

Technology, Disasters, and Public Response: Understanding the Complexities of Risk Communication

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Using Information Technology to Enhance**

Disaster Management

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Objectives

- Explore the role of science, technology, and the media in the communication of risk, warnings, and disaster information
- Based on the Committee's charge, provide information focusing on how "information technology can enhance crisis preparedness, response, and consequence management of natural and manmade disasters."

Social Science disaster researchers agree that one of the most important factors that contributes to the development of a disaster is the breakdown in the communication process



Communicating Hazard/Disaster Information

On 9/11

- A respondent, in the DRC's study of the 9-11 WTC attack, describes the communication process between two key agencies that responded to this event:
 - “In my perception, there was little or no communication between them...It was almost like two separate organizations running the same incident from two separate angles*.”

*Trainer, J. 2004. “*Searching For A System: Multi-Organizational Coordination in the September 11th World Trade Center Search and Rescue Response*.” Preliminary Paper No. 343. Disaster Research Center, University of Delaware.

Communicating Hazard/Disaster Information

On 9/11

- The breakdown in the communication process was an important factor in exacerbating the effects of this disaster:
 - “The inability to communicate was a critical element at the World Trade Center, Pentagon and Somerset County, Pennsylvania, crash sites...The occurrence of this problem at three very different sites is strong evidence that compatible and adequate communications among public safety organizations at the local, state, and federal levels remain an important problem*.”

**The 9/11 National Commission Report (2004:397).*

Communicating Hazard/Disaster Information

On Hurricane Katrina

- “Both the message and the messengers were ineffective before and after Katrina. Messages to the public were uncoordinated and often confusing, leaving important questions unanswered. Federal, state, and local officials did not have a unified strategy for communicating with the public*.”

**Select Bipartisan Committee Report on Hurricane Katrina (2006:361)*

Communicating Hazard/Disaster Information

On Hurricane Katrina

- “The Federal response suffered from significant organization and coordination problems during this week of crisis. The lack of communications and situational awareness had a debilitating effect on the Federal response...The Federal government’s problems responding to Hurricane Katrina illustrate greater systemic weaknesses inherent in our current national preparedness system...Insufficient planning, training, and interagency coordination are not problems that began and ended with Hurricane Katrina*.”

*The Federal Response to Hurricane Katrina: Lessons Learned (2006:50)

Communicating Hazard/Disaster Information On Hurricane Katrina

“During Hurricane Katrina, the destruction of communications systems left hospital and nursing home administrators unable to receive basic information, such as when assistance would arrive*.”

*U.S. Government Accountability Office (GAO).
www.gao.gov/cgi-bin/getrpt?GAO-06-443R (2006:14)

*Also see: Rodriguez, H. and Aguirre, B.E. (Forthcoming, 2006). “The Impact of Hurricane Katrina on the Medical and Health Care Infrastructure: A Focus on Disaster Preparedness, Response, and Resiliency.” FRONTIERS of Health Services Management.

Communicating Hazard/Disaster Information: On Post-Katrina

- The First Response Coalition (2006) report indicates that:
 - Since 9-11, “when the first responder communication crisis was catapulted onto the national scene, the nation has been continuously reminded that first responders cannot reliably communicate with each other during an emergency.”
 - Eight states in the Gulf Coast do not have the necessary equipment and resources for communications interoperability for the 2006 hurricane season....many first responders along the Gulf Coast still have antiquated communications equipment”
 - “Most public safety agencies in the Gulf remain unable to effectively communicate with one another both during “routine” emergencies and major disasters*.”

Other issues in Communicating Hazard/Disaster Information

- In terms of communication and use of hazard/disaster information, emergency managers in Oklahoma (2003-05) reported several problems:
 - Radar coverage is inadequate
 - Updating of weather information is slow
 - Inadequate communication with the public and between and within agencies
 - Limited warning time
 - Lack of training and experience among personnel

On Technology and Communicating Hazard/Disaster Information to the End-Users

- Previously cited reports call for new and enhanced technology to facilitate and improve communication prior to, during, and after a disaster event...this is critical...but...
- Enhancing technology should not be seeing as a “panacea” that will automatically result in the amelioration of the devastating impacts and consequences of disasters.

