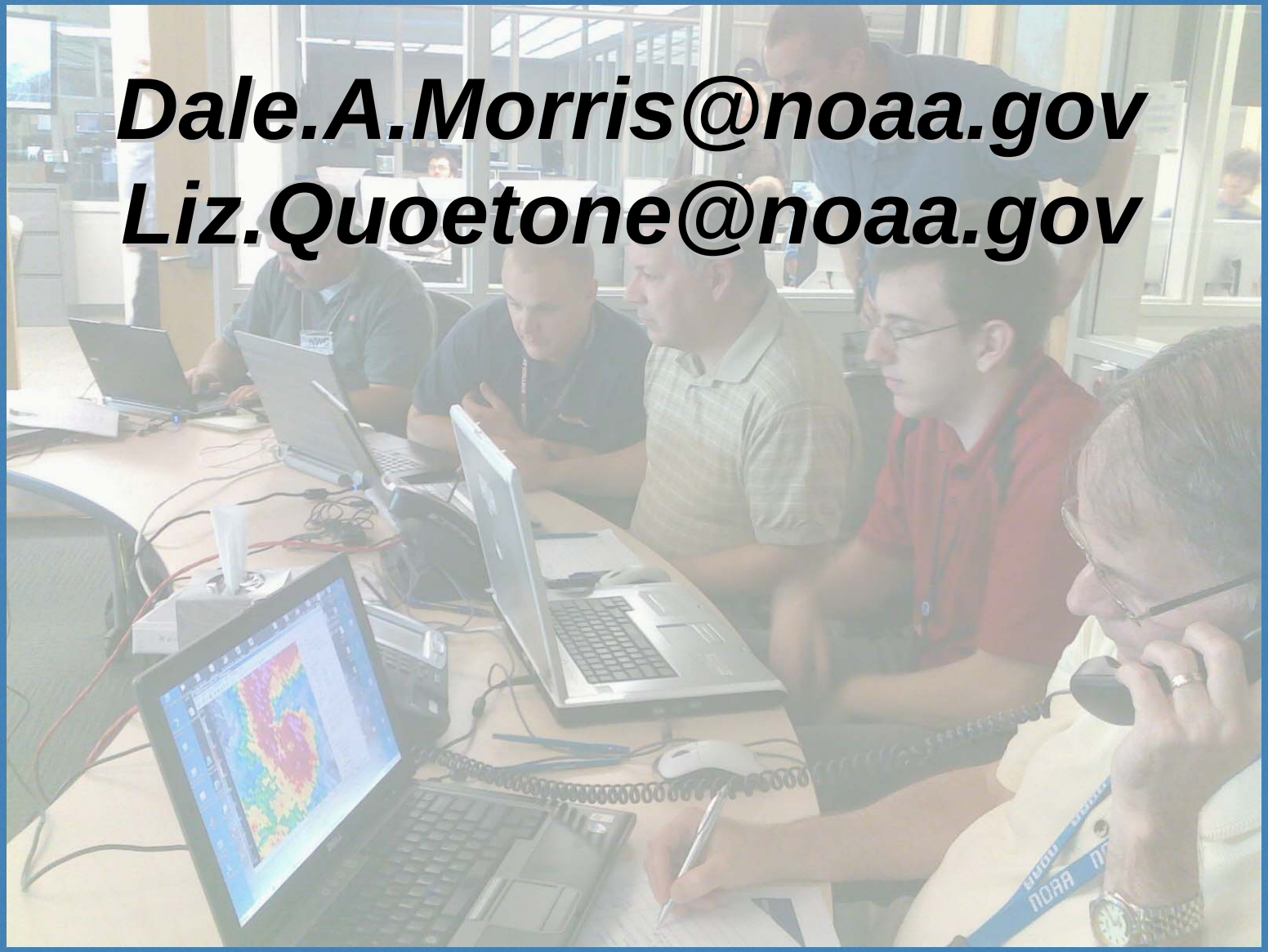
Do I Trust the Warning?
Do I Receive It?

- Drill, Baby, Drill: Develop, Exercise, and Practice Communication, Collaboration, and Coordination Skills with Actual Partners
  - High Fidelity / Distributed / Facilitated / Virtual Reality Simulations (Real-World Context)
  - Must maintain/improve science and technology expertise
  - Requires $$, staffing, increased priority on training/outreach
  - Integrated Warning Team Simulations (role-swapping)

Issues To Think About, Vol. 2

- Comprehensive Assessments & Evaluations
  - Independent/Formal?
  - Repeatable and Generalizable vs Regional?
  - Is NWS Product Suite Effective and Consistent?
    - Events vs Hazards, Watch/Warning/Advisory/Statement
  - Did/Does/Will the Over-Warning Problem (Cry-Wolf Syndrome) Exist?

- Forecaster and Office Workload Issues:
  - Correctly apply appropriate conceptual models
  - Deal with technological limitations
  - Maintain Situation Awareness
  - Effectively communicate with or support partners
  - Multiple Storms
  - Short-fuse vs Long-fuse events



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