SOCIAL MEDIA & PUBLIC DISASTER WARNINGS

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DISCLAIMER

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- **However:**
  - Opinions, findings & conclusions are the author's and do not necessarily reflect the views of the U.S. Department of Homeland Security

PURPOSE

- **Social media:**
  - Is a relatively new invention
- **Public warning systems & messages:**
  - Are not new & have been researched in the social sciences for 50+ years
- **Presentation purpose is to generate ideas:**
  - When the former is considered in the latter's context

THE BASIC QUESTION

(is about public behavior)

How do you help people in danger:

-STOP….

-HEAR…. &

-TAKE PROTECTIVE ACTIONS for….

TERRORIST ATTACKS

TECHNOLOGICAL EVENTS

NATURAL DISASTERS

BUILDING FIRES

BIOLOGICAL HAZARDS

HAZARDOUS MATERIALS AND MORE....

INCLUDING PUBLIC PROTECTIVE ACTIONS SUCH AS....

VEHICLE EVACUATION

PEDESTRIAN & OCCUPANT EVACUATION

SHELTERING IN PLACE

BREATHING PROTECTION

THE RESEARCH BASIS

- **50 years of social science warning research:**
  - People in disaster research literature
  - On warning systems, messages & public response
  - U.S. emphasis (not exclusively)

- **Hazards researched include:**
  - ***Natural*:** Hurricane Camille, Mt. St. Helens
  - ***Terrorism*:** World Trade Center 1993 & 9/11
  - ***Hazardous Materials*:** Mississauga, Nanticoke
  - ***Technology*:** Three Mile Island
  - ***Building Fire*:** MGM Grand, Cook County Hospital

- **We know:**
  - What works & doesn't, why & how to apply it

RESEARCH: PEOPLE IN COMMUNITY DISASTERS

- 350 page annotated bibliography available:
- *http://www.colorado.edu/hazards/publications/informer/infrmr2/pubhazbibann.pdf*

RESEARCH: OCCUPANTS IN BUILDING DISASTERS

- 150 entry bibliography available:
- *http://www.colorado.edu/hazards/library/BuildingsEvacBib2007.doc*

WE'LL "TOUCH" ON SOME TOPICS

- Design of "official warning systems"
- "Myths"
- "Alerting" the public
- Public warning "messages"
- Public response "processes"

BUT NOT OTHERS, e.g.,

- **Occupant warning response:**
  - Unique issues & applications inside buildings
- **Pre-event public education:**
  - How social media can help reach, teach & motivate the public to prepare
- **Bridging the research/ practice gap:**
  - What to overcome to apply knowledge
- **Response (non-warnings) applications:**
  - Of social media

TOPIC 1: WARNING MESSAGE DELIVERY SYSTEMS & SOCIAL MEDIA

WARNING "SYSTEMS"

- **Weave together disparate:**
  - Elements:
    - Technology, authorities & the grass roots
  - Disciplines:
    - Physical, social & behavioral sciences & IT
  - Specializations:
    - Inter-organizational relations, systems analysis, human factors & social psychology
  - Societal divisions:
    - Varied government jurisdictions, public & private sectors, organizations & the public
- **Goal: create "highly reliable" systems**

SUBSYSTEM FUNCTIONS

RISK
Natural Environment
Technological
Civil

MANAGEMENT
Interpretation
Decision to Warn
Warning Content
Warning Method & Channel
Response Monitoring
Warning Feedback

DETECTION
Monitoring
Detection
Data Assessment & Analysis
Prediction
Informing

PUBLIC RESPONSE
Interpretation
Confirmation
Response
Warn Others

SUBSYSTEM ACTORS

RISK
Nature
Technology
Terrorists & more

MANAGEMENT
Government
(Local, State, Tribal)
Building Operators

DETECTION
Scientific Agencies
Law Enforcement
(Police, DHS, CIA, FBI)
Public

RESPONSE
General Public
Racial & Ethnic Minorities
Visitors & Transients
Organizations & Facilities

