

**New initiatives that integrate
social science into meteorology**

**Eve Gruntfest ecg@uccs.edu
High Plains Conference Hays, KS September 4, 2008**

Background - applied geographer

**Social
scientist in
world of
engineers &
physical
scientists**



The Big Thompson Flood in Colorado

July 31, 1976

- **140 lives lost – 35 miles from Boulder**
- **Studied the behaviors that night**
 - **Who lived?**
 - **Who died?**
 - **Led to detection & response systems**



Focus on flash floods & warning systems

Outline

- 1) Background**
- 2) Report from recent research**
- 3) New efforts bringing social science & meteorology together**



Our 2003-2008 National Science Foundation project aimed to

- Evaluate impacts of
 - Demographic change
 - New & different sources of information
- Test conventional wisdom about
 - False alarms/
close calls



What we know about warnings – Public response components

- **Hear/receive**
- **Understand**
- **Believe**
- **Personalize**
- **Decide to act**
- **Respond**



The warning process is complex

Warning project methodology

- **Survey Development**

- **1 year**
- **Input from officials & hazards researchers**

- **Survey format**

- **Likert scale & true/false**
- **Demographic questions**
- **Experience with flash floods & trauma**
- **Surveys in English & Spanish to selected respondents**

- **Survey is available – for follow up studies**



Mail survey

- 6000 surveys sent to residents in or near the floodplain
- 1017 surveys returned

