

# Knowing Your Audience for Decision Support Briefings

“Outreach with a Dash of Introspection”

“Communication with Stakeholders”

“Meta-Uncertainty: A Brief Look”



*Dale Morris, WDTB  
AWOC Facilitation Workshop  
October 25, 2011*



# Personal Disclaimer

- Dabble in social science
- Not a social science/communications expert



- WAS\*ISer
- 15+ yrs Outreach/ Decision-Support Experience with Emergency Managers
- Career Follower of NWS Services
- Life Experience

# Why Are We Talking About Decision Support Briefings?

NWS Home | Contact Us



## A Weather-Ready Nation

National Weather Service Strategic Plan

SEARCH

This Site  All NWS

Explore the Plan  
TOWARD A BETTER FUTURE

Achieving Our Vision  
NWS GOALS

## Weather Decision Services

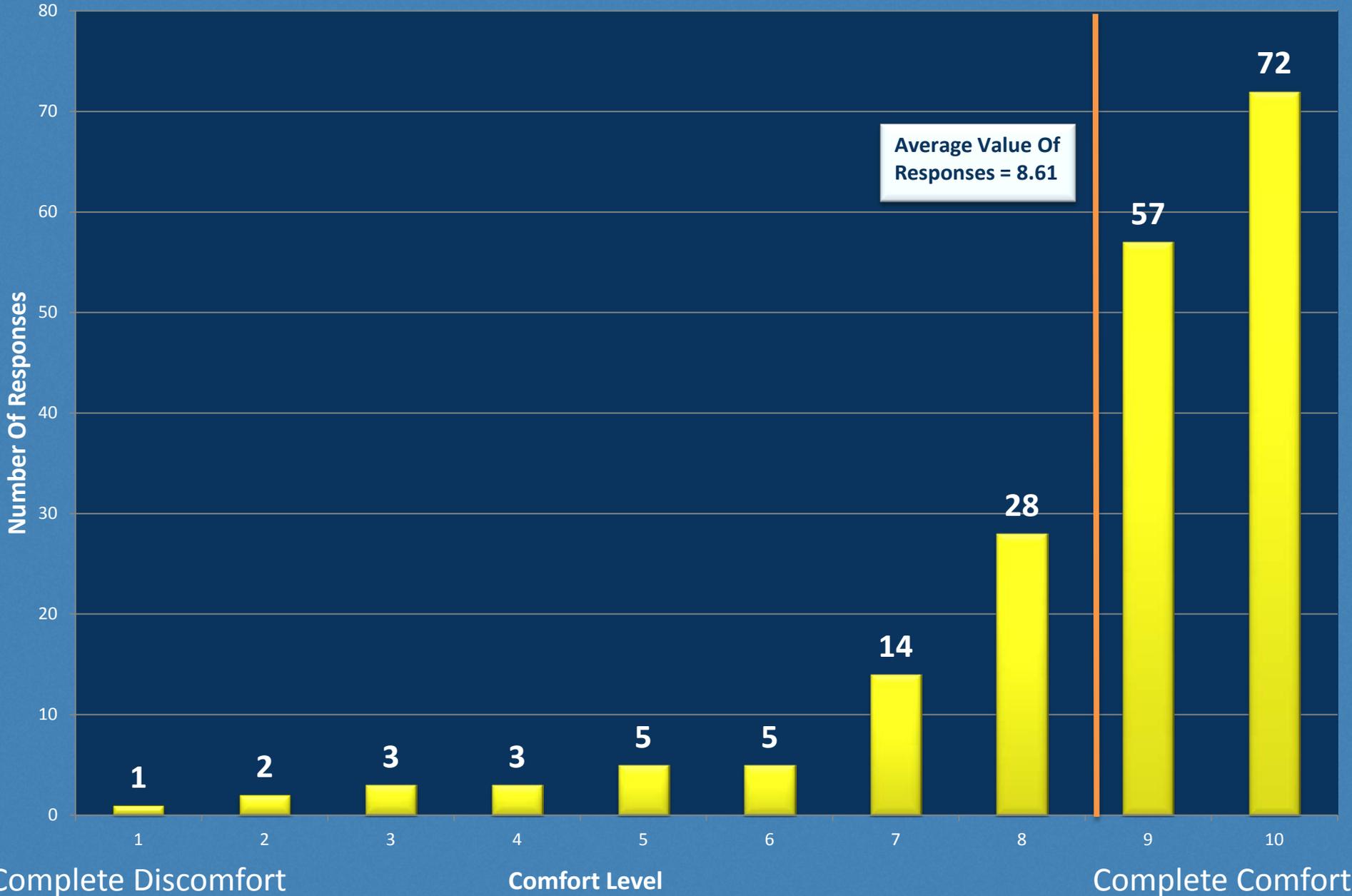
Improve weather decision services for events that threaten safety, health, the environment, economic productivity, or homeland security [Learn More >>](#)

- Significant Management Attention
- Delegation of Authority
- Culture Change

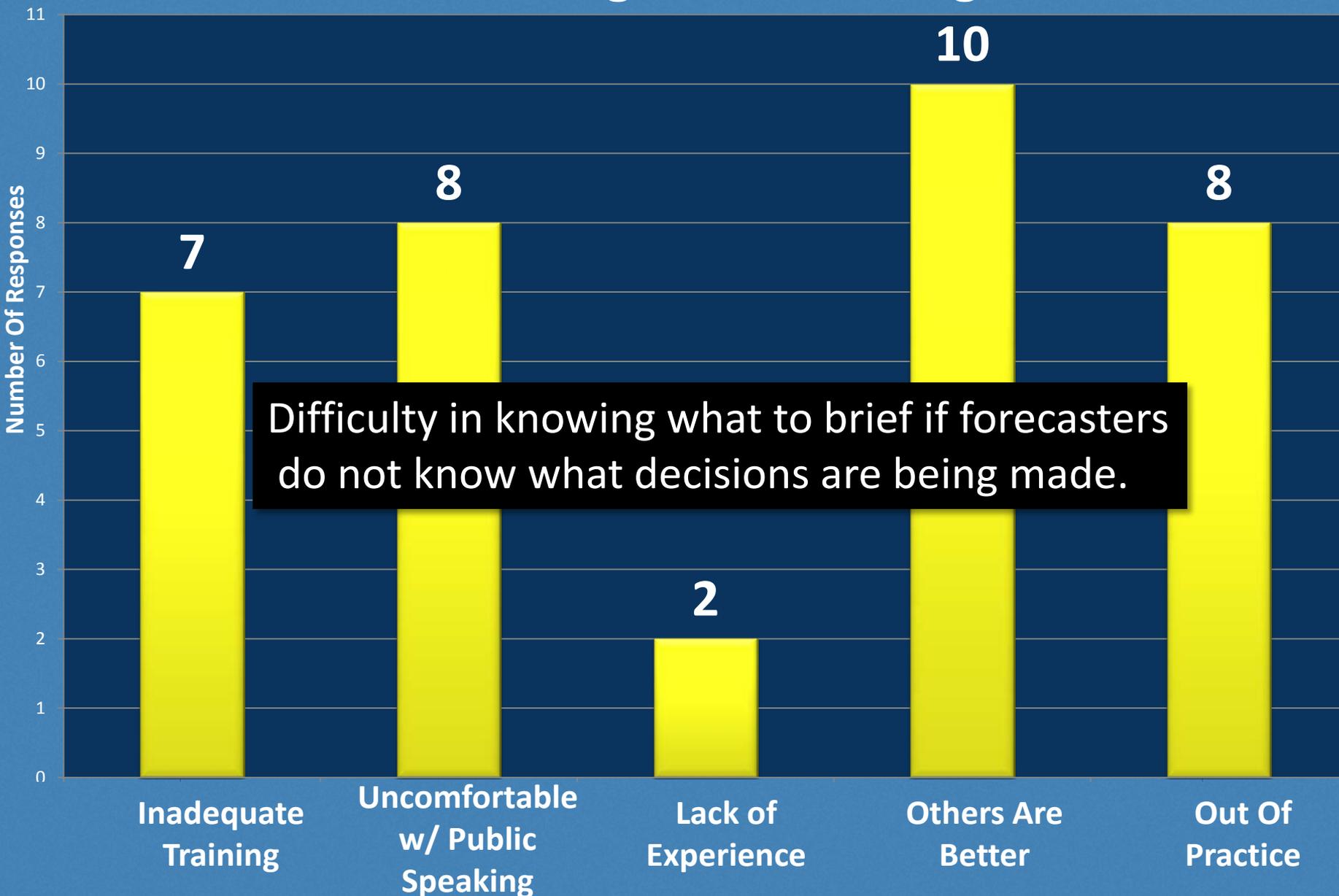
# A Brief Needs Assessment: Are We Prepared?