SUBSYSTEM LINKAGES

CUES
Observations from the risk environment

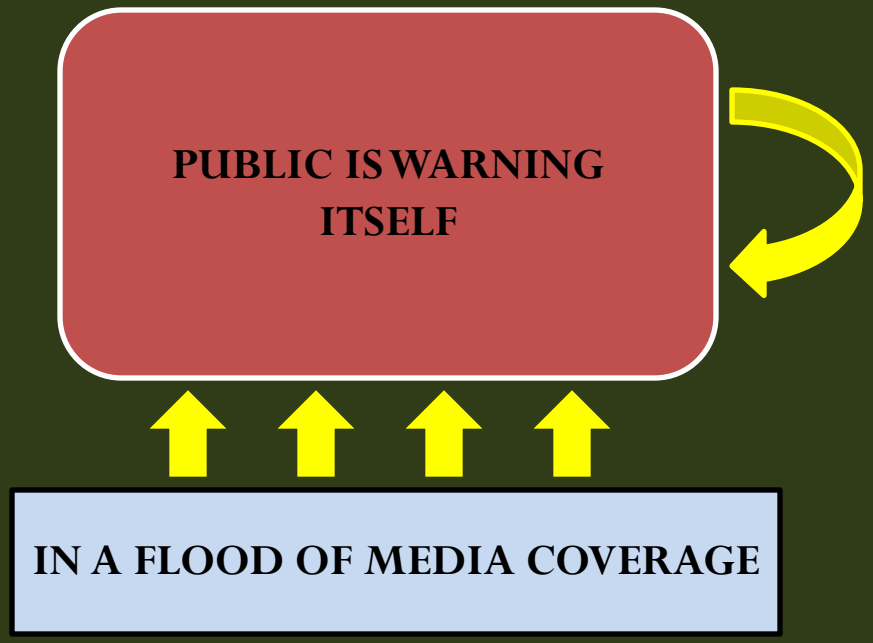
MONITOR
Observe another subsystem

INFORM
Communicate to another subsystem

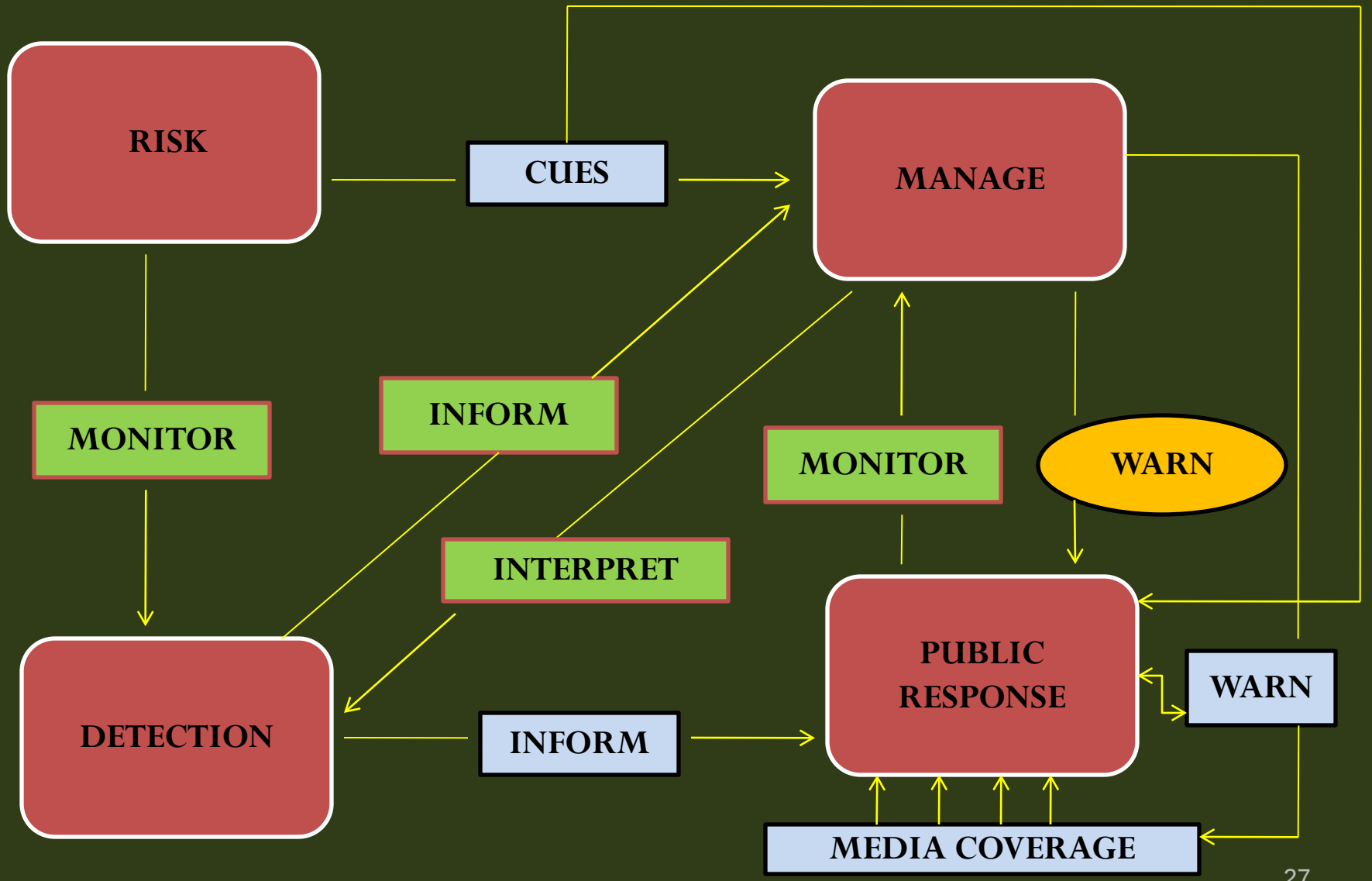
WARN
Communicate what to do to people at risk