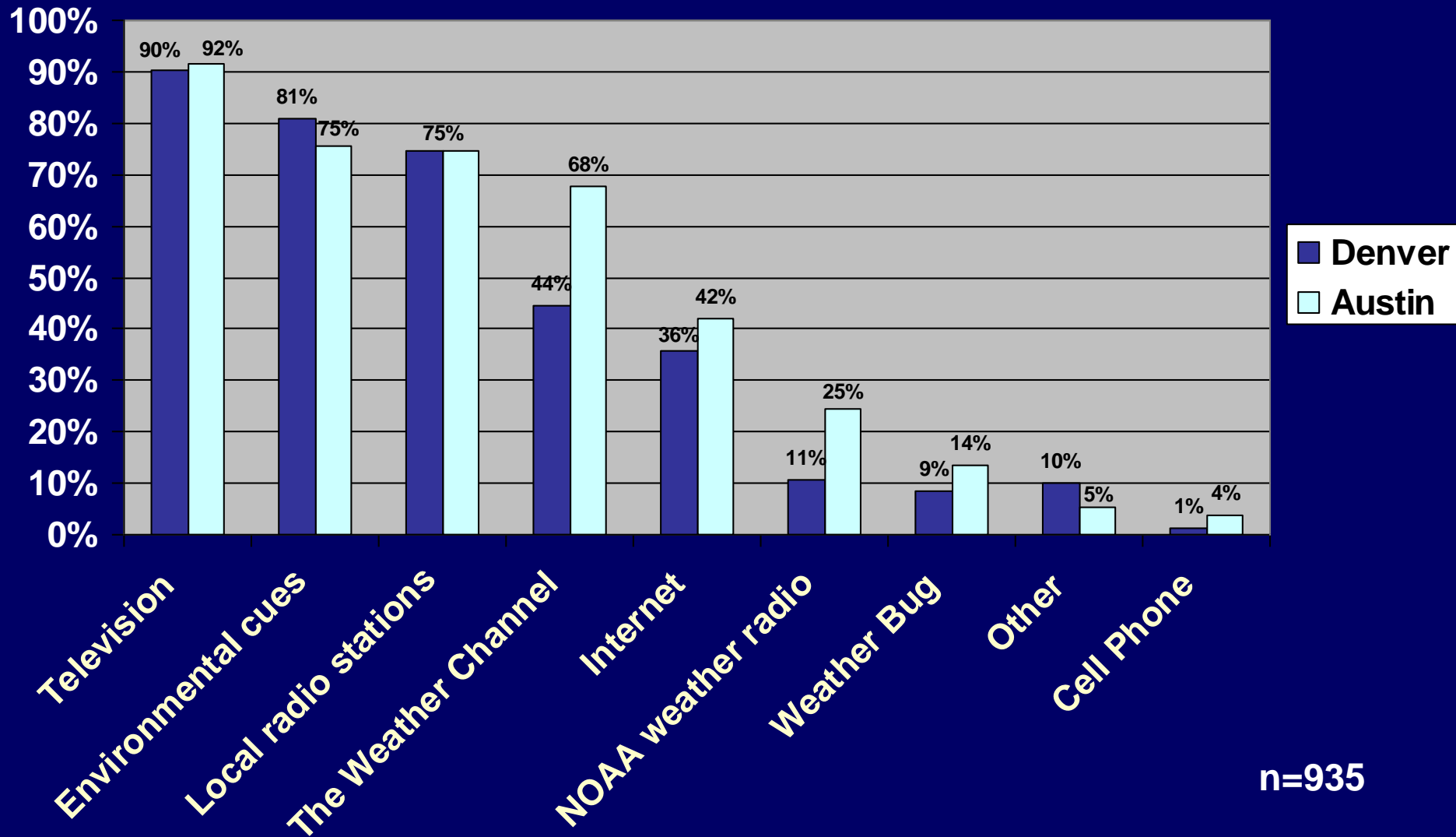


○ **Where do people get their weather information?**

○ **Best way for officials to warn you about a flash flood?**

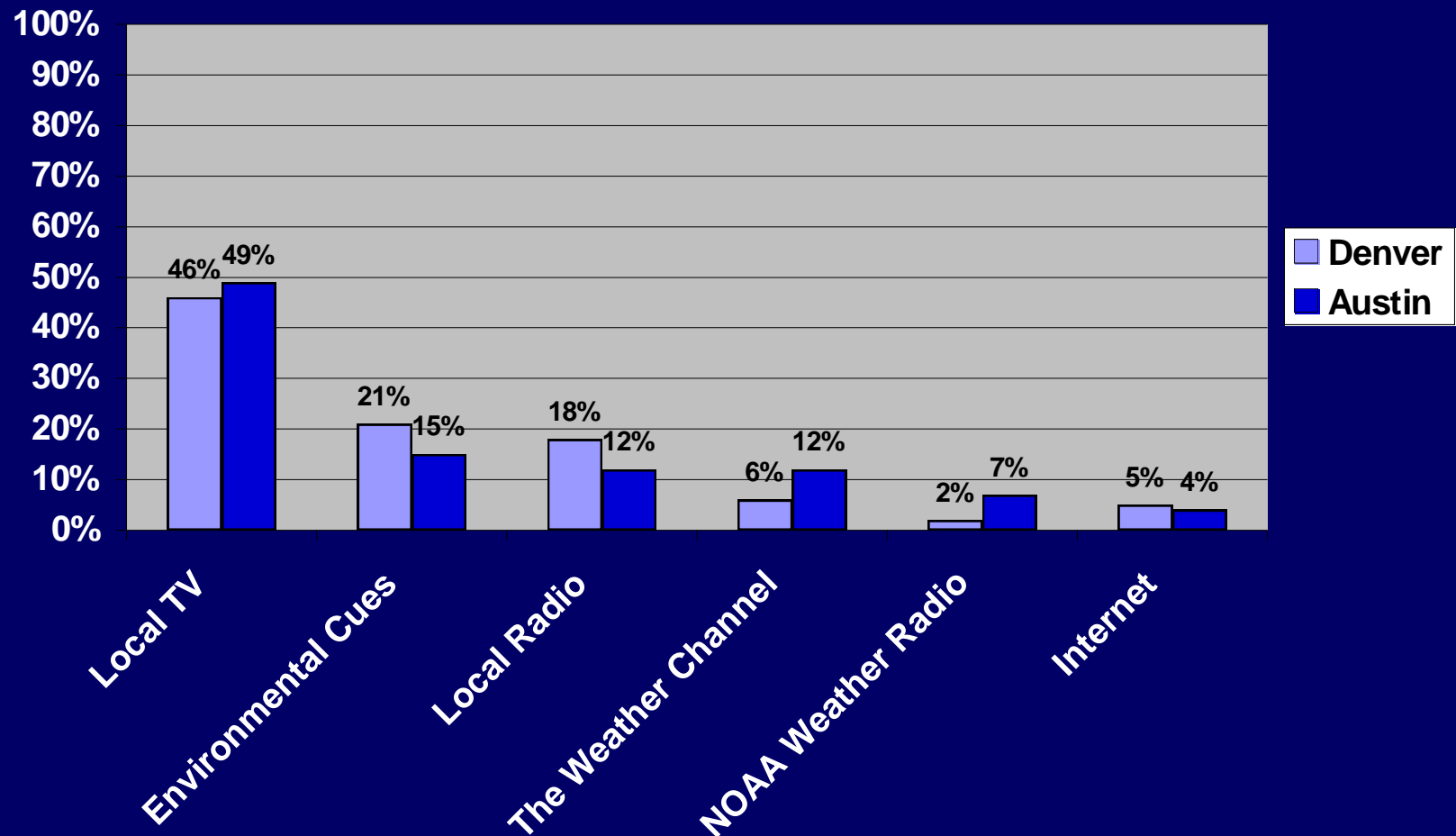


All sources of weather information used

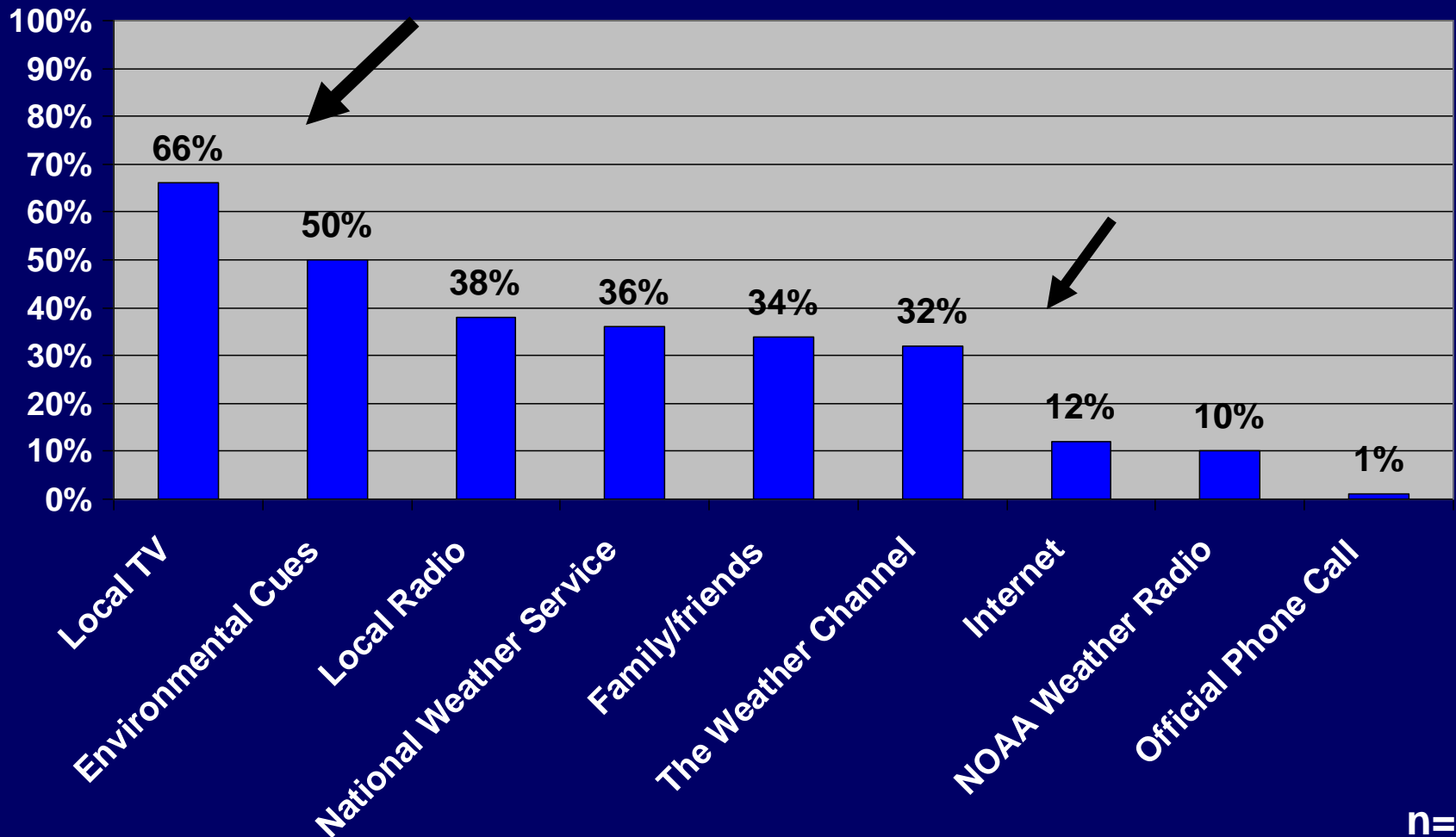


n=935

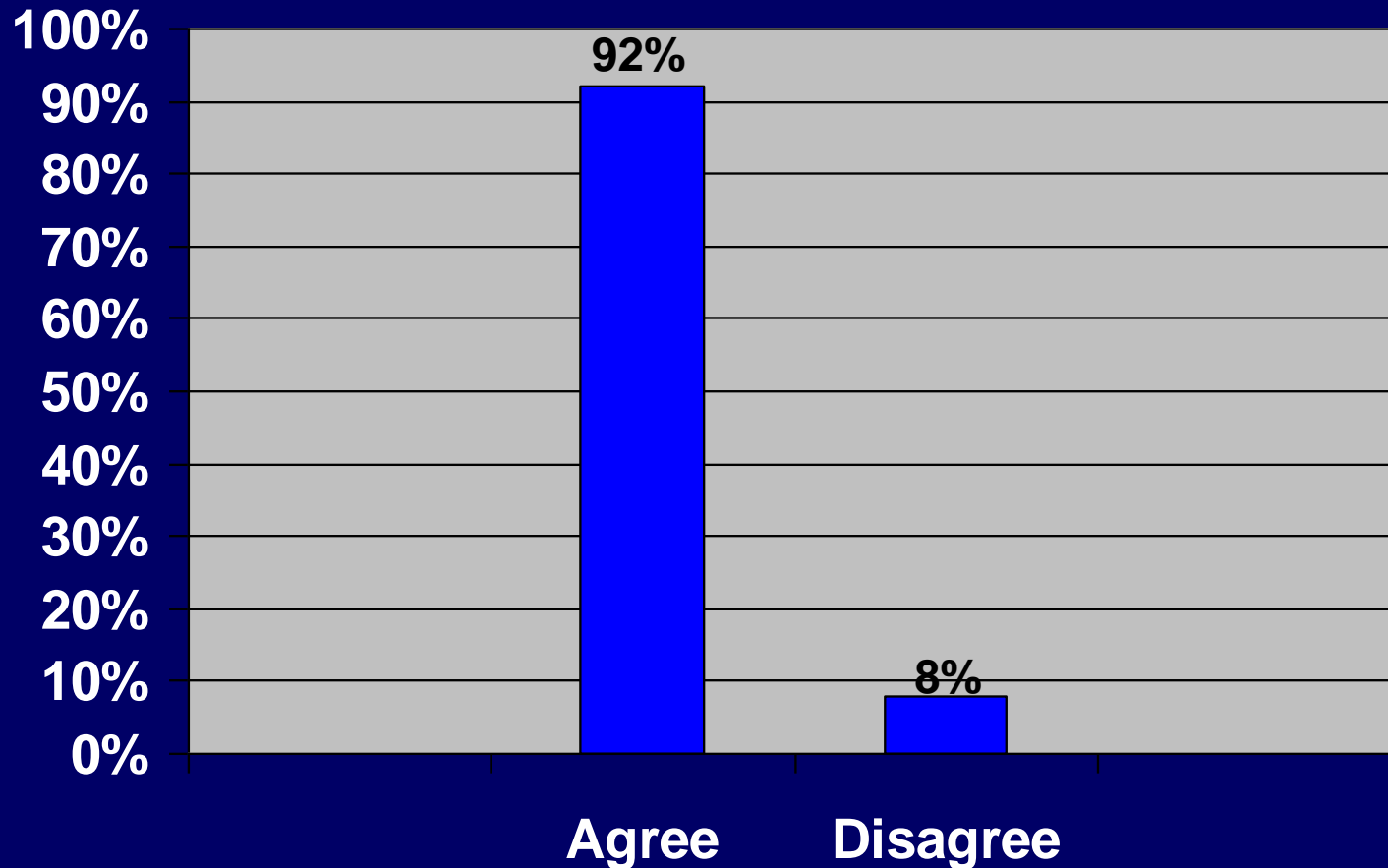
Most important source of weather information