- Short survey developed and administered by WFO AMA
- 5 Likert-scale questions with 4 open-ended follow-up questions
  - Scale from 1 to 10
- Online/anonymous
- 190 responses from Southern Region forecasters

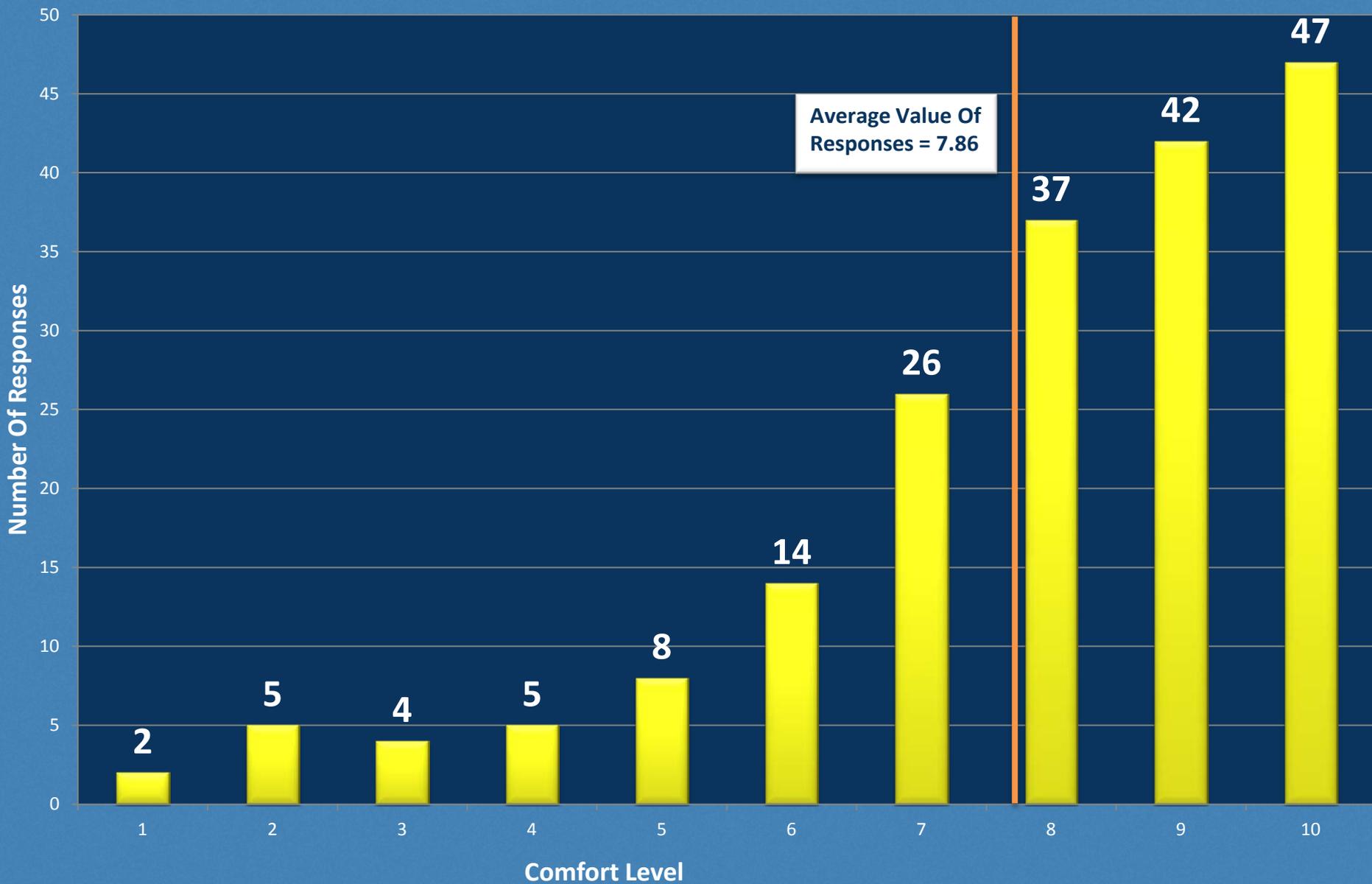
# 1. How comfortable are you in providing a phone briefing for a single decision maker during a high impact event?



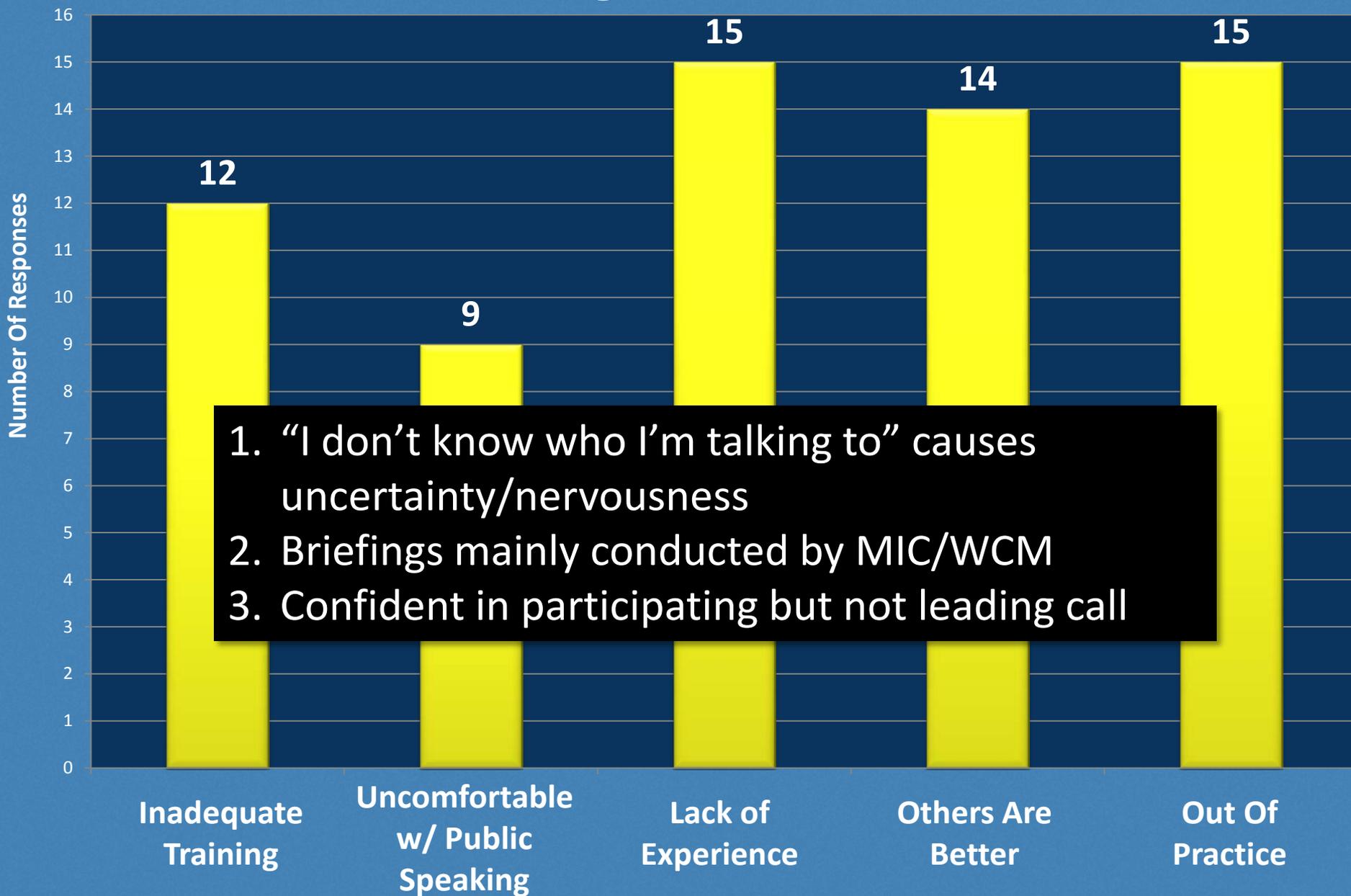
# Reasons for Forecaster Discomfort for Hosting Phone Briefings