INTERPRET
Make sense out of cues & information received

EXOGENOUS FACTORS



INTEGRATED SYSTEM



SOCIAL MEDIA USED TO DESIGN "OFFICIAL WARNING SYSTEMS"

- **To integrate official subsystems & players to avoid system failures:**
  - Use social media to create reliable warning systems
  - All subsystems & linkages present:
    - All actors are talking to each other
  - All subsystems, linkages, & exogenous factors integrated into a system
  - Linkages don't break when used

FAILURES IN SYSTEMS SOCIAL MEDIA COULD HELP ELIMINATE

- **Design a "complete" warning system:**
  - Subsystems specified
  - Linkages operational
  - Subsystems & linkages integrated
  - Exogenous factors incorporated in the system
- **Ensure that subsystems & linkages work:**
  - Appropriate technology
  - Sound system actor behavior
    - Practice makes perfect
- **Many others documented by research**

WHAT SOCIAL MEDIA COULD CONTRIBUTE TO SYSTEM DESIGN

- **Warning system preparedness:**
  - Elaborate: all warning systems elements
  - Integrate: subsystems, linkages, and exogenous factors into one system
- **Major goals:**
  - Rarely used system will work when needed
  - Weave together agencies & disciplines from different silos that rarely interact
  - Communication links don't break when used

EXAMPLE RESEARCH QUESTIONS

- **How can social media (or some adaptation of it) integrate subsystems in the nation's warning systems, e.g.,**
  - CDC to local public health agencies
  - Federal, state & local agency communication
  - and much more
- **How can social media facilitate the delivery of warnings to special populations:**
  - Nursing home, colleges, the poor, and more

TOPIC 2: MYTHS AND SOCIAL MEDIA

DEFINITION OF A MYTH

- **A myth exists when someone:**
  - **BELIEVES** it's true (but it's not)
  - Think they have **EVIDENCE** for it (but they don't)
  - **WON'T STOP BELIEVING** it (no matter what)
- **Consequences of myths:**
  - Can cost lives in warnings:
    - Warnings are withheld
    - Resources diverted
    - Insufficient information provides

MYTH 1: PANIC

- **Non-problem:**
  - Never occurred after a warning
- **Actual problem:**
  - "We didn't issue a warning so we wouldn't cause a panic"
- **Panic occurs when:**
  - Spaces are confined
  - Escape routes ARE available, but
  - People think: not enough time for everyone to use them, resulting in
  - People must: "compete to live"
- **Even then, panic is rare**

MYTH 2: "KISS"

- **Definition:**
  - "Keep it simple stupid"
- **Myth:**
  - Applies to public warnings
- **Reality:**
  - Applies to advertising, not warnings
  - Warned people become "information starved"
  - If warnings don't tell enough, they'll find what they want to know someplace else & confusion results

MYTH 3: CRY WOLF

- **Myth:**
  - People don't respond after false alarms
- **Reality:**
  - They do (perhaps differently)
- **False alarms:**
  - Can be productive for future response "if explained"
  - **REAL ISSUE:** their cost angers local government
- **Exception:**
  - People ignore sirens (especially if sounded frequently, e.g., for siren tests)

MYTH 4: CYBER TERRORISM

- **Myth:**
  - Cyber terrorism (hackers, spammers, phishers, trolls, malicious attackers) will occur during warnings
- **Reality:**
  - Few documented cases of cyber terrorism during warnings in America

MYTH 5: INFORMATION CAN BE CONTROLLED

- **Myth:**
  - Those with formal warning system roles can control public warning information
- **Reality:**
  - They could once, but those days are over because of social media

MYTH 6: SOCIAL MEDIA WARNINGS ARE WRONG

- **Myth:**
  - The warnings the public gives to itself are wrong and of lower quality than official warnings
- **Reality:**
  - The warnings the public gives to itself are accurate and self-correcting when they are not