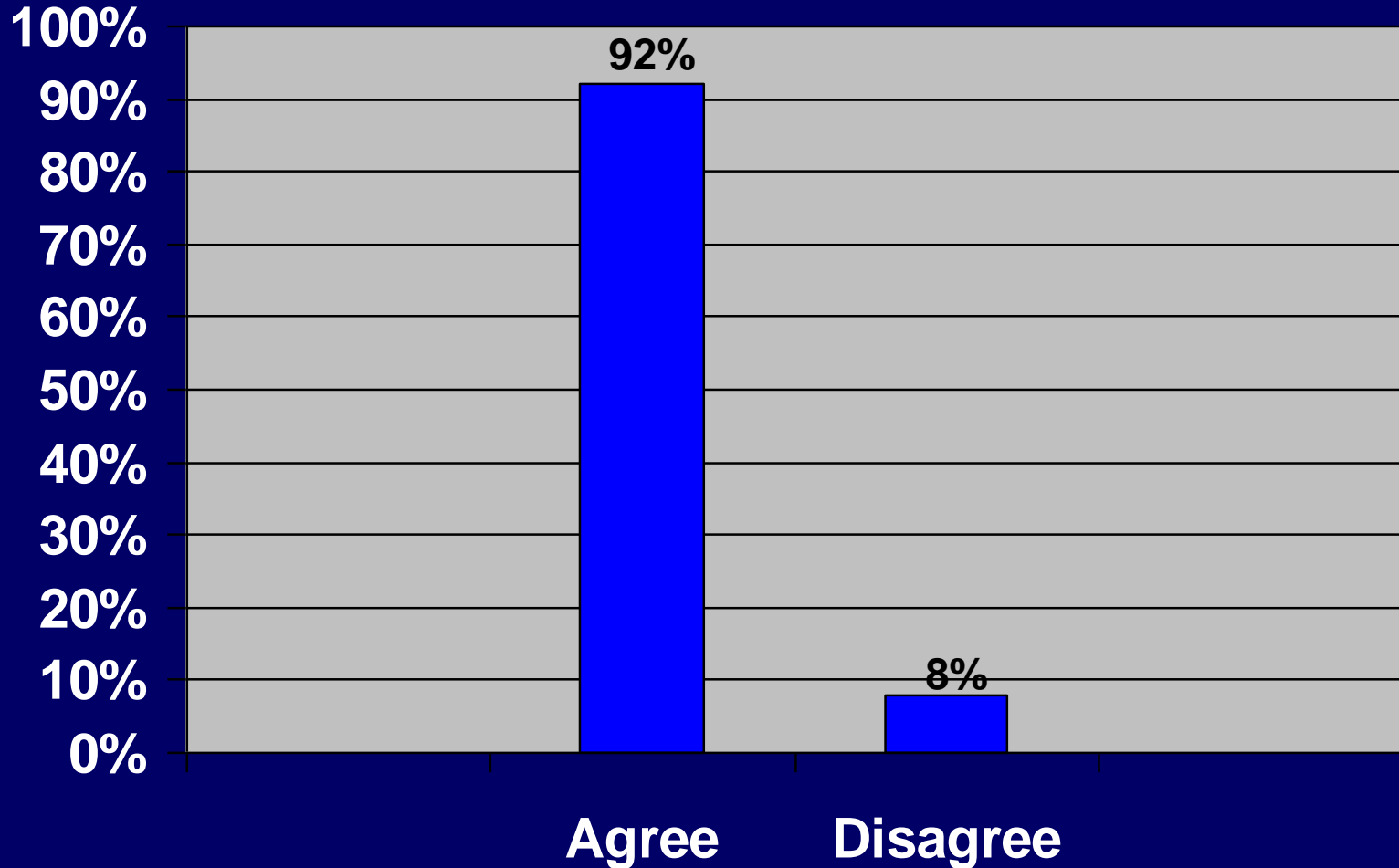
Thinking about your most recent flash flood experience, where did you find out about the flash flood (in Austin)



A flash flood *warning* indicates a more serious threat than a flash flood *watch*