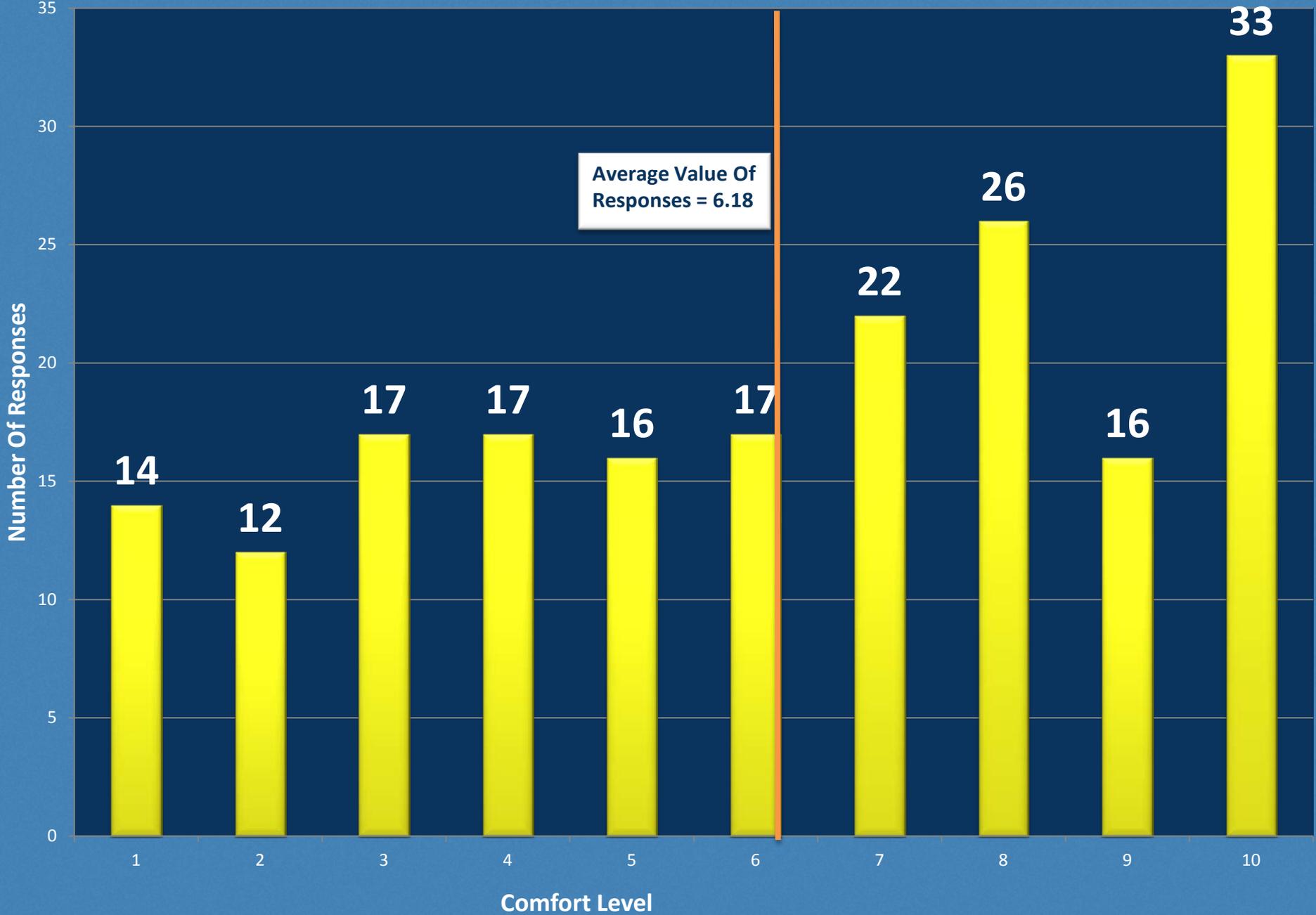
## 2. How comfortable are you in providing a conference call briefing for a large group decision maker during a high impact event? (Q/A period)



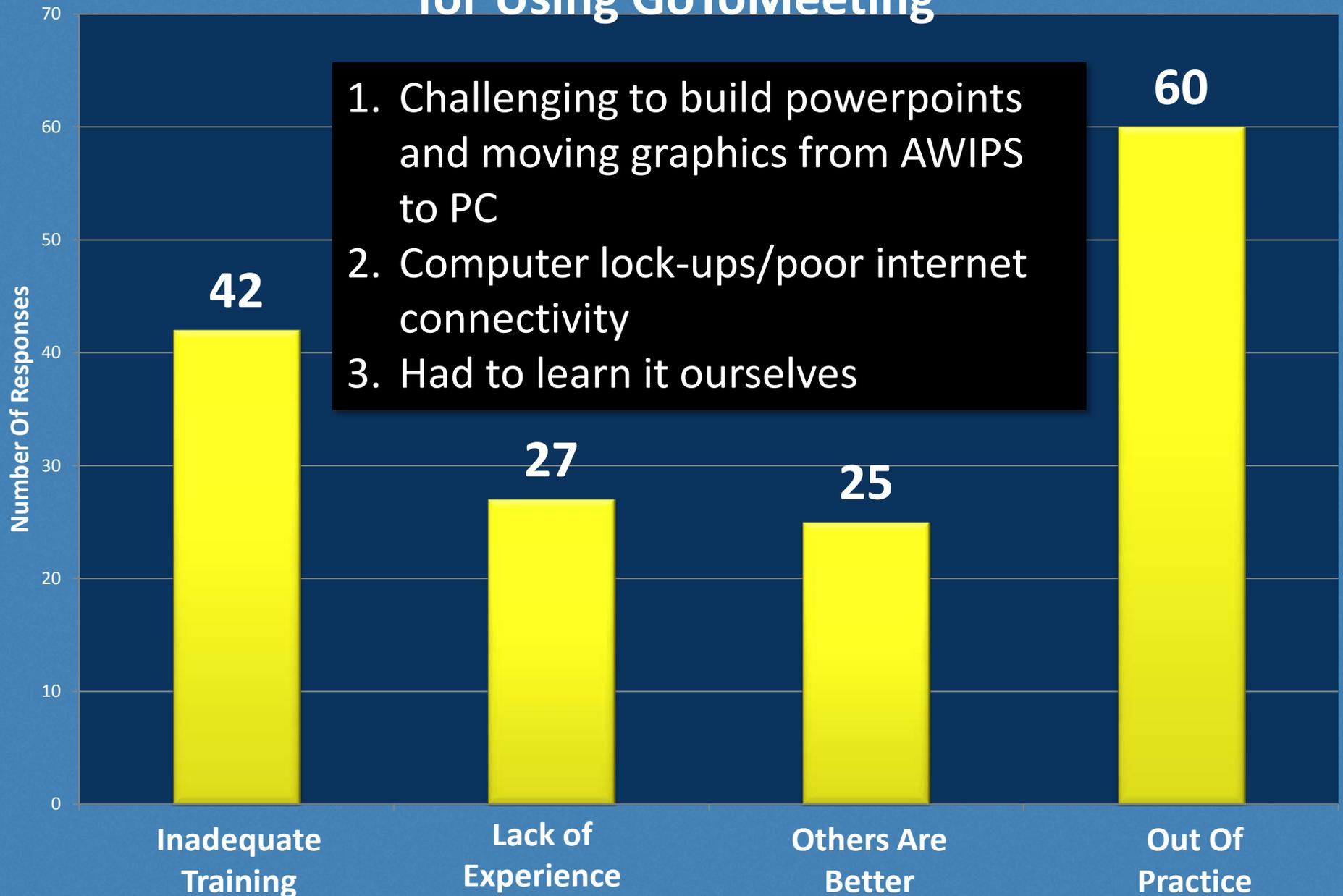
# Reasons for Forecaster Discomfort for Hosting Conference Calls