EXAMPLE RESEARCH QUESTIONS

- **To what extent are cyber-myths true & why:**
  - Terrorist events vs. other hazard types
- **How do social media & official warnings:**
  - Compare in actual events
- **Does belief in myths by warning providers:**
  - Influence event outcomes

TOPIC 3: ALERTING THE PUBLIC AND SOCIAL MEDIA

ALERTING

- **STOP** ongoing life
- Get people's **ATTENTION**
- **CAPTURE** your audience first, then deliver public warnings

FORMAL ALERTING

- **Get people's attention, e.g.,**
  - "Lights on" in theaters
  - Piercing sounds with TV crawlers
- **Wake people up, e.g.,**
  - Sleeping children & older adults
  - Hearing loss & under the influence
- **Outside devices loose effectiveness if:**
  - Windows shut & air/heat is on
  - 3 minute sounding 10 decibels over ambient outdoor siren has a 62% chance of waking someone up
- **Need indoor devices for alert at night:**
  - Fast moving community event
  - Fire in a hotel

INFORMAL ALERTING

- **Warning diffusion "among those warned"**
  - Always happens, count on it, & use it
- **9/11 example:**
  - Most in country learned about attack in 1 hour
  - Many in towers found out a plane hit from friends/relatives
- **Rule of thumb:**
  - 1 informal first warning for every 2 formal first warnings
- **Informal alerting increasing with new technologies**

HOW SOCIAL MEDIA CAN HELP ALERT THE PUBLIC

- **Social media may be new**
- **What it facilitates for warnings isn't:**
  - The "informal" alerting/warning process
- **Social media has the potential to:**
  - Accelerate alerting the public
  - Reach hard to reach sub-populations
  - Direct people to complete warning information

EXAMPLE RESEARCH QUESTIONS

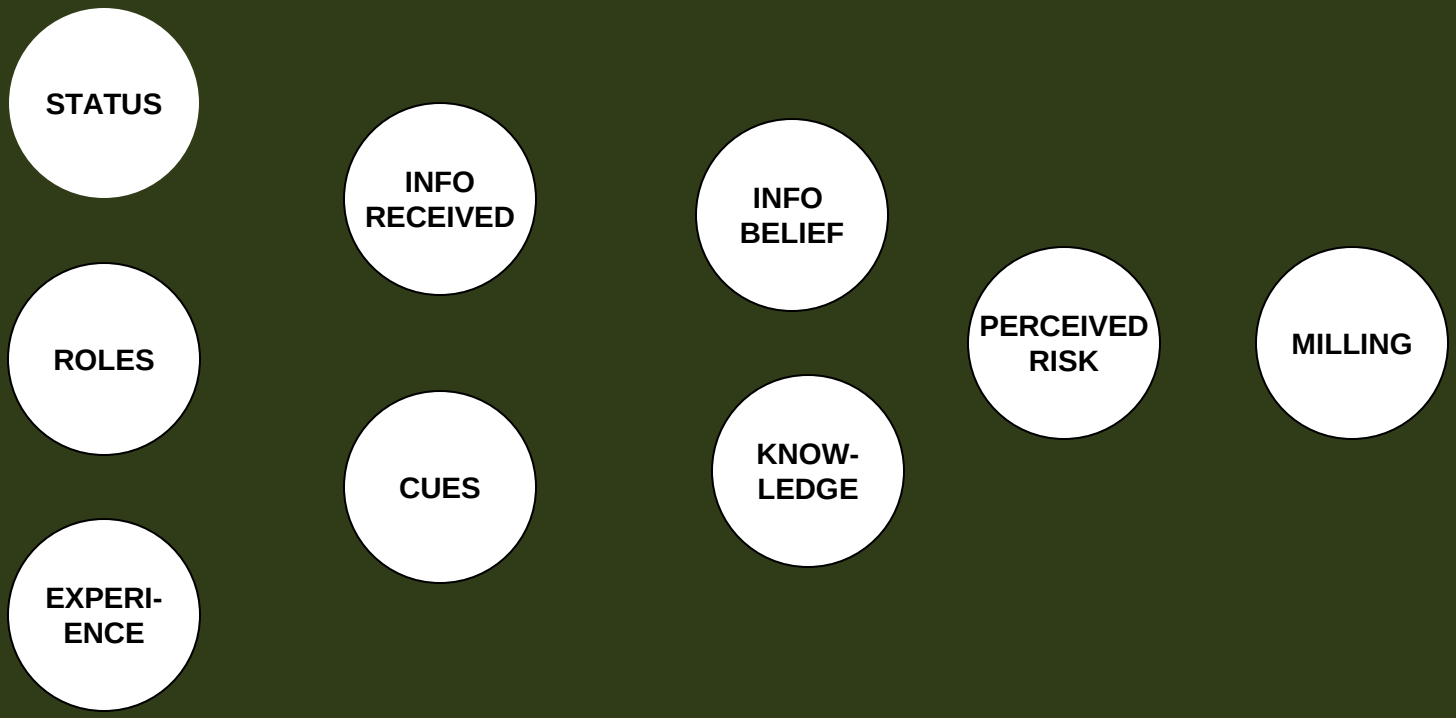
- **Sub-populations:**
  - What sub-populations are receive alerts from social media & which don't
  - Are adoption trends changing over time & how
- **What is the "tipping point" at which social media can be:**
  - A "first line" method to alert people at risk

