How We Deal with Risk in American Society
A Conceptual Framework

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Presentation at Policy Forum on

Building America's Resilience to Hazards

U.S Chamber of Commerce

Washington, DC

December 19, 2005

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Nature of the Problem

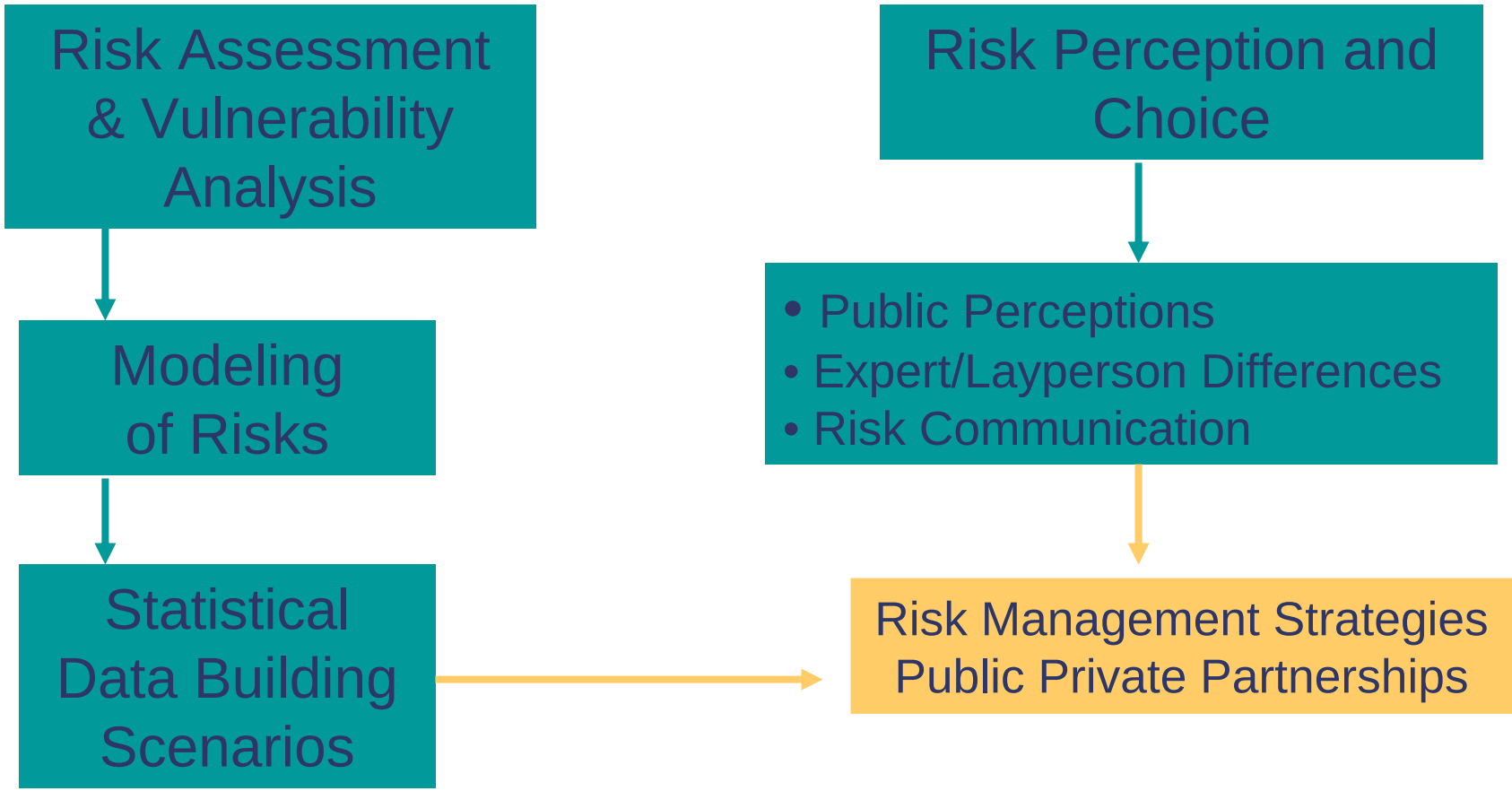
Natural hazards and other extreme events receive little attention until after a catastrophic event

Attention is likely to be short-lived unless concrete steps can be taken to develop long-term plans

Hurricane Katrina provides an opportunity to develop strategies for reducing hazard risks and better managing them in the future

Conceptual framework is relevant for other low probability high consequence events

Nature of the Framework



Nature of the Framework

Risk Assessment & Vulnerability Analysis

- Vulnerability Analysis
  - Characterize forms of physical, social, political, economic, cultural, and psychological harms to which individuals and modern societies are susceptible
  - Millions of dollars have already been spent to reduce our vulnerability
- Constructing Scenarios
  - What are the probabilities of specific events?
  - What are the potential consequences?

Risk Assessment and Vulnerability Analysis Basic Concepts

Estimating chances of specific events occurring and their potential consequences

Indicating what we know and don't know about the hazard

Degree of uncertainty surrounding the hazard

Hazard assessment for potential victims and threatened environment

- Low income and minority groups
- Property owners and renters
- Wildland/urban interface

Risk Assessment Questions to Ponder

- What are the chances that New Orleans will have a Category 3 or higher hurricane in the next 10 years and what will be the resulting damage and indirect losses?
- What is the likelihood of a severe nuclear power accident somewhere in the United States and what would be the resulting impacts?
- What are the chances that an airplane will crash into the Sears tower in the next year and how serious would the consequences be?
- What are the chances that there will be a smallpox epidemic in the United States in the next five years and how many people would be affected?