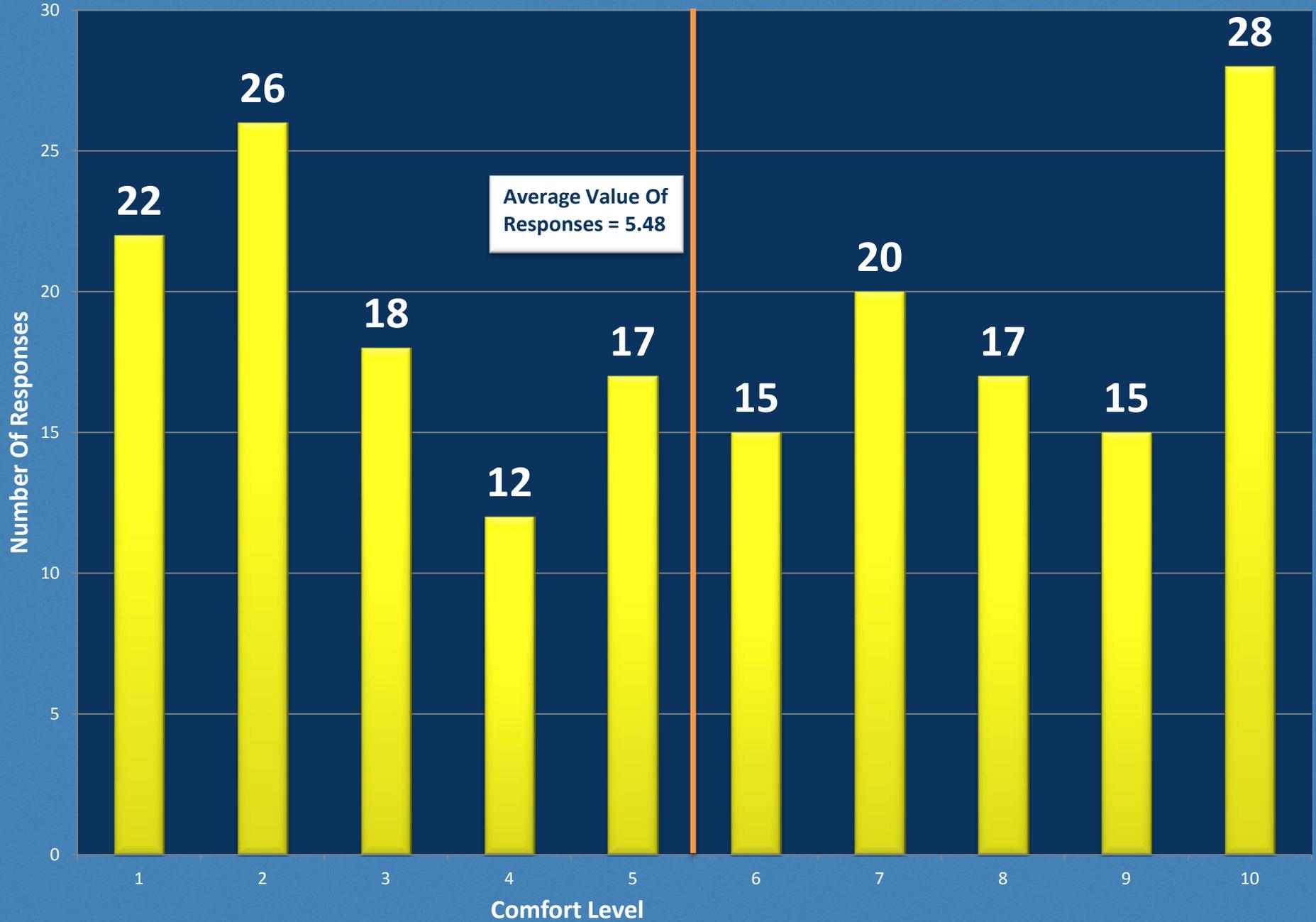
# 3. How comfortable are you in using GoToMeeting?



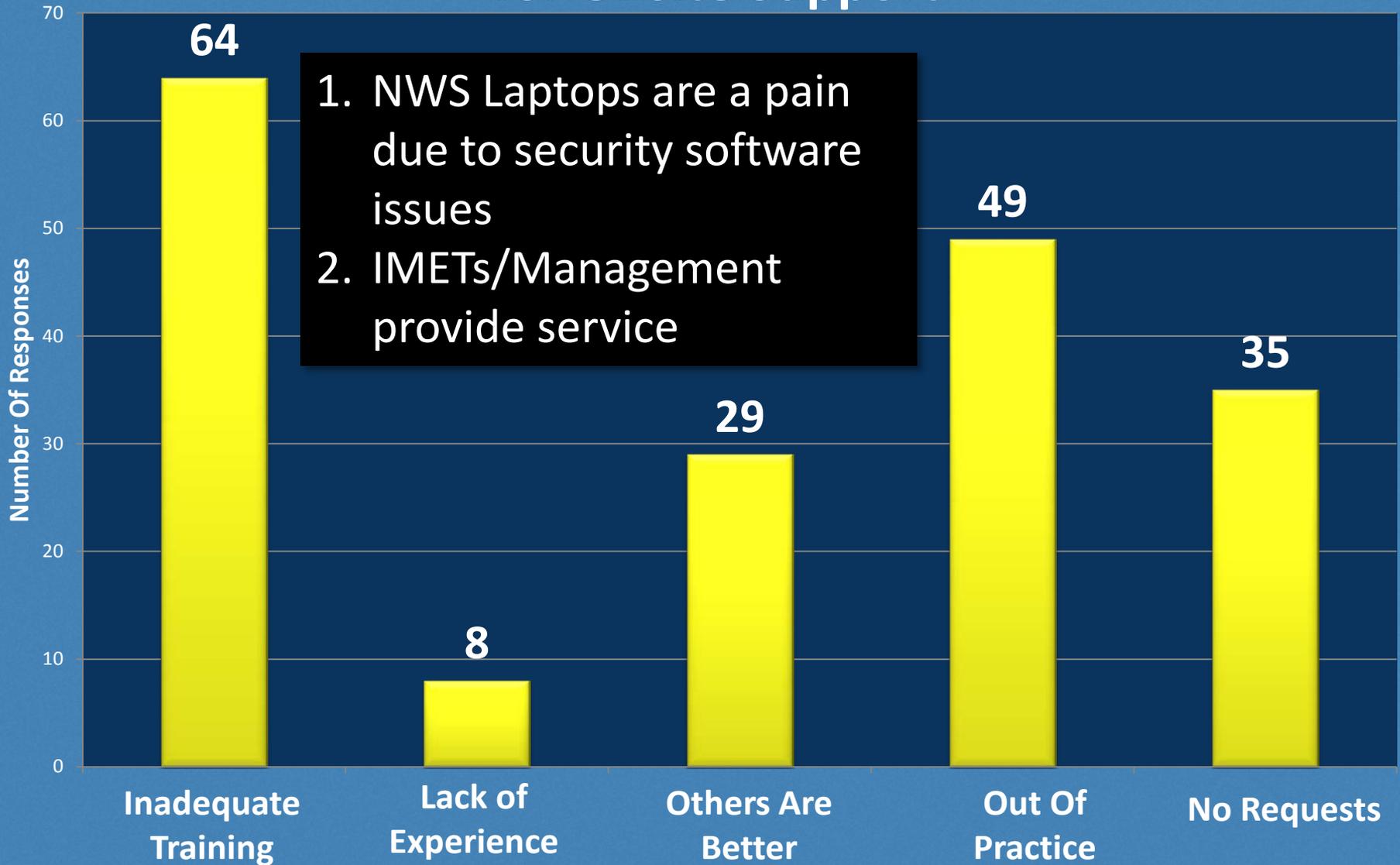
# Reasons for Forecaster Discomfort for Using GoToMeeting