TOPIC 4: WARNING MESSAGES, PUBLIC RESPONSE & SOCIAL MEDIA

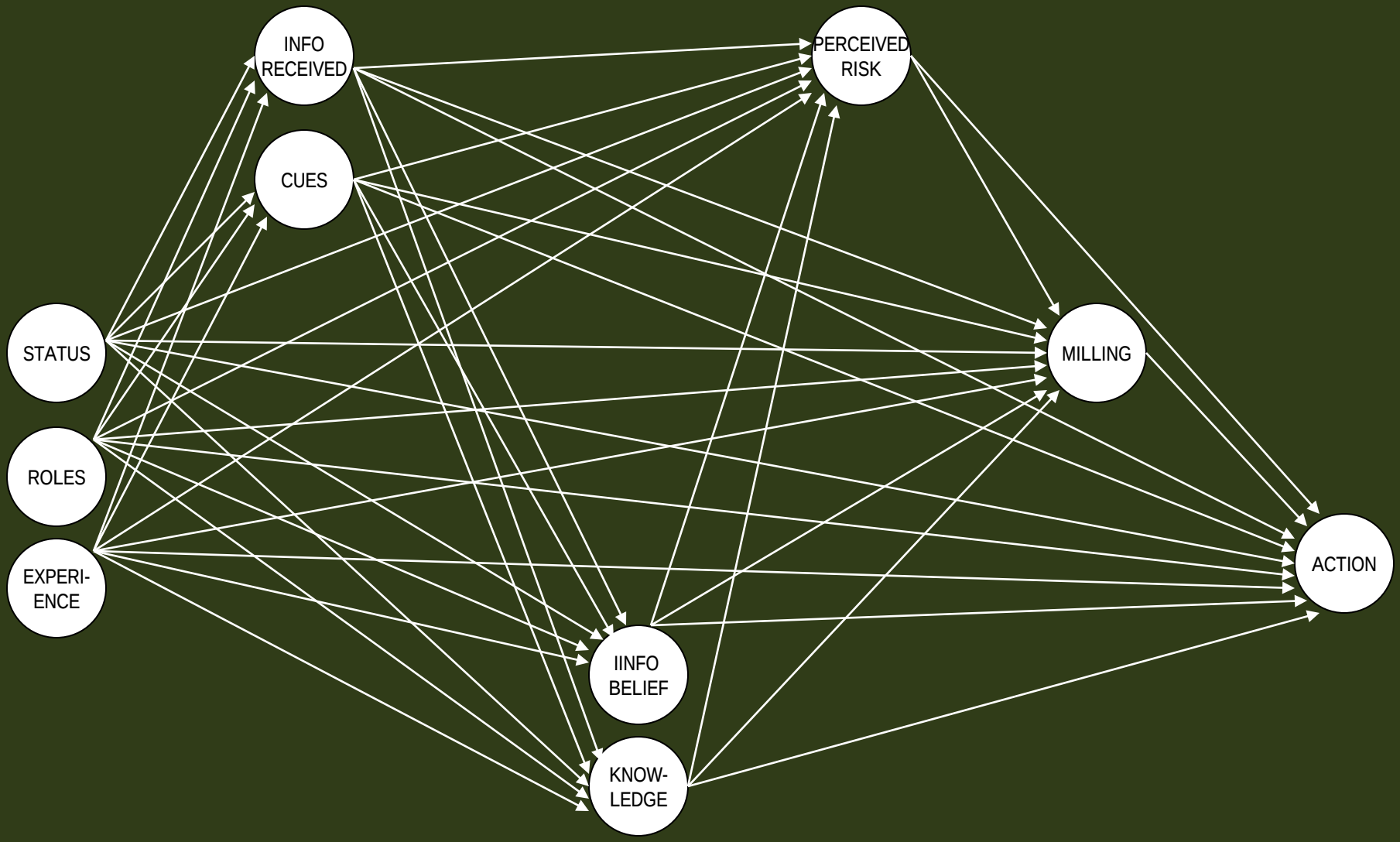
WARNING MESSAGES & PUBLIC RESPONSE

- **How the public responds to warnings and the factors that influence response:**
  - Studied by social scientists over the last half-century
  - 100's of publications exist
- **Much is known about how messages & other factors influence public response:**
  - Here's what 50+ years of research says…..