Risk Assessment and Vulnerability Analysis Open Issues and Questions

How accurately can experts estimate the likelihood and consequences of disasters of hurricanes of different magnitudes and intensities?

Can one characterize the types of uncertainties that currently exist in assessing risk and suggest ways to improve these estimates in the future?

What are the expected costs and benefits of undertaking specific risk-reducing measures in hurricane-prone areas and can one rank them on the basis of cost effectiveness?

What are the interdependencies in the system (e.g. infrastructure damage affecting supply of electricity, water, telephone/telecommunications, and other services to residences and businesses)?

How do these interdependencies affect the direct and indirect losses that would result from a future natural disaster?

Risk Perception and Choice

Basic Concepts

Risk perception is concerned with psychological and emotional factors that impact on behavior

Hazards where individuals have little knowledge and experience are highly dreaded and perceived as being very risky

Individuals exhibit systematic biases in processing information and making choices

- Estimating likelihood of event is influenced by salience
- “It cannot happen to me” bias before a disaster
- “It will happen to me” bias after a disaster
- Framing of information may influence choice

Individuals have difficulties learning due to biases and information processing limitations

Explain this behavior:

- I bought my first set of battery cables only after my car wouldn't start and I had to be towed. The towing charge was twice as much as the cost of the battery cables.

- Most homeowners in California purchase earthquake insurance only after they experienced a quake. When asked whether the probability of a future event was more likely than before the disaster most people responded "Less likely".

- Until seat belt laws were instituted in the United States, most drivers refused to wear them. When asked why they did not a typical response was "I won't have an accident". This response is consistent with the well-document finding that 90% percent of all drivers feel they are better than the average driver.

Risk Perception and Choice

Open Issues and Questions

- What role do perceived likelihoods and resulting consequences play in how people view a particular risk that they may face, such as a severe hurricane?
- How important are emotional factors such as fear, dread and anxiety in how people perceive these risks and learn over time?
- What role do social networks and social norms play in influencing risk perception, choice and learning with respect to low probability events?
- How can one best communicate information to those at risk from natural disasters so they are aware of what actions they can take prior to and after a disaster?
- What is the role of past experience and the media in influencing risk perception and choice?

Risk Management: Public- Private Partnerships Basic Concepts

Policy options for reducing losses and aiding recovery process

- Economic incentives
- Insurance
- Well enforced regulations and standards (e.g. building codes)
- Disaster assistance

Relevant roles of public and private sectors in implementing hazard management strategy

Criteria for evaluating alternative strategies

- Efficiency---allocating resources to maximize social welfare
- Equity---concern with fairness and distribution of resources

Risk Management: Public- Private Partnerships Open Issues and Questions

- What type of economic incentives would encourage property owners to mitigate the risks of a disaster and purchase insurance prior to a disaster?
- How does the prospect of federal aid to victims of a disaster affect protective decisions by individuals prior to a disaster?
- What are the appropriate roles of standards and regulations in reducing losses from large scale disasters and the impact of the event following the disaster?
- What types of financial backstops should be provided by the public sector at the state and federal levels for dealing with catastrophic losses following future disasters?
- How can one link different policy tools such as information provision, economic incentives, insurance, third party inspections, regulations and standards to achieve the desired objectives of a hazard management strategy?

Linking Risk Assessment & Vulnerability, Risk Perception & Risk Management

Interdependent Security Concepts

Risk faced by one person/firm depends on both its own protective investments as well as on the actions of others

Person or firm can suffer direct and indirect losses

Indirect losses may be conditioned on the direct loss not occurring

Key Questions

What are examples of interdependent security problems and why do individuals or firms have limited incentives to invest in risk-reducing measures?

What risk management strategies should be employed for dealing with economic consequences due to these interdependencies?

Examples of Interdependent Security Problems

Investing in airline security

Vaccination against infectious diseases

Mitigation against damage from fires and natural disasters

Transboundary risks (e.g. climate change)

Protecting a utility against power failures

Securing computer systems against attacks.

Product contamination via multiple suppliers

Avoiding divisional gambles that could bankrupt entire firm

- Baring's Bank (Singapore branch)
- Arthur Andersen (Houston office)

Risk Management Strategies for Dealing with Interdependent Security Problems

Collecting better information on risk and costs

Designing incentive systems (e.g. loans, subsidies or taxes)

Role of coordinating mechanisms

Require that all buyers of apartment units invest in fire prevention measures (e.g. smoke alarms) as a condition for purchase

Social norms—desire to invest in protection because it is the right thing to do. It may also increase property values.

Carefully designed standards (e.g. building codes for high-rises to withstand future disasters) that are well-enforced using third-party inspections.

Developing insurance programs for encouraging investment in protective measures when firms are faced with contamination.

Summary and Conclusions

Need to link risk assessment and vulnerability analysis with risk perception and risk management

Need creative private-public partnerships for improving firm and industry performance as well as social welfare

Future research requires more realistic characterization of behavior (i.e. field studies and controlled experiments), multi-period models, and close interaction with industry and government

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