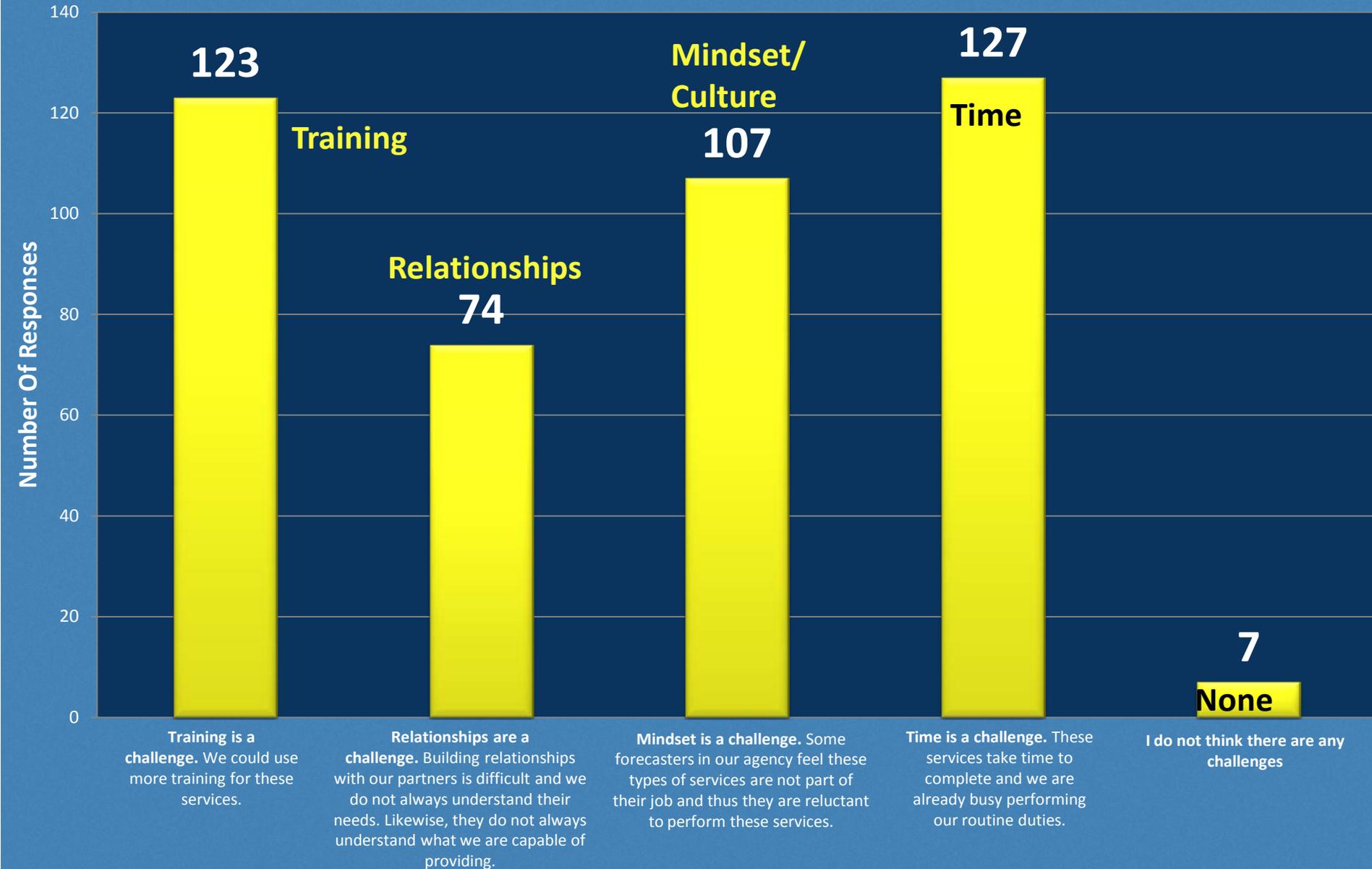
# 4. How comfortable are you in providing on-site support?



# Reasons for Forecaster Discomfort for Onsite Support



# 5. What challenges impair our ability to provide specialized service to core partners & decision makers?



# Additional Comments/Suggestions

- Resources and staffing (frequently mentioned)
- Advanced Planning a key
- Communication/outreach – partners are unaware that we can do this – we need to listen more
- Asked to make decisions rather than provide information – “I resent being put in that position”
- “The scientific expert is increasingly left behind in the new NWS DS era”
- Inexperienced forecasters do not have opportunities to provide these infrequent services

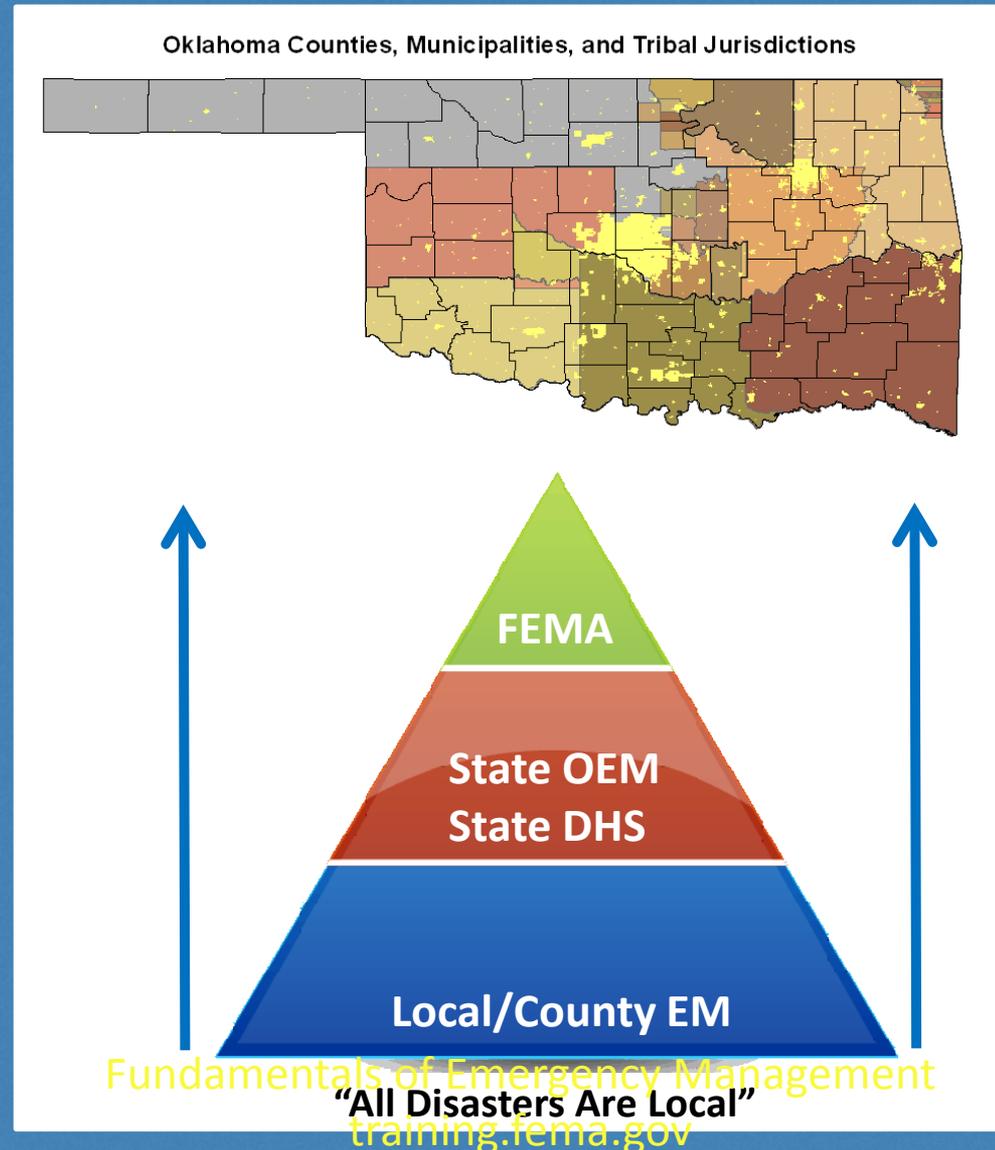
# Repeated Themes

- Insecurity/Let someone else do it/they may be better
- Inadequate Training
- Relationships
- Experience/Practice



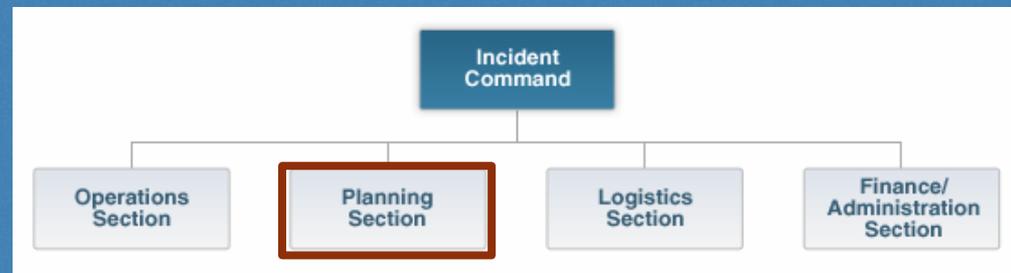
# Communication Is About Context: Understand Your Audience's Operational Context

- Basic "Survey" Information
- Jurisdictional Organization
- Newsletters
- Conferences: Entirety if possible