RESEARCH: 9 FACTOR TYPES RELATE TO PUBLIC RESPONSE



FACTORS MODELED



MODELS EXPRESSED AS EQUATIONS

- **Models are represented by equations:**
  - Called "simultaneous multiple regression equations"
- **Equations enable us to determine:**
  - Effect of every factor while controlling for the effects of everything else (good science)
- **The result is:**
  - Distinguish between what's really important & what isn't
- **When to get excited:**
  - When different studies reach the same conclusions
  - That's where we are with research on public response to warnings for hazardous events

EQUATIONS ESTIMATED MATHEMATICALLY

(WTC Evacuation on 9/11)*

$$X4 = \beta 41X1 + \beta 42X2 + \beta 43X3 + e4$$
$$X5 = \beta 51X1 + \beta 52X2 + \beta 53X3 + \beta 54X4 + e5$$
$$X6 = \beta 61X1 + \beta 62X2 + \beta 63X3 + \beta 64X4 + \beta 65X5 + e6$$
$$X7 = \beta 71X1 + \beta 72X2 + \beta 73X3 + \beta 74X4 + \beta 75X5 + \beta 76X6 + e7$$

*Averill, J. D., D.S. Mileti, R.D. Peacock, E.D. Kuligowski, N. Groner, G. Proulx, P.A. Reneke, and H.E. Nelson. 2005. Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Occupant Behavior, Egress, and Emergency Communications. *Report NCSTAR 1-7*, National Institute of Standards and Technology, Gaithersburg, MD. Available at:

http://wtc.nist.gov/NISTNCSTAR1-7.pdf

50 YEARS OF RESEARCH SYNTHESIZED IN 1 SLIDE

CONCLUSIONS FROM THE MATHEMATICS: What Matters Most

- **All factors aren't equal**
- **Some factors are REALLY important:**
  - **CONTENT**: what the message says:
    - Especially what actions to take
  - **REPETITION**: hearing same warning many times
  - **CUES**: seeing things that confirm the message
  - **MILLING**: confirming it with others
- **Other factors are LESS important, e.g.,**
  - Demographics (unless information is poor)

AN OBSERVATION FROM ACROSS ALL THE STUDIES

- **Message factors:**
  - Largest impact of all on public response
- **If "high quality" message factors:**
  - Influence of other factors decrease
  - Ability to manage public response can be high
  - Example: Nanticoke
- **If "low quality" message factors:**
  - Influence of other factors "increases"
  - Ability to manage public response can be lost
  - Example: Three Mile Island

SUMMARY OF AN "EVIDENCE BASED" WARNING

- **MESSAGE IS:**
  1. **CLEAR** (simply worded)
  2. **SPECIFIC** (precise and non-ambiguous)
  3. **ACCURATE** (no error)
  4. **CERTAIN** (authoritative and confident)
  5. **CONSISTENT** (within and between messages)
- **ABOUT:**
  6. **WHAT** (what to do)
  7. **WHEN** (when to do it)
  8. **WHERE** (who should & shouldn't do it)
  9. **WHY** (hazard & consequences)
  10. **WHO** (who's giving the message)
- **AND IS CONFIRMED:**
  11. **REPEATED** frequently
  12. over **MULTIPLE COMMUNICTION CHANNELS**

EVIDENCE BASED WARNING MESSAGE TEMPLATE

- **Message label**
- **Who's speaking**
- **Who message is for (location)**
- **What they should do by when (who shouldn't)**
- **Why they should do it (risk/consequences)**
- **Repeat:**
  - **Who message is for**
  - **What they should do by when**
- **End: message label & pending information**

SOCIAL MEDIA HOLDS PROMISE

- **Social media have potential to build on what's been learned in the social sciences:**
  - To push the critical public warning response buttons and help generate sound public warning response

- **Here are the critical "buttons":**
  - **CONTENT**: what the message says:
    - Especially what actions to take
  - **REPETITION**: hearing same warning many times
  - **CUES**: seeing things that confirm the message
  - **MILLING**: confirming it with others