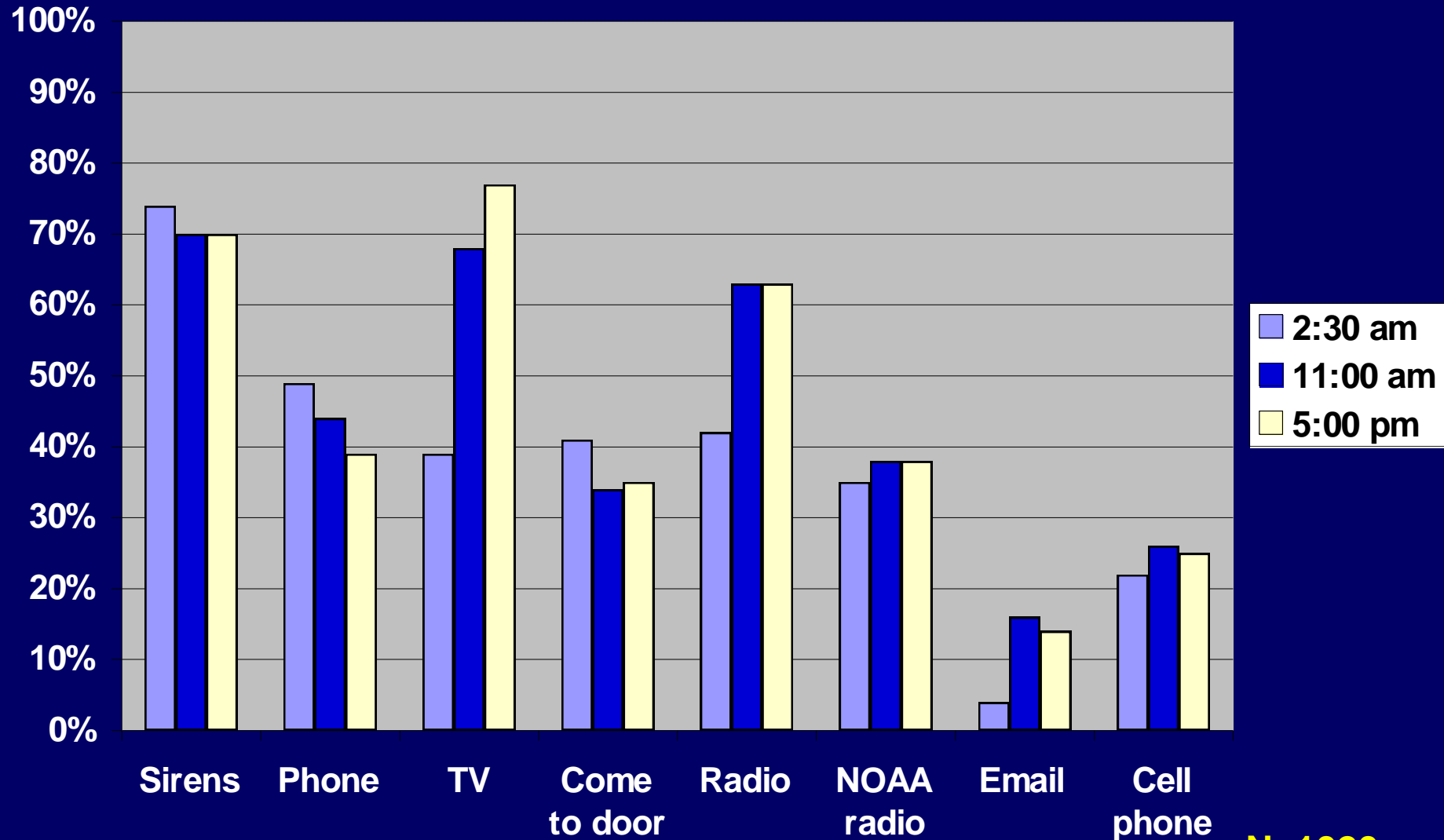


I take flash flood warnings seriously



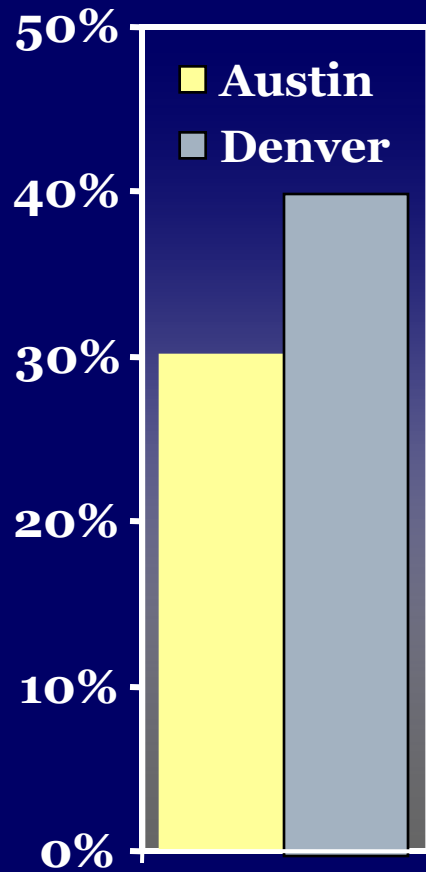
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The best way for officials to warn you about a flash flood?

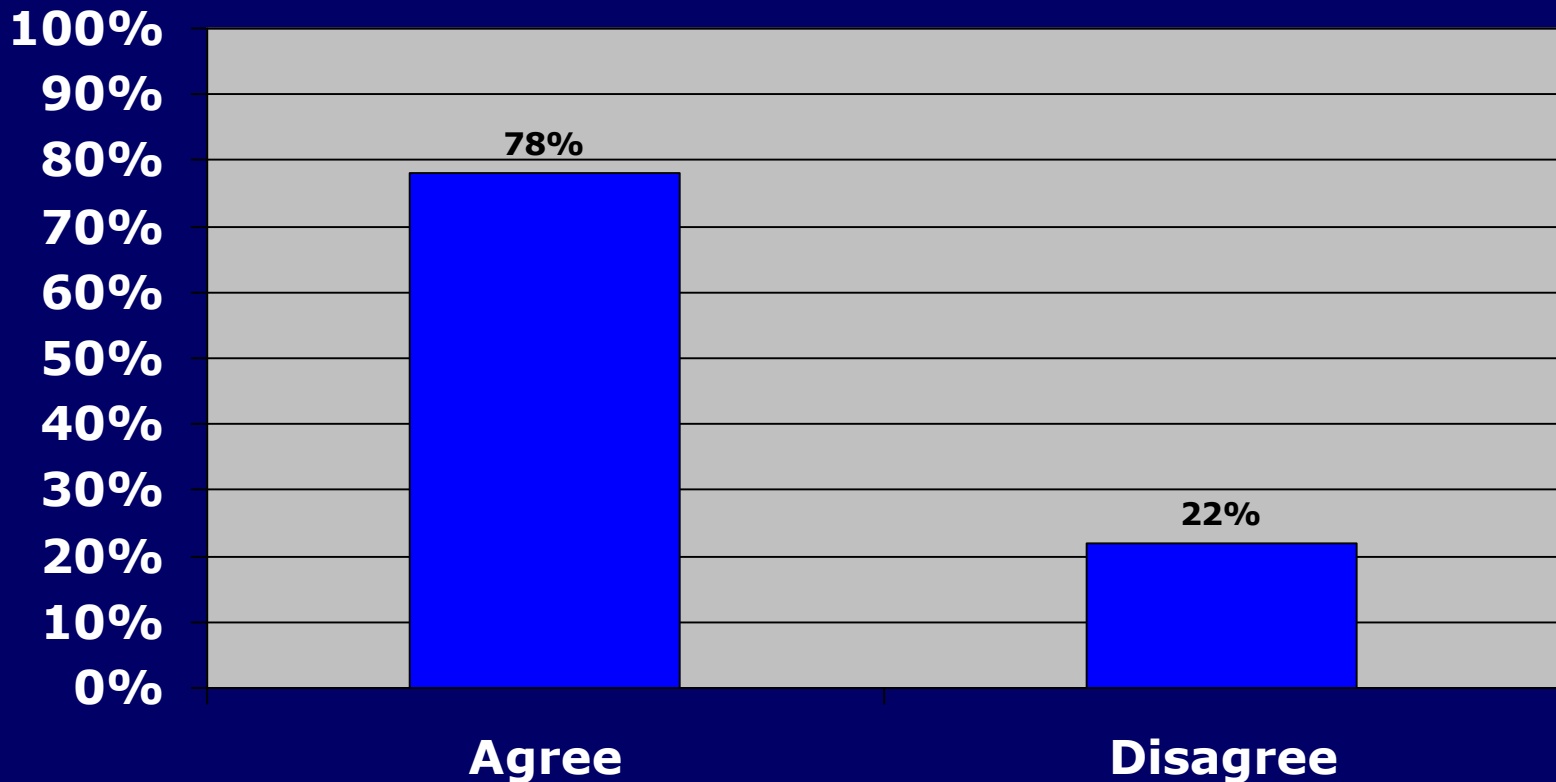


N=1020

Would I drive through flooded roads?