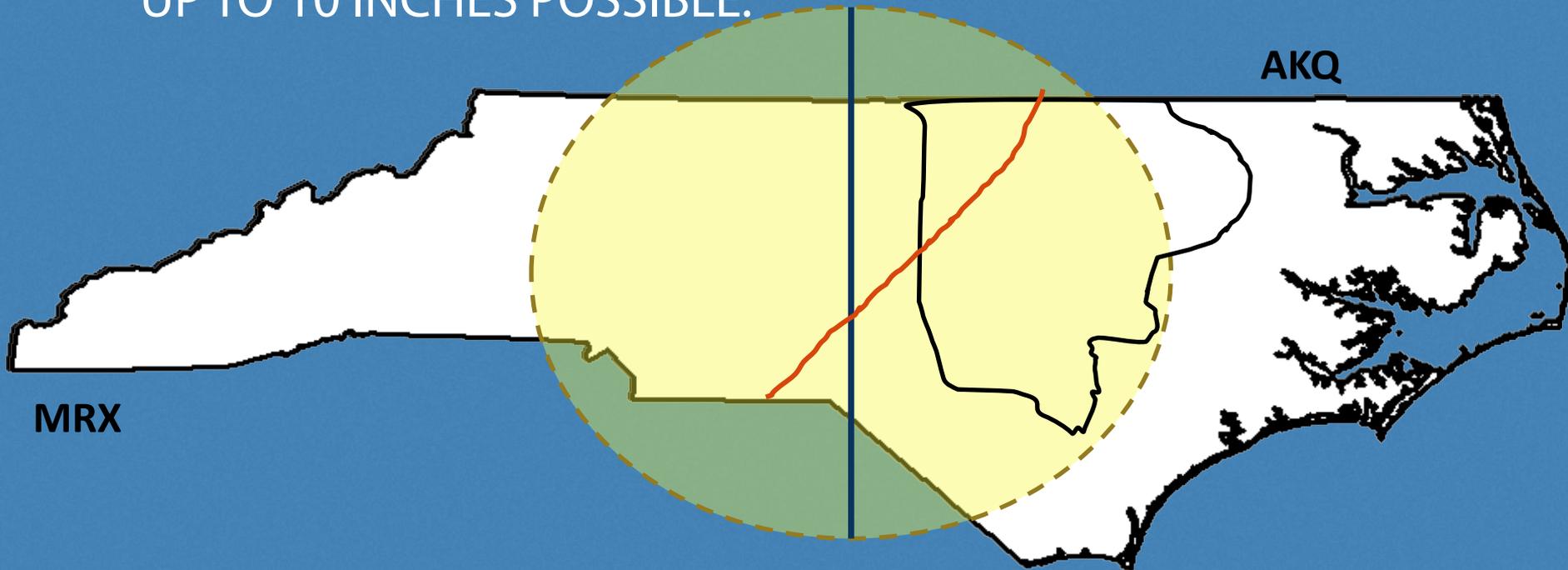
# Communication Is About Context: Understand Your Audience's Operational Context

- Idiosyncrasies
  - Location, Location, Location
  - Education/Weather Literacy
  - Technological Limitations
  - Redundancy Issues
  - Situational Dependence
    - Text vs Graphics
  - Ask Lots of Questions
    - needs & preferences
- Incident Command System
  - Weather: “Planning Section” (information/intelligence)
  - Don't use your acronyms\*
  - Clear and simple briefings
    - Depend on relationship



# Communication is About Clarity of Location: 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.





# How To Prepare: Simulations and Exercises

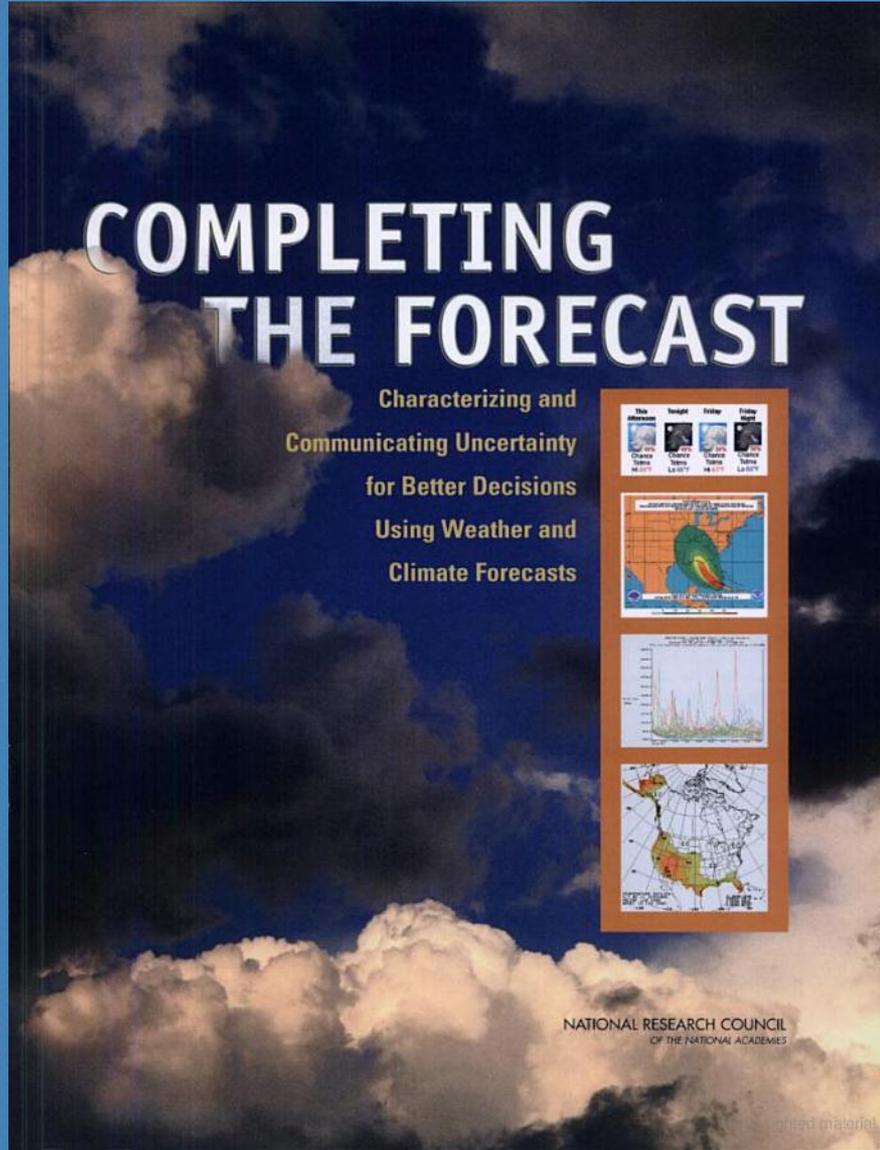
- Integrated Warning Team: Role-Swapping Exercises to Build Empathy
- High Fidelity Distributed Simulations... **with Actual Partners** important for contextual learning ... **and building relationships**
- Basic Simulation Capability to be in AWIPS-2 Baseline



- Interoffice Drills
- Partner & Stakeholder Collaboration
- Full End-To-End Exercises

- Collaborative simulations and interagency exercises: partnerships, teamwork and decision support
- Focus on teamwork and other social/human factors issues

# Uncertain About Uncertainty?



National Research Council, 2006

## Communicating Uncertainty in Weather Forecasts: A Survey of the U.S. Public

REBECCA E. MORSS, JULIE L. DEMUTH, AND JEFFREY K. LAZO

*National Center for Atmospheric Research,\* Boulder, Colorado*

(Manuscript received 2 November 2007, in final form 28 February 2008)

### ABSTRACT

Weather forecasts are inherently uncertain, and meteorologists have information about weather forecast uncertainty that is not readily available to most forecast users. Yet effectively communicating forecast uncertainty to nonmeteorologists remains challenging. Improving forecast uncertainty communication requires research-based knowledge that can inform decisions on what uncertainty information to communicate, when, and how to do so. To help build such knowledge, this article explores the public's perspectives on everyday weather forecast uncertainty and uncertainty information using results from a nationwide survey. By contributing to the fundamental understanding of laypeople's views on forecast uncertainty, the findings can inform both uncertainty communication and related research.

The article uses empirical data from a nationwide survey of the U.S. public to investigate beliefs commonly held among meteorologists and to explore new topics. The results show that when given a deterministic temperature forecast, most respondents expected the temperature to fall within a range around the predicted value. In other words, most people inferred uncertainty into the deterministic forecast. People's preferences for deterministic versus nondeterministic forecasts were examined in two situations; in both, a significant majority of respondents liked weather forecasts that expressed uncertainty, and many preferred such forecasts to single-valued forecasts. The article also discusses people's confidence in different types of forecasts, their interpretations of the probability of precipitation forecasts, and their preferences for how forecast uncertainty is conveyed. Further empirical research is needed to study the article's findings in other contexts and to continue exploring perception, interpretation, communication, and use of weather forecast uncertainty.