BUTTON 1: MILLING

- PUBLIC ACTION-TAKING: Social media is milling, can facilitate it, and therefore reduce the time spent before taking protective actions if we can provide the key elements of milling

- SURVEILLANCE: How the public is responding and what they think can be easily assessed and used to repackage subsequent warning messages by official warning providers

BUTTON 2: REPITITION

- PUBLIC ACTION TAKING: Social media fosters repetitive messaging thereby enhancing public protective action taking if designed to exceed "tipping points" on repetitive message curves

- OFFICIAL WARNING PROVIDERS: Strategic placement of key warning information in social media to be repeated (repeat broadcasters are the most believed)

BUTTON 3: CUES

- PUBLIC ACTION TAKING: Social media can post appropriate cues (the things that motivate others) for people to see and foster the protective actions of others

- OFFCIAL WARNING PROVIDERS: Strategic placement of protective action-taking, the hazard & more to grow sound public response

BUTTON 4: CONTENT

- PUBLIC ACTION TAKING: Social media provides first hand information content and self-corrects

- OFFICIAL WARNING PROVIDERS: Social media can be used to effectively point people elsewhere to find complete warning messages (informed by the research record) & correct wrong message content

EXAMPLE RESEARCH IDEAS

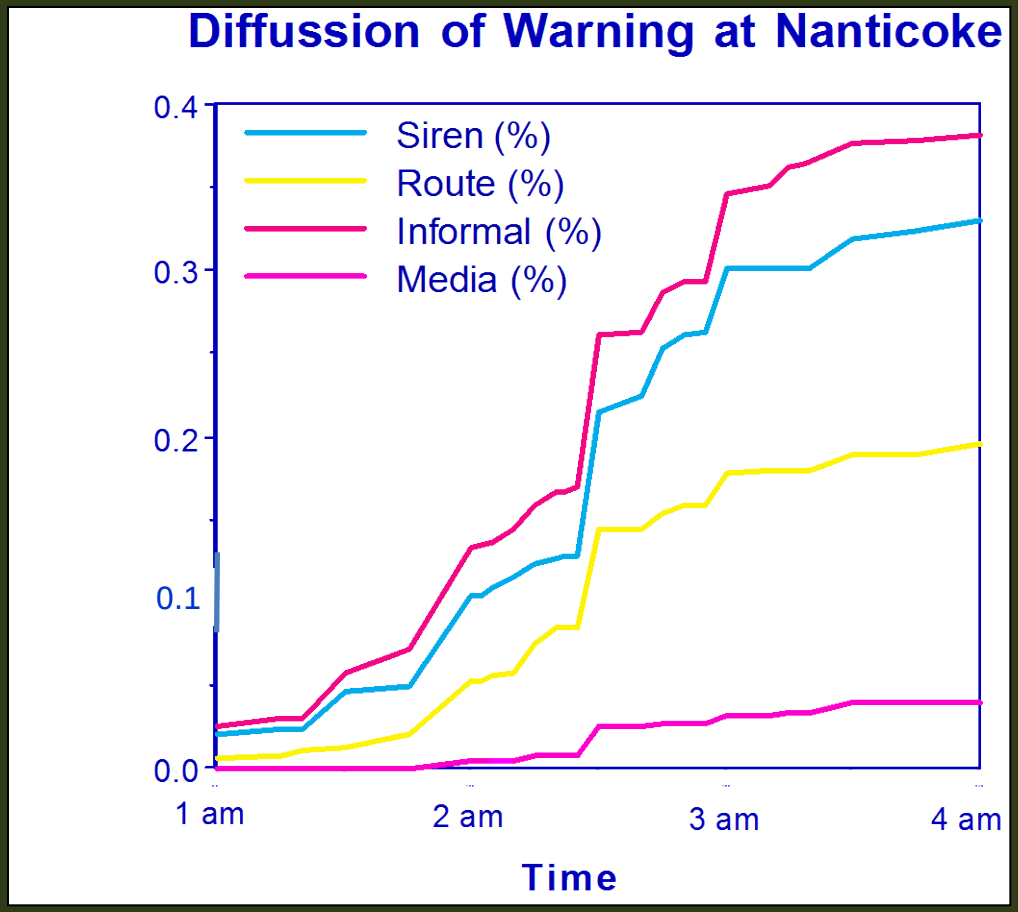
- **Milling:**
  - How does it occur across events: who, what & how
- **Repetition:**
  - How official warning providers can best influence public response via what they insert into social media
- **Cues:**
  - What approach to posting cues in social media works best to foster public protective action taking
- **Content:**
  - How social media can most effectively be used to put people in touch with complete warning messages