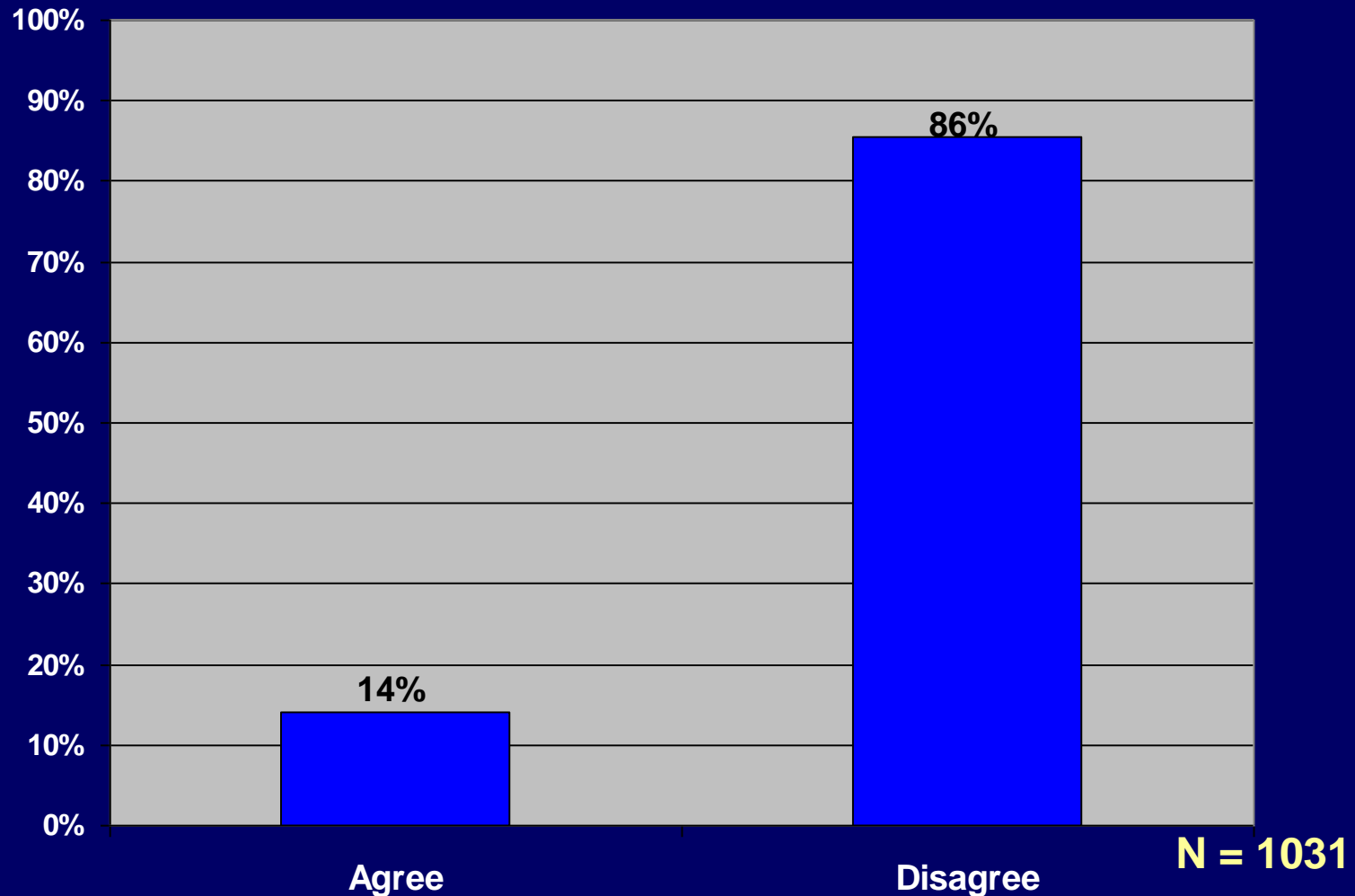


False alarm questions: Realizing it's difficult to predict flash floods, I prefer more warnings even if there are more false alarms or close calls



N= 1047

Officials are too sensitive to the possibility of flash flooding



Warning project limitations

- **Expectations were too ambitious**
 - Aimed to inform National Weather Service & emergency managers specifically how to be more effective
- **Survey**
 - Sampling response
 - Demographic representation
 - Typical survey limitations –learning what people say, not what they do
- **Warning project publications: *Environmental Hazards* 2007 -- Vol 7**
- **C. Benight, E.Gruntfest, M. Hayden, L. Barnes *Trauma and short-fuse weather warning perceptions***
- **S. Drobot C. Benight, E. Gruntfest *Risk factors for driving into flooded roads***
- **M. Hayden, S. Drobot, S. Radil, C. Benight, E. Gruntfest, L. Barnes *Information sources for flash flood warnings in Denver, CO and Austin, TX***
- **I.Ruin, J-C. Gaillard, C. Lutoff *How to get there? Assessing motorists' flash flood risk perception on daily itineraries***

Warning project findings

- Weather information requirements of each user community are highly specialized
- The weather research community has not focused on the individual needs of specific user communities

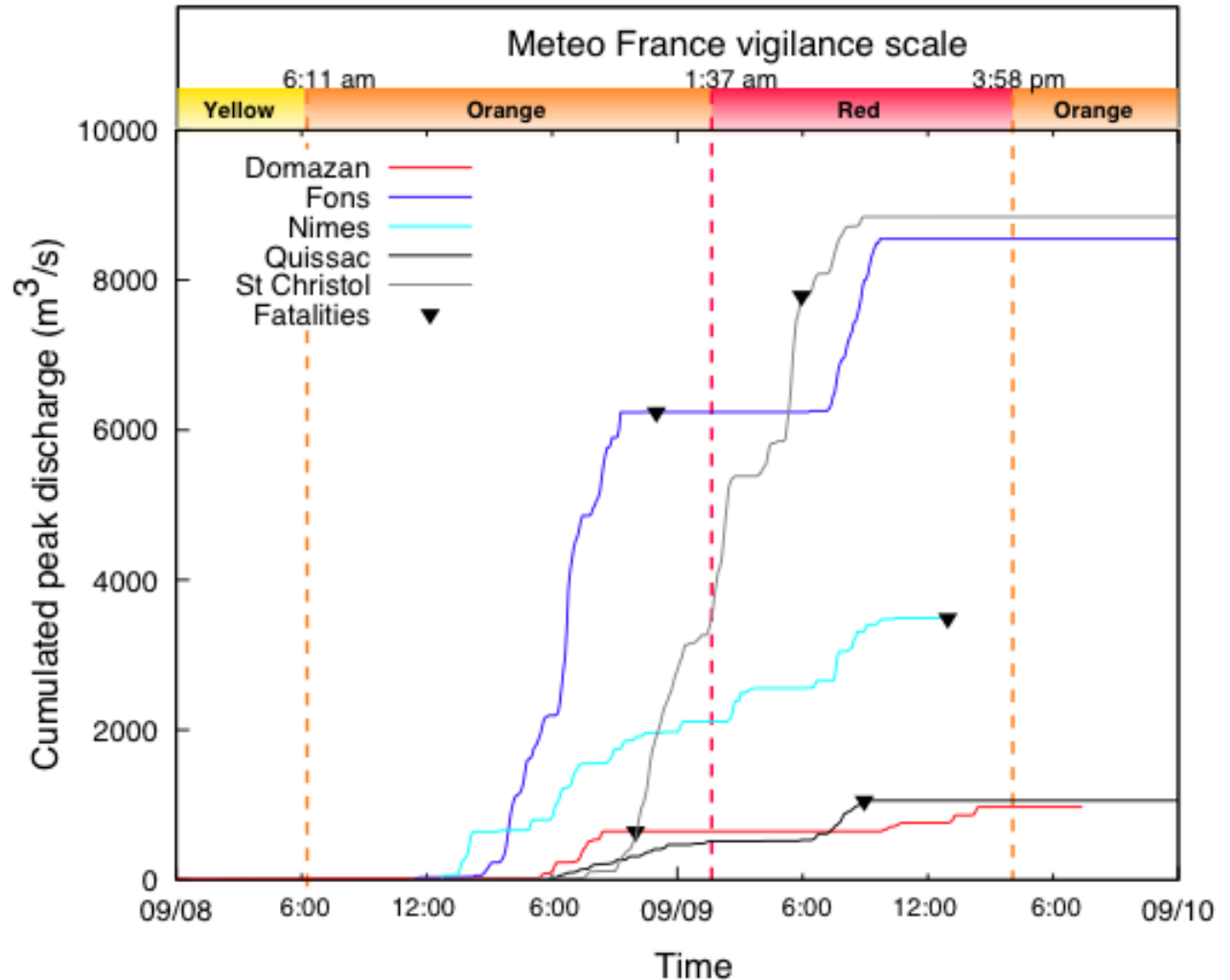


Ph.D. work by Isabelle Ruin from Grenoble: Human exposure during the 2002 Flash flood event new time/space analysis **Loss of life: Warning efficiency**