On Technology and Communicating Hazard/Disaster Information to the End-Users

- Most communication interoperability issues are not technical.
- Better human organization, willingness to cooperate, and the willingness of government to listen to those at local levels...are critical factors in making better use of information technology for disaster management*.

*National Research Council's report on *Information Technology to Enhance Disaster Management* (2005:2)

Communicating Hazard/Disaster Information to the End-Users

- In order to communicate effectively, we must know who our “communities” are:
- “The perceptions of risk of a 20-year-old atheist Angelo shopkeeper are most likely quite different from those of a 30-year-old devout Catholic Latino social worker, a 40-year-old Indian Hindu computer programmer, a 50-year-old Chinese Buddhist homeowner, or a 60-year-old Muslim grandfather, recently relocated from Lebanon to live with his beloved family*.”

*Frew, S. (May, 2004). Natural Hazards Observer, Vol. XXVIII, Number, 5:10-11.

Communicating Hazard/Disaster Information to the End-Users

- Information must reach the end-users or the population at risk in a comprehensible and useful form.
- It must be perceived by them as relevant to their situation (i.e., individuals need to be made aware and recognize their hazard risk and potential outcomes).
- End-users must have the capacity and the necessary resources to use this information to better prepare, respond to, and recover from a hazard/disaster situation.*

Rodríguez, H., Diaz, W. Santos, J., and Aguirre, B. (Forthcoming, 2006). "Communicating Risk and Uncertainty: Science, Technology, and Disasters at the Crossroads." In Rodríguez, H., Quarantelli, E.L., and Dynes, R. (Eds.). **Handbook of Disaster Research**. New York: Springer.

Other Factors that Impact the Communication Process and Community Response

- Do people perceive a serious threat to themselves, their families or property?
- Can protective action significantly reduce the negative consequences of the hazard event?
- Will the officially recommended action be superior to alternative actions taken by kin, neighbors, or advanced by conventional wisdom*?

*Rodríguez et al., Forthcoming, 2006.

Other Factors that Impact the Communication Process and Community Response

- Response to disaster events is also impacted by social class, education, gender, race, ethnicity, cultural background, and previous experiences with other hazard events (Rodríguez et al., forthcoming, 2006).
- These factors significantly influence the reception of the message as well as individual response (or lack thereof) to the same.

Other Factors that Impact the Communication Process and Community Response*

- The warning message:
 - Source (who is providing the message?)
 - Credibility and trust of sources that provides the information
 - Type of message
 - Perceived accuracy and reliability
 - Clarity, consistency, and frequency of messages
 - Frequency of the hazard and communities' previous experiences with hazard events
 - Communities' socio-economic and demographic characteristics

*See Rodriguez, et al. 2006; Blanchard-Boehm, 1997; Mileti and Fitzpatrick, 1992; Mileti and Sorenson, 1990.

The Risk Communication Model

- Hearing
- Confirming
- Understanding
- Believing
- Personalizing
- Responding*

*See Blanchard-Boehm, 1997; Mileti and Fitzpatrick, 1992; Mileti and Sorenson, 1990.

“But [for] a tornado warning you probably get about 30% [of individuals] that if they see it coming their way, I mean at their house, they may do something. The other 70% will probably go outside and look at it” (Emergency Manager in Oklahoma, 2004).

Technological Innovations: Multiple Sources for the Dissemination of Information

- Earth observation systems
- Geographic information systems (GIS)
- Global positioning systems (GPS)
- Remote sensing
- Internet and internet wireless connections
- E-mail
- Cellular phones
- Text messaging
- PDA's
- Telephone and fax machines
- Radios, TV, Newspapers, etc.