TOPIC 5: EXAMPLE PUBLIC RESPONSE PROCESSES AND SOCIAL MEDIA

DIFFUSION

- **Diffusion = getting the word out**
  - A social process regardless of technology used
- **No "SILVER BULLET" technology:**
  - Different technologies = different effectiveness
  - ***USE ALL OF THEM*** (relying on one won't work)
  - Reach sub-populations in different ways:
    - Using diverse technologies (channels) helps "confirm" the message which facilitates human response
  - Effectiveness impacted by time of day/night
  - Social media is not **THE** answer, it's **ANOTHER** answer among many

DIFFUSSION DATA EXAMPLE



MOBILIZATION

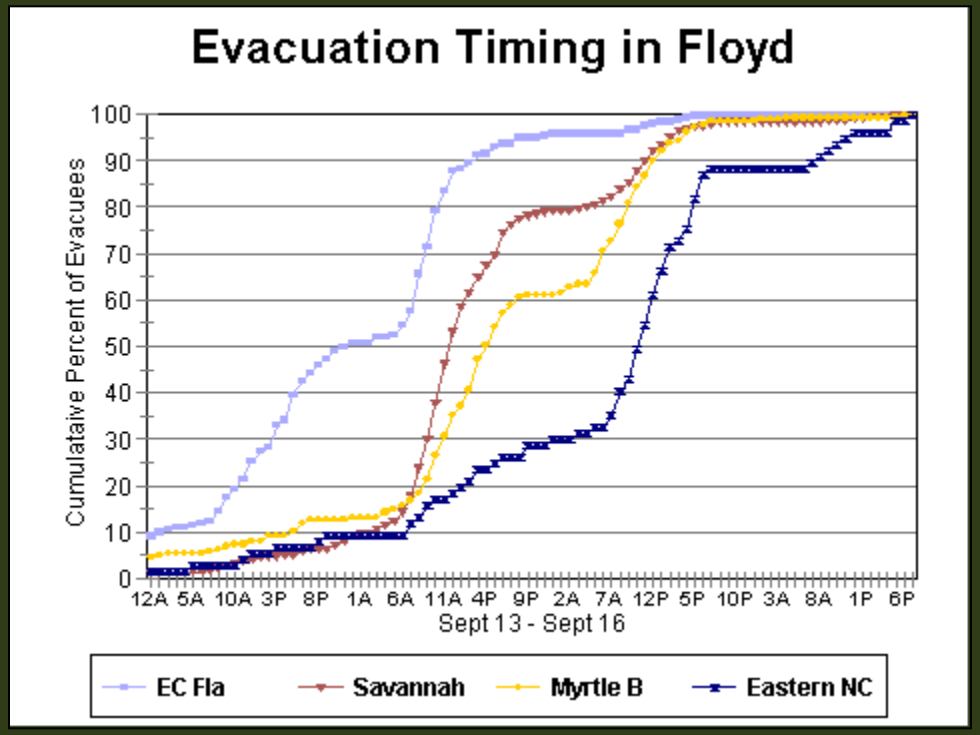
- **Time between first warning received & starting a protective action:**
  - People don't all act at once
  - Getting ready delays response
- **People delay to:**
  - Locate family & gather possessions
  - Confirm warning & need to take action
  - Talk it over with others
- **A very few people don't respond at all**

A VIEW OF MOBILIZATION

- **Can vary by:**
  - Urgency of event
  - Severity of threat
  - Time of day/night
  - Time increases as message quality decreases

- **Non-linear (curved) relationship between time & starting a protective action:**
  - Typically an "S" shaped relationship
  - Here's an example….

HURRICANE FLOYD DEPARTURE TIMES



COMPLIANCE

- **Will the public do what you recommend?**
- **Influenced by information during the event:**
  - **MESSAGE QUALITY & QUANTITY**
  - How public responds is more the result of the quality/quantity of messages they're provided during an event than anything else
- **Observed to be:**
  - **HIGH IN:** Haz-mat events, building fires, hurricane surge zones
  - **LOW IN:** Slow-term river floods
- **Inclined to be higher with increased:**
  - Severity of event & shortness of time to impact

EXAMPLE RESEARCH IDEAS

- **Diffusion:**
  - How social media can be used to shorten warning diffusion time
- **Mobilization:**
  - How social media can be used to reduce time to protective actions
- **Compliance:**
  - How social media influences protective action taking by those at risk and among those not at risk

SOCIAL MEDIA & WARNINGS

"The key questions are how we can use social media & social science knowledge to better integrate official warning systems & motivate more timely & effective public response."

QUESTIONS?

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