Extreme speed of watershed responses



Extremely short lead-time for warnings



Behavioral survey project

Observe driver's behavior at low water crossings in Texas

<http://70.253.207.10/video/index.shtml>

✓ Quantitative survey

- Use of video
- car counting

✓ Qualitative survey

- Use Youtube video, travels log & in-depth interviews



SSWIM

SOCIAL SCIENCE

woven into

Meteorology

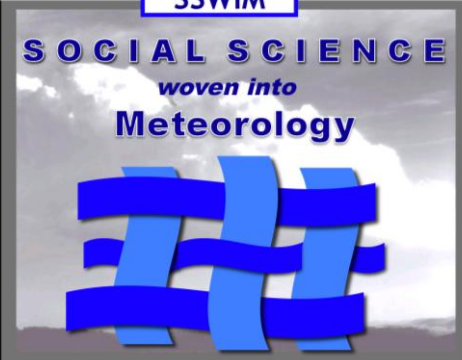


Social science *woven* into Meteorology (SSWIM)



**New initiative @ The National
Weather Center – Norman, OK**

May 1, 2008- April 30, 2011



Funding ~50% NOAA & 50% U of Oklahoma

Three main goals

- 1. To recognize & develop the existing social science activities in Norman**
- 2. To build a strong integrated community of practitioners, researchers, & others to coordinate new projects & proposals that weave social science *into the fabric* of the National Weather Center**
- 3. To assess the viability & interest in a new interdisciplinary Ph.D. program at OU focused on the societal impacts of weather & climate change-- no one being dragged into these new projects**

WAS*IS

CULTURE CHANGE

weather & society * integrated studies

www.sip.ucar.edu/wasis/



NCAR



Sponsored by the NCAR Societal Impacts Program

Changing from what **WAS** to what **IS**
the future of integrated weather studies

New culture change initiative since 2005

WAS*IS addresses two persistent issues



“I want to do work that integrates meteorology & societal impacts BUT...

- I don't know how &**
- I don't know anyone else who does this kind of work”**

Weather & Society * Integrated Studies

To change the weather enterprise so that social science is integrated into meteorological research & practice in comprehensive & sustained ways



What is WAS*IS?

1. Building an interdisciplinary community of practitioners, researchers, & stakeholders -- from the grassroots up -- who are *dedicated to the integration of meteorology & social science*

Mostly early career folks!

Capacity building -- creating a community for lifelong collaboration & support

What is WAS*IS?

2. Providing opportunity to learn & examine *ideas, methods, & examples* related to integrated weather-society work

- **Tools** – GIS, surveys, qualitative methods
- **Concepts** – initiating & building relationships, many publics, end-to-end-to-end
- **Topics** – risk communication, communicating uncertainty, vulnerability

Why WAS*IS?

Integrate (not add on)
social science into meteorology

Grow a community of
people passionate
about & dedicated to
this

**Avoiding another Hurricane
Katrina is NOT just about
improving the weather forecasts**

Recognize that
(meteorology + social
science)
> sum of its parts!

Address societal
impacts in real &
sustained ways

The **WAS*IS** movement

- Originally envisioned as only 1 workshop
- 6 workshops so far
 - Original 2-part Boulder **WAS*IS** (November 2005 & March 2006)
 - Condensed 3-day Norman **WAS*IS** (April 2006)
 - 2006 Summer **WAS*IS** (July 2006)
 - Australia **WAS*IS** (January-February 2007)
 - 2007 Summer **WAS*IS** (July 2007)
 - Summer 2008 **WAS*IS** held August 8-15

Each workshop had a distinct character with common mission - Grand total of 172 **WAS*ISers**

WAS*IS

WORKSHOPS

weather & society * integrated studies



Changing from what *WAS* to what *IS* the future of integrated weather studies

THE CHANGE IS UNDERWAY

Recognizing *WAS*ISers'* talent & research--*this is just a small sample*

Rebecca Morss - National Center for Atmospheric Research *Bulletin of the American Meteorological Society*

- problem definition
- social science research agendas &
- end-to-end-to-end process



Julie Demuth - co director of WAS*IS



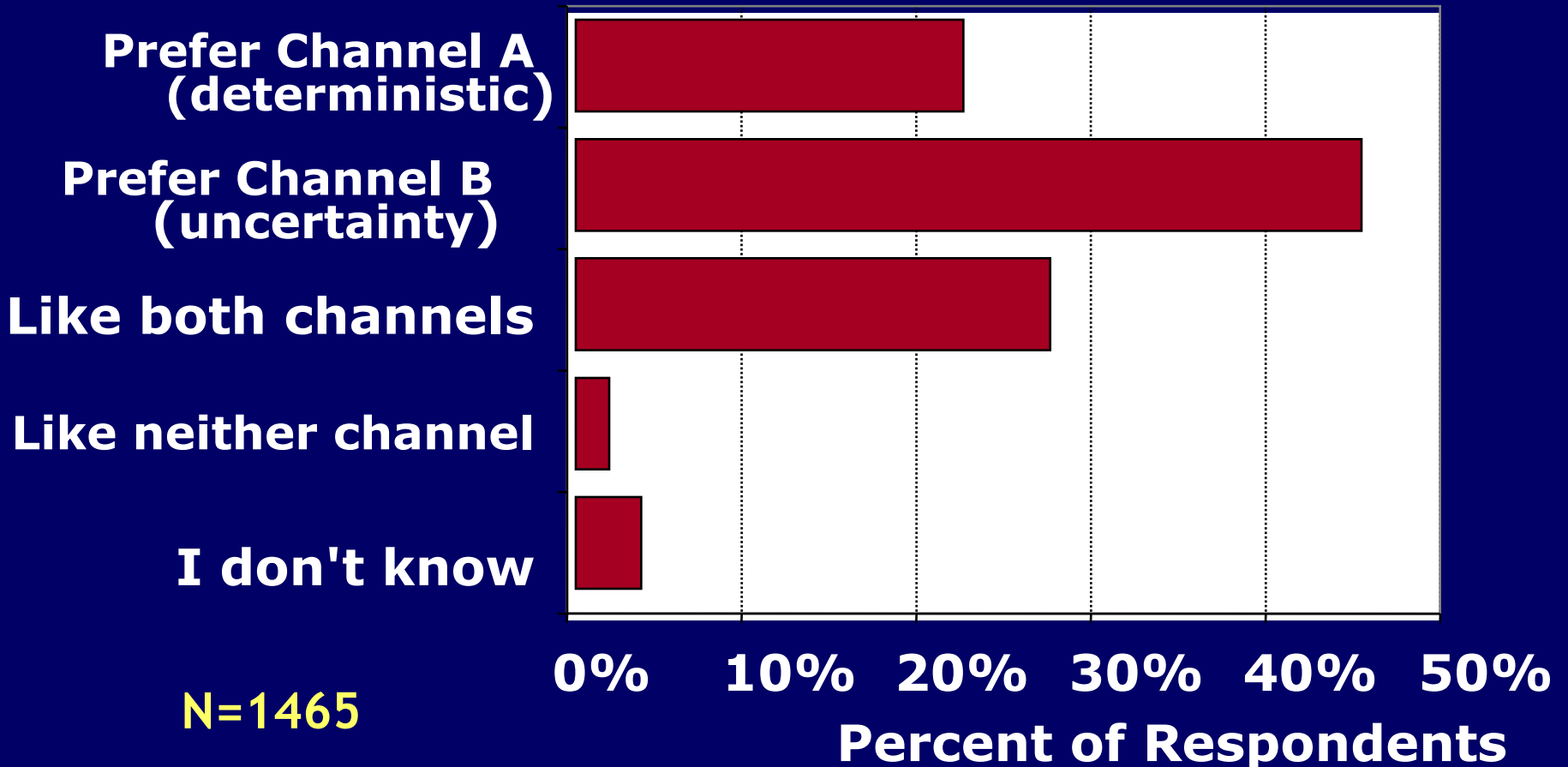
Demuth, J. et al (2007) Weather & Society Integrated Studies (WAS*IS): Building a Community for Integrating Meteorology & Social Science Bulletin of the American Meteorological Society 88(11) 1729-1737

Improving communication of weather forecast uncertainty

- Assess people's interpretations, uses, & preferences**
- Working with economists & psychologists**

Suppose you are watching the local evening news ...