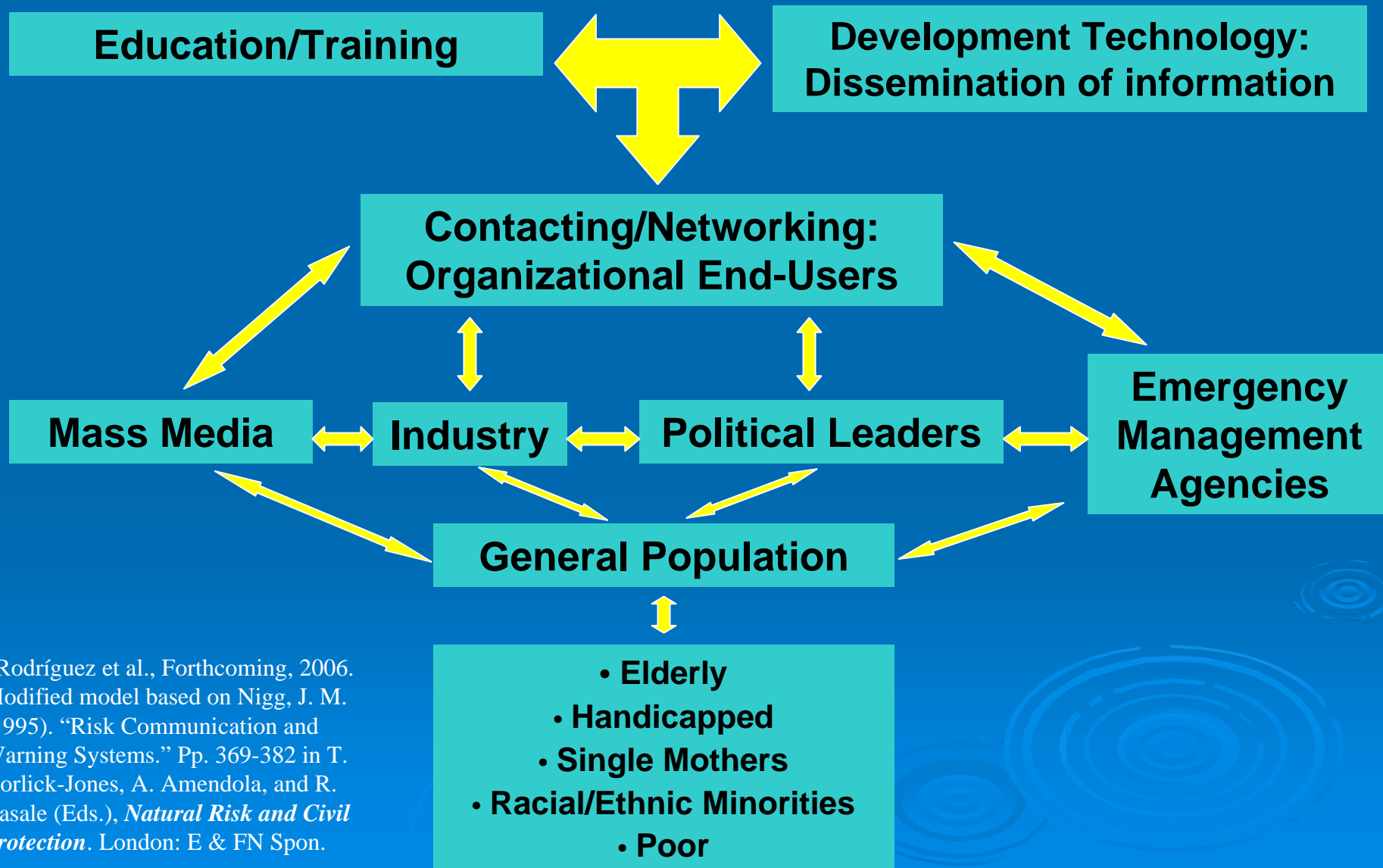
Multiple Sources for the Dissemination of Information: Some Concerns

- Although technological innovations have transformed the way we communicate, some concerns remain:
 - Access to multiple sources of information can create confusion and uncertainty, particularly given inconsistent, contradictory, and inaccurate information
 - Technological failures or malfunctions
 - System interdependency and cascading events increase vulnerability
 - May increase the “digital divide” and accentuate existing inequalities, particularly among minorities, the elderly, and other poor segments of the population