### 1. Introduction

Because the atmosphere is a dynamical system that exhibits limited predictability, weather forecasts are unavoidably uncertain. Meteorologists have recognized forecasts' inherent uncertainty since the early days of modern weather forecasting (Murphy 1998; NRC 2006). Moreover, users of weather forecasts have substantial experience with forecasts and subsequent weather and, thus, likely understand that forecasts are imperfect. Despite this recognition of forecast uncertainty,

Recently, advances in ensemble forecasting, growing understanding of potential pitfalls of deterministic<sup>1</sup> forecasting, and evolving user needs have revitalized interest in the provision of weather forecast uncertainty information. In 2002, for example, the American Meteorological Society (AMS) "endorse[d] probability forecasts and recommend[ed] their use be substantially increased" (AMS 2002). In 2006, a National Research Council (NRC) committee on estimating and communicating uncertainty in weather and climate forecasts, convened by the National Weather Service (NWS),

Morss, Demuth, and Lazo, 2008

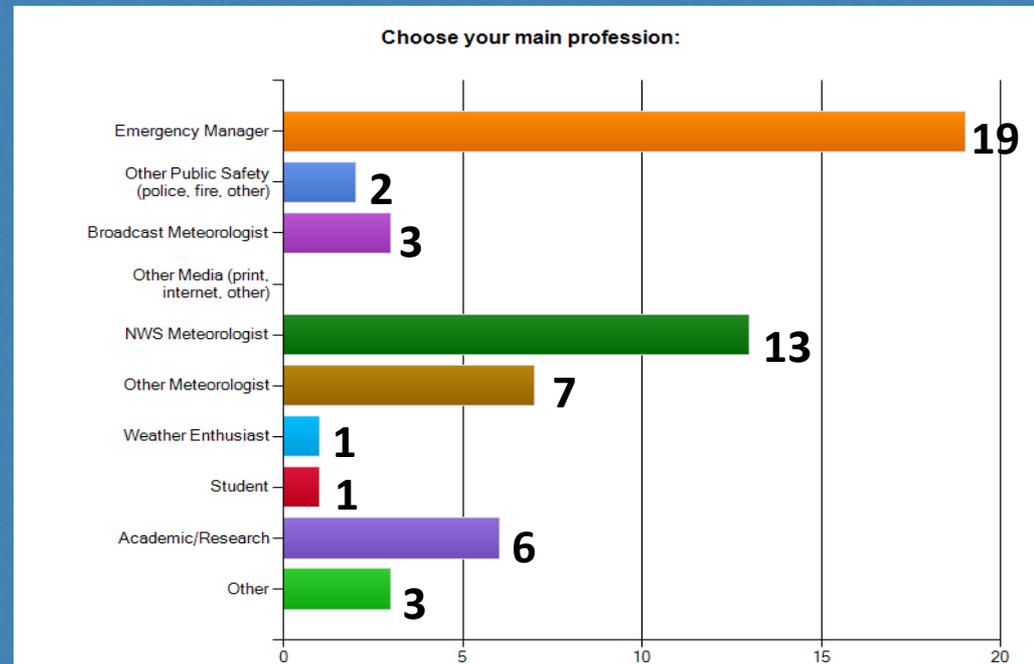
# Two Studies

## Morss, Demuth, and Lazo, 2008

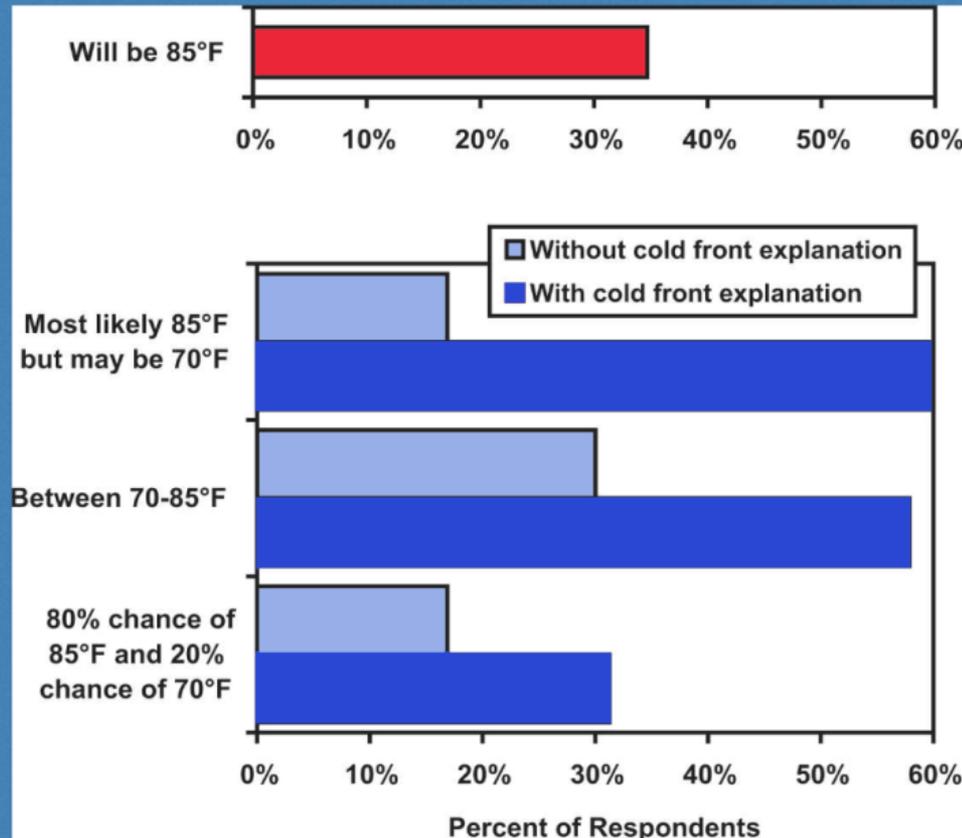
- National Web Based Survey
- General Public
- Every US State
- November 2006
- N=1520

## National Severe Weather Workshop, 2010

- Educated/Power Users
- Short Electronic Survey
- 8 questions/2 demographic
- March 2010
- N=55 (~20%)



# Deterministic vs Probabilistic vs Rationale



Morss, Demuth, Lazo

- > Forecasters: Tell your customers what you know!  
Product format is no excuse!

# What does POP mean?

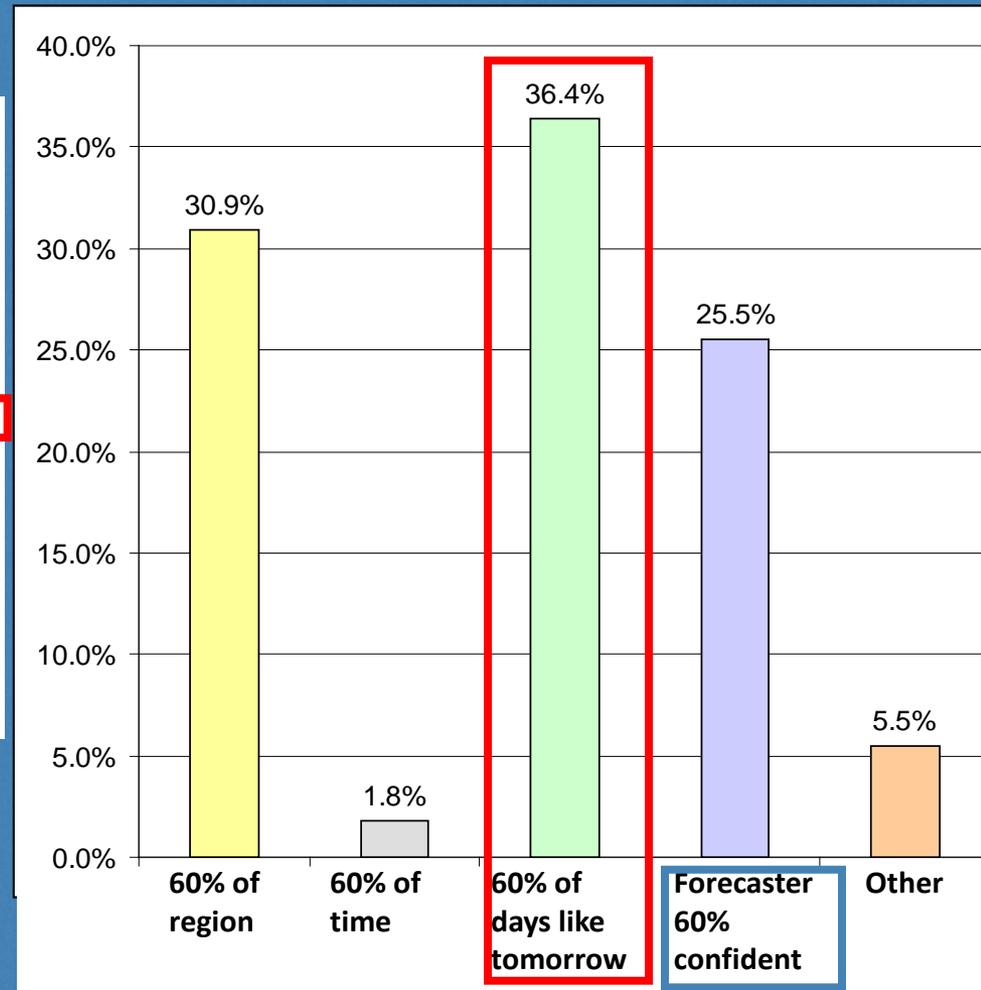
Suppose the forecast says there's a 60% chance of rain for tomorrow. Which of the options do you think describes what the forecast means?