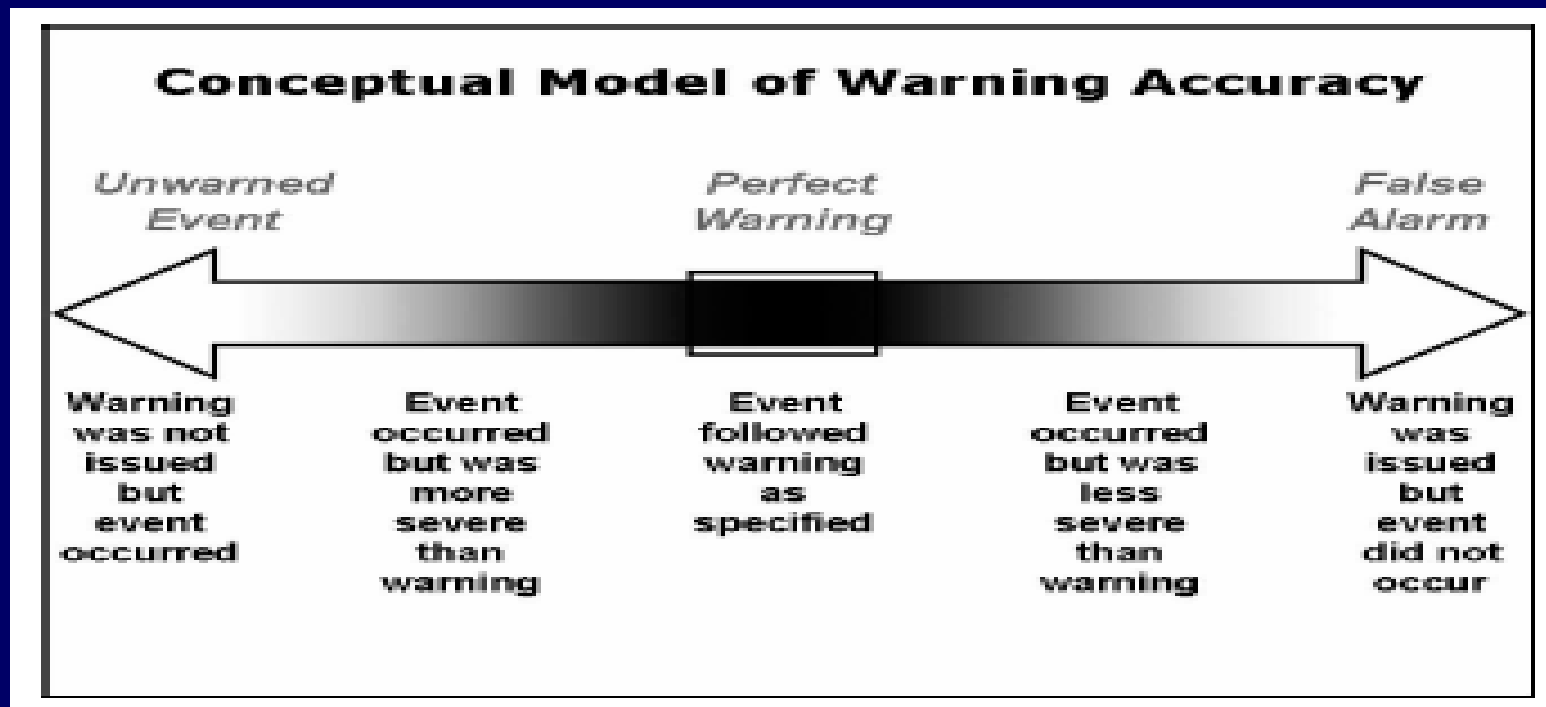
- The Channel A weather forecaster says the high temperature will be 76°F tomorrow
- The Channel B weather forecaster says the high temperature will be between 74°F and 78°F tomorrow.



Lindsey Barnes New conceptual model of false alarms & close calls



Emphasis on social relevance rather than product performance --*Provide what public needs/wants*



Barnes L, Grunfest E, Hayden M, Schultz D, Benight C (2007)

False Alarms and Close Calls: A Conceptual Model of Warning Accuracy. *Weather and Forecasting* 22, 1140-1147

Public – private – nonprofit collaborations to improve all elements of weather enterprise

with emphases on

Better communication

More geographic specificity

Reduced confusion

Partnership opportunities



**Melissa
Tuttle Carr**
The Weather
Channel



Kevin Barjenbruch-
WCM Salt Lake



Craig Schmidt – Division chief National Weather Service Western Region

Standardize collection & utilization of different types of information to improve National Weather Service efficiency & service –

Emphasize “high-impact” weather

Suggestion of communication tactical meteorologist (*societal impacts person*) in each office



Elements of socially relevant verification, **Dan Nietfeld, SOO Omaha**

- **Tornado or Severe Thunderstorm Warning?**
- **For how long?**
- **For what geographic area ?**
- **Specific messages to emphasize ?**



From DAN: These elements need to be added

Who will be impacted?

Are people

**awake/sleeping/driving/coaching,
getting married?**

**Will my friends/family be hit? What
about me?**

What has happened up to this point?

Have there already been fatalities?

**What are the TV stations saying? Have
earlier storms been "missed" ?**

- o Am I making this decision entirely on my own ?**
- o Are there any pre-existing negative (or positive) public perceptions of us / me?**
- o How will this information be received?**

Move from **WAS** to **IS** is underway

- **TEACHING** - New course offerings in **Weather & Society**

U North Carolina Asheville

U of Oklahoma

U of Colorado Denver



Chris Godfrey

Sam Ng

- **RESEARCH**

Publications in ***BAMS Environmental Hazards, Weather & Forecasting***

- **Presentations at professional meetings**

- **Several quick response proposals sent in for collaborative work to the Natural Hazards Research & Applications Information Center**

- **Many people** are friends of **WAS*IS** but are not official **WAS*ISers**

More possibilities under the **WAS*IS** umbrella

- **More advanced WAS*ISes**
- **Moving from WAS to IS beyond weather to hydrology, emergency management, climate**
- **Using WAS*IS to inform other NOAA activities**
 - **RISAs climate/weather continuum, Social Science Working Group**
- **Continuing annual WAS*IS workshops**
 - **2nd AUS WAS*ISes planned**
- **WAS*IS to introduce meteorology to social scientists**



WAS*IS on-line compendium (Demuth, Drobot, Gruntfest)

**24 contributions that highlight the methods,
results, & cooperative efforts of successful
integrated weather & social science projects**