An Integrated communication model

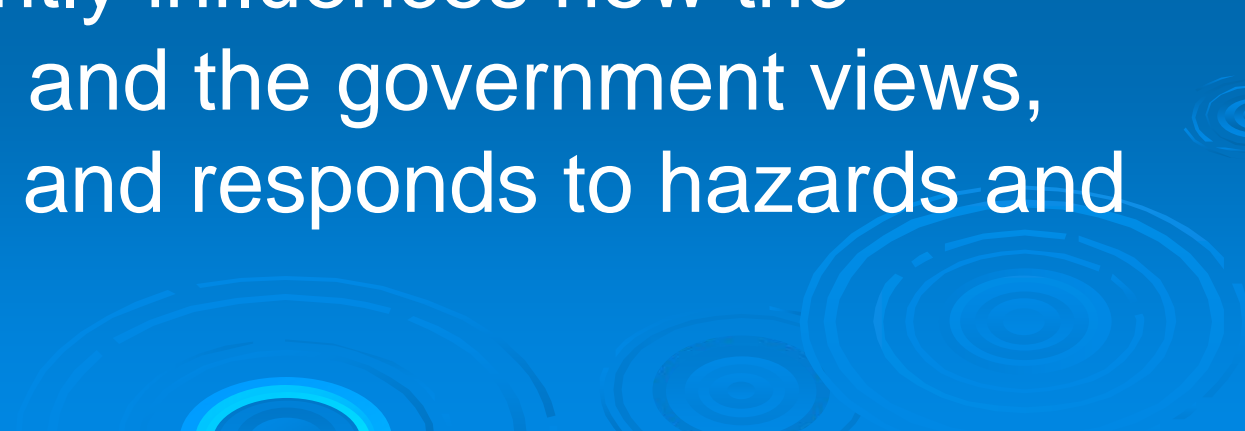
- To communicate risk to the public in an efficient manner and to enhance disaster preparedness and response, we need to develop an integrated warning or communication model, which must take into account:
 - development of technology
 - dissemination of scientific knowledge
 - characteristics, needs, and interests of end-users

A Model for Communicating Hazard Risk and Warnings*



*Rodríguez et al., Forthcoming, 2006. Modified model based on Nigg, J. M. (1995). "Risk Communication and Warning Systems." Pp. 369-382 in T. Horlick-Jones, A. Amendola, and R. Casale (Eds.), *Natural Risk and Civil Protection*. London: E & FN Spon.

The Role of the Media in the Communication Process

- The media is perhaps the most important or the primary source of disaster information.
 - It significantly influences how the population and the government views, perceives, and responds to hazards and disasters.
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- A decorative graphic consisting of several concentric circles in shades of blue, resembling ripples in water, located in the bottom right corner of the slide.

The Role of the Media in the Communication Process

- One of the primary functions (implicitly) of the media has been to define disasters*.
- Disaster research has often portrayed the media as conveying inaccurate (e.g., panic & looting behavior), biased, and exaggerated information, focusing on human loss and physical destruction.
- Nevertheless, the media has and can continue to play an important and positive role in providing up-to-date, accurate, and reliable information to the general public.

*See: Dynes, R. and Rodriguez, H. (2005). "Finding and Framing Katrina: The Social Construction of Disaster." In *Understanding Katrina: Perspectives from the Social Sciences*. Social Science Research Council, http://understandingkatrina.ssrc.org/Dynes_Rodriguez/.

Concluding Remarks

- Risk and disasters are socially constructed phenomenon, influenced by cultural norms, prejudices, and values.
- The communication of risk and crisis information must take into account the societal context in which the event occurs.
- Continued emphasis on the development of technology, while ignoring the social forces that shape disaster behavior and response is not the solution to the problem.


Concluding Remarks:

What needs to be done?

- Develop an integrated/holistic model to communicate risk and warnings, which takes into account:
 - developing an interdisciplinary approach
 - the role of new and emerging technology
 - the role of the media
 - and changing socio-economic and demographic characteristics of the population

Concluding Remarks:

What needs to be done?

- We must actively engage and respond to the needs and interests of end-users, if we are to be effective in:
 - Identifying their risks
 - Disaster planning and management
 - Development of technology
 - Communication process
- 
- The background of the slide features several faint, concentric circles in a lighter shade of blue, resembling ripples in water, located in the bottom right quadrant.

Concluding Remarks:

What needs to be done?

- Other initiatives that must be implemented include:
 - Adequate mitigation, planning, and response
 - Access to adequate resources
 - Networking among and between response types of organizations
 - Effective communication and coordination among and between organizations and the general public

Concluding Remarks: What needs to be done?

- Other initiatives that must be implemented include:
 - Training and education of responders, organizational and official representatives, and the general public
 - Emphasis should be placed on developing disaster resilient communities
 - Communities should be actively engaged in the decision-making process

For Additional Information

- Visit the DRC facilities at:

- 87 E. Main Street, Newark, DE
- (302) 831-6618

- Visit the DRC webpage:

- www.udel.edu/DRC/