TABLE 2. Responses to Q14a, the meaning of the forecast "There is a 60% chance of rain for tomorrow" ( $N = 1330$ ).

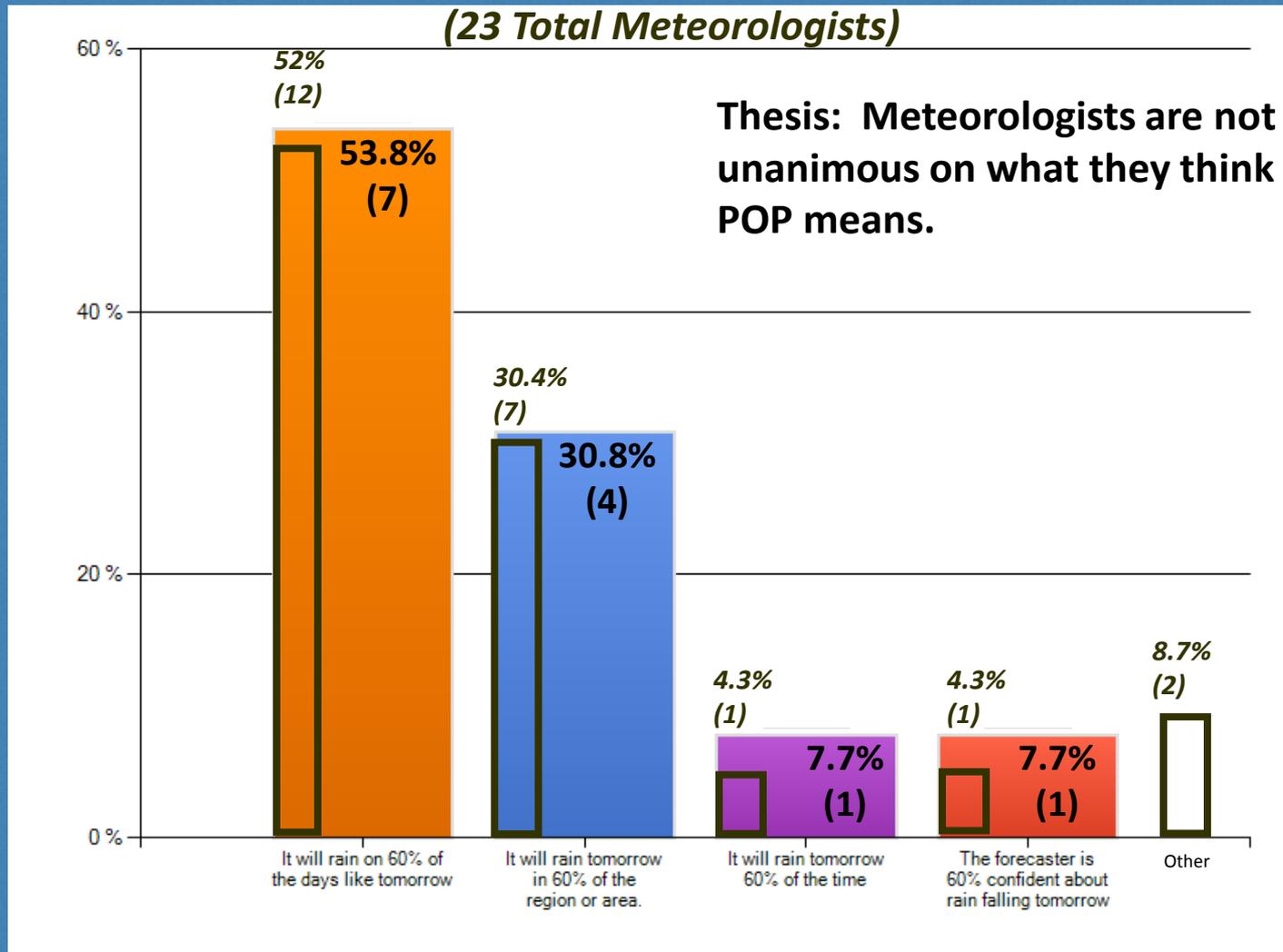
	Percent of respondents
It will rain tomorrow in 60% of the region.	16
It will rain tomorrow for 60% of the time.	10
It will rain on 60% of the days like tomorrow.*	19
60% of weather forecasters believe that it will rain tomorrow.	22
I don't know.	9
Other (please explain).	24

\* Technically correct interpretation, according to how PoP forecasts are verified, as interpreted by Gigerenzer et al. (2005).

Morss, Demuth, Lazo



# What does POP mean? (13 NWS Forecasters)

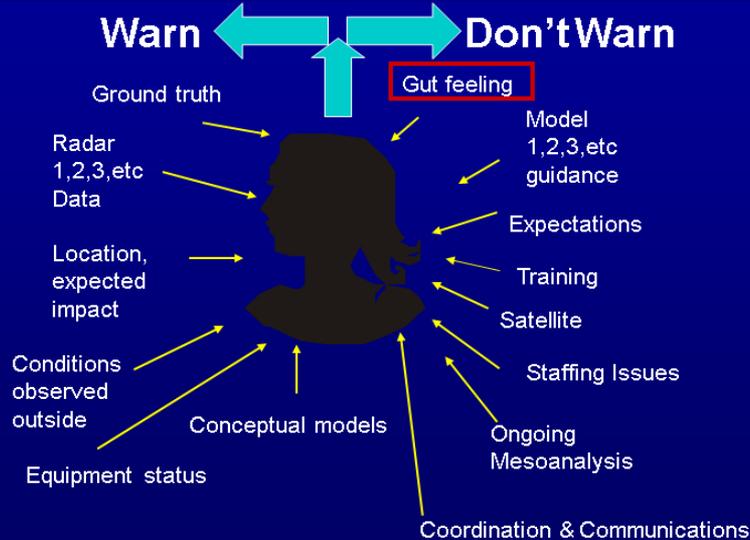


How can we communicate uncertainty or risk when we don't all agree on what it means?

# A Note About Forecaster Confidence

## Information Processing in a Warning Environment

> Challenge: How do we get forecasters calibrated against one another?



## Decision to Warn The Sum of All Inputs



**Beyond a reasonable doubt – Very likely (Criminal Trial)**  
A preferred, but rare, level of confidence in warning decisions

**Preponderance - More likely than not (Civil Trial)**  
Typical level of confidence in warning decisions

# Ways to Define Uncertainty

- Comparing similar conditions/events/watches
  - 60% prob in TOR watch
  - Probability of precipitation
- Forecaster confidence
- Model ensembles
  - 10 of 25 members with 2 m temp < 32 F: 40%
- Points vs areas
  - POP vs convective outlook probability
- Others?

> **Question: Does a particular customer want deterministic or probabilistic information, and if probabilistic, what does the customer understand?**

# Summary

- Many forecasters have insecurity about decision-support
- Knowing your audience is about relationships and context (understanding and empathy)
- We need community-wide consensus about uncertainty before we develop more probabilistic products....and are particular customers ready to use them?