Use as

**(1) part of undergraduate graduate-level
courses &**

**(2) a reference for scientists & practitioners to
apply in their own work**

WAS*IS indicators of change

Advanced WAS*IS held October 2007

20+ NW S WAS*ISers participated

Development of new metrics – for verification

Emphasis on social relevance rather than on product specificity



Chris Maier



Brent MacAloney



Barry Goldsmith & Andrea Bleistein

WAS * IS National Weather Service

**Multi-faceted impacts: operations, research,
& collaborations**

**Bureaucracy – dealing with tradition,
resistance**

**Metrics – societally relevant verification vs.
performance**

Partnerships within & outside of agency

- **Capacity building for long term**

- **Emphases**

- **On end-to-end-to-end – seamless processes**

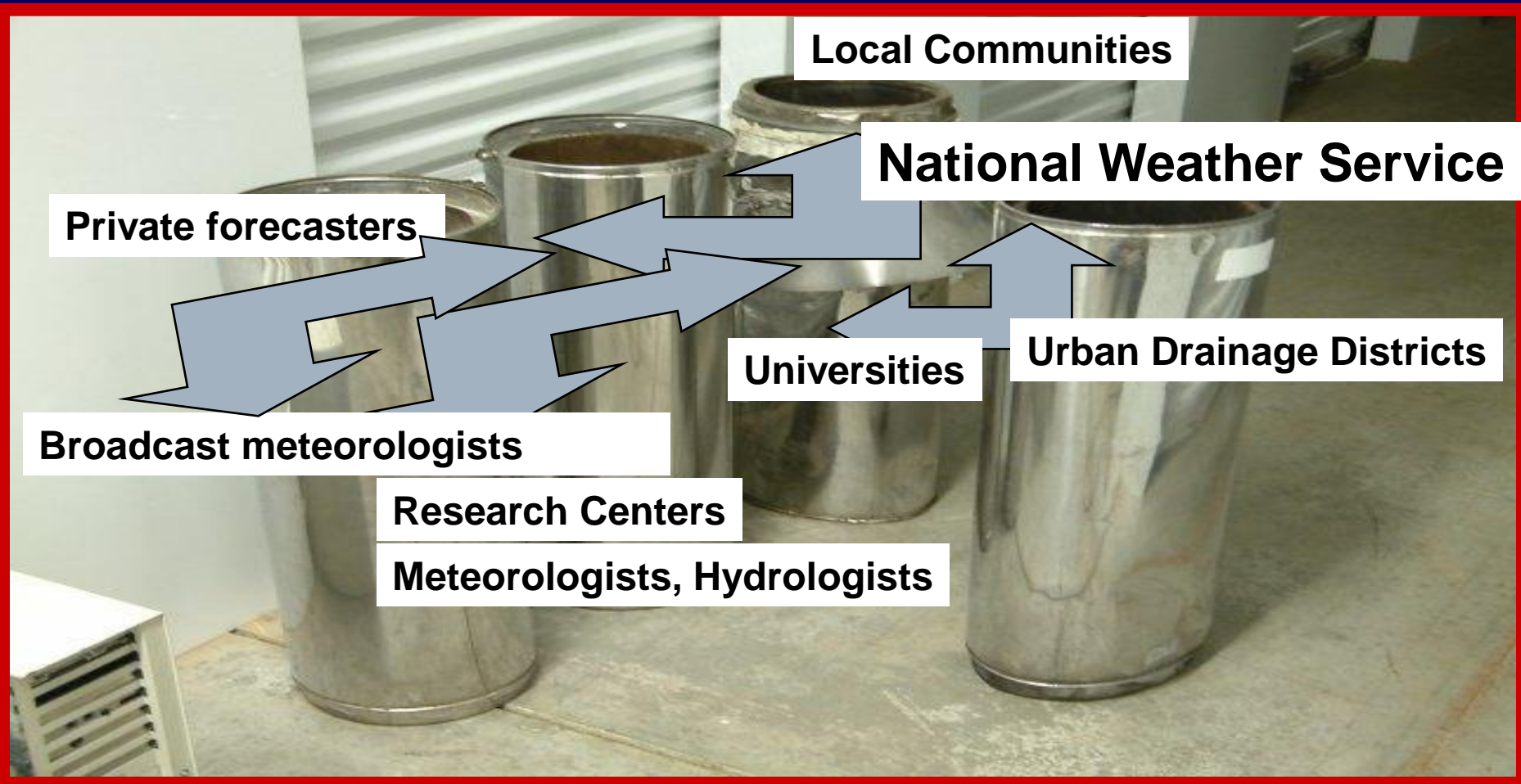
- **Interdisciplinary group of mostly early
career folks from all corners of NWS**

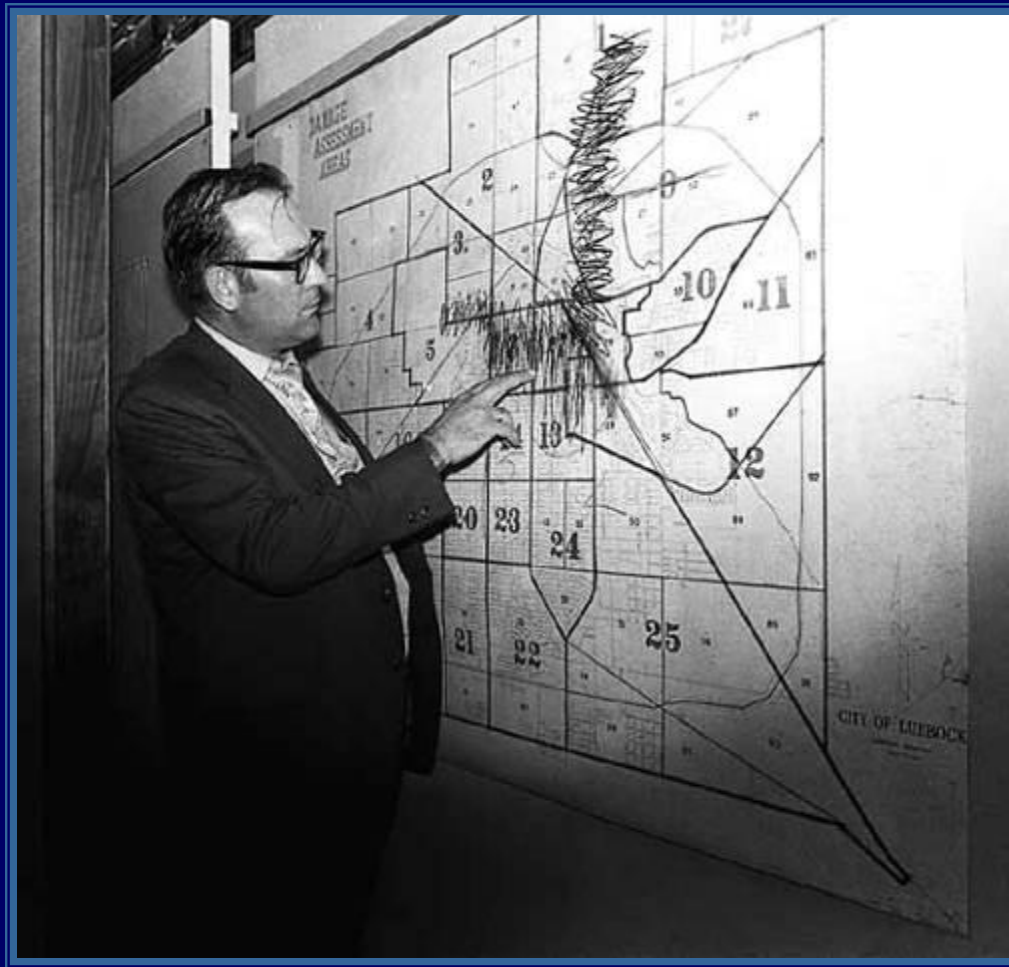
Greg Mortenson's *Three Cups of Tea*
analogy *One Man's Mission to*
Promote Peace . . . One School at a
Time (Best selling book about building schools in
Afghanistan & Pakistan)

- **1st cup- stranger**
- **2nd cup- honored guest**
- **3rd cup- you're part of family... takes years**
- **With 172 official **WAS*ISers** & hundreds of other like-minded hard-workers**
- **Social science & policy are having our 2nd cup of tea with meteorology**
- **We're not family yet – but we're no longer strangers**



The move from **WAS** to **IS** occurs when stovepipes are not the model - **Bring social science into programs & research efforts in sustainable ways**





What did the most influential players look like in meteorology prior to **WAS*IS**?



WAS * ISers are NOT the same people with new technologies!



The new fiesta – **WAS** * ISers!





WAS*ISers are changing the culture to integrate societal impacts in sustainable ways

**Thanks to for David Floyd for
today's invitation**

